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Yours very truly,
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Founder of THE ENGINEERING INDEX
and Editor of Volumes I. and II.

# THE

# ENGINEERING INDEX

FIVE YEARS 1896-1900

EDITED BY

**HENRY HARRISON SUPLEE, B.Sc.**

Mechanical Editor of The Engineering Magazine,
Member American Society Mechanical Engineers,
Member of the Franklin Institute,
Membre de la Société des Ingénieurs Civils de France,
Mitglied des Vereines Deutscher Ingenieure.

ASSISTED BY

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1901

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# PREFACE.

NEXT to knowing a thing comes the faculty of knowing where to look for it; and, indeed, it is a question as to which form of knowledge should take precedence.

The capacity of the human memory is closely limited, even in the most highly developed instances, and with the vast and continually increasing stream of knowledge and record of experience in books, and in the flood of periodical literature, the most highly trained memories have long ago recognized the severity of this limitation.

To know where to look for information about a desired subject is, then, the aim of practical study of current literature; and this is the one thing which a man need not do for himself, but which he can have others do for him, while devoting his own time to the use of the information.

Books of reference, with the exception of those dealing with the fundamental principles of knowledge, must always be behind the times. They can never possibly overtake their source, because the material from which they are made must become current practice before it can find its place in book form; and the progressive engineer has long ago learned that current information, obtained from current technical publications, is the material which he must use to reinforce his own experience.

Science was long ago defined as "knowledge reduced to a system," but a more modern definition might well be "knowledge reduced to an index." Such an index for the science of engineering was originated in 1884, by Professor J. B. Johnson, then Professor of Civil Engineering in Washington University, St. Louis, now Dean of the College of Mechanics and Engineering of the University of Wisconsin, Madison, Wis. This Index was published in the *Journal of the Association of Engineering Societies* from 1884 to 1895, but in the latter year the work was relinquished in favor of the ENGINEERING INDEX of the ENGINEERING MAGAZINE, the Board of Managers of the Association of Engineering Societies stating it to be "no longer necessary for them to maintain this department."

Since that time the work has been continued by the ENGINEERING MAGAZINE, continually increasing in scope and completeness, until at the present time it consists of a fully classified monthly index of the contents of nearly 200 technical journals, of the United States, Great Britain and her Colonies, Germany, France, Belgium, Switzerland, Holland, Austria-Hungary, Italy and Spain.

The present volume, containing the complete ENGINEERING INDEX, re-edited from the ENGINEERING MAGAZINE for the years 1896-1900, inclusive, is the third which has been issued, the previous volumes covering respectively the years 1884-1891, and 1892-1895, these having been edited by Professor Johnson, and published by the *Association of Engineering Societies* and by the ENGINEERING MAGAZINE respectively. To compare the extent to which the work has been expanded in the present volume over that of the earlier ones, it will suffice to state that Vol. II. contains about 6,000 entries taken from 62 journals, while the present volume contains nearly 40,000 entries taken from nearly 200 sources, there being more than four times as many entries per year in this index than in the previous volumes.

The work of the present editor has been that of examining and arranging all of the original entries, together with the reading and indexing of the technical journals other than those in the English language; all of the entries from the Continental journals having been written by him. The reading of the American and British journals has been performed under his personal direction, as has also been the re-arrangement of the items for the entire volume.

In this latter work much credit is cheerfully given to Mr. J. H. Cuntz, while the services of Mr. Charles T. Child, Mr. S. Norris Craven, Mr. C. H. Hunsdorfer, and Miss Louise Kingsley are also to be acknowledged, the latter having been especially helpful.

HENRY HARRISON SUPLEE.

NEW YORK, October, 1901.

# A SHORT ACCOUNT OF THE ORIGIN OF THE ENGINEERING INDEX

## AS PUBLISHED BY THE

## Journal of the Association of Engineering Societies.

When I was elected Professor of Civil Engineering in Washington University, in the summer of 1883, I felt my greatest lack lay in my ignorance of engineering literature. I at once began to reinforce myself in these directions by going to the libraries and indexing the chief sources of such literature, which then consisted of the Engineering News, Van Nostrand's Engineering Magazine, the Journal of the Franklin Institute, the Transactions of the American Engineering Societies of Civil, Mechanical, and Mining Engineers, the English journals "Engineering" and "The Engineer," and the Proceedings of the Institution of Civil Engineers. I began systematically to index the important articles in the various sources of engineering information in a book which I called an *Index Rerum.* At this time I was a member of the Board of Managers of the Association of Engineering Societies, representing the Engineers' Club of St. Louis. In the fall of 1883 this Board held a meeting in New York City in the office of Col. H. G. Prout, then a member of the firm of Atkin & Prout, now editor of the Railroad Gazette. At this meeting I described the work that I was doing for myself and offered to do it, somewhat more elaborately and free of charge, for the Journal of the Association, if the Board would agree to publish it. This the Board consented to do, and the index was begun in the number of that Journal for January, 1884. All the exchanges of the Journal were sent to me at my office at Washington University, and I negotiated many additional ones for the purpose of indexing their contents. Such foreign journals as could not be obtained by exchange I indexed at the public library. At the end of the first year I secured an annual allotment of $175 per year for this work, which sum I thereafter paid to my assistant, who was usually an instructor under me in Washington University. These assistants thereafter largely aided me in the preparation of these notes, their names being as follows: C. V. Mersereau (C. E., Cornell), M. Am. Soc. C. E.; C. W. Melcher (M. E., Washington University), M. Am. Soc. M. E.; O. E. Hovey (C. E., Thayer), Instructor in Civil Eng., Washington University; F. E. Turneaure (C. E., Cornell), Instructor in Civ. Eng., Washington University; C. W. Stewart (C. E., Cornell), and J. L. Van Ornum (C. E., University of Wisconsin), Instructor in Civ. Eng. in Washington University, now Prof. Civ. Eng. in that University.

It will thus be seen that all the indexing was done by professional engineers of more or less practical experience. No merely clerical work was ever allowed on this indexing during the twelve years I had it in my charge, namely from 1884 to 1895, inclusive.

The theory of this index from the start has been:

(1) To index only articles of permanent value.

(2) To give such a short and concise, but adequate description of the article as would enable one seeking information on the given subject to determine whether or not it would be worth his while to obtain or consult the article.

The index immediately found many friends who appreciated it most highly, and two gentlemen in particular lent me great assistance for the first two years; these were Professor George F. Swain, of Mass. Inst. of Tech., and Mr. Clemens Herschel, both members of the American Society of Civil Engineers. Both of these gentlemen sent me many important notes, especially from the French and German.

When the ENGINEERING MAGAZINE finally came to develop its index notes so as to make them descriptive, the Board of Managers of the *Journal* of the Association, of which I was then chairman, consented to abandon its publication and so gave the field entirely over to the ENGINEERING MAGAZINE. Personally, of course, I was only too glad to be relieved of the burden, but I am free to say that the work has been far better performed by the ENGINEERING MAGAZINE, both in scope and in thoroughness, than I was ever able to do. I believe, however, I was the author of this style of indexing, in so far as it required a perusal of the article and an estimate of its value named in the descriptive note.

J. B. JOHNSON.

# TO THE USER.

In order that the Engineering Index may be used conveniently and satisfactorily, it is desirable that the user should know something of the principles which have been followed in its preparation.

In the first place the Index is arranged alphabetically. This means that it is arranged according to the initial letters of certain "catch-words" which have been selected as indicating most nearly the true subjects of the articles indexed.

The choice of the proper catch-words has been by no means easy. Titles of articles frequently fail to indicate the principal subject treated, and hence it has often been necessary to choose some word which shall lead the searcher more clearly and directly to the matter sought. In this, as in all matters of arrangement, the controlling principle has been to assume the position of the searcher, and to inquire where he would be most apt to look for the desired information.

The users of such a work as the Index may be divided into two classes:

1. Those who are looking for a definite item or article, and who have a fairly clear idea of its subject and scope; and,

2. Those who are investigating a certain subject, and desire to be informed upon all the articles pertaining to that subject.

While it has been the aim to provide for the demands of both classes, the first class, consisting of searchers after definite articles, has been considered as the more important, but at the same time it has been found practicable to provide very fully for the second class. Both classes of searchers should, therefore, consider the word which most readily occurs in connection with the subject, and look for that word under its alphabetical position.

In so doing, the alphabetical order indicated by the catch-words at the tops of the successive pages should be followed, these words giving the first and last titles on the corresponding pages. The general location of the assumed catch-word having thus been found, the page should be examined, and *not before.*

The importance of this injunction will be seen when it is observed that, in the great majority of cases, there are numerous articles indexed under a single general catch-word, and that these articles are arranged alphabetically under sub-catch-words upon the pages. For example, on page 90 will be found the title **BRIDGE**, following which are fifteen pages of entries relating to bridges. These entries are arranged sub-alphabetically under **BRIDGE**, this main catch-word appearing at the top of every page, the sub-titles, in **bold-face** type, beginning with **Aesthetics**, and ending with **Zürich**, being arranged in alphabetical order beneath, there being more than 500 entries in all under the main catch-word **BRIDGE**.

In many instances, however, there are but few entries under a single main catch-word, but in all cases the main catch-word is printed in capitals, and the sub-catch-words in bold-face upper and lower case letters. Where, as is often the case, several articles appear under the same sub-catch-word, these are arranged alphabetically according to their titles except where it has been found desirable to bring very nearly related articles close together. In every instance the full and exact title of the article finally appears in the actual entry, the catch-word and sub-catch-word having been used simply as guide posts to direct the seeker to his destination. In the case of articles in languages other than English there appears first a free translation of the title of the article, followed by the exact title in the original language, this enabling the text to be more readily found in its original place of publication.

It is in many cases impossible to select catch-words which shall lead all searchers immediately to the desired articles, and hence there has been an abundant use of cross-references, and since many articles are very broad in their treatment, and might readily be indexed under several catch-words, more than one examination may sometimes be necessary before the final entry is found. In all such cases, however, the cross-references will be found at every probable place, so that every possible assistance is given.

The arrangement of the cross-references is as follows:

The general cross-references under a principal title are placed immediately after the main catch-words. The cross-references under sub-titles are placed at the end of the sub-group. When a cross-reference is given in upper and lower case letters only, it will be found under the same main heading; when it is in capitals it will, of course, be under the main title indicated. When the cross-reference consists of a word in capitals followed by one in upper and lower case letters, the latter indicates the sub-group under the given main reference.

Thus under **BRIDGE**, on page 90, will be found the general references **ARCH**; **CULVERT**; **VIADUCT**, under which some of the articles relating to bridges will be found. Then at the end of the group under the sub-catch-word **Paris**, on page 100, are the words: See also **Alexander III.**; **Mirabeau**; **Tolbiac**, meaning that other articles on Paris bridges will be found under those sub-catch-words, all these being under the main catch-word **BRIDGE**. These references are followed by: **BRIDGE ERECTION—Launching**, turning to which, on page 108, we find other articles on a Paris bridge.

Thus it will be seen that in every case the searcher will find at once either the entry he is looking for, or else a cross-reference directing him to the place where it will be found.

Suppose now, for instance, that it is desired to find references relating to the Diesel motor. The searcher may turn at once to D, and on page 236 he will find: **DIESEL MOTOR**; see **OIL ENGINE**; **THERMODYNAMICS—Heat Motor Cycles**. Turning, as directed, to **OIL ENGINE**, this main catch-word is found on the running head of page 671, and under this, under the sub-catch-word Diesel, will be found more than thirty different references to as many different articles upon the subject, including the original paper of Diesel, as well as others in English, French, and German.

Turning now to the second reference: **THERMODYNAMICS—Heat Motor Cycles**, we find under this heading a reference to a paper by Professor Meyer entitled "A Discussion of Heat Motor Cycles" in which the use of the Carnot cycle in the Diesel motor is discussed. Since this article is of general interest to the student of thermodynamics it is placed under that heading, the cross-reference directing the searcher for information about the Diesel motor to its place.

If, instead of originally looking under **DIESEL MOTOR**, the searcher looks under **MOTOR**, he will find, on page 655, under **MOTOR**: **Diesel**—See **OIL ENGINE—Diesel Motor**; and thus will be guided at once to the proper place.

A few general comments may be added.

In the arrangement of the entries under the sub-headings, the logical order has been followed when it conflicted with the alphabetical position by titles, to the extent of placing papers upon identical subjects together, as well as translations and originals, original papers and discussions, etc. In no case, however, does this place entries more than a few lines away from their alphabetical position, and no confusion can arise from this cause. Catch-words have been given in the singular in all cases, so as to have compound titles follow simple titles in alphabetical order. Except in very few instances "Electric" has been used instead of "Electrical," as a qualifying adjective; also "Electric Tramway" has been used for city and suburban roads, and "Electric Railway" for main and important interurban lines. **GAS** means illuminating gas in general, while **GASES** is used in the physical sense, in contradistinction to liquids and solids. **FUEL GAS** and **WATER GAS** have their distinctive positions. **SPACE TELEGRAPHY** has been used instead of wireless telegraphy, following the position of Professor Lodge, and **STRAY CURRENTS** has been used instead of electrolysis to indicate the action of electric currents from electric railways upon gas and water pipes.

Serial articles are indexed upon the appearance of the first instalment only, this giving the searcher the clue by which the succeeding articles can be found. This rule has been waived in some instances of articles in two or three instalments, which are indexed entire.

Since the Index was closed on January 1, 1901, it necessarily omits articles which, although appearing in journals dated at the close of 1900, were not available for indexing until a later date. In this it necessarily follows the precedent of the two previous volumes. It makes up for this, however, by containing those articles at the close of 1895 which had to be omitted from the previous volume, and this practice will have to be followed by succeeding volumes.

When the great number of subjects dealt with is considered, as well as the fact that many important articles include several subjects, it will be realized that the classification has in many instances necessarily been a compromise between conflicting conditions; but it is believed that the system, as a whole, will serve the great purpose which has always been kept in view, that of guiding the searcher to his destination with a minimum of labor or uncertainty.

# REFERENCE LIST OF PERIODICALS

## TITLES AND ABBREVIATIONS.

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In nearly every instance the abbreviated titles of periodicals indexed will be intelligible without further explanation, but in the following list all the titles are given, together with the addresses, in order that no possible difficulty may appear in the placing of references. The titles are arranged alphabetically in the order of the abbreviations, each being followed by the full title and place of publication. Only the more important papers in the transactions of Engineering Societies are indexed, as the various institutions publish periodical indexes to their complete transactions. It is to be noted that *w*=weekly; *m*=monthly; *s.m*=semi-monthly; *b.m*=bi-monthly; *qr*=quarterly; *yr*=yearly.

**Age of St**—Age of Steel. *w.* St. Louis, Missouri.
**Am Arch**—American Architect. *w.* Boston, Mass.
**Amer Assn of Ry Supts of Bridges and Buildings**—American Association of Railway Superintendents of Bridges and Buildings. New York.
**Am Chem Jour**—American Chemical Journal. *b.m.* Baltimore.
**Am Elect'n**—American Electrician. *m.* New York.
**Am Engr & R R Jour**—American Engineer and Railroad Journal. *m.* New York.
**Am Gas Lgt Jour**—American Gas Light Journal. *w.* New York.
**Am Geol**—American Geologist. *m.* Minneapolis, Minn.
**Am Jour of Soc**—American Journal of Sociology. *b.m.* Chicago.
**Am Jour Sci**—American Journal of Science. *m.* New Haven, Conn.
**Am Mach**—American Machinist. *w.* New York.
**Am Mag of Civ**—American Magazine of Civics. New York.
**Am Mas Mec Assn**—American Railway Master Mechanics Association, Chicago.
**Am Mfr**—American Manufacturer and Iron World. *w.* Pittsburg, Pa.
**Am Miller**—American Miller. *m.* Chicago.
**Am Rev of Revs**—American Review of Reviews. *m.* New York.
**Am Shipbuilder**—American Shipbuilder. *w.* New York.
**Am Soc Civ Eng**—American Society of Civil Engineers. New York.
**Am Soc Ir Engs**—American Society of Irrigation Engineers. *qr.* Denver, Colorado.
**Annals of Am Acad of Pol and Soc Sci**—Annals of the American Academy of Political and Social Science. *b.m.* Philadelphia, Pa.
**Ann della Societa d Ing e d Arch Ital**—Annali della Società degli Ingegneri e degli Architetti Italiana. *b.m.* Rome.
**Ann d Ponts et Chauss**—Annales des Ponts et Chaussées. *m.* Paris.
**Archaeologist**—The Archaeologist. *m.* Columbus, Ohio.
**Arch Rec**—Architectural Record. *q.* New York.
**Arch Rev**—Architectural Review. *s.q.* Boston, Mass.
**Arch Rundschau**—Architektonische Rundschau. *m.* Stuttgart, Germany.
**Arch't & Build**—Architecture and Building. *w.* New York.
**Arch't & Build's Mag**—Architect's and Builder's Magazine. *m.* New York.
**Arch't Lond**—Architect. *w.* London.
**Arena**—Arena. *m.* Boston, Massachusetts.

## *REFERENCE LIST OF PERIODICALS.*

**Atlantic M**—Atlantic Monthly. *m.* New York.
**Aust Min Stand**—Australian Mining Standard. *w.* Sydney.
**Auto Jour**—Automotor and Horseless Vehicle Journal. *m.* London.
**Auto Mag**—Automobile Magazine. *m.* New York.

**Baker's Ry Mag**—Baker's Railway Magazine. *m.* New York.
**Banker's Mag Aust**—Banker's Magazine of Australia. *m.* Melbourne.
**Banker's Mag Lond**—Banker's Magazine. *m.* London.
**Banker's Mag N. Y.**—Bankers' Magazine. *m.* New York
**B C Min Rec**—British Columbia Mining Record. *m.* Victoria, B. C.
**Berg u Hutten Zeit**—Berg-und Hüttenmännische Zeitung. *w.* Berlin.
**Board of Tr Jour**—Board of Trade Journal. *m.* London.
**Bos Jour Com**—Boston Journal of Commerce. *w.* Boston, Mass.
**Bradstreets**—Bradstreets. *w.* New York.
**Br Build**—Brick Builder. *m.* Boston, Mass.
**Bridges**—Bridges. *m.* Chicago.
**Brit Arch**—British Architect. *w.* London.
**Builder**—Builder. *w.* London.
**Bull Am Geogr Soc**—Bulletin American Geographical Society. *qr.* New York.
**Bull Am Ir & St Assn**—Bulletin of the American Iron and Steel Association. *w.* Philadelphia, Pa.
**Bull Bureau Am Rep**—Bulletin of the Bureau of Am. Republics. *m.* Washington, D C.
**Bull Dept Labor**—Bulletin of the Department of Labor. *b.m.* Washington, D. C.
**Bull Inter Ry Cong**—Bulletin of the International Railway Congress. *m.* Brussels.
**Bull Soc d'Encour**—Bulletin de la Société d'Encouragement. *m.* Paris.
**Bull Univ Wis**—Bulletin of the University of Wisconsin. Madison, Wisconsin.

**Cal Arch**—California Architect. *m.* San Francisco, Cal.
**Can Arch**—Canadian Architect. *m.* Toronto.
**Can Elec News**—Canadian Electrical News. *m.* Toronto.
**Can Eng**—Canadian Engineer. *m.* Montreal.
**Can Min Rev**—Canadian Mining Review. *m.* Ottawa.
**Cent Mag**—Century Magazine. *m.* New York.
**Chau**—Chautauquan. *m.* Meadville, Pa.
**Chem & Met Soc of S Africa**—Chemical and Metallurgical Society of South Africa. *m.* Johannesburg, S. A. R., and Edinburgh, Scotland.
**Clay Rec**—Clay Record. *s.m.* Chicago.
**Col Eng**—Colliery Engineer. *m.* Scranton, Pennsylvania.
**Col Guard**—Colliery Guardian. *w.* London.
**Com Lond**—Commerce. *w.* London.
**Compressed Air**—Compressed Air. *m.* New York.
**Comptes Rendus**—Comptes Rendus de l'Académie des Sciences. *w.* Paris.
**Con Rev**—Contemporary Review. *m.* London.
**Cons Repts**—Consular Reports. *m.* Washington, D. C.
**Cos**—Cosmopolitan. *m.* Irvington, New York.

**Deutsche Bau**—Deutsche Bauzeitung. *s.w.* Berlin.
**Deutsche Zeitschr f Elektrotech**—Deutsche Zeitschrift für Electrotechnik. *s.m.* Halle a. S., Germany.
**Ding Poly Jour**—Dingler's Polytechnisches Journal. *w.* Stuttgart, Germany.
**Dom Eng**—Domestic Engineering. *m.* Chicago.

**Ecl Elec**—Eclairage Electrique. *w.* Paris.
**Elec**—Electricity. *w.* New York.
**Elec Age**—Electrical Age. *w.* New York.
**Elec Eng**—Electrical Engineer. *w.* New York.
**Elec Eng Lond**—Electrical Engineer. *w.* London.
**Elec Engng**—Electrical Engineering. *m.* Chicago.
**Elec Lond**—Electricity. *w.* London.
**Elec Paris**—Electricien. *w.* Paris.
**Elec Plant**—Electrical Plant. *m.* London.
**Elec Power**—Electric Power. *m.* New York.
**Elec Rev**—Electrical Review. *w.* New York.
**Elec Rev Lond**—Electrical Review. *w.* London.
**Elec Ry Gaz**—Electric Railway Gazette. *w.* New York.
**Elect'n Lond**—Electrician. *w.* London.
**Elec Wld**—Electrical World. *w.* New York.
**Elec Wld & Elec Engr**—Electrical World and Electrical Engineer. *w.* New York.

**Elec Wld & Engr**—Electrical World and Engineer. *w.* New York.
**Elektrizitat**—Elektrizität. *b.w.* Leipzig, Germany.
**Elektrochem Zeitschr**—Elektrochemische Zeitschrift. *m.* Berlin.
**Elektrotech**—Elektrotechniker. *b.m.* Vienna.
**Elektrotech Anz**—Elektrotechnischer Anzeiger. *s.w.* Berlin.
**Elektrotech Echo**—Elektrotechnisches Echo. *w.* Magdeburg, Germany.
**Elektrotech Zeitschr**—Elektrotechnische Zeitschrift. *w.* Berlin.
**Elekt Rund**—Elektrochemische Rundschau. *b.m.* Frankfurt a. M., Germany.
**Elettricita**—Elettricità. *w.* Milan, Italy.
**Energ Elec**—L'Energie Electrique. *w.* Paris.
**Eng**—Engineer. *s.m.* Cleveland, Ohio.
**Eng & Contract**—Engineer and Contractor. *w.* San Francisco, Cal.
**Eng & Min Jour**—Engineering and Mining Journal. *w.* New York.
**Eng Assn of South**—Engineering Association of the South. Nashville, Tenn.
**Eng Lond**—Engineer. *w.* London.
**Eng Mag**—Engineering Magazine. *m.* New York & London.
**Eng Mech**—Engineering Mechanics. *m.* Philadelphia.
**Eng News**—Engineering News. *w.* New York.
**Engng**—Engineering. *w.* London.
**Engng Jour of Stanford Univ**—Engineering Journal. *s.an.* Stanford University, Palo Alto, California.
**Eng Rec**—Engineering Record. *w.* New York.
**Eng Rev**—Engineering Review. *w.* London.
**Engr Lond**—Engineer. *w.* London.
**Engs' Gaz**—Engineers' Gazette. *m.* London.
**Eng Soc Prac Sci**—Eng. Society of the School of Practical Science. Toronto, Canada.
**Eng Soc W Pa**—Engineers' Society of Western Pennsylvania. *m.* Pittsburg, Pa.

**Fairplay**—Fairplay. *w.* London.
**Fire & Water**—Fire and Water. *w.* New York.
**Forester**—Forester. *m.* Washington, D. C.
**Fort Rev**—Fortnightly Review. *m.* London.
**Forum**—Forum. *m.* New York.
**Foundry**—Foundry. *m.* Detroit, Michigan.

**Gar & For**—Garden and Forest. *w.* New York.
**Gas Engs' Mag**—Gas Engineers' Magazine. *m.* Birmingham, Eng.
**Gas Wld**—Gas World. *w.* London.
**Genie Civ**—Génie Civil. *w.* Paris.
**Geol Mag**—Geological Magazine. *m.* London.
**Gesundheits-Ing**—Gesundheits-Ingenieur. *s.m.* München, Bavaria.
**Giorn Dei Lav Pubb e d Str Ferr**—Giornale dei Lavori Pubblici e delle Strade Ferrate. *w.* Rome.
**Glasers Ann**—Glasers Annalen für Gewerbe & Bauwesen. *s.m.* Berlin.
**Gunton's Mag**—Gunton's Magazine. *m.* New York.

**Harper's Wk**—Harper's Weekly. *w.* New York.
**Heat & Ven**—Heating and Ventilating. *m.* New York.
**Horseless Age**—Horseless Age. *w.* New York.
**House Beaut**—The House Beautiful. *m.* Chicago.

**Ice & Refrig**—Ice and Refrigeration. *m.* New York.
**Ill Car & Build**—Illustrated Carpenter and Builder. *w.* London.
**Ill Soc of Engs & Surv**—Illinois Society of Engineers and Surveyors. Peoria, Illinois.
**Improv Bul**—Improvement Bulletin. *w.* Minneapolis, Minn.
**In Arch**—Inland Architect. *m.* Chicago.
**Ind & East Eng**—Indian and Eastern Engineer. *m.* Calcutta.
**Ind & Ir**—Industries and Iron. *w.* London.
**Ind Eng**—Indian Engineering. *w.* Calcutta.
**Ind Forester**—Indian Forester. *m.* Calcutta.
**Ind Rub Wld**—India Rubber World. *m.* New York.
**Ingenieria**—La Ingenieria. *m.* Buenos Aires, Argentina.
**Inst Mech Eng**—Institution of Mechanical Engineers. London.
**Inv Age**—Inventive Age. *s.m.* Washington, D. C.
**Ir Age**—Iron Age. *w.* New York.
**Ir & Coal Trds Rev**—Iron and Coal Trades Review. *w.* London.
**Ir & St Trds Jour**—Iron & Steel Trades Journal. *w.* London.
**Ir Trd Rev**—Iron Trade Review. *w.* Cleveland, Ohio.

**Jour Am Chem Soc**—Journal American Chemical Society. *m.* Easton, Pa.
**Jour Am Soc Nav Engs**—Journal American Society of Naval Engineers. *qr.* Washington, D. C.
**Jour Assn Eng Socs**—Journal of the Association of Engineering Societies. *m.* Philadelphia
**Jour of Elec**—Journal of Electricity. *m.* San Francisco, Cal.
**Jour Fr Inst**—Journal Franklin Institute. *m.* Philadelphia, Pa.
**Jour Gas Lgt**—Journal of Gas Lighting. *w.* London.
**Jour N E Water Wks Assn**—Journal of the New England Waterworks Association. *qr.* New London, Conn.
**Jour Pol Econ**—Journal Political Economy. *qr.* Chicago.
**Jour Roy Inst of Brit Arch**—Journal of the Royal Institute of British Architects. *s-qr.* London.
**Jour San Inst**—Journal of Sanitary Institute. *qr.* London.
**Jour Soc Arts**—Journal of the Society of Arts. *w.* London.
**Jour U S Art**—Journal of U. S. Artillery. *b.m.* Fort Monroe, Virginia.
**Jour Worcester Poly Inst**—Journal of Worcester Polytechnic Institute. *b.m.* Worcester, Massachusetts.
**Jour W Soc Engs**—Journal of the Western Society of Engineers. *b.m.* Chicago.

**Kansas Univ Qr**—Kansas University Quarterly. *qr.* Lawrence, Kansas.

**Locomotive**—Locomotive. *m.* Hartford, Conn.
**Loc Firemen's Mag**—Locomotive Firemen's Magazine. *m.* Peoria, Ill.
**Loc Engng**—Locomotive Engineering. *m.* New York.
**Lord's Mag**—Lord's Magazine. *m.* Boston, Mass.

**McClure's Mag**—McClure's Magazine. *m.* New York.
**Mach**—Machinery. *m.* New York.
**Mach Lond**—Machinery. *m.* London.
**Marine Eng**—Marine Engineer. *m.* London.
**Marine Engng**—Marine Engineering. *m.* New York.
**Marine Rev**—Marine Review. *w.* Cleveland, Ohio.
**Mas St Fit**—Master Steam Fitter. *m.* Chicago.
**Mech Eng**—Mechanical Engineer. *w.* Manchester, Eng.
**Mech Wld**—Mechanical World. *w.* London.
**Mem Soc Ing Civ de France**—Memoires de la Société des Ingénieurs Civils de France. *m.* Paris.
**Met Work**—Metal Worker. *w.* New York.
**Mfr's Rec**—Manufacturer's Record. *w.* Baltimore, Md.
**Milling**—Milling. *m.* Chicago.
**Min & Sci Pr**—Mining and Scientific Press. *w.* San Francisco, Cal.
**Mines & Min**—Mines and Minerals. *m.* Scranton, Pa.
**Min Inv**—Mining Investor. *w.* Colorado Springs, Colorado.
**Min Jour**—Mining Journal. *w.* London.
**Min Rept**—Mining Reporter. *w.* Denver, Colorado.
**Mitt aus d Kgl Tech Versuchsanst**—Mittheilungen aus der Königlichen Technischen Versuchsanstalt. Berlin.
**Mitt d Ver f d Ford d Local u Strassenbahnwesens**—Mittheilungen des Vereines für die Förderung des Local-und Strassenbahnwesens. *m.* Vienna.
**Mod Mach**—Modern Machinery. *m.* Chicago.
**Monatschr d Wurtt Ver f Baukunde**—Monatsschrift des Württembergischen Vereines für Baukunde. 10 parts yearly. Stuttgart, Germany.
**Mon d Architectes**—Moniteur des Architectes. *m.* Paris.
**Monit Indust**—Moniteur Industriel. *w.* Paris.
**Munic Af**—Municipal Affairs. *qr.* New York.
**Munic Af Sup**—Municipal Affairs Supplement. New York.
**Munic Engng**—Municipal Engineering. *m.* Indianapolis, Indiana.

**N Am Rev**—North American Review. *m.* New York.
**Nat Bld**—National Builder. *m.* Chicago.
**Nature**—Nature. *w.* London.
**Nature Paris**—La Nature. *w.* Paris.
**Naut Gaz**—Nautical Gazette. *w.* New York.
**New Sci Rev**—New Science Review. *qr.* New York.
**Nineteenth Cent**—Nineteenth Century. *m.* London.
**N Y R R Club**—New York Railroad Club. *m.* New York.
**N Z Mines Rec**—New Zealand Mines Record. *m.* Wellington.

**Oest Monatschr f d Oeff Baudienst**—Oesterreichische Monatsschrift für den Oeffentlichen Baudienst. *m.* Vienna.
**Oest Zeitschr f Berg & Huttenwesen**—Oesterreichische Zeitschrift für Berg-und Hüttenwesen. *w.* Vienna.
**Ores & Met**—Ores and Metals. *w.* Denver, Colorado.
**Overl Monthly**—Overland Monthly. *m.* San Francisco, Cal.

**Pav & Mun Eng**—Paving and Municipal Engineering. *m.* Indianapolis and New York.
**Phys Rev**—Physical Review. *b.m.* New York.
**Plumb & Dec**—Plumber and Decorator. *m.* London.
**Pop Sci M**—Popular Science Monthly. *m.* New York.
**Power**—Power. *m.* New York.
**Prac Eng**—Practical Engineer. *w.* London.
**Pro Age**—Progressive Age. *s.m.* New York.
**Pro Am Soc Civ Engs**—Proceedings of the American Society of Civil Engineers. *m.* New York.
**Pro Assn Ry Supts**—Proceedings of the American Association of Railway Superintendents of Bridges and Buildings. New York.
**Pro Cent Ry Club**—Proceedings of Central Railway Club. Buffalo, New York.
**Pro Engs Club of Phila**—Proceedings Engineers' Club. *qr.* Philadelphia, Pa.
**Pro Engs Soc of W Penn**—Proceedings of Engineers' Society of Western Pennsylvania. *m.* Pittsburg, Pa.
**Pro L Sup Min Inst**—Proceedings of the Lake Superior Mining Institute. Houghton, Michigan.
**Pro of Wld**—Progress of the World. *m.* New York.
**Pro Purdue Soc of Civ Engs**—Proceedings of the Purdue Society of Civil Engineers. *yr.* La Fayette, Indiana.
**Pro St. Louis Ry Club**—Proceedings St. Louis Railway Club. *m.* St. Louis, Missouri.

**Rev de Mecanique**—Revue de Mécanique. *m.* Paris.
**Rev d Obras Pub**—Revista de Obras Publicas. *w.* Madrid.
**Revist Tecn Ind**—Revista Tecnologico Industrial. *m.* Barcelona, Spain.
**Rev of Revs**—Review of Reviews. *m.* London & New York.
**Rev Tech**—Revue Technique. *b.m.* Paris.
**Revue Gen des Chemins de Fer**—Revue Génerale des Chemins de Fer. *m.* Paris.
**Rev Univ des Mines**—Revue Universelle des Mines. *m.* Liége, Belgium.
**Rhodes' Jour Bank**—Rhodes' Journal of Banking. *m.* New York.
**Rivista Marittima**—Rivista Marittima. *m.* Rome.
**R R Car Jour**—Railroad Car Journal. *m.* New York.
**R R Gaz**—Railroad Gazette. *w.* New York.
**Ry Age**—Railway Age. *w.* Chicago.
**Ry & Eng Rev**—Railway & Engineering Review. *w.* Chicago.
**Ry Mag**—Railway Magazine. *m.* New York.
**Ry Mas Mech**—Railway Master Mechanic. *m.* Chicago.
**Ry Press**—Railway Press. *m.* London.
**Ry Wld**—Railway World. *m.* London.

**Safety V**—Safety Valve. *m.* New York.
**San**—Sanitarian. *m.* Brooklyn, New York.
**San Plumb**—Sanitary Plumber. *s.m.* New York.
**San Rec**—Sanitary Record. *w.* London.
**Schw Bauz**—Schweizerische Bauzeitung. *w.* Zürich.
**Sci**—Science. *w.* Lancaster, Pa.
**Sci Am**—Scientific American. *w.* New York.
**Sci Am Sup**—Scientific American Supplement. *w.* New York.
**Sci Mach**—Scientific Machinist. *s.m.* Cleveland, Ohio.
**Scribner's Mag**—Scribner's Magazine. *m.* New York.
**Seaboard**—Seaboard. *w.* New York.
**Sib Jour Engng**—Sibley Journal of Engineering. *m.* Ithaca, New York.
**So Arch**—Southern Architect. *m.* Atlanta, Ga.
**Sta Eng**—Stationary Engineer. *m.* Chicago.
**Stahl u Eisen**—Stahl und Eisen. *s.m.* Düsseldorf, Germany.
**State's Duty**—State's Duty. *m.* St. Louis, Missouri.
**Steamship**—Steamship. *m.* Leith, Scotland.
**Stevens' Ind**—Stevens' Institute Indicator. *qr.* Hoboken, N. J.
**Stone**—Stone. *m.* New York.
**St Ry Jour**—Street Railway Journal. *m.* New York.
**St Ry Rev**—Street Railway Review. *m.* Chicago.

**Tech**—Technograph. *yr.* University of Illinois. Champaign, Ill.
**Technic**—Technic. *yr.* University of Michigan, Ann Harbor.
**Tech Qr**—Technology Quarterly. *qr.* Boston, Massachusetts.
**Tel Mag**—Telephone Magazine. *m.* Chicago.
**Terre Mag**—Terrestrial Magnetism. *qr.* Cincinnati, Ohio.
**Tradesman**—Tradesman. *s.m.* Chattanooga, Tennessee.
**Tram & Ry Wld**—Tramway & Railway World. *m.* London.
**Trans Am Inst Elec Eng**—Transactions American Institute of Electrical Engineers. *m.* New York.
**Trans Am Inst Min Eng**—Transactions American Institute of Mining Engineers. *m.* New York.
**Trans Am Soc Civ Eng**—Transactions American Society of Civil Engineers. *m.* New York.
**Trans Am Soc Heat & Ven Eng**—Transactions American Society of Heating and Ventilating Engineers. New York.
**Trans Am Soc Mech Engs**—Transactions American Society of Mechanical Engineers. New York.
**Trans Assn Civ Engs Cornell Univ**—Transactions of the Association of Civil Engineers of Cornell University. Ithaca, New York.
**Trans Inst Eng & Ship in Scot**—Transactions Institute of Engineers & Shipbuilders in Scotland, Glasgow.
**Transport**—Transport. *w.* London.

**U S Cons Repts**—Consular Reports. *m.* Washington.

**W Elec**—Western Electrician. *w.* Chicago.
**Wiener Bauindust Zeit**—Wiener Bauindustrie Zeitung. *w.* Vienna.
**Wis Engr**—Wisconsin Engineer. *qr.* Madison, Wis.
**W Ry Club**—Western Railway Club Proceedings. *m.* Chicago.

**Yacht**—Le Yacht. *w.* Paris.
**Yale Sci M**—Yale Scientific Monthly. *m.* New Haven, Connecticut.
**Yr Bk Soc Engs**—Year Book of the Society of Engineers. University of Minnesota, Minneapolis, Minn.

**Zeitschr d Oest Ing u Arch Ver**—Zeitschrift des Oesterreichischen Ingenieur-und Architekten Vereines. *w.* Vienna.
**Zeitschr d Ver Deutscher Ing**—Zeitschrift des Vereines Deutscher Ingenieure. *w.* Berlin.
**Zeitschr f Elektrochem**—Zeitschrift für Elektrochemie. *w.* Halle a. S. Germany.
**Zeitschr f Elektrotech**—Zeitschrift für Elektrotechnik. *s.m.* Halle a. S. Germany.
**Zeitschr f Inst**—Zeitschrift für Instrumentenkunde. *m.* Berlin.
**Zeitschr f Locomotiv**—Zeitschrift für Locomotivführer. *m.* Hanover, Germany.
**Zeitschr f Masch u Schloss**—Zeitschrift für Maschinenbau und Schlosserei. *m.* Berlin.

THE WORLD IS ITS FIELD

# THE ENGINEERING INDEX.

## 1896-1900, inclusive.

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## A

**ABATTOIR.**

**Machinery.**—Municipal Abattoirs and their Mechanical Equipment (Städtische Schlachthöfe und deren Maschinelle Einrichtungen). Gustav Wits. An illustrated account of various machines, mechanical appliances and scientific methods used in slaughter-house work. 5000 w. Zeitschr d Oest Ing u Arch Ver—July 13, 1900.

**Paris.**—The New Paris Abattoir (Das Neue Schlachthaus der Stadt Paris). A bird's-eye view and description of the new abattorr on the left bank of the Seine. About 25 acres of ground are included. and the abattoir has a capacity for about one-third the entire demand of the city. I plate. 1000 w. Oesterr Monat f d Oeff Bau—June, 1897.

**ABRASIVES.**

**Review.**—Abrasives. A. L. Goddard. A general review of abrasives now used and the methods employed. 3300 w. Wis Eng—Oct., 1896.

**United States.**—The Production of Abrasives. From the annual report of the United States Geological Survey, compiled by E. W. Parker, giving production of mineral abrasives and also carborundum and crushed steel. 1500 w. Ir Age—Sept. 20, 1900.

**ABUTMENT**

See **BRIDGE ABUTMENT.**

**ACCIDENT.**

See **BOILER ACCIDENT, BOILER EXPLOSION; BRIDGE ACCIDENT; COAL MINE ACCIDENT; COAL MINE EXPLOSION; DAM FAILURE; FACTORY ACCIDENT; FLY-WHEEL ACCIDENT; MINE ACCIDENT; RAILWAY ACCIDENT; STREET RAILWAY ACCIDENT;** etc.

**ACCOUNTING.**

See also **COST-KEEPING.**

**Diagrams.**—Diagram Accounts for Engineering Work. John Jameson. Read before the Instistution of Mechanical Engineers, England. Describes a plan of diagram accounts, giving the requisites of the system. 2800 w. Engng—Nov. 12, 1897

**Electric Stations.** See **ELECTRIC STATION MANAGEMENT.**

**Gas and Electric.**—Uniform Accounting for Gas and Electric Lighting Companies. James Blake Caboon. Abstract of a paper read at Chicago meeting of the Nat. Elec. Lgt. Assn., and Editorial on "Uniform Accounting a Prerequisite to National Municipal Statistics." 3000 w. Eng. News—June 14, 1900.

**ACCUMULATOR.**—See also **INVENTION—Needed.**

A Study of the Lead Accumulator (Studien am Bleiakkumulator). Martin Mugdan. An exhaustive examination of the chemical and electrical reactions which occur in the lead plate accumulator under various conditions of charging and discharging. 4500 w. Zeitschr f Elektrochemie—Dec. 7, 1899.

Electricity in Packages. E. Ralph Estep. Deals with the rapid development of the storage battery and the uses to which it is applied. Ill. Serial. Mod Mach—Oct., 1898.

Indicated Evolution in the Storage Battery. Leonard Paget. The writer does not believe the storage battery has been developed to its highest perfection. He considers the subject of its possible evolution by careful study of the constituent elementary parts, viz., the electrolyte, the positive and the negative plates. Serial. Elec—Feb. 26, 1896.

Past and Present Obstacles in the Storage Battery Development. Carl Hering. A paper read in a topical discussion on storage batteries. 3500 w. Trans Am Inst of Elec Eng—Nov., 1895.

Past and Present Obstacles in the Storage Battery Development. L. Epstein. A review of the paper on this subject lately presented by Mr. Carl Hering, and claiming that England is far in advance of the United States in the development of the storage battery. 1600 w. Elec Rev, Lond—Jan. 10, 1896.

Past Experience with Storage Batteries. Remarks by Frederick Reckenzaun, followed by general discussion of all the papers read on the storage battery question. 10800 w. Trans Am Inst of Elec Eng—Nov., 1895.

Progress in the development of Secondary Batteries in the Last Twenty-five years (Fortschritte in der Entwickelung der Sekundärbatterien in den Letzten 25 Jahren). An historical review of slow but steady progress. Serial. 2 parts. 3500 w. Elektrochemische Zeitschr—June, July, 1900.

Storage Batteries. Interesting information relating to storage batteries and their efficiency. Ill. 2000 w. St Ry Rev—July 15, 1898.

Storage Batteries. E. L. Nichols. Reviews the processes of Faure and Planté for the production of the plates, modifications of the grid, etc., noting the most important applications of the storage battery. 1600 w. Sib Jour of Engng—June, 1899.

Storage Batteries. E. J. Wade. From a forthcoming book to be published by "The Electrician" printing and publishing company. Part first discusses the nomenclature, the classification of electrodes, and the material of supports. Serial. Elect'n—Sept. 24, 1897.

Storage Battery Problems. E. J. Wade. Read before the Inst. of Elec. Engs. A discussion of some of the theoretical and chemical questions connected with the lead cell. Also editorial. Serial. Elect'n, Lond—March 23, 1900.

Storage Battery Engineering Practice. Joseph Appleton. Part first consists of introductory remarks and an explanation of the construction and operation of storage batteries. 1600 w. Elec Eng—March 17, 1897.

The Evolution of the Storage Battery. Maurice Barnett. An interesting and instructive paper reviewing the progress of the storage battery and followed by an extended discussion. 8800 w. Jour Fr Inst—April, 1896.

Twenty-Five Years' Progress in Secondary Batteries. L. Epstein. Slow but steady progress is shown. 3300 w. Elec Rev, Lond—Nov. 12, 1897.

The Lead Cell. B. E. Moore. A theoretical and experimental study, with results. 6000 w. Phys Rev —March-April, 1897.

**Accessories.**—Accumulator Accessories. Dealing with the accessories which are necessary for successful accumulator working. Serial. Elec, Lond—July 3, 1896.

**Acid Concentration.**—The Dependence of the Electromotive Force and Efficiency of Accumulators upon the Strength of Acid (Ueber die Abhängigkeit der Elektromotorischen Kraft und der Nutzeffectes des Bleiakkumulators von der Säurekonzentration). F. Dolezalek. A mathematical discussion, the conclusions of which are confirmed by experimental tests. 3500 w. Zeitschr f Elektrochemie—Feb. 5, 1898.

**Action.**—The Action of Accumulators (Die Wirkungsweise der Akkumulatoren). Dr. E. Hoppe. A discussion of the chemical and physical actions involved in the operation of the electrical storage battery. 2000 w. Elektrotech Rundschau—Oct. 15, 1898.

**Active Material.**—New Active Material for Accumulators (Neue Akkumulatoren-Masse). A rather indefinite account of a new active material which it is claimed will obviate the use of plates. 500 w. Elektrochemische Zeitschr—April, 1900.

**Application.**—Latest Progress in the Application of Storage Batteries. Joseph Appleton. Abstract of a paper read before the N. Y. Elec. Soc. Describes the conditions and methods of operation of the most interesting installations, and gives results from actual practice showing the present standing of storage batteries. Ill. 5800 w. Elec Wld—Feb. 4, 1899.

Recent Developments in the Application of Storage Batteries. Joseph Appleton. Attention is called to the rapid growth during the last three years of this branch of the electrical industry, and to some of the most important and interesting applications developed. Discussion. Ill. 8000 w. Pro of Engs' Club of Phila—July, 1898.

Storage Batteries. Charles Blizard. An outline of the applications of batteries abroad and a brief account of the more important applications that have been put down in this country during the past two or three years. Ill. 5800 w. Elec Power—May, 1896.

The Application of the Storage Battery. C. D. Wood. On the growing use and new applications. 2000 w. Yale Sci M—April, 1899.

**Automobiles.**—Accumulators. Félicien Michotte. An illustrated explanation of the apparatus and its working. 2800 w. Auto Mag—March, 1900.

Accumulators for Electric Automobiles of the Société Anonyme pour le Travail Electrique des Métaux. Describes a storage battery specially devised with reference to the requirements of the electric cab. 600 w. Elec Rev. Lond—Feb. 24, 1899.

International Competitive Trials of Accumulators for Road Traction. Gives the programme of a competition that has been arranged for the trial of accumulators intended for automobile vehicles driven on ordinary roads. 2400 w. Elec Rev, Lond—Jan. 6, 1899.

Notes on the Employment of Accumulators for Electrically Propelled Vehicles. Percy Northey. Read before the Automobile Club of Great Britain and Ireland. A discussion of points of interest in securing satisfactory working of accumulators, and their employment for propelling vehicles. Also discussion. 6200 w. Auto Jour—Jan., 1899.

Storage Batteries for Road Traction. Brief discussion of the batteries used in France for electric traction on common roads. 1100 w. Elec Rev, Lond—Dec. 23, 1898.

The Construction of Electric Accumulators. The interest of the accumulator to the automobilist, and an account of its development. 3000 w. Auto Jour—June, 1900.

The Storage Battery from the Standpoint of the User. W. M. Hutchinson. The writer's views of electrically propelled vehicles, after 18-months' personal experience, with a brief explanation of his method of keeping in order and caring for a vehicle battery. Ill. 2000 w. Horseless Age—Jan. 31, 1900.

See also Traction; ELECTRIC VEHICLES—Accumulator.

**Automobile Club Tests.**—Competitive Tests of Accumulators by the Automobile Club of France (Concours d'Accumulateurs de l'Automobile Club de France). A. Bainville. An account of the tests made, with criticisms. 1400 w. L'Electricien—April 7, 1900.

Competitive Tests of Accumulators (Preisausschreiben auf Akkumulatoren). C. Reimer. An account of the competitive tests made by the Automobile Club of France, from June 3 to Dec. 2, 1899, with a table showing results. 1500 w. Elektrochem Zeitschr—May, 1900.

Competitive Tests of Accumulators in France. A. de Courcy. A brief account of tests made by the Automobile Club of France. Ill. 700 w. W Elect'n—Feb. 3, 1900.

The Accumulator Tests of the Automobile Club of Paris (Concours d'Accumulateurs de l'Automobile Club de France). A. Bainville. The beginning of a review of the various accumulators tested, with a description of the manner of making the trials. Serial. L'Electricien—June 24, 1899.

The International Competition of Accumulators for Automobile Vehicles (Concours International d'Accumulateurs pour Voitures Automobiles). A summary of the official report, giving results of tests upon eight forms of accumulators. 1000 w. Génie Civil—Jan. 13, 1900.

The International Competition of Accumulators. (Concours International d'Accumulateurs). The official report of the tests of storage batteries adapted for automobiles as conducted by the Automobile Club de France. 3000 w. L'Electricien—Jan. 13, 1900.

**Blot.**—The Blot Accumulator. This invention by G. R. Blot is said to merit careful consideration. 1500 w. Elec Rev, Lond—Feb. 14, 1896.

The Blot Accumulator (Der Blot Akkumulator). This new storage battery cell is composed of narrow strips of corrugated lead, wound on leaden bobbins, these latter being built up into plates. Tests by d'Arsonval, de Nerville, and Preece, show most excellent results. 1500 w. Zeitschr d Ver Deutscher Ing—May 22, 1897.

The Blot Accumulator (Der Akkumulator Blot). Showing the details of the lead band construction and giving data and results of tests. 2500 w. Elektrochemish Zeitscher—June, 1899.

**Bosse.**—See German and French.

**Cadmium.**—The Cadmium Accumulator (Accumulateur au Cadmium). A description of the Commelin and Viau system, with a positive plate of peroxide of lead and a negative of deposited cadmium. Diagrams of the performance are given. 1200 w. L'Electricien—Oct. 13, 1900.

**Capacity.**—The Computation of the Capacity of a Lead Accumulator under Variable Current (Ueber die Berechung der Kapacität eines Bleiakkumulators bei Variabeler Stromstärke). A mathematical discussion by Herr Liebenow. 3500 w. Zeitschr f Elektrochemie—July 20, 1897.

The Dependence of Capacity of Accumulators upon the Strength of Charging Current (Ueber die Abhängigkeit der Kapacität von der Entladestromstärke bei Bleiakkumulatoren). Giving the results of numerous tests of the various makes of accumulators, by Prof. Penkert. 1500 w. Elektrotech Zeitschr—May 20, 1897.

**Cells.**—Cells for Accumulators (Ueber Akkumulatoren-Kasten). J. B. Hohn. Discussing especially the properties of hard rubber as used for the containing cells for accumulators. 800 w. Elektrochem Zeitschr—March 1, 1900.

**20,000-Cell Battery.**—See High Tension.

**Charging.**—A Comparison between Charging a Secondary Cell at Constant Potential and at Constant Current, More Especially as Regards Efficiency. A. A. Cohen and J. M. Donaldson. Read before the British Assn., Section A. Reports a series of tests to determine the efficiencies obtained with the two methods. 2 parts. 4000 w. Elect'n, Lond—Sept. 16, 23, 1898.

The Charging of Accumulators at Constant Pressure (Ueber die Ladung von Akkumulatoren bei Konstanter Spannung). C. Heim. A paper presented at a meeting of the German Electrical Engineers' Association in Hanover, containing a long discussion of the subject with tables and curves. Serial. Elektrotech Zeitschr—April 5, 1900.

**Charging and Care.**—See ELECTRIC VEHICLES—Batteries.

**Charging Rates.**—Pressure Ratios in Accumulator Plants (Spannungsverhältnisse bei Akkumulatoren-Anlagen). E. Schiff. Discusses the most advantageous rates for charging and discharging storage batteries. 1000 w. Elektrochemische Zeitschr—Feb., 1900.

**Crowdus.**—The Crowdus Accumulator. Illustrates and describes a cell which has been claimed to be the most suitable yet designed for automobile purposes. 1500 w. Auto Jour—April, 1899.

**Digoine.**—A New Electric Accumulator (Nouvel Accumulateur Electrique). The Digoine plate is composed of a network of leaden wires, soldered together to form a flat cage, which is stuffed with a paste composed of red lead. 1500 w. Génie Civil—Oct. 16, 1897.

**Electric Lighting.**—See also Electric Station.

**Electric Locomotives.**—See ELECTRIC LOCOMOTIVE—Paris—Mediterranean Ry.

**Electric Power Station.**—An Electric Railway Storage Battery Plant. An illustrated description of the storage battery plant of the Buffalo Railway Company. 1000 w. Am Elect'n—July, 1898.

Advantages of Storage Batteries in Power Houses (Wirkungen und Vortheile von Pufferbattereien in Bahnbetrieben). A short article on the advantages of storage batteries for small power houses with varying loads. 700 w. Ill. Zeitschr f Klein u Strassenbahnen—March 16, 1900.

Electric Tramways with Stationary Accumulators. Ludwig Schröder. Abstract of paper read before the Electrotechnischer Verein. Describes battery and its work. Also describes the Tettnang Electric railway, and the Remscheid. 2400 w. Elect'n—July 30, 1897.

The Use of Storage Batteries in Railway Work. William Baxter, Jr. Consideration of the advantages to be derived from their use. Serial. Elec Wld—Jan. 9, 1897.

Storage Batteries in Use by the Union Traction Co., Philadelphia. Brief illustrated account of the installation just completed for the Union Traction Co. 500 w. Elec Eng—Oct. 28, 1896.

Storage Batteries for Railways. Maurice Barnett. A paper on the value of accumulators in electric railway power plants. 2000 w. Tradesman—Nov. 15, 1895.

The Storage Battery Auxiliary of the Brunswick Traction Company. Illustrates and describes a storage battery sub-station in use on a New Jersey line and found very satisfactory. 1000 w. Elec Wld—Oct. 29, 1898.

Storage Batteries and Railway Power Stations. Robert McA. Lloyd. Abstract of a paper read before the Am. Inst. of Elec. Engs. The application of the storage battery to electric railway operation is discussed, and the advantages shown. 3500 w. Eng News—Feb. 23, 1899.

Storage Batteries and Railway Power Stations. Robert McA. Lloyd. Points out some of the uses of a storage battery in connection with a typical station. Also discussions in New York and Chicago. 20800 w. Trans Am Inst of Elec Engs—Feb., 1899.

Storage Batteries as Station Auxiliaries in Pittsburgh. An illustrated description of the storage battery plants adopted, and some of the results secured in economy. 1700 w. St Ry Jour—Jan., 1896.

The Application of the Storage Battery to Electric Traction. Charles Hewitt. Deals with the application of the battery on the car or locomotive, to long lines, and in the power-house itself, giving two applications in the writer's personal experience. The writer thinks' there is a wide and growing field in the application to long lines and in the power-station, but not to moving vehicles. Ill. 6500 w. Pro Engs' Club of Phila—Jan., 1897.

The Use of Accumulators in Central Stations of Electric Tramways. Ludwig Schröder. Abstracted from a communication to the Elektrotechnischer Verein. Describes their use on Zurich-Hirslanden line, the Brockenzell-Tettnang line and the Remscheid line. 1500 w. Elec Rev, Lond—Nov. 26, 1897.

The Use of Accumulators in Tramway Driving (Bahn-Betrieb mit Accumulatoren). A paper before the German Railway Society, discussing the advantages of storage batteries for equalizing the load upon the power plant. 5000 w. Glasers Annalen—Feb. 1, 1899.

See also Electric Station; ELECTRIC RAILWAY. Norway; ELECTRIC TRAMWAY—Power Computation.

**Electric Power Station, Chicago.**—A Study of the Storage Battery Performance on the South Side Elevated Railroad of Chicago. J. R. Cravath. Considers the uses and performance of the battery installed. 1800 w. Elec Eng, N. Y.—Oct. 13, 1898.

**Electric Railway.**—See ACCUMULATOR TRAMWAY.

**Electric Station.**—Accumulators—Their Application to Central Station Lighting and Power. W. A. Johnson. Read before the Can. Elec. Assn. Presents the advantages and adaptability of accumulators, and the cost. 1800 w. Can Elec News—June, 1897.

Application of Storage Batteries to Transmission Systems. C. O. Poole. Read before the Pacific Coast Trans. Assn. Presents the advantages of storage batteries in central stations, and discusses their cost, maintenance, etc. Also general discussion. 4000 w. Jour of Elec—July, 1900.

A Storage Battery Central Station. F. B. Sage. Illustrated description of the electric light plant of Claremont, N. H., which shows the advantage of storage batteries being applied to small lighting installations. 2000 w. Am Elect'n—June, 1898.

Batteries v. Generators. The question of reliance in electricity supply, favoring the storage system. 1500 w. Elec Rev, Lond—June 3, 1898.

Chicago Edison Company's Storage-Battery Plant. Illustrated description of this latest feature of the central station distribution system of this company. It is the largest battery plant that has ever been installed. 2200 w. W Elect'n—June 4, 1898.

Computations for Equalizing Accumulators (Beitrag zur Berechnung von Pufferbatterien). G. Brandt. A discussion of the method of computing the size of storage battery for equalizing the load in a traction power house, based upon the experiments of Seimens & Halske. 3000 w. Elektrotech Zeitschr—Oct. 19, 1899.

Electric Storage in an Edison Station. George P. Low. Illustrates and describes the installation features, and the practical results obtained at the Edison station of the San Francisco Gas and Electric Co. 6800 w. Jour of Elec—Aug., 1898.

Fribourg Accumulator Plant. Describes and illustrates a plant in Switzerland. 900 w. W Elec—April 2, 1898.

One of the Useful Applications of the Storage Battery. William Baxter, Jr. Shows its value as an adjunct to electric-lighting stations. 1800 w. Sci Am—Dec. 18, 1897.

Practical Experience with Storage Batteries in Central Stations. C. L. Edgar. A paper read in the discussion of the storage battery before the Am. Inst. of Elec. Eng. The author considers the uses to be 1, to carry the peak of the load at maximum hours; 2, to carry the entire load at minimum hours; 3, to act as an equalizer or reservoir; 4, for the equipment of annex stations. 3300 w. Trans Am Inst of Elec Eng—Nov., 1895.

Storage Batteries in Central Stations. Maurice Barnett. Abstract of a paper read before the Northwestern Elec. Assn. Reviewing the causes of change in public sentiment in regard to the storage battery, and considering, in a general way, the adaptability, performance and economy of the storage battery in a central station. 2800 w. Elec Eng—Jan. 22, 1896.

Storage Battery Manipulation on Variable Loads. J. E. Woodbridge. A consideration of the seeming desirability of the storage battery in the trolley line power station, and the difficulties of operation. 1000 w. Elec Wld—June 6, 1896.

Storage Batteries for Railways. Maurice Barnett. A paper emphasizing the great value possessed by storage batteries, not in furnishing direct motive power, but when used in connection with railway power plants. 2000 w. Tradesman—Nov. 15, 1895.

Storage Battery Plant in a Brooklyn Lighting Station. Illustrated description of an interesting accumulator installation in the second district station of the Edison Illuminating Co. 1000 w. Elec Rev—April 7, 1897.

The Electric Storage Battery. Rudolph H. Klauder. Calls attention to the dawning of a new era in electrical station practice in this country. The advantages of accumulators are considered, the situation in this country and in Europe is explained, the practical uses that can be made of the storage battery in generating plants, cost, etc. 10000 w. Pro Engs' Club of Phila—Nov., 1896.

The Scotia Street Storage Battery Station of the Boston Edison Co. Illustrated description. 1200 w. Elec Eng—April 21, 1897.

The Storage Battery or the Gas-Engine as an Auxiliay. Nelson W. Perry. Topical communication presented to the meeting of the Am. Inst. of Elec. Engrs. The author's opinion regarding the use of storage batteries for the purpose of relieving electrical systems of the strain due to sudden fluctuations of load. He considers the gas-engine preferable if economy is important. 2200 w. Elec Age—Nov. 30, 1895.

The Storage Battery for Central Stations. Arthur E. Childs. Abstract of a paper presented to the Amer. Inst. of Elec. Engrs. It considers generally the application of accumulators to balance the load on a generating station. 3000 w. Elec Engs—Nov. 27, 1895.

The Use of Accumulators in Central Station Practice. Clayton H. Sharp. Read before the Electrical Soc. of Cornell Univ. Discusses the advantages accruing from the use of an auxiliary accumulator plant in caring for irregular loads. 3000 w. Sib Jour of Engng—June, 1897.

The Use of Accumulators in Connection with Lighting and Traction Systems. John H. Rider. Read before the Municipal Elec. Assn., London. Considers the use of accumulators in the continuous-current lighting station, the alternating-current lighting station, the traction station, and the combined lighting and traction station. 2800 w. Elec, N. Y.—Aug. 17, 1898.

The Use of Storage Batteries in Electric Lighting. Francis B. Crocker. A paper read before the Amer. Inst. of Elec. Engrs., considering the usefulness of storage batteries in equalizing load, steadying voltage, and in various other ways. 3000 w. Elec Eng—Nov. 27, 1895.

See also **Electric Power Station; Switchboard; ELECTRIC STATION MANAGEMENT—Baths.**

**Electric Station, N. Y.**—The Bowling Green Storage Battery Station of the New York Edison Co. A short account of the objects for which the battery has been installed and the work it accomplishes, with illustrated detailed description. 1800 w. Elec Eng—March 10, 1897.

The Storage Battery Substations of the Metropolitan Street Railway, New York City. Describes the station at the foot of West 23d St., noting the peculiarities. 1900 w. Elec Wld—Jan. 21, 1899.

**Electric Storage Battery Co.**—The Electric Storage Battery Co.—Its Factory and Its Battery Installations. Joseph Wetzler. An account with many illustrations, of the factory and methods of manufacture of this company and some of the plants installed. 9900 w. Elec Eng, N. Y.—April 28, 1898.

**Electric Vehicles.**—See **Automobile; ELECTRIC VEHICLES—Accumulators.**

**Electrolysis Alternating Current.**—On the Formation of Lead Sulphate in Alternating Current Electrolysis with Lead Electrodes. Samuel Sheldon and Marcus B. Waterman. Results of experiments to determine whether electrolytic condensers, formed with lead electrodes, might not have a high efficiency, acting much in the same manner as the lead plates of a storage battery. 1200 w. Phys Rev—Jan., Feb., 1897.

**Electromotive Force.**—Changes of Electromotive Force Within the Secondary Cell. Charles Frederick Burgess. Deals with the means which are available for studying single potential differences which exist in different parts of the cell, and gives some of the data which was obtained in the application of one of these methods. 3700 w. Wis. Eng—Jan., 1899.

**Europe.**—Recent Improvements in Storage Batteries. Herbert Lloyd. A paper read before the N. Y. Elec. Soc. The writer having just returned from a tour of inspection of the storage battery plants of Europe. 2500 w. Elec—Feb. 5, 1896.

**Fire Alarm.**—The Storage Battery for Fire Alarm and Police Telegraph Purposes. John L. Hall. Explanation of the new installation which the writer has just completed for the fire alarm and police telegraph of Wilmington, Del., with illustrations. 700 w. Elec Wld—July 11, 1896.

**Gas.**—Gas Electric Accumulators (Les Accumulateurs Electriques à Gaz). Max de Nansouty. A discussion of the Cailleter and Collardeau gas battery, using the electrolysed gases of liquids other than water, and at pressures of more than 500 atmospheres. 1800 w. L'Electricien—March 11, 1899.

Gas Electric Accumulators (Les Accumulateurs Electriques à Gaz). A discussion of the improvements in gas storage batteries for electricity suggested by M. de Nansouty, showing the possibility of producing an accumulator of much less weight than has heretofore been possible. 2000 w. Revue Technique—March 25, 1899.

**Gas Relief.**—Concerning Accumulators with Gas Relief (Ueben die Akkumulatoren mit Entgasungseinrichtung). Jos. Zacharias. This is a description of improvements in electrical accumulators in which opportunity is given for the free escape of the gases which otherwise cause the rapid deterioration of the elements. The use of organic materials for the absorption of the gases is also suggested. 3000 w. Elektrochem Zeitschr—Nov., 1896.

**German and French.**—German and French Accumulators. Illustrated description of two special forms of accumulators that are attracting attention abroad—the Boese and the "shuttle." 1200 w. W Elec—Oct. 3, 1896.

**Graphical Investigation.**—A Graphical Investigation of the Action of Storage Batteries (Graphische Ermittelung der Leistung von Pufferbatterien). Moritz Kohn. A discussion of the action of a storage battery when used in parallel with a generator, the curves of the dynamo and the battery being combined. 2000 w. Elektrotech Zeitschr—Jan. 25, 1900.

**Gülcher.**—Tests of a Gülcher Accumulator (Untersuchung eines Gülcher-Akkumulators). The Gülcher plate is composed of lead wires and spun glass. Tests under various conditions of charging and discharging show excellent efficiency, with much less weight than existing forms. 3000 w. Elektrotech Zeitschr—March 18, 1897.

The Gülcher Accumulator (Die Gülcher-Akkumulatoren). Gülcher's improved storage battery plate is composed of a grating of leaden wires used as a warp, with a woof of fine strands of spun glass, the whole being charged with a paste of white lead. Ill. 500 w. Elektrochem Zeitschr—Dec., 1896.

**Hatch.**—The "Hatch" Secondary Battery. Illustrated description of a storage battery made in Boston, Mass. 500 w. Elect'n, Lond—Jan. 14, 1898.

**High Tension.**—Batteries for High Pressure (Hochspannungsbatterien). Prof. Feussner. A description of the large storage battery of the Reichsanstalt, at Berlin, intended for a pressure of 10000 volts. 3000 w. Elektrotech Zeitschr—Aug. 31, 1899.

Some Results Obtained with a Storage Battery of Twenty Thousand Cells. John Trowbridge. Read at meeting of Am. Acad. of Arts and Sciences. An illustrated account of interesting experiments. 2400 w. Nature—Aug. 2, 1900.

The High-Tension Accumulator of the Jefferson Physical Laboratory of Harvard University. Prof. John Trowbridge. Constructed for the study of the discharges of electricity through gases. Description and account of satisfactory work. 1300 w. Elec Wld—Jan. 2, 1897.

**Ignition.**—The treatment of Accumulators for Working Spark Coils. Discusses the management and treatment of the accumulator as a source of current for the various electric sparking appliances that are employed for the ignition of the explosive mixtures in certain classes of oil engines adapted for the propulsion of motor cars. 2000 w. Auto Jour—May 17, 1900.

**Insulation.**—The Measurement of the Total Insulation of Accumulator Batteries (Methode zur Messung der Gesammtisolation von Akkumulatoren Batterien). C. Liebenow. Two methods are given, one for ordinary use and the other when a high degree of insulation is required. A brief discussion is appended. 2000 w. Elektrotech Zeitschr—May 18, 1899.

**Internal Resistance.**—Measurement of the Internal Resistance of Accumulators. E. C. Remington. Explains method used by the writer, suggesting modifications that would probably work as well. 1500 w. Elec Rev, Lond—Oct. 20, 1899.

The Internal Resistance of Galvanic Cells (Ueber den Innern Widerstand Galvanischer Zellen). Especially relating to the resistance of various forms of accumulator cells. 2500 w. Zeitschr f Elektrochemie—April 5, 1897.

**Isolated Plants.**—Storage Batteries and Isolated Plants. Alton D. Adams. Discusses the advantages to building owners where electric power is required, by the use of a storage battery. 2800 w. Elec Wld & Eng—Dec. 30, 1899.

See also **INCANDESCENT LAMP—High Efficiency.**

**Lighting.**—Present Day Types of Accumulators. A specially contributed article in which the writer proposes to deal with the subject from the standpoint of the owner of a private house lighting installation. Serial. Elec, Lond—Feb. 14, 1896.

**Lining.**—Lining for Storage Battery Compartments.

The method of making the batteries acid-tight and of insulating, as detailed in a communication from the Hanover Street Railway Co. 1000 w. Elec Eng—Jan. 6, 1897.

**Lithanode.**—The Making of Lithanode Accumulators. Illustrated description of the process of making lithanode cells. 900 w. Elec Rev, Lond—May 13, 1898.

**Majert.**—The Majert Accumulator (Accumulateur Majert). Describing especially the method of planing the sheet lead into ridges, furnishing a plate of greatly extended surface, well adapted for receiving the active material. 2500 w. Revue Technique—Feb. 10, 1900.

The Majert Accumulator (Der Majert Akkumulator). A. Wilke. With many illustrations showing the details of manufacture of the lead plates, including the special machinery for forming the cellular surface. Tables of data of capacity and endurance are given. 3500 w. Elektrotech Zeitschr—Nov. 9, 1899.

**Management.**—On the Management of Electric Accumulators. F. G. Ansell. States briefly the changes going on in the battery, and gives directions for the management and care that will insure the greatest efficiency and length of service. 2000 w. Elec Eng, Lond—Sept. 3, 1897.

**Manganese.**—The Influence of Manganese in Accumulators (Ueber den Einfluss von Manganverbindungen auf Bleiakkumulatoren). An investigation of the action of the superoxide of manganese in storage batteries. Its presence is declared to be unfavorable, causing the battery to run down more rapidly when at rest. 1500 w. Zeitschr f Elektrochemie—Feb. 20, 1897.

**Manufacture.**—The Manufacture of Electric Accumulators. The importance of purity of materials and methods of testing. 2000 w. Auto Jour—July, 1900.

Notes on Accumulator Construction. Desmond G. FitzGerald. Considers how to find the number of plates that a given cell or vessel will contain; and how to find the dimensions of a cell or vessel to contain a given number of plates. 450 w. Elec Eng, Lond—Oct. 1, 1897.

Recent Progress in Accumulator Manufacture (Neuere Fortschritte der Akkumulatorentechnik). A review of recent progress in storage battery construction, including descriptions of the Pollak, Correns, Gülcher, Linde and Leitner batteries. 5000 w. Glaser's Annalen—Sept. 15, 1897.

The Present Status of Accumulator Manufacture (Der Gegenwärtige Stand der Accumulatorentechnik). A paper by Dr. Müllendorf before the German Society of Mechanical Engineers discussing the existing condition of electrical accumulators from a practical standpoint, especially as regards resistance to the wear and tear of daily use. 4000 w. Glaser's Annalen—Dec. 15, 1898.
See also **Electric Storage Battery Co.**

**Marine Plant.**—The Use of Storage Batteries at Sea. Presents some of the dangers to an electric plant at sea, and the value of the storage battery in case of the possible accident. 1400 w. Elec Rev, N. Y.—Dec. 14, 1898.

**Motor Generator.**—See **MOTOR GENERATOR—Accumulators Compared.**

**Organ.**—The Storage Battery of the Sage Chapel Organ of Cornell University. H. H. Norris. States the problem to be solved and the troubles met. Ill. 1000 w. Sib Jour of Engng—June, 1900.

**Paris Exposition.**—See **ELECTRO-CHEMISTRY—Paris Exposition.**

**Plates.**—A Method of Determining the True Surface of Accumulator Plates (Ueber eine Methode zur Bestimmung der Wahren Oberflächen von Akkumulator platten). Konrad Norden. Discussing a method of determining the effective area of any form of accumulator plate by the volume of current yielded, and showing how to apply data thus determined to subsequent designs. 3500 w. Zeitschr f Elektrochemie—Feb. 1, 1900.

Investigations of Battery Plates in Need of Repairs (Untersuchungen über Reparaturbedürftige Batterieplatten). J. K. Pumpelly. Photographs and descriptions of storage battery plates which had been in use for two months on motor vehicles in the streets of Chicago. 400 w. Elektrochem Zeitschr—July, 1900.

**Pneumatic Circuit Breaker.**—See **ELECTRIC CIRCUIT BREAKER—Pneumatic.**

**Polarization.**—Gas Polarization in the Lead Accumulator (Ueber die Gaspolarisation im Bleiakkumulator). W. Nernst and F. Dolezalek. A short discussion of the subject. 900 w. Zeitschr f Elektrochemie—May 10, 1900.

Gas Polarization in Lead Accumulators (Ueber die Gas-Polarisation im Bleiakkumulator). Dr. Strasser and Dr. Gahl. An article, giving the results of experiments with lead-antimony negative plates of various composition. 1000 w. Zeitschr f Elektrochemie—July 5, 1900.

**Railway Power Station.**—See **Electric Power Station.**

**Rapid Charge.**—Accumulators for Rapid Charging. L. Epstein. Reviews the opinions of M. Blanchon as expressed in a paper read before the Société Internationale des Electriciens, and objects to his conclusions. 1500 w. Elec Rev, Lond—April 16, 1897.

Quick-Charge Accumulators. M. Blanchon. Read before the Société Internationale des Electriciens. Describes the construction of the Tudor accumulator, showing what constitutes a "quick-charge" accumulator, considers the services it can render for electric traction, etc. 6000 w. Elect'n—Aug. 20, 1897.

**Regulating Devices.**—Accumulator-Regulating Devices. Illustrates and describes the Heath and Field system. 900 w. Elec Eng, Lond—Jan. 13, 1899.

**Ribbe.**—The Ribbe Accumulator. Illustrated description of an accumulator which the inventor claims to be especially adapted to the propulsion of cars or other vehicles. 1400 w. Eng, Lond—April 23, 1897.

The Ribbe Accumulator (Der Ribbe-Akkumulator). This new storage battery is constructed with perforated celluloid plates to support the paste in such a manner as to render the cells much less liable to injury by transportation or rough handling. 1200 w. Etektrochem. Zeitschr—May 1, 1898.

**"Shuttle."**—See **German and French.**

**Sussman Dry.**—See **INCANDESCENT LAMP—Sussman Mine.**

**Switch.**—Charging Storage Cells for Signalling Purposes. A. S. Hubbard. Illustrated description of a switch, which, operated by the starting and stopping of the dynamo, automatically changes the sets. 400 w. Elec Eng—Dec. 18, 1895.

See also **ELECTRIC SWITCH—Accumulators.**

**Switchboard.**—Storage-Battery Manipulation at the Boston Edison Station. An illustrated description of the method of switchboard manipulation. 900 w. Elec Wld—Dec. 14, 1895.

**Telegraph Work.**—C. P. R. Telegraph Storage Battery Plant at Ottawa. W. J. Camp. Illustrated description. 1500 w. Can Elec News—May, 1896.

The Generation of Current in the Main Telegraph Office at Stuttgart (Die Stromerzeugungsanlage im Stuttgarter Haupttelegraphenamt). G. Ritter & J. H. West. An elaborate account of the use of accumulator batteries at the Stuttgart telegraph office. Three articles. 7500 w. Elektrotech Zeitschr—Jan. 27, Feb. 3, 10, 1898.

The Installation of Accumulators at the Main Telegraph Office in Paris (Akkumulatoreneinrichtung auf dem Haupt Telegraphenamt in Paris). Since 1895, 11000 Calland cells have been replaced by Tudor, and Laurent-Cély storage batteries, of which full details are given. 3000 w. Elektrotech Zeitschr—March 18, 1897.

The Storage Battery in Telegraph Work. Maurice Barnett. The almost ideal application of storage batteries for telegraph and telephone stations, fire alarms, police telegraphs, burglar-alarm, and heat regulating systems. A discussion of their adaptation for this kind of work. Serial. Elec Wld—June 13, 1896.

The Storage Battery in Telegraph Work. Maurice Barnett. Discusses their lower first cost, their lower maintenance cost, the smaller floor space required by them and their more satisfactory performance in service. Ill. 2200 w. Am Elect'n—March, 1897.

**Telephone Exchange.**—The Storage Battery in Telephone Exchange. Illustrates and describes a very successful installation of the Bell Telephone Co., of Philadelphia. 8oo w. Elec Wld & Eng—Sept. 9, 1899.

**Temperature Coefficients.**—The Temperature Coefficients of Lead Accumulators (Ueber den Temperaturkoeffizienten des Bleiakkumulators. F Dolezalek. An experimental research, with tables and curves. 1200 w. Zeitschr f Elektrochemie—April 19, 1900.

**Tests.**—A Comparison Between Various Accumulators (Ueber die Vergleichende Darstellung von Akkumulatoren). P. Schoop & H Bendorf. A detailed account of comparative tests. Very fully tabulated data are given, this installment containing the results for the Baumgarten and the Gülcher accumulators. Serial. Elektrochem Zeitschr—Oct., 1898.

Notes on Accumulator Testing. Carl Hering. The object of the article is to point out some of the more important conditions under which tests are to be made, and to give hints regarding the carrying out of such tests. Serial. Elec Wld—Jan. 4, 1896.

Testing Secondary Cells. A review of some points of scientific interest, relating to secondary batteries brought out in a case tried recently in the London courts. 5000 w. Elec Plant—March 1, 1896.

**Theatre.**—The Use of the Storage Battery in the Theatre. On the advantages and adaptability of storage batteries. 1500 w. Am Elect'n—April, 1900.

**Theory.**—Contributions to the Theory of the Lead Accumulator. An account of rival theories of the reactions taking place in the ordinary lead accumulator. 1200 w. Elect'n—Oct. 30, 1896.

Note on the Theory of Lead Surfaces (Ein Beitrag sur Theorie des Bleisammlers). Discussing the chemical and electrical action of leaden plates in accumulators. 5000 w. Zeitschr f Elektrochemie—June 5, 1897.

Notes on the Theory of the Lead Accumulator (Beiträge des Bleikkumulators). F. Dolezalek. A mathematical discussion, taking into account the degree of concentration of the acid solution and its effect upon the electromotive force. 3000 w. Zeitschr f Elektrochemie—May 25, 1899.

On the Relation between the Heat Evolved and the E. M. F. Generated by Voltaic Action. Desmond G. FitzGerald. Considers the question in its bearings on the theory of lead reversible batteries. 3400 w. Elec Eng, Lond—Nov. 25, 1898.

The Theory of the Accumulator. Summary of an article in the "Elektrotechnische Rundschau," in which Prof. Hoppe, of Hamburg, applies the electro-chemical theory to accumulators. 2200 w. Elec Rev, Lond—Nov. 18, 1898.

**Traction.**—On Secondary Batteries for Electrical Locomotion. Desmond G. FitzGerald. The first part discusses the objections from weight in accumulators used for car propulsion and their application for the motive power of the heavier class of vehicles. Serial. Elec Rev, Lond—March 20, 1896.

Traction Accumulators—Law of Maximum Work. Law of Maximum Useful Work. Desmond G. FitzGerald. The opinions of the writer, with reasons. 1200 w. Elec Eng, Lond—Aug. 20, 1897.

See also **ACCUMULATOR TRAMWAY.**

**Tudor.**—The Manufacture of Tudor Accumulators. Illustrated detailed description. 1800 w. Elec Rev, Lond—Jan. 28, 1898.
See also **Rapid Charge.**

**Ventilation.**—See **ELECTRIC VEHICLE—Battery Ventilation.**

**Voltage Regulation.**—The Regulation of Storage Battery Voltage. Roderick Macrae. Illustrates and describes some of the methods employed in operating storage batteries on distributing mains, discussing the different arrangements. 2400 w. Elec Wld & Engr—March 24, 1900.

## ACCUMULATOR TRAMWAY.

See also **ACCUMULATOR—Electric Power Station; Traction.**

Accumulator Roads (Akkumulatorenbahnen). E. Hauswald. A description of the use of the Pollak accumulator system in Frankfort, with load diagram and details of cost and management. 1800 w. Elektrotech Zeitschr—Jan. 20, 1898.

Accumulator Traction on Rails and Ordinary Roads. L. Epstein. Part first reviews the causes that have delayed success in this field, and gives data concerning the system as applied at various places. Serial. Elec Eng, Lond—Nov. 12, 1897.

A Critique of Accumulator Traction. Abstract of a report, giving the conclusions of the deputation of the Blackpool Corporation on Continental Systems of Electric Traction. Conclusions favor the overhead trolley. 1600 w. Elect'n, Lond—April 29, 1898.

Application of the Storage Battery to Electric Traction. Charles Hewitt. Read before the American Street Railway Assn. The full paper with discussion. Discusses the application of the battery direct to car or locomotive, to the ends of long lines, and to the power-house. Ill. 8000 w. St Ry Rev—Nov. 15, 1897.

Application of the Storage Battery to Electric Traction. Charles Hewitt. Extracts from a paper read at the American Street Railway Assn. Reviews the most important applications of the storage battery to electric traction. 2800 w. Elec Wld—Oct. 23, 1897.

Present Position of Accumulator Traction. M. Van Loenen-Martinet. A report read at the meeting of the Permanent International Tramways Union, held at Geneva, upon the question: "What progress has been made in accumulator traction?" 1700 w. Ry Wld—Sept. 8, 1898.

Storage Battery Railroading. E. R. Gilbert. Considers the advantages and disadvantages of this system in comparison with other means of propulsion. 1800 w. St Ry Rev—July 15, 1898.

Storage Battery Traction. J. Sarcia. The first number treats of recovery of energy, and calculation of the traction coefficient. From "L'Industrie Electrique." Serial. Elec Ry Gaz—Dec. 28, 1895.

The Storage Battery for Street Car Traction. A protest from storage battery people against an article in the September number of this paper. 2200 w. St Ry Rev—Jan. 15, 1896.

Traction by Accumulators. An abstract of an article published in the "Elektrotechnische Anzeiger," describing some experiments made with a tramcar propelled by accumulators. Ill. 1300 w. Elec Rev, Lond—May 14, 1897.

**Berlin-Charlottenburg.**—Watt-Hour Measurements on the Motive Power of the Berlin-Charlottenburg Tramway (Wattstundenmessungen an den Betriebsmitteln der Berlin-Charlottenburger Strassenbahn). Max Schiemann. A very full account of tests made on an accumulator system, measuring the watt-hours used, and also the capacity of the accumulators. 5000 w. Elektrotech Zeitschr—Oct. 6, 1898.

**Birmingham, Eng.**—Storage Battery Traction at Birmingham. Described as being quite satisfactory to the public and very unprofitable to the companies. 600 w. Ry Wld—April, 1896.

**Bremerhaven.**—Electric Tramways and Automobiles in Bremerhaven (Elektrische Strassenbahn in Bremerhaven und Elektrische Automobilen). Dr. Sieg. Discussing mainly the use of storage batteries both for tramway and automobile service. 5000 w. Elektrotech Zeitschr—May 11, 1899.

**Chicago.**—Electric Storage Battery Cars on the Englewood and Chicago Electric Railway. An account of the railway which employs this system exclusively. Ill. 3300 w. Eng News—Jan. 6, 1898.

Englewood and Chicago Electric Storage Battery Road. George A. Damon. History and illustrated description of a road now attracting much attention, as it is the first one in this country to have an equipment especially designed for the use of this system. 4500 w. W Elect'n—Aug. 7, 1897.

Tests of a Storage Battery Electric Railway Power Plant. An account of tests of the power plant and batteries of the Englewood & Chicago Electric Ry., made by George A. Damon. 3000 w. Eng News—Feb. 3, 1898.

Test of the Chicago Storage Battery Road. A brief sketch of the history of the company and description of the equipment, with account of test. Ill. 6800 w. St Ry Rev—Feb. 15, 1898.

The Englewood & Chicago Storage Battery Line. An account of a successful storage battery line which has been in operation more than two years. Ill. 1800 w. St Ry Jour—Sept., 1899.

The Englewood and Chicago Storage Battery Railway. Illustrated description of a road recently put into operation. 1700 w. Elec Eng—Dec. 2, 1896.

**Cologne.**—Accumulator Traction in Cologne. C. H. Biggs, Jr. Information relating to the proposed change of power on what is said to be the best paying line in Germany. 1000 w. Elec Eng, Lond—Oct. 29, 1897.

**Germany.**—Accumulator Tramways (Ueber Akkumulatorenbahnen). A paper before the Electrotechnical Society of Cologne, dealing mainly with the commercial results of the use of storage batteries on various German tramways. 5000 w. Elektrotech Zeitschr—April 1, 1897.

**Ghent.**—Accumulator Driving on the Electric Street Railway in Ghent (Akkumulatorenbetrieb der Elektrischen Strassenbahn zu Ghent). J. Zacharias. With a general description of the method of charging the batteries, and details of the working of the plant. There are 38 motor cars and 22 miles of track. 1500 w. Elektrotech Zeitschr—July 6, 1899.

**New York.**—The New Storage Battery Cars on the Madison Avenue Line, New York. Description of the batteries, their location and handling, shifting devices, etc. Also brief descriptions of the car bodies, truck, controller and the generating plant. Ill. 2200 w. Elec Eng—Nov. 27, 1896.

**Paris.**—Electric Traction in Paris. L. Bayly. Brief illustrated description of the Madeleine-Courbevoie line, the cars being operated by the accumulator system. 1200 w. Elec Rev, N. Y.—Aug. 17, 1898.

**Test Car.**—Experiments with an Accumulator Test Car, with Shunt Motors and Improved Regulator. (Versuchsfahrten mit einem Akkumulatorenwagen mit Nebenschlussmotoren und einem Neuen Steuerapparat). E. G. Fischinger. With elaborate power diagrams and detailed drawings of the controller system. 2500 w. Elektrotech Zeitschr—March 24, 1898.

### ACCURACY.

See also **EXPERIMENTAL ERROR.**

Accuracy. Editorial dealing with the degree of accuracy most desirable in mechanical construction, viewed beth from the standpoint of the purchaser and the manufacturer. 2200 w. Eng, Lond—Jan. 24, 1896.

### ACETIC ACID.

The Manufacture of Acetic Acid (La Fabrication de l'Acide Acetique). Fr. Miron. Describing the technological details of the process of obtaining acetic acid, methylic alcohol, acetone, creosote, and gaiacol by the distillation of wood. Serial. La Revue Technique—March 10, 1898.

### ACETYLENE.

See also **CALCIUM CARBIDE; GAS LIGHTING.**

Acetylene. A brief review of what has been learned regarding the manufacture and use, and of the work to which it has been satisfactorily applied. 1400 w. Builder—Nov. 25, 1899.

Acetylene. A discussion of the properties, its dangerous qualities and advantages as an illuminant. 1200 w. Fire and Water—March 6, 1897.

Acetylene. A discussion of progress made with this illuminant, the researches made at Pintsch's gas works at Berlin and Fürstenwalde, trouble with the burners, etc. Ill. 3800 w. Engng—March 17, 1899.

Acetylene (Acétylène). Illustrated description of the improved acetylene generator of the "Société Internationale de l'Acétylène," with data as to the advantages of this illuminant, both for train lighting and stationary service. 1500 w. La Revue Technique—Feb. 25, 1898.

Acetylene. Vivian B. Lewes. Abstract of a lecture delivered at the London Institution. Reviews the history of the commercial formation of calcic carbide, describes the process of manufacture, the apparatus for generating acetylene and the difficulties in its utilization. 2800 w. Jour of Gas Lgt—Nov. 30, 1897.

Acetylene. Vivian B. Lewes. A series of 4 Cantor lectures. Gives the history of this gas, its analysis, properties, experiments, etc. 20000 w. 4 parts. Jour Soc of Arts—Dec. 23 and 30, 1898, Jan. 6 and 13, 1899.

Acetylene. W. W. Goodwin. Lecture delivered at 23d Annual Meeting of Am. Gas Lgt. Assn. Illustrated by experiments; cuts of apparatus and descriptions are given. The method of generating carbide of calcium, apparatus for decomposing the carbide, and showing its illuminating power, and the cost of its commercial production are presented. Discussion. 5000 w. Am Gas Lgt Jour—Nov. 11, 1895.

Acetylene. W. H. Tozer. Describes the gas and its production from calcic carbide, and considers its prospects. 2000 w. Prac Eng—March 4, 1898.

Acetylene. The story of the discovery, with some consideration of its value. 1300 w. New Sci Rev—Jan., 1896.

Acetylene and Its Applications (L'Acétylène et ses Applications). M. E. Hubon. An extended review of the present status of lighting by acetylene, including descriptions of generators, burners and other appliances. 10000 w. Soc Ing Civ de France—Feb., 1899.

Acetylene and its Importance as an Illuminating Material (Das Acetylen und seine Bedeutung als Beleuchtungsmittel). Dr. Karl Thomae. A discussion of the chemistry of acetylene and a description of its progress, especially on the Continent. Two articles. 7000 w. Zeitschr d Ver Deutscher Ing—April 30, May 7, 1898.

Acetylene and Its Modern Developments. Vivian B. Lewes. Read at Belfast meeting of the Incorporated Gas Inst. Considers the production, cost and utility of acetylene, discussing the generators, burners, dangers, etc., and its present standing. Discussion. 11400 w. Gas Wld—June 25, 1898.

Acetylene the New Illuminant. V. J. Youmans. General review of progress in the manufacture and use of acetylene as an illuminant. 3000 w. Pop Sci M—Oct., 1896.

Acetylene Gas. An abstract of an article on this subject appearing in the "N. Y. World," of Jan. 26, with brief notice of a paper on the same subject by Prof. Crafts. 2000 w. Elec Wld—Feb. 1, 1896.

Acetylene Gas. Walter R. Addicks. Describes the manufacture of calcium carbide as carried out at Spray, N. C. Considers the qualities of the product, and the possibilities, as well as practicabilities of acetylene as a factor in the manufacture of gas. 10000 w. Am Gas Lgt Jour—March 9, 1896.

Acetylene Gas. George Black. A general essay, historical and descriptive. 3800 w. Can Elec News—July, 1896.

Acetylene Gas. Vivian B. Lewes. Reviews the history of its discovery, its properties, methods of production, etc. 5400 w. Ill. Car and Build—Feb. 10, 1899.

Acetylene Gas for Lighting. H. L. Tyler. Considers the candle power, generation and cost. Also gives tables, useful in estimating the expense of lighting by acetylene. 1200 w. Dom Engng—Sept., 1899.

Acetylene Gas: Its Generation and Use. Thomas Glover. Read before the Midland Assn. of Gas Managers. Refers to the manufacture, makes a comparison of cost as a supply for light and heat, describes generating apparatus, etc. 1800 w. Gas Wld—Feb. 26, 1898.

Aceytlene Gas, the New Illuminant. C. T. Marshall. Read at meeting of the Northern Arch. Assn., Newcastle, Eng. Brief history of the gas and its generation. 2400 w. Arch, Lond—March 11, 1898.

Acetylene Gas. Information derived from sources believed to be reliable. Partly abstracted from a pamphlet issued by the Acetylene Illuminating Co. History and causes of danger. 1300 w. Eng, Lond—Dec. 11, 1896.

Acetylene Lighting. F. Cortez Wilson. Read before the Chicago Architects' Club. An outline of facts that have been determined in connection with acetylene lighting. 3300 w. San Plumb—Dec. 1, 1899.

A Lecture upon Acetylene. J. M. Crafts. Delivered before the Soc. of Arts at Boston. Treats of its value as an illuminant; danger in use of liquefied acetylene; temperature of the flame; explosiveness, etc. 9000 w. Science—March 13, 1896.

A Sober Account of Acetylene. A favorable review of work by William E. Gibbs, entitled "Lighting by Acetylene. Generators, Burners and Electric Furnaces." 1100 w. Jour Gas Lgt—Aug. 23, 1898.

Calcium Carbide and Acetylene Gas. Consular reports from C. H. Day, of Berlin, and Consul-General Mason, of Frankfort. Gives history of calcium carbide, its production and properties, and discusses the use of acetylene gas. 3800 w. Cons Reports—Nov., 1897.

Carbide of Calcium and Acetylene. Discusses the prospects for producing acetylene at an economical rate and gives illustrations and explains the construction of various electric furnaces. 3000 w. Eng, Lond—Jan. 15, 1897.

Further Communications on Acetylene (Einige weitere Mittheilungen über Acetylen). A paper and discussion by Inspector Leissner and others before the German Society of Mechanical Engineers, including the apparatus for the production of the carbide of calcium, and the reduction of cost and danger. 7500 w. Glaser's Annalen—March 15, 1897.

Practical Use of Acetylene. W. W. Goodwin. The employment of acetylene as an enricher is reviewed favorably and the conclusions of Prof. Vivian B. Lewes on the subject are adversely criticised. 2700 w. Am Gas Lgt Jour—June 1, 1896.

Recent Research on Acetylene. G. E. Brown. Abstract of three papers by H. G. Söderbaum on his experiments with acetylene. 1100 w. Pro Age—July 15, 1897.

Some Facts About Acetylene Gas. John C. McMynn. Read before the Northwestern Electrical Assn., Milwaukee. Followed by an abstract of the discussion. 3000 w. Elec Rev—Jan. 29, 1896.

Some Theoretical Aspects of Acetylene Manufacture. Calls attention to the great interest taken in this new illuminant, and the promising future awaiting it, considering briefly the chemical phenomena and reactions taking place during the decomposition of the carbide. 2700 w. Engr, Lond—June 24, 1898.

The Generation and Use of Acetylene. Concerning the appliances required for a complete acetylene installation, and the precautions to be observed in its erection. Ill. 2500 w. Builder—March 3, 1900.

The History, Status, and Possibilities of Acetylene. Henry Harrison Suplee. Showing that greater economy of production is alone needed to make acetylene a competitor of gas. 4400 w. Eng Mag—Aug., 1897.

The New Gaseous Illuminant, Acetylene, and Its Source of Production, Calcium Carbide. An account of the discovery of acetylene, its nature, cost, efficiency of any process, etc. 2500 w. Ind and East Engr—March, 1900.

The Present Position of Acetylene Lighting. Abstract translation of a lecture by Dr. Paul Wolff, of Berlin, published in "Zeitschrift für Angewandte Chemie." Part first considers cost of production, the difficulties to overcome, cause of explosions, etc. Serial. Jour Gas Lgt—Nov. 8, 1898.

The Real Value of Acetylene as an Illuminant. Gives a comparison of different illuminants as regards cost, illuminating power, and hygienic effect. 3300 w. Engr, Lond—March 31, 1899.

The Truth About Acetylene Gas. Albert Stetson. Severely criticising the statements made in the paper read by John C. McMynn. 2800 w. Elec—Feb. 12, 1896.

The Use of Acetylene. A. H. Mulliken. Abstract of a paper read before the Fire Underwriters' Assn. of the Northwest, at Chicago. Arguing that it is not a dangerous gas, and will surely find its place. 1300 w. W Elect'n—Oct. 9, 1897.

The Use of Acetylene. Edward Renouf. Gives a review of the progress of this illuminant during the last five years, and predicts that acetylene will soon be a factor in giving an improved and cheaper light. Ill. 5200 w. Ap Pop Sci M—July, 1899.

The Utilization of Acetylene. A review of the advantages and limitations of acetylene and a discussion of the position the calcium-carbide industry may hope to gain. 2500 w. Engr, Lond—Aug. 19, 1898.

**Alcohol.**—See **ALCOHOL—Acetylene.**

**Alcohol Incandescent Compared.**—Lighting with Acetylene and Spirit Incandescent Lamps (Ueber Acetylen-und Spiritus-Glühlicht-Beleuchtung). A paper by Herr Gerdes, before the Society of Mechanical Engineers, comparing actetylene with the light from alcohol incandescent lamps; with discussion. 3000 w. Glaser's Annalen—Feb. 15, 1898.

**Analysis.**—The Technical Analysis of Calcium Carbide and Acetylene and the Purifying of the Latter. G. Lunge and Edward Cedercreutz. from the "Zeitschrift für Angewandte Chemie." Gives the method proposed by the authors to determine analytically, the possible 4 per cent. of impurities in acetylene. 2000 w. Pro Age—Dec. 15, 1897.

The Technical Analysis of Calcium Carbide and Acetylene and the Purifying of the Latter. G. Lunge and Edward Cedercreutz. Gives method proposed by the authors to determine, analytically, the possible 4 per cent. of impurities in acetylene. 1800 w. Gas Wld—Jan. 1, 1898.

**Apparatus.**—Acetylene Apparatus. T. O'Conor Sloane. Illustrated detailed description of apparatus and method of using it. 2800 w. Sci Am Sup—April 4, 1896.

See also **ACETYLENE GENERATOR.**

**Austrian Engineers' Report.**—Report upon Acetylene Gas (Bericht über den Corporativen Besuch der von der Acetylengas-Gesellschaft Veranstalteten Demonstration). A report of the visit of a committee of the Society of Austrian Engineers to an exhibition of acetylene gas. With illustrations of generators, etc. 2500 w. Zeitsch d Oesterr Ing u Arch Ver—Feb. 26, 1897.

**Automobiles.**—See **AUTOMOBILE—Acetylene.**

**Bicycle Lamp.**—An Acetylene Gas Lamp for Bicycles. Illustrated description of lamp made by the George H. Clowes Mfg Co., of Waterbury, Conn. 700 w. Sci Am—Nov. 13, 1897.

**Car Lighting.**—See **CAR LIGHTING—Acetylene.**

**College Buildings.**—Illumination of College Buildings by Acetylene. Orrin E. Dunlap. Brief account of the adoption of this syestem of lighting by the Niagara University and Seminary of Our Lady of Angels. Ill. 450 w. W Elec—Aug. 21, 1897.

**Commercial.**—Acetylene Gas Considered Commercially. Horace Allen. Discusses the possible reduction of cost by the use of blast-furnace gas in the production of calcium carbide. 1300 w. Elec. Rev, Lond—Jan. 5, 1900.

**Copper Oxides.**—The Action of Acetylene on the Oxides of Copper. F. A. Gooch and De Forest Baldwin. A report of investigations. 1800 w. Am Jour of Sci—Nov., 1899.

**Cost.**—A Discussion of Certain Recent Data on the Cost of Acetylene and Calcium Carbide. W. H. Birchmore. Review of the report of experts sent by "Progressive Age" to investigate the calcium carbide, in which appears to be implied a disingenuous intention on the part of those in interest toward the public, and the accuracy of the figures given by the committee are questioned as not representing average conditions. 3400 w. Am Gas Lgt Jour—May 25, 1896.

The Acetylene Mystery. Criticism of the claims of the various acetylene companies, especially on the cost of producing calcium carbide. 2500 w. Eng & Min Jour—Jan. 18, 1896.

**Dangers.**—See **Explosive Properties.**

**Drawbacks.**—Some Drawbacks to the Use of Acetylene. J. Verters, in "Chem. Zeitung." Calls attention to various inconveniences. 900 w. Sci Am—Sept. 23, 1899.

**Electricity and Gas Compared.**—Commercial Value of Acetylene Gas as an Illuminant. T. A. Ferguson. Extract from a paper read before the National Electric Light Assn. An estimate of the minimum cost of electric lighting, leads the author to the conclusion that acetylene is not likely to prove a successful rival either of the incandescent gas light, or the electric light. 2000 w. Eng News—May 14, 1896.

**Enemies.**—Some Enemies of Acetylene. Discusses ill-designed generators, and other things which have been of harm to this industry. 2500 w. Engr, Lond—April 27, 1900.

Some More Enemies of Acetylene. Further discussion of generators and the use of acetylene. 3200 w. Engr, Lond—June 1, 1900.

**Enriching Gas.**—Use of Acetylene for Enriching Gas Produced from Lean Coals. T. Vautier. Presented at the convention of the Société Technique de l'Industrie du Gas. Describes a series of tests upon coals which produce a gas having a yield of less than 3.6 cubic feet per carcel hour, or .5 cubic feet per candle hour. 3300 w. Pro Age—Dec. 1, 1897.

**Ethylene.**—Acetylene v. Ethylene. An explanation of the present state of knowledge on the subject of carbides and the gas ethylene, with a comparison of its illuminationg power with acetylene. 1500 w. Engr, Lond—Dec. 16, 1898.

**Exhibition Committee Report.**—Report of the Acetylene Exhibition Committee. A review of this report and statements concerning its value to those interested in the conditions of safety in acetylene generators. 1300 w. Engr, Lond—March 3, 1899.

**Explosive Properties.**—Acetylene and Its Liability to Explosion (Das Acetylen und seine Explosions Gefährlichkeit). A paper by Dr. Slaby before the Society of Railway Engineers, showing that with reasonable care, explosions need not occur. 2000 w. Glaser's Annalen—April 1, 1897.

Acetylene as an Explosive. A timely account of explosions and accidents with acetylene, which emphasizes the care needed in handling this material. 1800 w. Eng, Lond—Oct. 23, 1896.

Acetylene Gas Considered from the Firemen's Standpoint. William McDavitt. From an address at Syracuse, N. Y., convention. Describes the dangerous properties of calcium carbide, and the way to extinguish a fire caused by it. 1400 w. San Plumb—Oct. 2, 1899.

Acetylene Explosions. Surveys some of the principal accidents that have occurred, discussing the cause, and giving information. 1800 w. Sci Am—Feb. 5, 1898.

Acetylene from the Underwriters' Standpoint. E. B. Shuttleworth. Report submitted as the result of study of the manufacture and use of acetylene. Considers manufacture, storage and carriage of calcium carbide; manufacture of acetylene at low pressure; use of low pressure acetylene for illuminating purposes; use of compresses or liquefied acetylene for illuminating purposes. 5000 w. Can Eng—Jan., 1898.

Acetylene Safer Than Most Other Illuminants. H. F. Fuller. States facts to prove its safety, especially from an insurance point of view. 1000 w. Dom Engng—June, 1899.

Dangers in the Generation and Use of Acetylene (Ueber die Gefahren bei der Erzeugung und Verwendung von Acetylen). Dr. H. Gerdes. An account of the experiments made at the Pintsch works at Berlin, showing that with reasonable precautions no serious dangers need be incurred. The use of mixed acetylene and oil-gas for lighting railway carriages is discussed. 6000 w. Glaser's Annalen—Sept. 15, 1898.

On the Products of the Explosion of Acetylene. W. G. Mixter. An illustrated account of experiments made to obtain facts for or against the hypothesis that a sufficient frequency of molecular impacts is requisite to secure spread of explosive change throughout a gas. 2200 w. Am Jour of Sci—Jan., 1900.

On the Rapidity of Detonation of Acetylene (Sur la Vitesse de Détonation de l'Acétylène). MM. Berthelot and Le Chatelier. A communication to the French Academy giving the results of experiments upon the rate of propagation of igniton at pressures from 5 to 30 atmospheres. 3000 w. Comptes Rendus—Aug. 28, 1899.

Protection to Workingmen in Germany (Die Wirkung der Deutschen Arbeiterversicherung). Report of a standing committee of the Workingmen's Beneficial Society. Contains a special investigation of the dangers of acetylene and the reasonable precautions for its safe handling. Two articles. 3500 w. Gesundheits Ingenieur—April 30, May 15, 1897.

Risks in the Use of Calcium Carbide and Acetylene. E. V. French. Report prepared for the Boston Manufacturers' Mutual Fire Insurance Co. 1000 w. Eng News—Feb. 23, 1899.

Solutions of Acetylene and Their Explosive Properties. Messrs. Berthelot and Vieille. Read before the Academie des Sciences, Paris. A study of the properties of acetylene solutions. 2500 w. Pro Age—Sept. 1, 1897.

Studies of the Explosive Properties of Acetylene. Messrs. Berthelot and Vieille. Extracts from the proceedings of the Academie des Sciences. A study of the precise conditions under which the explosive properties were susceptible of manifesting themselves. 2200 w. Pro Age—Dec. 1, 1896.

The Acetylene Gas Hazard. L. J. Krom. Contending that acetylene is no more dangerous than ordinary illuminating gas, and discussing the restrictions of proposed legislation, giving results of experiments. 1100 w. Sci Am—Oct. 8, 1898.

The Dangers of Acetylene. M. Ad. Bouvier. Read before the Société Technique du Gaz. Abstract, discussing the properties, risks and safeguards. 1400 w. Gas Wld—July 9, 1898.

The Explosibility of Acetylene at Low Temperatures (Sur l'Explosibilité de l'Acétylène aux Basses Temperatures). G. Claude. A note showing great solubility of acetylene in acetone when a low temperature is maintained, and also the freedom from explosition under such conditions. 600 w. Comptes Rendus—Jan. 30, 1899.

The Explosive Side of Acetylene. Frederick H. McGahie. An account of some cases studied to determine the limits to avoid dangerous or uneconomic conditions. 1700 w. Sci Am—Jan. 6, 1900.

The Explosive Side of Acetylene. Frederick H. McGahie. On the explosive limits and the conditions under which acetylene can be used with safety. 2800 w. Sci Am Sup—Dec. 2, 1899.

The Explosiveness of Acetylene when Mixed with Inert Gases (Sur l'Aptitude de l'Acétylène Mélange à des Gas Inertes). MM. Berthelot and Vieille. A very full account of the further researches of these distinguished investigators, showing the influence of the composition of the diluting gas. An important paper. 4000 w. Comptes Rendus—March 27, 1899.

The Fire Hazard of Acetylene. Present Attitude of fire underwriters toward the employment of acetylene. The liability to explosions is considered as a special fire hazard, etc. Abstract of an article in "Am. Exch. and Review." 600 w. Am Gas Lgt Jour—April 27, 1896.

See also **ACETYLENE EXPLOSION.**

**Fire Hazard.**—See **Explosive Properties.**

**Flame Temperature.**—See **FLAME —Temperature.**

**Generation.**—Acetylene. George French. An exposition of the wet process. 1500 w. Heat and Ven—Oct. 15, 1898.

The Best Method of Generating Acetylene; Water to Carbide, or Carbide to Water? J. A. Painchaud. Discusses the plunge system, and the sprinkling and immersion systems, advocating the carbide to water generators. 1000 w. Ir Age—Oct. 25, 1900.

See also **ACETYLENE GENERATOR.**

**Generator.**—Automatic Generators of Acetylene (Générateurs Automatiques d'Acétylène). Illustrated description of improved acetylene generator; also apparatus for generating the gas as needed for immediate use. 1000 w. La Génie Moderne—Feb. 15, 1897.

**German Chemists.**—A German Conference on Acetylene. A summary, compiled from the "Journal für Gasbeleuchtung" of the conference proceedings of the German Society of Chem. Ind., giving the precautions considered necessary. 1500 w. Jour Gas Lgt—March 23, 1897.

German Chemists Discuss Acetylene. Report of discussion of the Berlin Chemical Industrial Society. 1500 w. Gas Wld—April 3, 1897.

**Hawes, Yorkshire.**—Acetylene Gas Lighting at Hawes. Describes a public scheme of lighting by acetylene gas successfully carried out in a small market town. 700 w. Engr., Lond—Oct. 13, 1899.

**Hygienic Aspect.**—Acetylene from a Hygienic Standpoint (Acetylen vom Hygienischen Standpunkte). Josef Vértess. An investigation of the products of combustion of acetylene with especial reference to their effect upon health. Pure acetylene is found very satisfactory in this respect. 2500 w. Gesundheits Ingenieur—July 31, 1898.

The Hygienic Aspect of Acetylene. Translated and condensed from a paper read before the Academy of Medicine, Paris. Some points concerning its excellence as an illuminant, the circumstances under which it is explosible, etc. 900 w. Plumb and Dec—Feb. 1, 1899.

**Industry.**—Progress in the Acetylene Gas Industry. John B. C. Kershaw. Considers the advance made in the generation and purification of acetylene and the progress in its utilization. 2200 w. Elec Rev, Lond—Oct. 6, 1899.

The Calcium Carbide and Acetylene Gas Industries. John B. C. Kershaw. Cautionary remarks, giving information concerning the production and utilization. 2000 w. Elec Rev, Lond—July 7, 1899.

The Present State of the Acetylene and Carbide Industry (Ueber den Heutigen Stand der Acetylen und Carbid Industrie). Victor Berdenich. Paper read before the Oesterr Ingenieur und Architekten-Verein, giving an account of the present state of the art in Europe. 5500 w. Zeitsch d Oest Ing u Arch Ver—April 13, 1900.

The Present Status of the Acetylene Industry (Ueber den Jetzigen Stand der Acetylen-Technik). A general review of the various methods of generating acetylene now in use, together with the conditions of safe and economical use. Three articles. 3500 w. Schweizerische Bauzeitung—June 10, 17, 24, 1899.

**Ireland.**—The Future of Acetylene. Interesting evidence given by Thomas Holliday, chemist and engineer, before a select committee of the House of Commons, in support of the Irish Industries Bill, and advocating Ireland as a center for this industry. 2200 w. Gas Wld—April 17, 1897.

**Lamp.**—Letang & Serpollet's Acetylene Lamp. A. Etançon, in "La Nature." Illustrated description of the lamp, manner of charging and cost of light. 1200 w. Sci Am Sup—May 1, 1897.

See also **ACETYLENE GENERATOR—Camp & Mareschal.**

**Liquid.**—Acetylene. Objections to use of acetylene in the liquid form. 500 w. Eng Rec—Feb. 8, 1896.

**Metallic Derivatives.**—Researches upon the Metallic Derivatives of Acetylene (Recherches sur les Dérivès Métalliques de l'Acétylène). MM. Berthelot and Delépine. An important communication to the French Academy, giving the detaidel results of a long series of experiments. 5000 w. Comptes Rendus—Aug. 14, 1899.

**Mine Illuminant.**—Acetylene Gas as a Mine Illuminant. A. Holland. Abstract of an address before the Can. Min. Inst. Reports the use in the Grand Calumet Silver Lead Mine, and states its advantages as a mine illuminant. 1300 w. Ir and Coal Trds Rev—April 28, 1899.

**Miners' Lamps.**—Acetylene Lamps for Miners' Use. K. Baumgartner, in "Allgemeine Bergmännische Zeitschrift." Illustrates and describes a lamp made by the Velo Company, of Dresden-Löbtau. States the advantages and disadvantages. 1200 w. Col Guard—Feb. 23, 1900.

**Niagara Falls.**—Illumination of Niagara Falls. Illustrated description of the lighting by acetylene gas. 700 w. W Elec—July 24, 1897.

**Oliva, Prussia.**—The Municipal Acetylene Plant at Oliva (Die Acetylen Stadtanlagen in Oliva). Dr. Paul Wolff. A description of a municipal plant for a small town in Eastern Prussia, with illustrations of the generating house and piping. Ill. 1800 w. Zeitschr f Klein u Strassenbahnen—Jan. 16, 1899.

**Patents.**—The Patent Side of Acetylene Gas. Information from a circular bearing on the patents owned by the Electro Gas Company of New York. 3200 w. Pro Age—July 15, 1897.

**Poisonous Action.**—On the Poisonous Action of Acetylene. M. N. Grehant, in "Comptes Rendus." Comparative experiments supporting the conclusion that illuminating gas is much more poisonous than acetylene. 800 w. Elec Eng—Dec. 11, 1895.

On the Poisonous Properties of Acetylene. Dr. Rudolf Rosemann. From the "Journal of the Pharmacological Inst. of the University of Greifswald." Describes minutely, from notes of observations made at frequent intervals, the effects of acetylene upon vital functions, when inhaled by animals. Twelve experiments were made. In one of these, thirty-two observations were taken of the vital conditions of the animal, before death was produced. 7000 w. Pro Age—March 1, 1896.

The Physiological Action of Acetylene. W. H. Birchmore. General conclusions deduced from experiments bearing upon the amount of the gas that can be diffused in the air of a room without perception by the senses; the amount required to produce headache; and the amount and time required to produce a fatal effect. 1200 w. Elec Eng—Nov. 13, 1895.

Note on the Use of Acetylene Gas as an Illuminant for Polariscope Work. H. W. Wiley. Contributed by the Chemical Laboratory of the U. S. Dept. of Agriculture, to the Washington Section of the Amer. Chem. Soc. 800 w. Pro Age—March 16, 1896.

Note on the Use of Acetylene Gas as an Illuminant for Polariscope Work. H. W. Wiley. Account of an experimental examination into the application of this illuminant to polariscopic work, resulting favorably to its usefulness. 700 w. Jour of Am Chem Soc—Feb., 1896.

**Properties.**—Some of the Properties of Acetylene Gas. An abstract translation of a paper read at Paris, by the French engineer Bouvier, which discusses some acetylene accidents and gives interesting data. 1700 w. Sci Am—Sept. 3, 1898.

**Purification.**—The Chloride of Lime Process for the Purification of Acetylene. F. B. Ahrens, in "Zeitschrift für Angewandte Chemie." Abstract translation. The objectionable behavior of chloride of lime as a purifying agent and the reasons, and its efficiency. 900 w. Jour Gas Lgt—Sept. 19, 1899.

The Purification of Acetylene. Shows the need of purification and briefly explains Dr. Wolff's scheme, which is considered practical and efficient. 900 w. Jour Gas Lgt—June 14, 1898.

Some Facts About Purification of Acetylene Gas. Theodore Kautney. Read before the International Acetylene Assn. Shows that most of the troubles arises from impurties, and that getting rid of them will give a gas of superior quality. 1500 w. Dom Engng—Sept. 15, 1900.

The Purification of Acetylene by Means of Chloride of Lime. Discusses the necessity of purification, the methods, and results. 2500 w. Engr, Lond—Nov. 3, 1899.

**Railway Lighting.**—A Description of Acetylene Gas Plant. C. B. Outon. Describes an apparatus of the writer's construction which has recently been erected at one of the Great Southern and Western Railway stations and used with success. Read before the North of Ireland Assn. of Gas Managers. 700 w. Gas Wld—Aug. 14, 1897.

The Application of Acetylene Lighting to Railway Purposes (Die Anwendung der Acetylenbeleuchtung für Eisenbahnzwecke). Dr. Paul Wolff. A description of the installation of the Pictet-Wolff apparatus at the Schlachtensee Railway Station in Berlin. Ill. 3000 w. Zeitschr f Klein u Strassenbahnen—Oct. 16, 1899.

The Use of Acetylene in Railway Station and Train Lighting. A. Lipschutz. Describes its use for station lighting and gives details of a plant in practice. Also considers its adaptability to train lighting. 6500 w. Jour Assn of Engng Socs—June, 1900.

See also **CAR LIGHTING.—Acetylene.**

**Raising Sunken Vessels.**—See **WRECKING—Acetylene.**

**Regulations, Berlin.**—Regulations for Acetylene Lighting at Berlin. Translated from the "Zeitschrift für Beleuchtungswesen. Regulations relative to the production and use, for employers, and workmen in other than large works. 1500 w. Pro Age—Jan. 1, 1898.

**Regulations, England.**—Restrictions Placed on Carbide of Calcium in England. Notification issued by the English Home Office regarding the keeping of carbide of calcium. 700 w. Pro Age—April 1, 1897.

**Regulations, New York.**—Acetylene Regulations and Insurance. Copy of the regulations recently adopted by the fire department of New York City, for the transportation, sale and use of calcium carbide. 1200 w. Met Work—Dec. 10, 1898.

Acetylene Regulations for New York. Requirements of the N. Y. Board of Fire Underwriters for the installation of acetylene gas generators and for the storage of a limited supply of calcium carbide. 900 w. Pro Age—March 1, 1898.

**Schönsee.**—An Acetylene Gas Plant. Describes a municipal plant at Schönsee, Prussia, designed to supply 2000 burners. 900 w. Eng Rec—Oct. 21, 1899.

The Acetylene Plant for Lighting the Town of Schönsee (Die Acetylen-Centrale für die Beleuchtung von Schönsee). Paul Wolff. A detailed description of this small municipal plant of 1000 burners' capacity, showing the arrangement of generators, purifiers and distribution. 5000 w. Glaser's Annalen—June 1, 1899.

**Shipboard.**—Acetylene on Board Ships. Vivian B. Lewes. Report of a lecture delivered before the Inst. of Naval Archt's. Considers the uses to which it could be put, and the factor of danger. 1200 w. Gas Wld—April 10, 1897.

**Solution.**—Acetylene Solution (L'Acétylène Dissous) A proposition to dissolve acetylene gas in liquid acetone, the latter being obtained by calcination of acetate of lime. The gas in solution under pressure to be served to customers in siphons similar to those used for carbonated waters. 1000 w. La Revue Technique—March 25, 1897.

**Standard Light.**—See **PHOTOMETRY—Acetylene Standard.**

**Storage.**—The Storage of Calcium Carbide and Acetylene. Editorial from "London Chemical Trade Journal." Gives classification and reviews the position showing that calcium carbide is safe, compressed acetylene gas practically so, while liquid acetylene requires care in handling. 1300 w. Pro Age—March 1, 1897.

**Technology.**—The Techonology of Acetylene. Review of a book by Vivian B. Lewes. 3800 w. Jour Gas Lgt—Aug. 21, 1900.

**Town Lighting.**—Town Lighting with Acetylene. Results at Wabash (Ind.), New Milford (Conn.), Milford (Pa.), and Cowdenbeath (Scotland), are given. Ill. 2800 w. Pro Age—Dec. 1, 1898.

**Underwriters' Rules.**—The Fire Underwriters' Rules for Safe Introduction of Acetylene Gas Generators. Charles A. Hexamer. A copy of the rules, with introductory remarks. 1800 w. Jour Fr Inst—April, 1899.

**Vienna.**—Acetylene Lighting at Vienna. From "Journal für Gasbeleuchtung." Describes the arrangement for lighting the Franzenplatzes both by illuminating gas and acetylene. Ill. 700 w. Pro Age—March 15, 1898.

**Volume.**—Cubic Feet of Acetylene to a Pound of Carbide. H. F. Fuller. An explanation of the theoretical combination and the calculations by which it is ascertained that the most acetylene that can be obtained from one pound of carbide is 5.584 cubic feet. Serial. Dom Engng—Jan., 1899.

**Wabash, Ind.**—The Acetylene Installation for Lighting the City of Wabash, Ind. Brief account of a plant that is to replace the artificial gas system. The gas is piped through the streets and sold by meter, and is thus far a success. 1000 w. Am Gas Lgt Jour—Nov. 28, 1898.

**ACETYLENE ACCIDENT.**—See also **ACETYLENE EXPLOSION.**

**Jersey City.**—Destruction of the Liquefied Acetylene Works at Jersey City. Official information, with report of the inquest and editorial comment. Ill. 9500 w. Pro Age—May 2, 1898.

**ACETYLENE BLACK.**

Acetylene Black and its Derivatives (Le Noir d'Acétylène et ses Dérivés). E. Hubou. A description of a process of obtaining amorphous carbon by decomposing acetylene, with an account of the advantages of this acetylene black, and the utilization of the by-products. 8000 w. Mem d l Soc d Ing Civil de France—Nov. 12, 1900.

Acetylene and the Manufacture of Mineral Blacks. Georges F. Jaubert. From "La Revue des Produits Chimiques." An account of experiments made for ascertaining a process suitable for the manufacture on a large scale. 2500 w. Sci Am Sup—March 17, 1900.

Lamp-Black from Coal Gas and Acetylene. Georges F. Jaubert, in "Jour. du Gas te de l'Electricité. Notes on the industrial preparation of blacks in general and their use, with particulars concerning the beautiful black of exceptional fineness, known as acetylene black. 2000 w. Pro Age—Sept. 15, 1899.

**ACETYLENE BURNER.**

Burners for Acetylene. Abstract translation of articles by Dr. Paul Wolff, published in the "Zeitschrift für Beleuchtungswesen," giving tests of various burners, and some information on the illuminating value of this gas. 2000 w. Jour Gas Lgt—March 1, 1898.

Burners for Acetylene Gas (Ueber Acetylenebrenner). A. Weber. With diagrams and curves showing the illuminating efficiency of various burners adapted for use with acetylene. 2000 w. Schweizerische Bauzeitung—Jan. 29, 1898.

The Efficiency of Acetylene Burners. A. Weber. Abstract translation of a paper reprinted in the "Journal für Gasbeleuchtung. Experiments made to ascertain the quality of various burners, as all burners so far used smoke after a short period of use. 800 w. Jour Gas Lgt—April 5, 1898.

**Bunsen.**—Acetylene Laboratory Burner. Arthur Lachman. From "Am. Chem. Jour." Discusses the acetylene Bunsen burner, the properties of the acetylene blue flame, and the comparative operating expenses of acetylene gas and gasoline gas. 2000 w. Pro Age—Aug. 15, 1900.

**ACETYLENE CONGRESS.**

See also **ACETYLENE EXHIBITION.**

**Budapest.**—The Acetylene Exhibition and Congress at Budapest. An account of the meeting, with abstracts of important papers and comments. 3000 w. Engr, Lond—Aug. 11, 1899.

The Official Report of the Budapest International Acetylene Exhibition and Congress. Comments on this report, and information gathered from it. 1500 w. Engr, Lond—Feb. 2, 1900.

The Papers Read at the Acetylene Congress. Abstract translations of more important papers read, as taken from the report of Herr F. Liebetanz. Serial. Jour Gas Lgt—Oct. 17, 1899.

**Nürnberg.**—The 1899 Acetylene Congress at Nurnberg. Brief account of this meeting with abstracts of papers presented. 2500 w. Engr, Lond—Nov. 17, 1899.

**ACETYLENE EXHIBITION.**

**Budapest.**—The Second International Acetylene Exposition at Budapest, 1899 (Die Zweite Internationale Acetylen-Austellung in Budapest, 1899). Karl Neudeck. A complete review of the exposition, with plan of the building, and illustrated descriptions of the various exhibits, forming a complete account of the present status of the subject. Three articles. 8000 w. Zeitsch d Oesterr Ing w Arch Ver—Jan. 12, 19, 26, 1900.

The II. International Congress for the Carbide and Acetylene Industry (II. Internationaler Congress für Carbid und Acetylen-Industrie). H. Koechlin. A general review of the exposition at Budapest, with descriptions of the more important exhibits. 500 w. Oesterr Monatschr f d Oeffent Baudienst—March, 1900.

**London.**—The Acetylene Gas Exhibition. General description of the exhibition now open at the Imperial Institute, London. 2200 w. Col Guard—July 1, 1898.

The Acetylene Gas Exhibition. Perry F. Nursey. An accounts of the exhibition of acetylene gas apparatus and production in London. 6500 w. Ind and Ir—June 17, 1898.

**ACETYLENE EXPLOSION.**

See also **ACETYLENE.—Explosive Properties.**

Acetylene Gas Accidents. John B. C. Kershaw. A summary of accidents that have come under the writer's notice during the last two years. 1000 w. Elec Rev, Lond—April 28, 1899.

**Rochester, N. Y.**—The Acetylene Gas Explosion. E. A. Gay. An account of the disaster in the shop of Valentine J. Long, Jr., at Rochester, N. Y. Ill. 855 w. Am Mach—Nov. 11, 1897.

**Wilmington, Del.**—Explosion of an Acetylene Gas Plant in the Post Office Building, Wilmington, Del. W. A. Jones. Describes the plant and gives facts gathered, and inferences as to its cause. Ill. 1700 w. Eng Rec—Jan. 15, 1898.

**ACETYLENE GENERATORS.**

Acetylene Gas Generators and the Essentials of Safety in their Construction and Use. J. Pemberton Stubbs. Read before the Incorporated Society of Inspectors of Weights and Measures. Part first is introductory, dealing with the production of calcium carbide, and showing that with ordinary care little danger is risked in the use of acetylene. Serial. Engng—July 15, 1898.

Acetylene Gas Generator. Joseph H. Adams. A simple, safe and inexpensive apparatus that may be constructed at home is described and illustrated. 800 w. Sci Am—April 23, 1898.

Acetylene Generators. Dr. N. Caro. Abstract translation of article in the "Zeitschrift für Beleuchtungswesen." Considers the reactions by which acetylene is produced, the necessity of a gasholder, and how the generators devised for use stand with regard to the existing conditions. 2800 w. Jour Gas Lgt—June 14, 1898.

Apparatus for the Production of Acetylene Gas. From "Le Génie Civil. Describes and illustrates two types, one having been in use for two years. 1200 w. Sci Am Sup—July 2, 1898.

Apparatus for the Production of Acetylene Gas. Illustrates and describes the "Revolver" apparatus of the Société du Gas Acétylène, and its operation, and the Reibel apparatus. Particulars and illustrations taken from "Le Génie Civil." 2200 w. Sci Am Sup—June 18, 1898.

Apparatus for the Production of Acetylene Gas (Appareils de Production du Gas Acétylène). E. Hubon. The first of a series of articles describing and illustrating the various generators for producing acetylene gas from calcium carbide. Serial. Le Génie Civil—March 26, 1898.

Professor Lewes on Acetylene Generators. Abstract of paper read at meeting of the London Section of the Society of Chemical Industry. Notes the especially dangerous impurities; discusses the existing types of generators; describing experiments made. 1400 w. Jour Gas Lgt—June 14, 1898.

Wet and Dry Acetylene Generators. H. F. Fuller. Part first is confined to the wet process, discussing the advantages claimed. Serial. Heat & Ven—Oct. 15, 1898.

**Automatic Feed.**—Automatic Feed Acetylene Generator (Appareils Cousin à Chute Automatique de Carbure). Illustrated description of an acetylene generator which feeds the carbide automatically. 500 w. La Rev Tech—Oct. 25, 1898.

**Bournonville.**—Acetylene for Railroad Lighting. An illustrated description of the Bournonville Generator. 500 w. R R Gas—Sept. 28, 1900.

A New Acetylene Gas Generator. Illustrated description of an invention of Eugene Bournonville. 1400 w. Eng News—Oct. 4, 1900.

**Bruncor.**—A New Acetylene Generator. From "La Nature." An illustrated description of a new apparatus called the "Bruncor." 700 w. Sci Am Sup—Aug. 26, 1899.

**Camp and Mareschal.**—Apparatus for Lighting with Acetylene. Illustrated description of three new pieces of apparatus, designed both for the production of acetylene and for lighting therewith. Camp's and Mareschal's gas generators, and the Morison Lamp. From "Revue Industrielle." 1200 w. Sci Am Sup—Feb. 27, 1897.

**Criterion Automatic.**—The Criterion Automatic Acetylene House Generator. Illustrates and describes two styles of acetylene-gas generators, especially intended for lighting single dwelling houses, country seats and out buildings, small manufacturing plants, etc. 700 w. Sci Am—Aug. 6, 1898.

**Exley.**—Acetylene Gas Generator. Sketches with brief description of Exley's acetylene gas generator. The form of construction is what is known as a displacement holder. 350 w. Engr, Lond—Dec. 2, 1898.

**House Supply.**—Acetylene Plant for House Supplies. Considers the most promising sphere of usefulness to lie in the supply of buildings which are out of the reach of the mains of gas-works undertakings. Emphasizes the need of proper purification and comments favorably on the generator patented by Prof. Raoul Pictet of Germany. 1400 w. Jour Gas Lgt—Oct. 4, 1898.

**Kay.**—An Acetylene Gas Generator. Illustrated description of Kay's patent safe acetylene gas generators. 1400 w. Col Guard—Feb. 4, 1898.

**Locomotive Headlights.**—See **HEADLIGHTS.—Acetylene.**

**Motor Vehicles.**—Acetylene Generators for Motor Vehicles. W. F. Cooper. Discusses the classes of generators used. 1000 w. Horseless Age—June 20, 1900.

**Naphey.**—Naphey's Automatic Acetylene-Gas Generator. Illustrated description of a machine which claims to remove all possibility of danger. 800 w. Met Work—Nov. 20, 1897.

**Portable.**—Acetylene at the Agricultural Show (Au Concours Agricole, L'Acétylène). Describes several portable generators for household production of actylene gas from calcium carbide. 2000 w. Le Génie Moderne—May 1, 1897.

**Sardi.**—An Italian Acetylene-Gas Generator. Describes the Sardi Generator, and illustrates it in sections. 700 w. Ind & Ir—Nov. 12, 1897.

**Temperature.**—The Conditions of Temperature Existing in Acetylene Generators. Results of experiments as given in report of Vivian B. Lewes. 4800 w. Jour Gas Lgt—March 7, 1899.

## ACETYLENE LIGHTING.

See **Acetylene.**

## ACETYLENE MANUFACTURE.

Apparatus for the Manufacture of Acetylene Gas. Illustrations and brief descriptions of some of the more prominent apparatus in use. From "Génie Civil." 2000 w. Sci Am Sup—Sept. 26, 1896.

## ACETYLENE MOTORS.

See also **AUTOMOBILE—Acetylene.**

The Use of Acetylene for Motors. An abstract translation of article by A. Von Ihering in the "Journal für Gasbeleuchtung." A summary of researches by himself and others in the use of acetylene in gas motors. 700 w. Jour Gas Lgt—Dec. 15, 1896.

The Use of Acetylene for the Production of Motive Force. P. Chevillard. Describes experiments by Cuinat showing it possible to obtain a regular working with acetylene, and the cost. 1400 w. Pro Age—Oct. 15, 1897.

## ACIDS.

**Concentration.**—Concentration of Mineral Acids (Acides Mineraux de Haute Concentration). Description of improved methods of concentrating sulphuric and nitric acids, with a view of reducing the loss of platinum and obtaining high concentration with greater economy. 2500 w. La Revue Technique—Jan. 25, 1897.

## ACOUSTICS.

Photographing the Koenig Manometric Flames (Photographie des Flammes de Koenig). A description of the method used to obtain permanent records of acoustic phenomena. Acetylene was used in the manometric burner and the vibrations photographed. 1000 w. Comptes Rendus—April 12, 1897.

**Architectural.**—Acoustics. W. C. Sabine. Discusses the acoustical problem of an auditorium, its various phases, and gives suggestions for the solution. 3900 w. Pro of Am Inst of Arch'ts—1898.

Architectural Acoustics. Illustrated paper, by W. C. Sabine, on the acoustic properties of auditoriums, and experiments made at Harvard University to determine methods of overcoming defective acoustics in halls. 4000 w. Eng Rec—Nov. 12, 1898.

Architectural Acoustics—Reverberation, Absorbing Power of Wall Surface. Wallace C. Sabine. Illustrated description of the methods of determining the reverberation and absorbing power of rooms in terms of open windows as units of measurements. 3500 w. Eng Rec—April 21, 1900.

Architectural Acoustics—Reverberation, Approximate Solution. Wallace C. Sabine. Explanation of a method of providing for the absorption of reverberation in halls as soon as their shape has been learned. Ill. 1800 w. Eng Rec—April 28, 1900.

Architectural Acoustics—Reverberation; Calculation in Advance of Construction. Wallace C. Sabine. Illustrated description of the methods adopted in preparing plans for a large concert hall to avoid annoyance from reverberation. 2200 w. Eng Rec—May 26, 1900.

Architectural Acoustics—Reverberation; Exact Solution. Wallace C. Sabine. A discussion of the physical principles which underlie the annoying reverberation in some rooms. 2500 w. Eng Rec—May 12, 1900.

Architectural Acoustics—Reverberation; Rate of Decay of Residual Sound. Wallace C. Sabine. Illustrated explanation of the theory of the manner in which residual sounds die out in auditoriums, and its confirmation by experiments. 2500 w. Eng Rec—May 5, 1900.

Architectural Acoustics—Reverberation; the Absorbing Power of an Audience, and Other Data. Wallace C. Sabine. Gives the results of experiments to determine the effect of people and inanimate objects to prevent annoying reverberations in an auditorium, in terms of a sq. m. of open window surface. 3100 w. Eng Rec—May 19, 1900.

Architectural Acoustics. Wallace C. Sabine. A description of the various causes of defective sound distribution in rooms, and of methods of investigating them, both quantitatively and qualitatively. 3900 w. Eng Rec—April 14, 1900.

Notes on Acoustics in Architecture. Adolf Cluss. Reviews results obtained by scientists and architects, and the established laws and axioms of sound, etc. 4500 w. Pro of Am Inst of Arch'ts—1898.

**Auditorium Key Note.**—How to find the Key Note of Auditoriums. Ephraim Cutter. The principle of air physics which this method is designed to carry out, is that oratorical phonation should be in the key note of the audience, the oripulations of speech being the same as those of song, and the basic vowels of speech and of song being the same. Directions for ascertaining the key of any auditorium are then given, with a number of examples of its application in different buildings. 1100 w. Am Jour of Sci—Dec., 1895.

**Brick Tile and Terra Cotta.**—The Acoustic Properties of Brick, Tile and Terra Cotta. Calls attention to the capabilities of these materials in assisting and modifying sound. 1500 w. Clay Rec—May 12, 1899.

**Capitol Washington.**—Architectural Acoustics; Hall of Representatives, U. S. Capitol, 1853. Letter from W. R. Hutton, describing investigations by Capt. Meigs and Professors Henry and Bache. 900 w. Eng Rec—Oct. 20, 1900.

**Researches.**—Researches in Acoustics. Alfred M. Mayer. Containing the variation of the modulus of elasticity with change of temperature as determined by the transverse vibration of bars at various temperatures. The acoustical properties of aluminum. 5000 w. Am. Jour of Sci—Feb., 1896.

**Sound Reflector.**—See **SOUND REFLECTOR.**

### ADMIRALTY OFFICE.

**London.**—The New Admiralty Offices. Illustrated description. 1600 w. Eng, Lond—July 31, 1896.

### ADZING MACHINE.

Combined Sleeper Adzing and Boring Machine. Illustrated description of a machine specially designated for adzing and boring seatings in sleepers, of irregular form and of such hard woods as are used on the South American railways. 300 w. Engng—Nov. 8, 1895.

### AERIAL NAVIGATION.—See AERONAUTICS.

### AERODYNAMICS.

**Thin Plate.**—The Aerodynamics of a Thin Plate, and the Conditions of its Descent. (Der Aërodynamische Schwebezustand einer Dünnen Platte und deren Sinkgeschwindingkeit). F. R. v. Loessl. A mathematical investigation with diagrams of experiments, furnishing valuable data in connection with aerodynamical problems. Three articles. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—July 29, Aug. 5, 12, 1898.

The Aerodynamic Conditions of a Thin Plate. (Der Aerodynamische Schwebezustand einer Dünnen Platte). Josef Popper. A critical discussion of the theory of v. Loessl concerning the conditions of soaring or floating of a thin plate in the air. Two papers. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 27, Feb. 3, 1899.

### AERONAUTICS.

Recent Advances Toward a Solution of the Problem of the Century. A. M. Herring. The writer classifies all methods under four heads and examines the advantages and disadvantages of each class, reviewing the work in this field. Ill. 8500 w. Aeronautical Annual—1897.

Practical Means for the Conquest of the Atmosphere (Moyens Actuels de la Conquête de l'Atmosphere). Leo Dex. A discussion of the free and captive balloon, including proposed methods of guiding, the aeroplane, the parachute, and the hélicoptère, from the standpoint of the mechanical principles involved. Two articles, 4500 w. Revue Technique—Sept. 25, Oct. 10, 1899.

The Navigation of the Air (La Navigation Aerienne). R. Soreau. A discussion of the influence of the wind near the surface and at an elevation, as a preliminary to the study of aërial navigation. 2000 w. Génie Civil—Feb. 24, 1900.

The Present Status of Aërial Navigation. Octave Chanute. Showing the progress made in aërial navigation during the last four years, and the comparative importance of studying the flight of the sailing birds rather than that of the flapping birds. Ill. 3200 w. Eng Mag—April, 1896.

**Altitude Measurement.**—Apparatus for Measuring Altitudes (Appareil Destiné à Mesurer les Hauteurs, etc.). L. Cailletet. An apparatus for determining the altitude of a balloon by photographing two points on the surface of the earth. A simultaneous photograph of the barometer is also taken for comparison and verification. 1200 w. Comptes Rendus—Oct. 26, 1897.

**Andrée Balloon.**—The Aeronautic Expedition of M. Andrée to the North Pole (L'Expedition Aeronautique de M. Andrée au Pôle Nord). With photographic views of the buildings, gas generators and apparatus pertaining to the protection and inflation of the balloon. 2500 w. Génie Civil—Aug. 21, 1897.

The Andrée Balloon Expedition to the North Pole. Notes on this undertaking, which has been planned by engineers. Describes the arrangements and the departure. 2300 w. Eng News—Aug. 12, 1897.

The Andrée Expedition (L'Expedition Andrée). Description with photographs of the construction of the buildings and apparatus for inflation of the balloon of the Andrée expedition at Spitzbergen. 4500 w. Génie Civil—July 17, 1897.

The Andrée Polar Expedition. Illustrated description of Andrée's balloon, and balloon house, in Spitzbergen. 1000 w. Sci Am Sup—Sept. 12, 1896.

**"Avion."**—The "Avion." From "L'Illustration." Illustrated description of an apparatus devised and constructed by M. Ader, a French engineer. 1500 w. Sci Am—Aug. 27, 1898.

**Bird Flight.**—Our Teachers in Sailing Flight. Otto Lilienthal. An account of the writer's observation of storks in the village of Vehlin in Ostprignitz. 2700 w. Aeronautical Annual—1897.

The Sailing Flight of Birds. An attempt to explain the sailing flight of birds by the action of lateral wind. 1000 w. Engng—May 29, 1896.

The Way of an Eagle in the Air. E. C. Huffaker. A study of the art of soaring, with account of experiments. 6400 w. Aeronautical Annual—1897.

**Chanute Experiments.**—Recent Experiments in Gliding Flight. O. Chanute. The author reached the conclusion that the maintainance of the equilibrium under all circumstances, was the most important problem to solve. The article gives the experiments made and illustrates and describes the designs used, giving the degree of success attained by the apparatus, and much information. 8000 w. Aeronautical Annual—1897.

**De Bausset Ship.**—Air Talk. Irving A. Taylor. Discusses the De Bausset air ship and also liquefied air, showing that the first is not practical, and the second very costly. 1500 w. Elec Eng, N. Y.—Oct. 28, 1897.

**Dragon Balloon.**—The Dragon Balloon. A. Von Parseval. Illustrates and describes the characteristics and principles of action. Serial. Jour of U. S. Art—May-June, 1900.

**1896.**—Aeronautics in 1896 (Die Aëronautik im Jahre 1896). A review of the progress made during the past year, with especial reference to Continental Europe. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—March 19, 1897.

**1897.**—Aeronautics in 1897. (Die Aëronautik im Jahre 1897). A general review of progress in the past year, with especial reference to the mechanical features involved. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 11, 1898.

**Electro - Aerostatics.**—Electro - Aerostatics. S. D. Mott. Illustrated description of machines for scientific investigations, and other uses. 2200 w. Elec Wld—June 20, 1896.

**Gliding Experiments.**—Gliding Experiments. Octave Chanute. A study of the laws underlying the possible solution of the problem of flight, with account of recent experiments and general information. Ill. 10500 w. Jour W Soc of Engs—Oct., 1897.

**Kites.**—See **KITE.**

**Kosch.**—Latest Inventions in Aerial Navigation, Rudolph Kosch. Illustrated description of a new experimental machine, designed by the author, and some results attained by it, with general remarks upon aviation. 2800 w. Sci Am Sup—May 30, 1896.

**Kress Flying Machine.**—The Building of the Kress Flying Machine (Ueber den Bau des Kress'schen Drachenfliegers). W. Kress. An address before the Oest. Ing. und Architekten Verein, giving a report of progress in the construction of this aeroplane machine. 1200 w. Zeitschr d Oest Ing u Arch Ver—June 15, 1900.

**Langley Experiments.**—Artificial Flight Successfully Achieved by Prof. Langley's Aerodrome. Letter from Alexander Graham Bell, with explanations by Prof. Langley, describing briefly a trial of this machine and its successful operation. 800 w. Sci Am—May 23, 1896.

Story of Experiments in Mechanical Flight. Samuel Pierpont Langley. A narrative account of the writer's work in aerodromics, and of the successful flight of his aerdrome. Ill. 6500 w. Aeronautical Annual—1897.

The "Flying Machine." S. P. Langley. An informal and popular account of the author's experiments with flying-machines, built chiefly of steel, driven by steam-engines. Ill. 8000 w. McClure's Mag—June, 1897.

**Long Voyages.**—Preliminary Experiments in Long Distance Aerial Navigation (Essais Préliminaires a la Navigation Aérienne au Long Cours). Léo Dex. A well illustrated account of a balloon and auxiliary apparatus, including heavy guide-rope, used in ascensions, with a view to determining the conditions for remaining in the air a week or more. Serial. Revue Technique—May 10, 1900.

The Practicability of Long Aerial Voyages (De la Possibilité des Voyages Aeriêns au Long Cours). A discussion of the possibility of investigating the interior of the Sahara and the Soudan by means of a balloon, with the mechanical features of the apparatus. A detailed examination of the problem is given. 6000 w. La Revue Technique—May 10, 1898.

**Maxim.**—Flying Machines and Ordnance. Hiram Maxim. Delivered before the Engng. Soc. of Columbia Univ. of the City of N. Y. Relates experiments with flying machines, and his work on rapid-firing guns and smokeless powder. 2500 w. Sci Am—Dec. 24, 1898.

**Pilcher Soaring.**—Pilcher's Soaring Apparatus. Illustrates and describes the apparatus, explains its principles, and gives an account of the present state of development of apparatus and system. 1800 w. Prac Eng—Dec. 6, 1895.

**Propellers.**—Screw-Propellers Working in Air. Hiram S. Maxim. Brief account of experiments. 1000 w. Aeronautical Annual—1897.

**Propeller Lifting Power.**—The Experiments of Prof. Wellner (Experiences du Professeur Wellner). Describing the experiments made to ascertain the levitating power of aerial screw propellers. Two sizes of propellers were driven by a stationary engine, and the lifting power measured at various speeds. 800 w. Le Génie Moderne—Sept. 15, 1897.

The Lifting Power of Air Propellers. William George Walker. Illustrated description of experiments on the thrust or lifting power of air propellers 30 feet in diameter. 2500 w. Engng—Feb. 16, 1900.

**Santos Dumont.**—The New Air Ship of M. de Santos Dumont. Francis P. Mann. Illustrates and describes an air ship that is to compete for the prize of 200,000 francs, offered by M. Henry Deutsch, of Paris. 1000 w. Sci Am—July 7, 1900.

See also **Zeppelin and Santos Dumont.**

**Scientific Research.**—The Balloon as an Instrument of Scientific Research. John M. Bacon. Showing the possibilities of the balloon for investigation. Discussion. 5400 w. Jour Soc of Arts—Feb. 17, 1899.

**Soaring Machines.**—Experiments with Soaring Machines. Percy S. Pilcher. A letter objecting to a statement made regarding his success, and giving some account of his experiments. Ill. 1000 w. Nature—Feb. 20, 1896.

**Steam Aeroplane.**—Experiments with a Steam Aeroplane (Expériences Faites avec un Aeroplane mû par la Vapeur). MM Tatin & Richet. An aeroplane propelled by steam, and weighing 72 pounds, travelled 450 feet in 7½ seconds. 1000 w. Comptes Rendus—July 5, 1897.

**Submarine Boat Visibility.**—The Visibility of Submarine Boats from Balloons (Le Ballon Voit le Sous-Marin). Léo Dex. Showing the availability of the captive balloon for the purpose of detecting the approach of a submarine boat, owing to the wider angle of vision. 2500 w. Revue Technique—March 10, 1899.

**Warfare.**—The Balloon in Warfare. H. Hergesell. A review of recent achievements in aëronautical science, due largely to the demands of modern warfare, discussing the systems of various countries in the use of the captive balloon. 5000 w. Forum—Sept., 1898.

See also **WARSHIP.**

**Zeppelin's Air Ship.**—Count von Zeppelin's Air Ship. Illustrated description, and discussion of this large dirigible air ship. 1000 w. Sci Am—May 26, 1900.

Count von Zeppelin's Dirigible Air Ship. Illustrates and describes the structure of this huge air ship, being built on a float in Lake Constance 1200 w. Sci Am Sup—Nov. 11, 1899.

The Ascension of Count Zeppelin's Air Ship. An illustrated account of the ascension on July 2, 1000 w. Sci Am—Aug. 11, 1900.

The Ascension of the Zeppelin Air Ship (Rundschau. Auffahrt des Zeppelinschen Luftfahrzeuges). The personal report of Count Zeppelin to the Council of the Gesellschaft zur Förderung der Luftschiffahrt. 700 w. Zeitschr d Ver Deutscher Ing—Aug. 4, 1900.

The First Two Trial Trips of von Zeppelin's Air Ship. Illustrations and brief account of ascensions and evolutions, showing advancement of great interest to aeronautics. 1600 w. Sci Am Sup—Oct. 27, 1900.

The Zeppelin Air Ship as the Latest Experiment with Dirigible Balloons (Das Zeppelin Luftschiff als Neuester Versuch zur Lenkbararmachung von Gasballons). H. von Loessl. A general review of the attempts which have been made to steer gas balloons, with reference to the recent experiments of Zeppelin. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 31, 1900.

**Zeppelin and Santos Dumont.**—Pegasus. Discusses the balloons of Count Zeppelin and M. de Santos Dumont. Ill. 2300 w. Auto Jour—Sept., 1900.

### ÆSTHETIC ENGINEERING.

The Artistic Element in Engineering. Frank O. Marvin with Editorial. An address delivered before the Am. Assn. for the Advancement of Science. A plea for more attention to the æsthetic aspect of engineering in the furtherance of which, it asserts, that the American engineering schools are doing little or nothing. 5300 w. Eng News—Sept. 10, 1896.

The Esthetic Treatment of Engineering Work. H. Heathcote Statham. Showing the undesirability of tawdry ornament in huge engineering structures. 3300 w. Eng Mag—Oct., 1897.

**Afghanistan.**—Engineering in Afghanistan. Reviews the work accomplished and the mechanical progress which has been made in Kabul. 1700 w. Ind & East Engr—May, 1899.

### AFRICA.—See also SOUDAN; SOUTH AFRICA.

**Africa.**—Present and Future of Africa's Commerce. In this article it is contended that notwithstanding the small amount of commerce in proportion to area at present carried, the turn of Africa has come, and need for her coöperation in the general economy of the world will increase. 1300 w. Bradstreet's—March 7, 1896.

The Economic Conquest of Africa. H. G. Prout. A forecast of the economic future of Africa, showing the changes which may be expected from the introduction of European methods of exploitation, transport and development. 4000 w. Engineering Magazine—Feb., 1900.

### AGRICULTURAL MACHINERY.

Agricultural Machinery. History of reaping machines. 4200 w. Sci Am—July 25, 1896.

The Cheapening of Farm Machinery. The present state of the farming machine industry and the extent of its aid to agriculture. 2200 w. Ir Age—Oct. 22, 1896.

**German Exhibitions.**—Agricultural Machinery and Tools Exhibited at Stuttgart and Hamburg (Die Landwirth-schaftlichen Maschinen und Geräte in Stuttgart und in Hamburg). Giving illustrations of many of the modern plows, cultivators and similar machines shown at these recent exhibitions. Serial. Zeitschr d Ver Deutscher Ing—Jan. 15, 1898.

**Germany.**—Agricultural Machinery in Germany. Prepared by the Philadelphia Commercial Museum. American trade in this line shows an advance of over 50 per cent. in ten years. Information concerning the machines most widely used. 2000 w. Am Mfr & Ir Wld—Feb. 3, 1899.

**Laufenberg Harvester.**—California Harvesting Machinery. Frank Corry. Illustrates and describes the Laufenberg traction engine and combined harvester as used on the Pacific coast. 500 w. Sci Am—Oct. 8, 1898.

**Russia.**—Agricultural Machinery in Russia. A statement of the conditions existing in Russia in reference to agriculture and manufactures, and the opportunities for trade machinery and implements. 1300 w. Bd of Trd Jour—Feb., 1897.

**U. S. in Argentine.**—The Trade with Argentine in Agricultural Implements. Statistics of the exportation of iron and steel and manufactures of these products, showing that America supplies more than half the agricultural machinery, and discussing means of increasing the trade. 1200 w. Am Mfr & Ir Wld—Nov. 11, 1898.

**U. S. in Mexico.**—United States Agricultural Machinery in Mexico. Reports a very promising outlook for trade in these implements, without competition from abroad. 900 w. U. S. Cons Repts, No. 310—Dec. 28, 1898.

### AGRICULTURAL MOTORS.

**Brussels Exposition.**—International Competition of Agricultural Motors (Concours International des Moteurs Agricoles). Camille Lambotte. An illustrated review of the steam and petroleum motors for agricultural service as shown at the Brussels Exhibition in 1897. 3000 w. Revue Universelle des Mines—June, 1898.

### AGRICULTURAL SHOW.

**York, Eng.**—Royal Agricultural Show at York. Illustrates and describes some of the implements exhibited. 5200 w. Engr, Lond—June 22, 1900.

### AIR.

**Compressed.**—See **COMPRESSED AIR.**

**Liquefied.**—See **LIQUID AIR.**

**Weight.**—The Weight of Air. Information on the properties of air, and tables based on the laws of Boyle and Gay Lussac, which will prove useful in engineering calculations. 3300 w. Locomotive—Jan., 1900.

### AIR ANALYSIS.

**Carbonic Acid.**—Causes of Uncertainty in the Testing for Carbonic Acid in Large Volumes of Air (Sur Quelques Causes d'Incertitude dans le Dosage de l'Acide Carbonique dans de Grands Volumes d'Air). A paper by M. Armand Gautier giving details of methods and results. 3500 w. Comptes Rendus—May 16, 1898.

**Carbonic Oxide.**—Method of Testing the Presence of Carbonic Oxide in Air (Méthode pour Reconnaitre et Doser l'Oxyde de Carbone en Présence des Traces de Gas Carburés de l'Air). A paper presented before the French Academy by M. Armand Gautier, showing delicate methods of testing impurities in the atmosphere. 3000 w. Comptes Rendus—May 9, 1898.

### AIR BRAKE.

See also **BRAKE.**

Air Brakes. Two papers, with discussion, read before the New England Railroad Club, on air-brake equipment of passenger and freight cars. The papers are practical in their treatment and cover the subject well. 6500 w. R R Gaz—Dec. 13, 1895.

The Air Brake. R. A. Parke. History of the air brake, and its evolution from straight air to automatic, from automatic to quick action, and from quick action to the modern high speed brake, with sectional views. 5400 w. Ry Mag—April, 1897.

**Adjusters.**—Brake Slack Adjusters. Committee report before the Air Brakemen's Association, embodying the results of experience with adjusters, and recommendations as to construction, location, setting and general practice. 1800 w. R R Gaz—April 24, 1896.

**Association.**—The Air Brake Men's Association. Concluding account of the Boston meeting, containing committee reports on maintenance of freight and passenger brakes, air-brake signals and main reservoir and connections, with topical discussions of various minor points. 6500 w. R R Gaz—May 1, 1896.

**Automatic Recorder.**—An Automatic Air Brake Recorder. O. G. R. Parker's paper before the Northwest Railway Club, describing a continuous disc pressure recorder, attachable at any point on the train, as a check on the engine runner. 1200 w. Ry Rev—May 2, 1896.

**Auxiliary Reservoirs.**—Experiments upon Auxiliary Reservoirs. G. R. Henderson. Graphical representation of the effects of varying the capacity of the auxiliary reservoir for a given size of brake-cylinder, with explanation. 800 w. Am Eng & R R Jour—Oct., 1897.

**Chapsal.**—The Chapsal Brake and Improvements in Railway Brakes (Le Frein Chapsal, et les Perfectionnements des Freins de Chemins de Fer). A discussion of the relative merits of the Chapsal and the Westinghouse brakes, maintaining the superiority of the electro-pneumatic system of Chapsal. 5000 w. La Revue Technique—May 10, 1896.

**Compressor.**—Modern Compressors for Air Braking. E. J. Wessels. Illustrated description of a compressor of the single-acting type, with double cylinders which are placed vertically, with trunk pistons connecting directly to eccentrics, in crank case. 1200 w. Elec Rev, N. Y.—Oct. 20, 1897.

**Coupling.**—An Air-Tight Dummy Coupling. Illustrated description of a compound air brake coupling used on the Michigan Central R.R. possessing advantages that have led to their replacing angle cocks on engines. 600 w. Ry Rev—Jan. 18, 1896.

Air Brake Hose Dummy Couplings. Editorial reviewing the defects of common practice and suggesting a remedy. 250 w. R R Car Jour—April, 1896.

**Cylinder Lubrication.**—Economical Oiling of Brake Cylinders. Report of Committee of Association of Railroad Air Brake Men. Urges necessity of uniform treatment on account of rapid increase of freight equipment, and discusses frequency of oiling, lubricants, methods and location of cylinders. 3000 w. R R Car Jour—June, 1896.

The Air Brake Men's Association. Full committee reports on the water-raising system in sleeping cars and the economical lubrication of air brake cylinders. 4800 w. R R Gaz—April 24, 1896.

**Department.**—Organizing and Conducting the Air Brake Department of a Railroad. Extracts from a paper presented at meeting of the Association of R. R. Air Brake Men, in Detroit. Suggestions of what should be required. 1900 w. Ry & Engng Rev—June 3, 1899.

**Electrical Control.**—The Electrical Control of Air Brakes. (Ueber eine Elektrische Steuerung von Luftdruckbremsen). H. Wagner. Describing an electrical attachment for use with the Westinghouse brake, enabling greater promptness in braking to be made. 3500 w. Glaser's Annalen—Sept. 15, 1900.

**Electric Car.**—Compressed Air Brake for Electric Tramways (Frein à Air Comprimé pour Voitures de Tramways Electriques). An illustrated description of the standard air brakes, as applied on the electric tramway operated by the "Chemin de fer de l'Ouest," between the Invalides and Versailles. 1800 w. L'Electricien—Nov. 4, 1899.

The Howe Air Brake for Electric Cars. Describes an air brake designed especially to meet the needs of electric street car service, but is equally applicable to cable service, and to other services running single cars or short trains. Ill. 1000 w. R R Gaz—June 4, 1897.

The "Standard" Air Brake for Street Cars. A description of the several parts, with illustrations, considering the driving mechanism, the pump, the governor, the operating valve, and the platform equipment. 1400 w. R R Gaz—June 3, 1898.

The Standard Air Brake for Street Cars. Illustrates and describes the brakes that are to be applied to the 160 cars now being built for the electric service of the Third Avenue Railroad in New York City. 1700 w. R R Gaz—March 31, 1899.

**Electric Control.**—A New Electric Air Brake System. An illustrated description of a system of electrically controlled air brakes, designed especially for electric cars. 1300 w. Elec Rev, N. Y.—Sept. 19, 1900.

**Elevators.**—The Pneumatic Elevator Safety. J. J. Swann. Illustrates and describes an application of an air brake to elevators. 1500 w. Compressed Air—Feb., 1900.

**Emergency.**—Emergency Brake Problem. Records of tests made by Walter E. Harrington, the writer, with conclusions drawn at the time. 1500 w. W Elec—Nov. 16, 1895.

The Emergency Brake and the Garrison Accident. Editorial on the great saving of life due to the action of the emergency brakes. 700 w. R R Gaz—Nov. 19, 1897.

**Emergency Recorder.**—An Automatic Recorder of Emergency Brake Applications. Illustrates and describes the invention of W. E. Symons, which is intended to register all emergency applications of the brake, but does not record service applications. 450 w. R R Gaz—Feb. 2, 1900.

**Equipment.**—Discussion of Air Brake Equipment. Discussion by the members, of a paper read by Mr. Waitt. The opinions expressed are valuable, as they come from those engaged in practical railroad operations. 15500 w. Pro West Ry Club—Dec., 1895.

**Fitchburg Ry.**—Air Brake Practice on the Fitchburg Railroad. H. S. Kolseth describes a method adopted with excellent success, for increasing the efficiency of engineers in handling the air brakes. 900 w. Loc Engng—Aug., 1896.

**Freight Cars.**—Air Brake Equipment on Freight Trains. Discussion of paper by A. M. Waitt before Western Ry. Club. It deals with the trouble some roads have had with the freight air brake. 1800 w. Ry Rev—Jan. 25, 1896.

Air Brakes on Freight Cars. A discussion in the Western Railway Club of the paper by A. M. Waitt. Serial. R R Gaz—Jan. 17, 1896.

Air Brakes on Freight Trains. A. M. Waitt. Abstract of a paper read at the November meeting of the Western Railway Club on the details of operation of air brakes. With editorial. 4600 w. R R Gaz—Nov. 29, 1895.

Air Supply and Demand in Freight Service.

From a report of the committee of the Northwest Railway Club, showing that under severe conditions in freight train service the air supply is deficient, and recommending the use of large pumps and stopping the leaks. 1200 w. R R Gaz—March 10, 1899.

Air Supply and Demand in Freight Service. Substance of a paper presented at the Northwest Railway Club. On the necessity of increasing the air supply, and the economy of maintaining air pumps in first-class condition. 3300 w. Ry & Engng Rev—March 25, 1899.

Handling Freight Trains Partially Equipped with Air. Editorial discussion of paper of Mr. Nichols on this subject, read before the Central Association of R. R. Officers, at their July meeting. 2000 w. R R Gaz—Nov. 19, 1897.

Handling Freight Trains Partially Equipped with Air. Upon the instructions of C. L. Nichols, Supt. of the C., R. I. and P. R. R., with portion of a recent discussion at the Air Brake Men's Association. 1500 w. R R Gaz—Oct. 6, 1899.

**Gage Location.**—Best Location for the Air Gage Where it Can be Seen by Night and Day. Extracts from a report of a committee of the Air Brake Men's Association, criticizing and suggesting in regard to the importance in location of air gage. 2000 w. R R Gaz—April 30, 1897.

**Handling.**—In What Way Can the Rough Handling of Trains by the Air Brake be Reduced to a Minimum? Discussion on correspondence of the Trav. Engs. Assn., with recommendations of the committee. 13500 w. Trav Engs Assn Rept—Sept., 1896.

"The Art of Air Braking," from an Engineer's Standpoint, that is to Say, the Care and Manipulation of Engine Equipment. Report of committee, with interesting discussion. 7700 w. Trav Engs Assn—Sept., 1895.

**High Speed.**—Some Fine Features of the High-Speed Brake. Illustrates and discusses some ingenious features of the device. 1200 w. Loc Engng—Oct., 1898.

The High-Speed Brake. From a paper by R. A. Parke. Description of the operation as brought forth in a paper read before the New England Railroad Club. 1100 w. Ry Mas Mech—Jan., 1896.

The High-Speed Brake. R. A. Parke. From a paper read before the New England Railroad Club. Descrpition of a quick acting brake used on the Empire State Express. 1000 w. R R Car Jour—Jan., 1896.

The Westinghouse High-Speed Brake. Illustrated descrption. 2000 w. R R Gaz—June 25, 1897.

**History.**—The First Air Brake—A Short History; also Reminiscences of Its First Engineer. An interesting illustrated account of the first air braked train. 2000 w. Loc Engng—Feb., 1900.

**Hose.**—Specifications for Air Brake Hose. G. P. Campbell. Discusses some of the causes of failure in air hose, showing that they are not due to poor material. 1500 w. R R Gaz—Aug. 26, 1898.

Specifications for Air Brake Hose. Report of committee to Master Car Builders' Association. Discusses the manufacture of hose, the causes of weakness, giving recommended specifications and tests. Ill. 3000 w. Am Eng & R R Jour—July, 1898.

Specifications for Air Brake Hose. Report of the Committee of the Central Ry Club, with tests and standard specifications of the L. S. & M. S. Ry., the Erie Ry. and the C. B. & Q. Ry. 4200 w. Central Ry Club—March, 1898.

Specifications for Air Brake Hose. Synopsis of paper by Arthur M. Waitt, read at convention of Master Car Builders' Assn., with comments of the trade, and by the editor. 4500 w. Ind Rub Wld—Sept. 1, 1898.

Talks with Rubber Men on Air Brake Hose. A consensus of opinions of rubber men. 2500 w. Ind Rub Wld—June 10, 1896.

The Bursting of Air Brake Hose. A. M. Waitt. Extracts from paper read before the Western Railway Club (Chicago). The result of careful examination of burst and worn-out hose, with the writer's suggestions for remedying troubles arising from the same, and much general information. 2700 w. Ind Rub Wld—March 10, 1896.

The Inspection of Air Brake Hose. A plea for greater care in determining the cause of damage and failure. 1200 w. Ry Mas Mech—June, 1896.

The Unwinding Test for Air-Brake Hose. G. P. Campbell. Report of test made, with some facts concerning rubber. Also a letter from a maker. 1500 w. R R Gaz—July 22, 1898.

**Hose Tools.**—Compressed Air Hose Tools. B. G. Miller. Illustrations and descriptions of machines especially useful in doing the work on air hose and the pipes connected with the air-brake system. They are in use at the Fort Madison shops of the A., T. & St. F. Ry. 900 w. R R Car Jour—Jan., 1899.

**India.**—Automatic Brakes for Goods Trains, Recommending the use of continuous brakes as a safety measure, with reasons supporting the position taken. 1500 w. Ind and East Eng—Feb. 22, 1896.

The Working of Automatic Brakes on Railways in India. Some notes on the progress of equipment and accident percentages of trains. 800 w. Ind Engng—March 21, 1896.

**Inertia Attachment.**—Inertia Brake Attachment. An illustrated description of an apparatus designed by H. H. Westinghouse, in which the inertia of a weight acts to increase the braking pressure. 600 w. Ry and Eng Rev—Sept. 22, 1900.

**Inspection.**—See also **Maintenance.**

**Inspection and Care.**—Inspection and Care of Air Brakes. Describes the practice of the Lake Shore and Michigan Southern Railway, at Buffalo, N. Y. 1500 w. Am Eng and R R Jour—March, 1899.

**Instruction.**—Air-Brake Instruction. A report presented by a committee to the sixth annual convention of the Traveling Engs. Assn. at Buffalo. Suggestions relating to methods to be taught, and points for instruction. 5000 w. Ry Age—Sept. 23, 1898.

When Traveling Engineers are also Air-Brake Instructors How Can They Best Instruct and Examine the Engineer and Train men, without the Use of an Air-Brake Instruction Car, or Instruction Room? Report of committee, with very interesting discussion. 10000 w. Trav Engs Assn—Sept., 1895.

**Instruction Car.**—Air Brake Instruction Car; B & M. R. R. Illustrated description of a car recently built by the Boston and Maine R. R. designed to give all information possible in the mechanism of the brakes. 900 w. R R Car Jour—Aug., 1897.

Air-Brake Instruction Car—Michigan Central Railroad. Illustrated description. 600 w. Ry Rev—Feb. 22, 1896.

Air-Brake Instruction Car on the "Big Four Route." Illustrated description of the interior of this car. 1500 w. Sci Am—Aug. 21, 1897.

Southern Railway Air-Brake Instruction Car No. 108. Brief account with excellent illustrations of an interesting development of modern railroad educational work. 800 w. Loc Engng—June, 1896.

The Michigan Central Air-Brake Instruction Car. W. W. White. Illustrated description. 600 w. Loc Engng—March, 1898.

**Instruction Plant.**—Central of Georgia Railroad Air-Brake Instruction Plant. W. W. Elfe. A condensed description with photograph. 250 w. Loc Engng—May, 1896.

**Instruction Room.**—A Model Air-Brake Instruction Room. Brief illustrated description of the new and complete instruction equipment of the St. Paul and Duluth Road. 1200 w. Ry Age—Aug. 20, 1897.

**Lipkowski.**—Reports on the Lipkowski Compressed Air Brake (Rapports ou Comité de l'Exploitation Technique des Chemins de Fer sur le Frein à Air Comprimé, Système Lipkowski). E. Vicaire. French official reports, giving the results of trials on French Railways, which were satisfactory, on the whole. 8000 w. Ann d Ponts et Chaussées—1st quarter, 1900.

**Locomotive Driver.**—See **BRAKES—Locomotive Driver.**

**Locomotive Truck.**—The Engine Truck Brake as on Aid in Train Stopping. Report of committee presented at meeting Air Brake Men's Assn., at Baltimore. 1800 w. Ry Age—April 15, 1898.

**Lubrication.**—Lubricating Air Brake Parts. From a report presented at the Jacksonville meeting of the Assn of Ry. Air Brake Men. 1800 w. Ry Mas Mech—May, 1900.

**M. C. B. Report.**—Air Brake Appliances. Report of the committee of the M. C. B. Assn., presented to the annual convention at Old Point Comfort. Ill. 1000 w. Ry Age—June 16, 1899.

**M. C. B. Standard.**—The M. C. B. Standard for Air Brakes. Editorial discussion of the proposed action of the Am. Ry. Assn. in regard to the application of air brakes to freight cars. Reviews the past history and discusses the present situation. 1800 w. Eng News—May 19, 1898.

**Maintenance.**—Inspection and Maintenance of Air Brake Equipment. Discussion at the November meeting. 6000 w. Cent Ry Club—Nov., 1899.

Inspection and Maintenance of Air Brakes. Extracts from the reports presented at the November meeting of the Central Ry. Club. 900 w. R R Gas—Nov. 17, 1899.

Lame Maintenance of Air Brakes. C. F. Sundberg. Giving particulars of how carelessly the air brakes are kept up. 750 w. Loc Engng—Aug., 1899.

Maintenance of Passenger and Freight Brakes. Report of committee at third annual convention of Assn. Railroad Air Brake Men. A full discussion of equipment, valves, tools, methods, reports, etc., with illustrations of apparatus and forms for records. 4000 w. R R Car Jour—June, 1896.

**Mexico.—See CAR —Safety Appliances.**

**N. Y. N. H. & Hartford.**—Contact Shoe and Brake on the N. Y., N. H. and Hartford Railroad. Illustration and description of the shop and air compressor apparatus and its action. 600 w. Elec Eng—Oct. 21, 1896.

**Patent.—See PATENT—Infringement.**

**Patent Decision.**—Important Air-Brake Decision. The claims, argument and opinion of the court in the infringement suit between the Westinghouse Air Brake Co. and the Boyden Air Brake Co. Considerable information is embraced in the arguments on destruction. 8000 w. Ry Rev—Nov. 23, 1895.

The Effect of the Air-Brake Decision. Editorial discussing the decision in the case of Westinghouse Air Brake Co. against the New York Air Brake Co. 2000 w. R R Gas—July 28, 1899.

**Piston Travel.**—Air-Brake Piston Travel. A report on the effects of air-brake piston travel and the limits which should be set to that travel. Made by a committee of the Air Brakemen's Assn. 4000 w. R R—April 17, 1896.

Piston Travel, Means of Adjustment and Its Effect Upon the Handling of Trains. Abstract of report to the Assn. of Railroad Air Brakemen, Baltimore meeting. 2700 w. R R Car Jour—May, 1898.

Piston Travel of Air Brakes. Editorial reviewing the conclusions of Air Brakemen's Convention. 1100 w. Ry Rev—April 25, 1896.

**Repairs.**—Best Methods of Locating and Repairing Defects en Route. Abstract of report to Assn. of Railroad Air Brakemen. Gives list of defects usually found and suggests remedies. 2800 w. R R Car Jour—Aug., 1898.

**Repairs and Instruction.**—Air Brake Repair and Instruction Rooms of the St. Paul & Duluth Ry. G. R. Parker. Illustrated detailed description of apparatus for repair, testing and instruction purposes. 1400 w. Ry Mas Mech—Oct., 1899.

**Rigging Cost.**—The Cost of Air-Brake Rigging. Reviews the recent discussion arising from Mr. Parke's criticism of railroad shop expenses, and gives tabulated figures for a 36-ft. car rigging, with cost and weight, from actual practice. 1200 w. Ry Rev—July 25, 1896.

**Russia.**—Westinghouse Air Brakes on Russian Railways. Translation of the ministerial order requiring all standard Russian railways to equip their freight cars and engines with the Westinghouse air brakes by Jan. 1, 1903. 2200 w. U. S. Cons Repts, No. 531—Sept. 18, 1899.

**Semaphore Gauge.**—Wrong Location of the Semaphore Air Gauge. Harry A. Flynne. The right and wrong way of placing air-brake gauges is illustrated and described. 1000 w. Loc Engng—Sept., 1899.

**Sliding Wheels.**—A New Device for Preventing the Sliding of Car Wheels by Air Brakes. Illustrates and describes a device, designated for use in connection with the ordinary air brake, which is being tried on the Pacific coast. 800 w. Eng News—April 20, 1899.

**Standard.**—The Standard Air Brake as applied to Tramways and Light Railway Cars. Illustrated detailed description, with statement of advantages claimed. 1500 w. Ry Wld—Jan. 5, 1899.

**Superintendent.**—Qualifications of a Superintendent of Air Brakes. A paper read by F. B. Farmer before the Northwest Railway Club. Prefacing the author's estimate of qualifications by a summary of reasons demanding the existence of such an official enforced by instances from experience. 1800 w. Ry Rev—April 18, 1896.

**Tenders.**—Foundation Brake Gear for Locomotive Tenders. Extracts from report of committee of the Air Brakemen's Assn. Considers brake power, piston travel, brakebeams, etc. 2200 w. R R Gas—April 30, 1897.

**Testing Cock.**—Testing Cock for Air Brakes. J. P. Kelly. Illustrates and describes the writer's design. 900 w. Loc Engng—Jan., 1900.

**Testing Plants.**—Air-Brake Testing and Inspecting Plants. Discussion in the Western Railway Club, of committee report presented at the preceding meeting devoted chiefly to compressors and pumps, and the time necessary for testing trains properly. 7800 w. Pro West Ry Club—May, 1896.

Air-Brake Testing and Inspecting Plant. Editorial review on the report of the Committee on Air-Brake Testing and Inspecting Plants. An extract is given embodying the recommendation as to inspection and testing in interchange yards and elsewhere. 500 w. R R Car Jour—April, 1896.

Air Brake Testing and Inspecting Plants. Full report of committee to the Central Railway Club. 2000 w. Pro Cent Ry Club—March, 1896.

A Yard Installation for Testing Air Brakes. Illustrates and describes the plant at West Freight Yard, Wilmington, Del. 600 w. R R Gas—March 24, 1899.

**Train Tests.**—Tests of Air-Braked Trains on Mountain Grades. Extracts from the report published by the Westinghouse Air Brake Company, as "Bulletin No. 7," containing important information. 3000 w. R R Gas—April 27, 1900.

**Triple Valve.**—A New Triple Valve. Illustrated description of a new triple valve and high-speed brake attachments, patented by M. W. Hibbard. 1200 w. R R Gas—Aug. 10, 1900.

**Triple Valve Tests.**—Tests of Westinghouse and New York Triple Valves. A report of an important series of tests of air brake apparatus, with editorial discussion. 9500 w. R R Gas—June 15, 1900.

**Two-Pipe.**—Two-Pipe Air-Brake System. Illustrated description of device as given by Mr. Westinghouse in his patent specifications. 1400 w. Loc Engng—Feb., 1897.

**Valves.**—The Pressure-Retaining Valve and its Use. Extracts from report of a committee of the Air-Brakemen's Assn. The history of the introduction of the retaining-valve in the air-brake service, with recommendations. 2200 w. R R Gas—April 30, 1897.

**Westinghouse Plant.**—The Westinghouse Air Brake Company's Plant. A general account of the plant and of the processes employed in the manufacture of air brake equipment. 2300 w. Ry Age—Aug. 6, 1897.

## AIR CHAMBER.

**Pump.**—An Air-Chamber Charging Pump. Walter Ferris. On the operation, uses and usefulness of the air-pump. Ill. 1200 w. Am Mach—March 30, 1899.

## AIR COMPRESSION.

**Theory.**—Theoretical Modes of Air Compression. Lemuel R. Hopton. A short outline of the various modes of compression, with a comparison of their efficiency and advantage. 1500 w. Yale Sci M—March, 1897.

**Two-Pipe.**—The Two-Pipe System of Air Compression. A. E. Chodzko. Considers the advantages claimed for it over the single-pipe system. 4400 w. Mod Mach—Jan., 1899.

Two-Pipe Air Compression. Charles Cummings. A reply by the inventor to Mr. Chodzko's criticisms of the Cummings system. 2200 w. Mod Mach—June, 1899.

## AIR COMPRESSOR.

See also **COMPRESSED AIR; COMPRESSED AIR PLANT.**

Air Compression. Robert Peele. Illustrates and describes the structure and mode of action of the five classes commonly used. 2400 w. Mines & Min—April, 1899.

Hints Concerning Air Compressors. H. H. Kelley. Illustrates and describes the construction and operation. 2200 w. Engr, U. S. A.—March 1, 1900.

Notes on Air Compressors. Robert Peele. An article intended particularly for the use of students in mining engineering. Part first treats of the general structure of compressors, the compression of air, wet compressors, dry compressors, piston clearance in air cylinders, and composed or stage compression. Ill. Serial. Sch of Mines Quar—April, 1897.

Some Notes on the Compression of Air. E. C. Sickles. Personal experience with the practical operation of air compressors. 1700 w. Sib Jour of Engng—June, 1900.

The Air Compressor. O. G. Smith. A brief statement of the important features in the process of compressing air, and how it is accomplished in the design of air compressors. 1400 w. Ir & Coal Trds Rev—Dec. 22, 1899.

The Air Compressor. O. G. Smith. A statement of the features of the process of air compressing. 1300 w. Min Rept—Aug. 17, 1899.

**Air Pumps Compared.**—Economy in Compressed Air. Curtis W. Shields. Comparison between air pumps and compressors, with use and advantages of compressors. 1800 w. Engng Mech—Dec., 1896.

**Auxiliary.**—An Auxiliary Air Compressor for Steam Engines. An illustrated description of a compressor manufactured by the Sedgwick-Fisher Co., which can be conveniently and economically operated by the steam engine which supplies the motive power for a plant. 700 w. Eng News—Sept. 20, 1900.

**Compound.**—Compound or Two-Stage Air Compressors. Robert Peele. On the advantages of stage compression, and the rise and construction of the intercooler. 2600 w. Mines & Min—Jan., 1900.

Experiments on a Two-Stage Air Compressor. John Goodman. Contributed to the Inst. of Civ. Engs. Devoted to a description of tests and methods of reducing the results. Ill. 3200 w. Col Guard—July 23, 1897.

Test of a Compound Air Compressor. Gives data and a computation of saving effected, with some general remarks upon stage compression, as compared with single compression. Review of a graduate thesis prepared by F. C. Weber and W. K. Lanman, at Cornell University. 1000 w. Am Mach—April 16, 1896.

The Proportions of Compound Air Compressor Cylinders to Secure Best Economy.—Economy of Compounding. F. A. Halsey. Demonstrates that the proportion of cylinders which divides the work equally also secures the greatest saving possible from compounding. 1500 w. Am Mach—March 31, 1898.

See also **Four-Stage.**

**Compound Duplex.**—A Compound Duplex Automatic Air Compressor and the Largest Impulse Water Wheel in the World. E. A. Rix. Discusses the difficulties and usual methods of overcoming them, describes the ideal compressor, and the writer's method of constructing and operating compressed air engines. Ill. 3200 w. Am Mach—Nov. 10, 1898.

**Compound High Duty.**—A Compound High Duty Air Compressor. Illustrates and describes a compressor in the service of the Indianapolis Water Co., used in raising water from a series of wells. 700 w. Am Mach—Dec. 15, 1898.

**Koster Compound.**—The Köster Compound Air Compressor (Verbund Kompressor, Bauart Köster). An tandem-compound steam engine and a tandem-compound air-compressor coupled side by side to the same shaft, with cranks at right angles. The air cylinders have mechanically-actuated valves. Efficiency 81 per cent. 3500 w. Zeitsch d Ver Deutscher Ing—April 10, 1897.

**Philadelphia Compound.**—The Philadelphia Compound Air Compressor. Illustrated description of the principal features of the new compound air compressor built by the Philadelphia Engineering Works. 1800 w. Ir Age—June 17, 1897.

**Corliss-Valved.**—See **Strnad.**

**Efficiency.**—The Efficiencies of Air Compressors. C. P. Paulding. Review of some points in articles which have recently appeared in "American Machinists." The possible and actual in air compressors. 1200 w. Am Mach—July 9, 1896.

What is the Efficiency of an Air Compressor? Frank Richards. A discussion of the subject of compression, showing the fallacy of some ideas generally held. 1400 w. Am Mach—Oct. 6, 1898.

**Electric Motors.**—Automatic Air Compressors Adapted for Electric Motors. Illustrates and describes the Rix variable air compressor being installed at the North Star mine at Grass Valley, Cal. 1200 w. Min & Sci Pr—Dec. 31, 1898.

**Explosions.**—See **AIR COMPRESSOR EXPLOSION.**

**Four-Stage.**—Test of a Four-Stage Air Compressor at Pressures up to 2500 lbs. per sq. in. K. E. Stuart and H. L. Terwilliger. Condensed from a graduating thesis at Cornell University, Ithaca, N. Y. Describes plant, plan and theory of test, the testing, and gives conclusions. 4800 w. Eng News—Oct. 7, 1897.

**Gasoline.**—A Gasoline Air Compressor for Bridge Work. Illustrates and describes a portable plant for generating compressed air, used in connection with work at West Point, Ky., in strengthening a bridge on the Illinois Central Railroad. 1100 w. Ry Age—Oct. 14, 1898.

**High Altitude.**—Air Compressors at High Altitudes. F. A. Halsey. Shows that the air produced is not proportional to the barometric pressure, and the value of compound compressors in such locations. 1300 w. Am Mach—June 2, 1898.

**Hydraulic.**—A Simple Air Compressor. C. P. Turner. Illustrated description of the hydraulic air compressor. 1400 w. Min & Sci Pr—June 25, 1898.

Compression of Air by Direct Action of Water. Herbert W. Umney. From a paper read before the Society of Engineers. Deals with an improved method of compressing air, illustrating experimental plant and stating the advantages of the method. 3000 w. Ry & Engng Rev—Sept. 17, 1898.

Hydraulic Air Compressing Plant. C. H. Taylor. Extract from a paper read at meeting of Mining Engineers in Montreal. The compression was effected by the flow of water down a vertical pipe, the air being collected in a receiver. Ill. 2400 w. Eng, Lond—June 11, 1897.

Hydraulic Plant for Compressing Air. H. D. Pearsall. Read at meeting of Manchester (Eng.) Assn. of Engineers. The author confines his attention to those hydraulic air compressors which have attempted to apply the water directly. 3600 w. Col Guard—Dec. 3, 1897.

The Compression of Air by the Direct Action of Water. Herbert W. Umney. Read before the Society of Engineers. Presents an improved method of compressing air, suitable for adoption in case of low water falls, and of less expense than by other means. 3300 w. Prac Eng—July 16, 1897.

**Hydraulic, Ainsworth, B. C.**—Compressed Air Plant at Ainsworth, B. C. Describes and illustrates an apparatus for compressing directly by falling water, without the use of any moving mechanism. 1200 w. Can Elec News—Sept., 1898.

Compressed Air Plant at Ainsworth, B. C. Illustrated detailed description of a plant run by compressed air derived direct from falling water. 2200 w. B. C. Min Rec—July, 1900.

**Hydraulic, Magog.**—A Description of the 150-Horse Power Hydraulic Air Compressor Erected for the Dominion Cotton Mills Company, at Magog, Que. C. H. Taylor. Illustrated description with results of tests. 2800 w. Can Min Rev—March, 1897.

Hydraulic Air Compressor Plant at Magog. Illustrated description of a 150-horse power compression plant erected for the Dominion Cotton Mill Co. as a test system, by the Taylor Hydraulic Air Compressing Co. 2400 w. Can Eng—March, 1897.

Report on Trials Made at Magog, Quebec, to Test the Economy Effected by Compressed Air. J. T. Nicolson. Trials were made at the Dominion Cotton Mill, where there is installed a 150-h. p. hydraulic air-compressing plant. 1600 w. Can Elec News—Dec., 1899.

The Hydraulic System of Air Compression. Illustrated description of a system in successful operation for two years at Magog, Quebec. 2000 w. Sci Am—April 28, 1900.

The Use of Water Powers by Direct Air Compression. W. O. Webber. The revival of an old application by which a high efficiency is attained with simplicity of mechanism. 2500 w. Engineering Magazine—Oct., 1900.

See also **COMPRESSED AIR—Reheating Tests.**

**Indicator Diagrams.**—The Analysis of Air Compressor Indicator Diagrams. F. A. Halsey. Analysis of card submitted by a correspondent, with reply to questions asked. 1600 w. Am Mach—March 3, 1898.

**Ingersoll-Sergeant.**—Efficiency of a Four-Stage Air Compressor Delivering Air to a Storage Reservoir. The paper is supplementary to records published in the issue of Oct. 7, giving the total efficiency of the Ingersoll-Sergeant apparatus, and the results derived from it. 1600 w. Eng News—Nov. 4, 1897.

New Types of Iingersoll-Sergeant Air Compressors. Describes two recent designs. Ill. 800 w. R R Gaz—Feb. 11, 1898.

**Intercooler.**—The Intercooler on the Air Compressor. Frank Richards. On the value and efficiency of the intercooler, with suggestions. Ill. 1600 w. Am Mach—Nov. 9, 1899.

See also Compound.

**King-Riedler.**—Tests of a King-Riedler Air Compressor at the Rose Deep Mine, South Africa. L. I. Seymour. Read before the South African Assn. of Engs. and Arch'ts. Data of tests made, with summary of results and explanatory remarks. 1500 w. Compressed Air—Aug., 1898.

**Pneumatic Gun.**—High-Pressure Air Compressors of the Pneumatic Gun Battery at Fort Winfield Scott, San Francisco, Cal. B. C. Batcheller. Illustrated description with data. An instructive article. 1800 w. Am Mach—April 23, 1896.

Some Tests of Air Compressors. A. E. Chodzko. Tests made by the military unthorities on the dynamite guns of Fort Point, San Francisco. Ill. 2800 w. Jour of Elec—Dec., 1895.

**Richards's.**—Richards's Automatic Belt Driven Air Compressor. Illustrated description of a compresser designed especially for shop use or for any place where there is running shafting and where it is desirable to maintain a constant supply of compressed air without care of apparatus and at the least cost. 300 w. Am Mach—Jan. 14, 1897.

The Best Air Compressor for Shop Service. Frank Richards. A criticism of some ideas advanced in the discussion on compressed air, at the monthly meeting of the R. R. Club, with the writer's personal opinions. 1500 w. Am Mach—Dec. 3, 1896.

**Rotary Blower.**—See **BLOWER—Air Compressor.**

**Shop Service.**—See **Richards's.**

**Speed.**—The Speed of Air Compressors. Frank Richards. A discussion of the proper speed of an air compressor, written in reply to an inquiry. 1300 w. Am Mach—Feb. 8, 1900.

**Strnad.**—The Strnad Air Compressor at the Maybach Mine (Luftkompressionsmaschine System "Strnad" auf Grube Maybach). Illustrated description of double-cylinder tandem air compressor, with Corliss valves on air cylinders. Full details are given, together with indicator diagrams. 2000 w. 1 plate. Glückauf—July 30, 1898.

Corliss Air Compressor (Corliss Luft Kompressor). A powerful air compressor, with compound steam cylinder, and Corliss valves on the air cylinder, mechanically operated. The spring discharge valves are contained in the Corliss admission valves. 4500 w. 1 plate. Glückauf—July 17, 1897.

Corliss-Valved Air Compressor. Herr Kaufhold. From a communication to "Glückauf." Describes the air compressor designed by Ferdinand Strnad. There is only one air cylinder, the piston of which is driven directly off the crank-shaft. Ill. 2000 w. Col Guard—Sept. 3, 1897.

Corliss-Valved Air Compressor. Describes a compressor patented by Ferdinand Strnad, which compresses the air in one operation to five atmospheres above the atmosphere, with only one air cylinder. From a communication by Herr Kaufhold, of Düsseldorf, to "Glückauf." Ill. 2700 w. Prac Eng—Oct. 22, 1897.

**Two-Stage.**—See **Compound.**

## AIR COMPRESSOR EXPLOSION.

Compressed Air Explosions—A Recent Typical Explosion. Frank Richards. Considers the dangers from imperfect design and mismanagement. 1500 w. Am Mach—Feb. 3, 1898.

Compressed Air Explosions. William E. Gibbs. A letter to the editor giving an experience of the writer where an explosion was in his opinion caused by the ignition of oil vapor or spray mixed with air. 1200 w. Am Mach—Jan. 13, 1898.

Compressed Air Explosions. Frank Richards. Refers to the discussion of Mr. Dickie's paper before the A. S. M. E. and considers any reference to the fact that fatal explosions of vaporized oil have occurred with air compressors as unnecessary. 900 w. Am Mach—Dec. 30, 1897.

Compressed Air Explosions Caused by Ignition. A letter of inquiry from Henry Fisher, of Nottingham, Eng., with editorial reply concerning the cause. 1400 w. Compressed Air—July, 1897.

Explosions and Ignitions in Air Compressors and Receivers. Alfred George White. Excerpt transactions Inst. C. E. An account of an explosion, with a description of the compressor, and the writer's explanation of the cause. 1600 w. Compressed Air—July, 1900.

Explosions and Ignitions in Air Compressors and Receivers. Alfred George White. From "Pro. of Inst. of Civ. Engs." And account of an occurrence of this nature, with description of compressor, and discussion of cause. 1800 w. Am Mach—Aug. 2, 1900.

Explosions in Air Compressors and Receivers. T. G. Lees. Abstract of paper read at meeting in Sheffield, Eng. Describes explosions which occurred at Clifton Colliery, the conditions which caused them and gives lessons to be learned. 2400 w. Ir & Coal Trds Rev—Feb. 11, 1898.

Explosions of Air Compressors. Translated and condensed from "Glückauf." Investigations made by the L. A. Riedinger Machine Co., of Augsburg, Germany. 900 w. Am Mach—Jan. 27, 1898.

Explosions of Air Compressors (Explosionen an Luftkompressoren). F. Strnad. With details of explosions in various parts of Europe, and a discussion of the causes and remedies. In every case an explosive mixture of air and vapor of oil was ignited by the heat due to the pressure. 3500 w. Glückauf—Oct. 9, 1897.

Explosions in Air Compressors. From an article by F. Strnad in "Glückauf." A discussion of the causes and remedies of explosions, giving details of explosions in Europe. In cases cited an explosive mixture of air and oil vapor were ignited by the heat of compression. Gives precautionary measures. 2800 w. Col Guard—Dec. 10, 1897.

**Dortmund.**—An Occurrence of Hydrocarbons in Compressed Air (Ueber ein Vorkommen von Kohlenwasser-stoffen in Druckluft). H. Kette. An account of the formation of explosive gases owing to the volatilization of lubricating oils in an air compressor, near Dortmund, Westphalia. 1500 w. Glückauf—March 17, 1900.

Explosion of an Air Compressor at Dortmund (Explosion eines Luft Kompressors bei Dortmund). This fatal explosion was due to the gasification of the lubricant and ignition of the mixed gas and air by overheated portions of the machine. A curious and important case. 2500 w. Glückauf—June 26, 1897.

## AIR FLOW.—See also COMPRESSED AIR—Flow.

**Nozzles.**—Investigations into the Discharge of Air from Conical Diverging Nozzles (Versuche über das Ausströmen von Luft durch Konisch Divergente Rohre). A Fliegner. A general examination of the theory, with diagrams based upon experimental researches, with especial reference to the nozzles of the de Laval steam turbine. Three articles. 8000 w. Schweizerische Bauzeitung—March 5, 12, 19, 1898.

## AIR HOIST.

An Air Hoist for Mercantile Purposes. Illustrated detailed description. 600 w. Com Air—Oct., 1896.

A Self-Propelling Air Hoist, with Unlimited Travel. Illustrated description of a novel apparatus and its operation. 900 w. Am Mach—April 26, 1900.

Compressed Air for Hoisting Purposes. John L. Klindworth. Favoring the use of air hoists and calling attention to special points. 1400 w. Mach—Jan., 1897.

Handy Air Lift. Illustrating a useful substitute for the block and tackle, for changing stacks and loading wheels. 60 w. Loc Engng—May, 1896.

See also **MOLDING MACHINE.**

## AIR LIFT.

Lifting Water by Compressed Air. Clark Howell. Illustrates and describes novel features in the adaptation of the air lift system to pumping water from muddy streams. 2800 w. Met Work—Sept. 15, 1900.

The Lifting of Water by Compressed Air (Druckluft-Wasserheber). E. Josse. A review of the development of the air-lift, from the time of Löscher in 1797 to Pohlé at the present time, with examples of various actual installations. 4500 w. Zeitschr d Ver Deutscher Ing—Sept. 3, 1898.

The Air Lift. Translation of paper by E. Josse, in the "Zeitschrift des Vereines Deutscher Ingenieure." Gives description of several German plants and the results of tests made on them. Serial. Eng Rec—Oct. 8 and 15, 1898.

The Efficiency of Air Lift Apparatus. Herbert T. Abrams. A letter claiming 45 per cent. for a well designed plant. 700 w. Eng Rec—May 28, 1898.

Theoretical and Practical Limitations of the Air Lift Pump. E. E. Johnson. Explains the operation and the conditions under which the air is discharged. 1200 w. Eng News—April 22, 1897.

**Pohlé.**—Some Figures on the Cost of Pumping with the Pohlé Air Lift. George R. Murray. The cost under the system is discussed in detail, both for large and small plants. 2200 w. Compressed Air—Jan., 1897.

**AIR MOISTURE.—See HUMIDITY.**

**AIR PUMP.**

Vertical Air Pumps without Suction Valves (Betrachtungen über die Stehenden Kondensator-Luftpumpen ohne Saugventile). Karl Reinhardt. A mathematical discussion of an improved form of air pump for condensing engines. A very simple and effective design. 5000 w. Zeitschr d Ver Deutscher Ing—March 5, 1898.

**Berrenberg Mechanical.**—The Berrenberg Mechanical Pump. An illustrated description of a pump for the exhaustion of an electrical incandescent lamp. 1600 w. Elec Rev, Lond—Jan. 24, 1896.

The Berrenberg Pump for Exhausting Incandescent Lamps (Berrenberg'sche Luftpumpe für die Glühlampen Fabrikation). 2500 w. Elektrotech Zeitschr—March 15, 1900.

**Compressors Compared.**—See **AIR COMPRESSOR.—Air Pump Compared.**

**Condenser.**—Performance of a Vertical Air Pump without a Foot Valve (Wirkungsweise einer Stehenden Kondensation-Luftpumpe ohne Saugventile). H. Berg. A description and analysis of action of an improved form of air pump for use with condensing steam engines; the foot-valve is dispensed with, and a high efficiency maintained. 3500 w. Zeit d Ver Deut Ing—Jan. 28, 1899.

See also **CONDENSERS.**

**Marine Engines.**—Independent Air Pumps of Marine Engines. A. B. Willets. Presents the many advantages, and the methods of working, etc. Ill. 1600 w. Ir Age—June 30, 1898.

**Mining.**—Points in Repairing Mining Air Pumps. Suggestions, with illustrations, for light repairs and cleaning. 1300 w. Am Mfr & Ir Wld—June 16, 1899.

**AIR RECEIVERS.**

**Constant Pressure.**—Constant Pressure Air Receivers. E. A. Rix. Describes a way to overcome the volumetric loss. It consists in having a pipe connected at the lowest point of the receiver, and with a water tank high enough to give constant pressure. 1200 w. Am Mach—July 7, 1898.

**AIR RESISTANCE.**

Researches Upon the Resistance of the Air (Recherches sur la Résistance d l'Air). The papers of M. Le Dantec and M. Canovetti, giving data and results of their experiments. A valuable contribution to knowledge. 10000 w. Bull de la Soc d'Encour—July, 1899.

The Resistance of the Air. G. H. Bryan. An account of the investigations of MM. l'Abbé Le Dantec and Canovetti. 1700 w. Nature—Nov. 30, 1899.

**Projectiles.**—The Law of Resistance of the Air to the Motion of Projectiles (Sur la Loi de la Résistance de l'Air au Mouvement des Projectiles). Paul Vielle. A discussion of the wave formations in the air accompanying the flight of projectiles; with tables of pressures, velocities and temperatures. 1500 w. Comptes Rendus—Jan. 29, 1900.

**Trains.**—Atmospheric Resistance to the Motion of Railroad Trains. W. F. M. Goss. From a paper read at the April meeting of the Western Ry.Club. Also editorial. Describes experiments made, and gives conclusions reached. 7000 w. R R Gaz—May 20, 1898.

**AIR SHIP.—See AERONAUTICS.**

**AIR VELOCITY.—See also COMPRESSED AIR—Flow.**

Measurement of the Velocity of Air. R. C. Carpenter. Illustrates and describers some of the instruments and methods used, showing the difficulty in obtaining accuracy. 1500 w. Heat & Ven—June, 1899.

**ALBERTITE.**

Notes on the Albertite of New Brunswick. John Rutherford. A description of the result of the mining operations at the Albert mine, which supports the opinion that the albertite was injected into an open fissure, when in a very fluid state. Ill. 2800 w. Can Min Rev—Jan., 1898.

**ALCOHOL.**

**Acetylene.**—The Manufacture of Alcohol from Acetylene. A review of some of the methods and the opinions concerning them. Ill. 2000 w. Eng News—May 31, 1900.

**ALCOHOL LAMP.—Incandescent.—See ACETYLENE.—Alcohol Incandescent Compared; INCANDESCENT GAS LIGHTING.—Denayrouze Alcohol.**

**ALCOHOL MOTORS.**

Investigations upon Alcohol Motors (Recherches sur les Moteurs à Alcool). Max Ringelmann. Showing that more than double the quantity of alcohol is required than of petroleum, for the same power developed, and that with the present prices of alcohol and petroleum the former is commercially impracticable. 1500 w. Comptes Rendus—Oct. 18, 1897.

The Harnessing of Bacchus. An article on the application of alcohol to power purposes. 1500 w. Auto Jour—July, 1900.

**ALCO-VAPOR MOTOR.—Boat.—See BOAT.—Alco-Vapor Motor.**

**ALKALI.—See AMMONIA; ELECTRO CHEMICAL WORKS; ELECTRO-CHEMISTRY; ELECTROLYSIS; SODA.**

**ALKALI WORKS. — See ELECTRO-CHEMICAL WORKS; GAS WORKS; GAS MANUFACTURE.**

**ALLOY.—See also METALS—Rarer.**

Alloys. Chandler Roberts-Austen. First lecture on this subject, delivered before the Society of Arts, London, on March 15, 1897. It is the beginning of the fourth series on this subject, dealing with recent investigations and results. 4000 w. Jour Soc of Arts—Oct. 22, 1897.

Alloys. Prof. Roberts-Austen. Report of second Cantor lecture on this subject. 1200 w. Engng—March 26, 1897.

Alloys. Prof. Roberts-Austen. Report of his third Cantor lecture on this subject. 900 w. Engng—April 2, 1897.

Alloys. Prof. Roberts-Austen. Report of the fourth and concluding Cantor lecture on this subject taking up the discussion of curves of initial freezing points. 600 w. Engng—April 9, 1897.

Alloys. W. C. Roberts-Austen. Abstract of the first of a new series of Cantor lectures. Describes methods of investigation. 1000 w. Min Jour—March 20, 1897.

Alloys. William C. Roberts-Austen. Read before the British Inst. of Mech. Engs. The fifth report of the Alloys Research Committee. Ill. Serial. Engng—Feb. 17, 1899.

Concerning Alloys (Ueber Legirungen). A review of the recent progress of knowledge in the nature of alloys and the manner in which metals unite when fused together. 3500 w. Stahl und Eisen—Oct. 15, 1899.

**Antifriction.**—Study of White Alloys Called Antifriction. G. Charpy. Describes researches made to obtain a methodical classification to assist in deciding which alloy should be used in each individual case. Ill. 8500 w. Metallographist—Jan., 1899.

**Argentaurum.**—See **ARGENTAURUM.**

**Coinage.**—See **COINAGE.—Alloys.**

**Copper-Zinc.**—Alloys. W. C. Roberts-Austen. Fourth report of the Alloys Research Committee. Read before the Inst. of Mech. Engs. Deals with the present position of the research, with the copper-zinc series of alloys, with certain relations between the fusibility and strength of alloys; also gives descriptions of experiments. Serial. Engng—Feb. 12, 1897.

**Dilatation.**—On the Dilatation of Metallic Alloys. H. Le Chatelier. Gives results of researches concerning the determination of the dilatation. Ill. 2500 w. Metallographist—Oct., 1899.

**Electrical Properties.**—The Calculations of the Electrical Resistances of Alloys and Their Application to the Finding of Alloys of Definite Electrical Properties. C. Liebenow. Read before the Elektrotechnischen Verein on Nov. 23, 1897. Part first consists of introductory remarks and a consideration of simple alloys. Serial. Elec, N. Y.—Feb 9, 1898.

**Lead-Tin-Bismuth.**—The Constitution of Ternary Alloys (Sur la Constitution des Alliages Ternaires). Georges Charpy. A micrographic examination of alloys of lead, tin, and bismuth, showing how the different constituents are arranged in the alloy. 1500 w. Comptes Rendus—June 6, 1898.

**Microscopic Study.**—Microscopic Study of Alloys. T. K. R. Explanation of the value of microscopic analysis of alloys, with illustrations. 900 w. Nature—Nov. 4, 1897.

See also **METALLOGRAPHY.**

**Nature.**—The Nature of Alloys. Abstract of the second and third of a series of lectures on alloys, showing how alloys will separate from the molten mixture at certain temperatures, having a different composition from the eutectic alloy This separated alloy is not always the best for mechanical purposes. The mass should be cooled quickly in order that no segragation may take place. 900 w. Ir & St Trds Jour—Nov. 2, 1895.

**Nickel-Aluminum.**—Note on the Disintegration of an alloy of Nickel and Aluminum. Erwin S. Sperry. Reports oft-repeated experiments showing an alteration in half-and-half alloy. 500 w. Trans Am Inst of Min Engs—Feb., 1899.

**Researches.**—Experimental Researches on the Metallic Alloys (Recherches Expérimentales sur les Alliages Métalliques). G. Charpy. Devoted especially to the white antifriction alloys, with much valuable information and many tables; the whole forming a part of the work of the Commission on Alloys. 10000 w. Bull de la Société d'Encour—June, 1898.

**Solution Theory.**—Application of the Solution Theory to Metallic Alloys (Beiträge zur Anwendung der Lösungstheorie auf Metalllegirungen). Hanns von Jüptner. A discussion of the extension of the solution theory as developed by the author in connection with iron and steel, to other metallic alloys; with data from the experiments of Osmond, Le Chatelier and others. 3000 w. Stahl und Eisen—Jan. 1, 1899.

Metallic Alloys and the Theory of Solution. Charles T. Haycock. Abstract of a discourse delivered at the Royal Inst. Brief statement of results in investigating some of the properties of alloys in the liquid state. 1400 w. Nature—Dec. 29, 1898.

**Temperature Influence.**—The Influence of Temperature on the Properties of Alloys (Etude sur l' Influence de la Température sur les Propriétés des Alliages Métalliques). M. G. Charpy. A very complete investigation of the effect of increased temperature upon the strength of alloys, with especial reference to various bronzes and copper alloys. 12000 w. Bull de la Société d'Encour—Feb., 1899.

## ALTERNATING CURRENT.

Alternating Currents Twenty-Five Years Ago, and To-day. Edwin J. Houston and A. E. Kennelly. The changes in the application and use of alternating currents are reviewed. 2200 w. Elec Wld—March 4, 1899.

Alternating Current Working. H. E. Raymond. Suggestions intended to aid the inexperienced in the practice of alternating current transmission. 1600 w. Am Elect'n—March, 1897.

Alternate Current Workings. Donald H. Fry. The first of a series of articles aiming to make clear some points in alternating currents not generally understood, and to show wherein they differ from direct currents. Ill. 3000 w. Jour of Elec—April, 1898.

The Principles of Alternate Current Working. Alfred Hay. Based on a series of evening lectures delivered at the University College, Liverpool. The subject is treated in a manner adapted to the comprehension of students. Serial. Elec Eng, Lond—June 19, 1896.

Alternating Currents. The first of a series of articles dealing with the phenomena, principles, and application of these currents. Ill. Serial. Ind & Ir—Sept. 30, 1898.

Alternating Electric Currents. Alton. D. Adams. Illustrated explanation of alternating currents, showing that they are essentially different from the direct only in their periodic change of direction. Serial. Engr, U. S. A—May 15, 1899.

Fundamental Ideas of Alternating Currents. Dugald C. Jackson. Read at convention of the Northwestern Elec. Assn. A statement of the elementary electric and magnetic principles which relate to the flow of alternating currents. Serial. Elec Wld & Engr—March 17, 1900.

The Alternating Current. Lawford H. Fry. An attempt to make clear the occurrences in a circuit carrying an alternating current of electricity, without using complicated mathematical formulae. 2500 w. Am Mach—Dec 23, 1897.

The Use of Alternating Current. Part first considers its application to street railway service, phase relation, impedance, capacity, self-induction, wave forms and torque. Ill. Serial. St. Ry Rev—June 15, 1897.

**Branching Circuits.**—The Graphical Treatment of Alternating Currents in Branching Circuits, with Special reference to the Case of Variable Frequency. Henry T. Eddy. Considers general and special cases. 9000 w. Trans of Am Inst of Elec Engs—May, 1898.

Currents in Branched and in Mutually Inducing Circuits Produced by Harmonically Varying Electromotive Forces. Thomas R. Lyle. The first of a series of articles in which the writer aims to produce the theory of the currents named in something of the simplicity of the theory of steady currents in branched conductors. Serial. Elect'n, Lond—Oct. 14, 1898.

**Calculation.**—Notes on Alternate Current Calculations. The first of a series of articles on the arithmetic of alternate current distribution, including arithmetical examples relating to polyphase currents. Serial. Elec'n, Lond—Oct. 28, 1898.

**Cost.**—Computations of the Cost of Alternating Currents (Berechnung des Strompreises bei Wechselströmen). G. Benischke. A discussion of a convenient method of computing current costs by the use of efficiency factors. 2000 w. Elektrotech Zeitschr—June 29, 1899.

**Curve.**—A New Apparatus for Showing the Successive Values of Alternating Current Curves (Ein Neuer Apparat zur Objektiven Darstellung der Momentanwerthe von Wechselstromkurven). W. Peukert. Describes an apparatus for showing the elements of the curve simultaneously to an audience by the use of a double form of Depres mirror galvanometer. 1800 w. Elektrochem Zeitschr—Aug. 31, 1899.

A Simple Method of Analysing Periodic Curves. E. Basil Wedmore. Paper read at a students' meeting of the Inst. of Elec. Engs. The writer enunciates the principle, gives examples of its application, and proves the method analytically and geometrically. 4000 w. Elec Eng, Lond—June 5, 1896.

Deformed Curves (Ueber Deformirte Kurven). Rud. Goldschmidt. A discussion of the variations of alternating-current curves from the strict sinusoidal form, deriving equations for the complicated forms which sometimes occur. 2500 w. Elektrotech Zeitsch—Nov. 30, 1899.

On a Simple Approximate Method of Determining the Harmonic Components of a Graphically Given Complex Harmonic Wave. Edwin J. Houston and A. E. Kennelly. A method serviceable to engineers rather than to mathematicians, for finding the amplitudes of the harmonic components in an alternating current wave. 1200 w. Elec Wld—May 14, 1898.

The Commutated Current Wave of a Composite-Wound Alternator. Dugald C. Jackson. Presents a series of curves with comments. 450 w. Trans of Am Inst of Elec Engs—May, 1898.

The Determination of the Wave Form of Alternating Currents Without a Contact Maker. Harris J. Ryan. Illustrated description of a method which may be used when the special contact maker apparatus is not available. Discussion. 4000 w. Trans Am Inst of Elec Engs—Sept., 1899.

The Effect of Armature Inductance upon the Electromotive Force Curves of an Alternator. W. E. Goldsborough. A series of experiments carried on in the electrical laboratories of Purdue University for the purpose of investigating this subject. Apparatus and method are described and results given. 9500 w. Trans Am Inst of Elec Engs—June and July, 1897.

The Experimental Plotting of Periodical Occurrences in Physical Phenomena (Ueber die Experimentelle Aufzeichnung Periodischer Vorgänge aus Physikalischen Gebieten). Dr. R. Franke. Describing and illustrating apparatus for drawing the curves representing the waves of alternating currents. 4500 w. Elektrotech Zeitschr—Nov. 16, 1899.

The Graphical Method of Representing Alternating Potentials (Ueber die Graphische Darstellung des Wechselpotentials und ihre Anwendung). H. Görges. An elaborte geometrical system of showing alternating potentials, describing the method of application. 5000 w. Elektrotech Zeitschr—March 17, 1898.

The Validity of the Use of Sine Curves in Alternating Current Problems. W. G. Rhodes. Justification of the use of sine functions in the calculation of alternating current problems. 1100 w. Elec Rev. Lond—Dec. 25, 1896.

See also **ALTERNATOR.—Wave Forms; INDUCTION CURVES; OSCILLOGRAPH.**

**Curve Recorder.**—A Reliable Method of Recording Variable Current Curves. J. A. Switzer. Describes investigations carried on in the Physical Laboratory of Cornell University, in the hope of adding something to the work of Dr. A. C. Crehore. 3200 w. Phys Rev—Aug., 1898.

An Alternating Cycle Curve Recorder. Hugh L. Callendar. Describes a new piece of apparatus intended to reduce the labor involved in the study of alternating-current phenomena by means of the delineation of the curves which represent the mode of variation of the pressure and current, throughout the cycle. 4000 w. Elect'n, Lond—Aug. 26, 1898.

**Curve Tracer.**—An Electric Curve Tracer. Edward B. Rosa. Illustrated description of apparatus for reducing the labor and increasing the speed of drawing electric curves, for delineating the forms and phases of periodic electric quantities. Serial. Elec Wld—Nov. 27, 1897.

An Electric Curve Tracer. Edward B. Rosa. Discusses the value of methods of investigation by tracing the forms and phases of alternating-current curves, and the methods by which current curves have been drawn. An illustrated description of an apparatus for doing this work, which reduces the labor and increases the speed. 5200 w. Phys Rev—Jan., 1898.

**Curve Tracing.**—A New Method of Tracing Alternating Current Curves. Fitzhugh Townsend. Describes a method recommended for its simplicity, accuracy and rapidity. 1800 w. Trans Am Inst of Elec Engs—Jan., 1900.

A New Method of Tracing Alternating Curves. Discussion of paper by Fitzhugh Townsend. 4500 w. Trans Am Inst of Elec Engs—March, 1900.

**Diagrams.**—Alternating Current Diagrams. Robert A. Philip. An illustrated explanation of a system of diagrams intended to represent graphically the relations between the various elements of an alternating current circuit. 3000 w. Elec Wld & Engr—Dec. 23, 1899.

**Frequency.**—A Simple Method of Measuring the Duration of Period of an Alternating Current (Ueber eine Einfache Methode zur Messung der Periodendauer von Wechselströmen). Walter König. The measurement is made by the use of an electroscopic powder of sulphur and red lead, which, when shaken on a plate over which a wire, carrying the current has been drawn, shows the positive and negative points. 1200 w. Elektrotech Zeitschr—June 15, 1899.

Periodicity in Alternating Current Apparatus. James M. Andrews. Read before the Ohio Elec. Lgt. Assn. Discusses separately each perodicity, its value as regards transformers, line losses, induction motors, etc., and the different systems. 3500 w. W Elect'n—Sept. 8, 1900.

Methods of Determining the Frequency of Alternating Currents. Carl Kinsley. Reviews methods that have been used and suggests a new and easy method that may be employed with an error of less than ¼ of 1 per cent. Ill. 1800 w. Elect'n, Lond—June 16, 1899.

Method of Determining the Number of Alterations (Ueber eine Methode zur Bestimmung der Wechselzahl Oscillirender Ströme). A mathematical discussion by Gustav Wilhelm Meyer. 3000 trotech Zeitschr—Jan. 28, 1897.

hod of Measuring the Frequency of Al- rents. Harrison W. Smith. Briefly method recently employed for meas- ns in the frequency of currents of about 120 alterations per second. 1200 w. Tech Quar—June, 1899.

A Simple Device for Measuring the Frequency of an Alternating Current. Hubert V. Carpenter. Describes a method in which a stretched wire vibrates in synchronism with the current. 1800 w. Elec Wld & Elec Engr—Aug. 5, 1899.

Frequency Measurement. A reprint of a portion of a paper read by W. R. Ayrton and John Perry before the Inst. of Elec. Engs. about ten years ago, considering this subject. 1800 w. Elec Wld & Engr—Oct. 14, 1899.

**Frequency Teller.**—An Electric Frequency Teller. Albert Campbell. Description of a simple, portable instrument devised by the writer, for the direct measurement of frequency. 600 w. Elect'n—July 31, 1896.

**Frequency Transformation.**—See **ELECTRIC CURRENT CONVERTER.**

**Graphical Representation.**—A Graphical Representation of the Flow of Alternating Currents in Long Conductors (Ueber die Graphische Darstellung des Verlaufes von Wechselströmen längs Langer Leitungen). Dr. F. Breisig. A paper read before the Berlin Electrotechnical Society, giving an analytical and graphical discussion, and describing a model for illustrating the wave action. 6000 w. Elektrotech Zeitschr—Jan. 25, 1900.

**Graphic Study.**—Graphic Method for Studying Alternating Currents (Résumé de la Méthode Graphique pour l'Etude des Courants Alternatifs). S. Hanappe. A very elaborate mathematical treatise. It deals with the application of graphical methods to the study of machines. Illustrated with many diagrams. Serial. Rev Univ des Mines—Nov., 1898.

**Instantaneous Voltage.**—Diagrams of Instantaneous Voltage in Alternate Current Circuits. H. N. Allen. Describes method of obtaining a clear idea of the variation of potential throughout the circuit. The instantaneous voltages, for any moment during the period, are plotted as ordinates and the impedances of the circuit as abscissæ. 1600 w. Elect'n—Aug. 20, 1897.

**Mathematics.**—Symbolic Representation of General Alternating Waves and of Double Frequency Vector Products. Charles Proteus Steinmetz. A mathematical study of the vector analysis of alternating current phenomena, with discussion. 7000 w. Trans Am Inst of Elec Engs—June and July, 1899.

**Mean Value.**—A Simple and General Method of Obtaining the Mean Value of the Power of an Alternating Current. Samuel J. Barnett. Mathematical demonstration. Also reprint of previous paper in which several typographical errors appeared. 1800 w. Elec Wld—Aug. 26, 1899.

**Optical Study.**—New Optical Method of Studying Alternating Currents (Nouvelle Méthode Optique d'Etude des Courants Alternatifs). Describing an improvement in the strobosopic method of M. Pionchon, devised by MM. Abraham and Buisson. 120 w. Comptes Rendus—July 12, 1897.

**Parallel and Series.**—Parallel and Series Arrangement of Alternating Currents of Different Curve Forms (Parallel und Reihenschaltung bei Wechselströmen von Beliebiger Kurvenform). G. Roessler. A discussion of the character of a combined current when the wave curves are other than sinusoidal in form; the subject being mathematically treated. 4000 w. Elektrotech Zeitschr—Sept. 1, 1898.

**Phase Difference.**—Means for Producing Large Differences in Phase (Ueber Mittel zur Erreichung Grosser Phasenverschiebung). J. Görner. A mathematical discussion, with diagrams showing several methods applicable in practice. The applications of the methods are shown in the Hartmann & Braun meter. 2500 w. Elektrotech Zeitschr—Oct. 26, 1899.

**Polyphase.**—On Rotary Currents with Reduced Speed. Hans Gorges. Paper read before the Verband Deutscher Elektrotechniker, Berlin. Translated from "Elektrotechnische Zeitschrift." Phenomenon described and attention called to the more important points of the investigation. 1000 w. Elec—Sept. 9, 1896.

Polyphase Electric Currents. Sketches briefly the chief features of the system. 1400 w. Engr, Lond—March 19, 1897.

**Polyphase Wave Form.**—The Wave Form of the Rotary Current (Ueber die Wellenform des Drehstromes). O. S. Bragstad. A mathematical discussion, with an experimental determination of the theory developed. Diagrams and formulæ. 2400 w. Elektrotech Zeitschr—March 29, 1900.

**Rectifier.**—See ELECTRIC CURRENT RECTIFIER.

**Resistance.**—See ELECTRIC RESISTANCE.—Alternating Current.

**Resonance.**—Mechanical Representation of Electrical Phenomena and Investigations of Resonance of Alternating Currents (Mechanische Hülfsvorstellungen bei elektrischen Vorgängen und Untersuchungen über Wechselstromresonanz). An elaborate mathematical treatment by Dr. Heinke of Munich. 12000 w. Elektrotech Zeitschr—Feb. 4, 1897.

**Rushes in Condensers.**—See ELECTRIC CONDENSERS.—Alternating Current Rushes.

**Theory.**—Elements of Complex Quantities and Vectors with Reference to Their Use in Alternating Current Work. Franz J. Dommerque. A study of sine law for electromotive force and current, showing that the E. M. F. changes by sines, while the magnetic flux changes by cosines of the same angle. Ill. 1800 w. Elec Engng—June 1, 1898.

The Division of an Alternating Current in Parallel Circuits with Mutual Induction. Frederick Bedell. Paper read before the British Assn. at Liverpool. Mathematical, with diagrams. 1000 w. Elec Eng, Lond—Oct. 9, 1896.

The Effect of Insulation Resistance and Capacity on the Absolute Potentials in Alternate Current Systems. A. Von Ettinghausen and G. Ossana. From the "Zeitschrift für Elektrotechnik." The paper is chiefly devoted to the consideration of three-phase circuits, but the methods are also applicable to single and two-phase alternating systems. 2400 w. Elect'n—Oct. 30, 1896.

**Transformer.**—See TRANSFORMER.

**Vector Diagrams.**—The application of Vector Diagrams to the Flow of Alternating Currents (Ueber die Anwendung des Vektordiagramms). Dr. F. Breisig. Devoted especially to the consideration of flow in long circuits with high tensions. Two articles. 9000 w. Elektrotech Zeitschr—June 1, 8, 1899.

## ALTERNATING CURRENT MOTOR.

See **ELECTRIC MOTOR.**

## ALTERNATOR.

See also **DYNAMO; ELECTRIC MACHINERY; ELECTRIC PLANT; ELECTRIC POWER STATION; ELECTRIC STATION; HYDRO-ELECTRIC PLANT.**

Alternating Current Generators and Transformers. Alton D. Adams. Illustrated detailed description of these machines and their operation. 900 w. Engr, U. S. A.—July 1, 1899.

Alternating Current Generators. H. G. Reist. Read at the Chicago convention of the Nat. Elec. Lgt. Assn. Traces the improvements made in alternating current generators, describing the latest machines and their operation. Ill. 4000 w. Elec Rev, N. Y.—May 23, 1900.

Alternators. M. I. Pupin. Historical review of the steps that led to the use of the alternator and the transformer. The method of armature winding is illustrated, and the ways of constructing the alternator. 2000 w. Elec Pow—Jan., 1896.

Extending Applications of Alternating Machines. Alton D. Adams. On the rapid rate at which this machinery has grown in favor for both light and power, and its advantages. 2500 w. Sci Am—Oct. 27, 1900.

On the Alternating Current Dynamo. W. E. Goldsborough. A study, giving general equations that cover the working of alternating current dynamos, with graphical analysis and discussion. 1400 w. Phys Rev—May-June, 1896.

**Bankside, London.**—The Alterations to the Brush Alternators at Bankside Station. Ernest Kilburn Scott. Describes alterations made to the alternators at this London electric lighting station. Ill. 1200 w. Elect'n, Lond—Aug. 18, 1899.

**Compounding.**—Compounding Alternators for Constant Voltage (Sur le Compoundage des Alternateurs à Voltage Constant). Maurice Leblanc. Illustrated description of an ingenious auxiliary exciting method which is applicable to alternators having high armature reactance, permitting them to be paralleled, etc. 1200 w. Comptes Rendus—Nov. 7, 1898.

The Automatic Compounding of Alternating Dynamos. Maurice Leblanc. Extracts from a paper recently presented before La Société Internationale des Electriciens, describing an ingenious system of compounding. Ill. 1400 w. Elec Wld—Jan. 14, 1899.

**Construction.**—How to Build a Small Alternating Current Dynamo Without Castings. Nevil Monroe Hopkins. Describes a small machine which produces a "single phase" alternating current at 110 volts pressure, and is built witohut patterns and castings. Ill. 4800 w. Sci Am—Sept. 11, 1897.

**Deptford.**—The New 1000-Unit Machine at Deptford. General remarks on the difficulties encountered by the London Electric Supply Corporation, followed by a description of the new engines. 5400 w. Engr, Lond—Dec. 20, 1895.

**Design.**—Design of Alternators. H. F. Parshall and H. M. Hobart. Describes a method founded upon experimental data. Part first discusses inherent regulation, and excitation regulation. Serial. Engng—July 27, 1900.

The Calculation of Alternating Current Generators. Alexander Rothert. Part first discusses the methods of Kapp and Behn-Eschenburg, pointing out the deficiencies which sometimes cause erroneous results, for the purpose of comparison with a theory to be given which is free from such errors. Serial. Elec Wld—Aug. 13, 1898.

See also **Voltage Drop.**

**Direct Service.**—Alternating Generators for Direct Service. Alton D. Adams. An explanation of the desirable features. 1200 w. Elec Wld & Engr—Oct. 7, 1899.

**Electromotive Force.**—Determination of the Virtual Electromotive Force of Alternators. Karsten Knudsen. A consideration of the practical applications of the magnetic field, and the electromotive forces set up in conductors when moving in a field of definite strength. Serial. W Elect'n—Dec. 11, 1897.

**Exciting.**—A New Method of Exciting Alternators (Ein Neues Erregungssystem für Wechselstrom Maschinen). A system of auxiliary brushes are arranged so as to deliver a current from the armature of the alternator for exciting the field. 3000 w. Elektrizität—March 8, 1900.

**Hunting.**—Hunting of Alternating Current Apparatus. H. W. Buck. Explains what the phenomen of hunting is, the cause, and the laws which govern it, with related matter. Ill. 1800 w. Elec Wld & Engr—April 7, 1900.

**Hutin-Leblanc.**—A 640 Horse-Power Hutin-Leblanc Alternator with Stationary Armature. F. Guilbert. Abstract of an article in "L'Industrie Electrique" of Nov. 10. Illustrated description. 1300 w. Elect'n—Dec. 11, 1896.

**Induction.**—Some Tests with an Induction Generator. A. F. McKissick. Paper presented at meeting of Am. Inst. of Elec. Engs. at Omaha. Describes tests made. 2500 w. Elec Wld—Sept. 3, 1898.

Some Tests with an Induction Generator. A. F. McKissick. Tests of an induction motor acting as a generator, driven by a direct-current motor are given, with curves showing the operation. 2400 w. Trans Am Inst of Elec Engs—May, 1898.

**Inductor.**—Some Account of the Evolution of the Inductor Alternator. John F. Kelly. Read before the National Electric Light Assn. The first number contains an illustrated description of the machines of Knight, Wheatstone, Lippens, S. M. Martin and S. A. Varley. Serial. Elec Rev—May 13, 1896.

**Laboratory.**—A Universal Alternator for Laboratory Purposes. Henry S. Carhart. Illustrated description of the machine with reasons for adopting this design. 700 w. Am Elect'n—Nov., 1897.

A Universal Alternator for Laboratory Purposes. Henry S. Carhart. Read before the Am. Assn. for the Adv. of Science. Describes the machine. 800 w. Elec Eng—Sept. 16, 1897.

**Maximum Output.**—The Maximum Output of Alternators. Dugald C. Jackson. Gives theoretical formulas which apply with a considerable degree of accuracy to the only machine with which the writer had an opportunity to experiment. 6500 w. Elec Wld—March 20, 1897.

**Parallel.**—Method of Detecting and Equalizing the Period Difference of the Alternating Circuits (Anordnungen zur Erkennung und Ausgleichung der Periodendifferenz Zweier Wechselstromkreise). W. Ritter. Giving a number of diagrams showing methods of connecting alternators when operated in parallel. 3500 w. Elektrotech Zeitschr—Jan. 4, 1900.

Paralleling of Alternators. Robert Hammond. Abstract of paper read before the Northern Soc. of Elec. Engs. The latest information on this much discussed subject. Serial. Elec Eng, Lond—March 13, 1896.

Running Alternators in Parallel. Describes a method patented by G. Dettmar, of Linden, near Hanover, which aims at the removal of the difficulty of separating two parallel-connected machines without affecting the terminal potential of the one which is to remain on the bus bars. 1500 w. Elec Eng, Lond—March 31, 1899.

The Oscillation of Parallel Connected Dynamos (Das Pendeln Parallel Geschalteter Maschinen). Gisbert Kapp. A discussion of the best methods of preventing the oscillations which sometimes appear in direct-driven dynamos which are connected in parallel. 4000 w. Elektrotech Zeitschr—Feb. 16, 1809.

The Paralleling of Alternators. Edward P. Burch. Gives suggestions of two simple ways of connecting alternators in parallel. 700 w. Elec Wld—Oct. 8, 1898.

Operating Alternators in Parallel. Describes the usual procedure in coupling. Ill. 1500 w. Power—Dec., 1899.

Parallel-Driving with Alternating Generators (Ueber den Parallelbetrieb mit Wechselstrommaschinen). Dr. G. Benischke. A study of the conditions under which satisfactory parallel driving is practicable, with wave diagrams and a description of a mechanical model by which the action can be illustrated. 5000 w. Elektrotech Zeitschr—Dec. 14, 1899.

The Parallel Connection of Alternators Driven by Gas Engines (Das Parallelschalten von Wechselstrommaschinen die durch Gasmaschinen Betrieben Werden). G. Dettmar. Showing how the alternators may be synchronized by the use of a magnetic brake acting on the fly wheel of the gas engine. 2500 w. Elektrotech Zeitschr—Oct. 19, 1899.

The Action of Parallel-Connected Alternators (Ueber das Verbalten Parallel Geschalteter Wechselstrommaschinen). Hans Görges. Giving a graphical method for showing the action, as well as differential equations for the alternations. 7500 w. Elektrotech Zeitschr—March 8, 1900.

Parallel Operation of Alternators. Charles Proteus Steinmetz. Advises the operation in parallel wherever feasible and showing that if equality of frequency and constancy of frequency have been provided for, they will run satisfactorily, and if they cannot be fulfilled, parallel operation is impracticable. 1400 w. Elec Wld—Jan. 2, 1897.

Parallel Operation of Direct-Coupled Alternators. W. L. R. Emmet. An explanation of a principle of importance in the proper parallel operation of engine-driven alternators. 1200 w. Elec Wld & Engr—Jan. 20, 1900.

Some Notes on the Parallel Running of Alternators. Sidney E. T. Ewing. Remarks on this subject of interest to engineers in charge of alternators connected in parallel. 2000 w. Elec Eng, Lond—Oct. 22, 1897.

Alternating Current Dynamos in Parallel. J. E. Woodbridge. Describes treatments which seem to work well in practice. Serial. Elec Eng—April 28, 1897.

See also **DYNAMO.—Motive Power; Parallel; ELECTRIC INDICATOR.—Synchronism.**

**Polyphase.**—See **DYNAMO.**

**Polyphase—Single Phase.**—See **DYNAMO.**

**Reaction.**—Comments Upon M. Blondel's Theory of Inductor Reaction (Observation sur une Note de M. Blondel Relative à la Réaction d'Induit des Alternateurs). A. Potier. A communication to the French Academy discussing mathematically the theory of M. Blondel. 1500 w. Comptes Rendus—Oct. 23, 1899.

Inductor Reactions of Alternators (Sur les Réactions d'Induit des Alternators). A. Blondel. A communication to the French Academy showing how the reaction may be referred to two or three coefficients of self-induction. 1500 w. Comptes Rendus—Oct. 16, 1899.

**Regulation.**—The Regulation of Alternating-Current Generators. C. L. Cory. Read before the convention of the Pacific Coast Elec. Trans. Assn. at San Francisco. Discusses the drop through the armature, and the change in the strength of the magnetic field due to the demagnetizing action of the armature current. 2700 w. Jour of Elec—Aug., 1899.

**Short-Circuit Curves.**—Experiments on the Short-Circuit Curves of Alternating Generators (Untersuchungen über die Kurzschlusskurve von Weckselstrom Generatoren). A Rothert. A long mathematical discussion with many diagrams based upon original experiments. Three articles. 7500 w. Elektrotech Zeitschr—Aug. 31, Sept. 7, 14, 1899.

**Slattery.**—A High or Low Tension Alternator. H. F. M. Dahl. Illustrates and describes the 10 K. W., ten-pole, single-phase, Slattery alternator belonging to the electrical engineering department of the University of Minnesota, which was remodelled according to a plan proposed by George D. Shephardson. 1000 w. Year Bk of Soc of Engs, Univ of Minn—1898.

**Synchronizing.**—Notes on Synchronizing Alternators H. E. M. Kensit. Gives methods for ascertaining whether the synchronizing transformers are so connected that the alternators are in phase when the lamp is bright. Ill. 1500 w. Elect'n, Lond—Feb. 4, 1898.

**Tests.**—Alternating-Current Dynamo Tests. Horace Field Parshall. From the "Proceedings of the Institution of Civil Engineers, England." Investigations made to determine efficiency at different loads, to obtain quantitative results, and to establish an economical, accurate and comprehensive method of testing. 4000 w. Elec Eng, Lond—Dec. 17, 1897.

**Unipolar.**—See also **DYNAMO.**

**Unipolar Self-Exciting.**—Unipolar Self-Exciting Alternators. J. L. Routin. Translated from "L'Eclairage Electrique." Describes an arrangement by which a generator may operate without the help of a rectifying commutator. 700 w. Elec, N. Y.—Jan. 26, 1898.

**Voltage Drop.**—The Design of Alternating Current Generators with Regard to the Drop in Tension (Die Vorausberechnung von Wechselstrommaschienen mit Bezug auf den Spannungsabfall). J. Fischer-Hinnen. With diagrams of windings and tables of data, together with applications to practical Examples. 7500 w. Elektrotech Zeitschr—Oct. 14, 1897.

Alternator Design. J. Fischer-Hinnen. From the "Elektrotechnische Zeitschrift." An essay on the calculation of alternating current machinery, with special reference to the drop of pressure in the armature windings. Ill. Serial. Elec Eng, Lond—Nov. 5, 1897.

Investigation of the Loss of Pressure in Armature Windings of Alternate Current Machines. Translated from "Elektrotechnische Zeitschrift." Illustrated description of method. Serial. Elec, N. Y.—Nov. 24, 1897.

The Fall in Pressure in Alternating Generators (Ueber den Spannungsabfall bei Wechselstromgeneratoren). B. A. Behrend. A comparison of the methods of Behn-Eschenburg and Rothert for measuring the fall in pressure, showing the latter to be untrustworthy. 3500 w. Elektrotech Zeitschr—Nov. 30, 1899.

**Wave Forms.**—Conditions Affecting the Wave Form of Alternators. L. A. Herdt and E. M. Archibald. Paper before the Canadian Electrical Association, discussing forms of electromotive-force waves under commercial conditions, with diagrams. 800 w. W Elect'n—Sept. 15, 1900.

Conditions Affecting the Wave Form of Alternators. L. A. Herdt and E. M. Archibald. Paper read before the Can. Elec. Assn. Considers the extent to which the E. M. F. wave of certain machines may change under not unusual commercial conditions. Ill. 800 w. Can Engr—Sept., 1900.

See also **ALTERNATING CURRENT.—Curves.**

## ALTITUDE MEASUREMENT.

See **AERONAUTICS—Altitude Measurement.**

## ALUMINOTHERMY.

Aluminum as Fuel. Dr. H. Goldschmidt. From a paper read before the German Electro-Chemical Society, Leipsic. Explains the process of using aluminum as a refining and heat producing agent, and the adaptation of the working method to the purpose in view. 1600 w. Am Mfr & Ir Wld—July 1, 1898.

Aluminum as a Reducing Agent and Accumulator of Heat (Ueber das Aluminum als Reductionsmittel und Wärme-Accumulator). Dr.

H. Seidel. A discussion o. ... experiments of Goldschmidt concerning the production of high temperatures by the use of aluminum. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 13, 1899.

Aluminum as a Reducing Agent and a Source of High Temperatures. The investigations of Dr. Hans Goldschmidt are reported, which have made it possible to produce metals on a large scale and to utilize in other ways the temperature produced by the reaction. Explains its use in the production of metallic chrome and manganese and of corundum. 1500 w. Ir Age—Oct. 6, 1898.

Aluminum for High Temperatures and for the Reduction of Metals from their Oxides. J. B. Nau. Describes the method of Hans Goldschmidt for the extraction of metals from their oxides by means of metallic aluminum. 2000 w. Ir Age—June 16, 1898.

A New Method of Generating High Temperatures (Ueber ein Neues Verfahren zur Erzeugung Hober Temperaturen). Dr. H. Goldschmidt. The process is based on the fact the aluminum develops a high temperature in entering into combination, and hence raises the temperature when used as a reducing agent. 3000 w. Stahl und Eisen—May 15, 1898.

A New Method of Treatment of Metals and Alloys, etc. (Ein Neues Verfahren zur Darstellung von Metallen und Legirungen, etc.). Dr. H. Goldschmidt. A discussion of the use of aluminum for obtaining high temperatures in connection with the fusion of metals and other substances. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 10, 1898.

High Temperatures Produced by a New Method. Ernest F. Lange. Presented at the Paris meeting of the Iron and Steel Inst. A description of the Goldschmidt process. 4000 w. Ir Age—Oct. 4, 1900.

Later Experience with the Goldschmidt Process for the Production of High Temperatures (Neues über das Goldschmidtsche Verfahren zur Erzeugung Hober Temperaturen). F. Wüst. Relating experiences with the use of aluminum for the production of high temperatures, giving examples of practical applications. 1800 w. Stahl und Eisen—July 15, 1899.

Method of Producing High Temperatures (Verfahren zur Erzeugung Hoher Temperaturen). Dr. H. Goldschmidt. A paper read before the German Electro-chemical Society giving the further results of the author's methods of producing high temperatures by the use of aluminum. 2000 w. Zeitschr für Elektrochemie—July 20, 1899.

The Generation of Intense Heat Through the Combustion of Aluminum. S. B. Archdeacon. Describes the process, based on the affinity of aluminum and oxygen, noting some of its applications. Ill. 3600 w. Eng & Min Jour—Aug. 25, 1900.

The Goldschmidt Process for Producing High Temperatures (Ueber das Goldschmidtsche Schweissverfahren). A discussion of the results of experience with the use of aluminum for the production of very high temperatures. 1200 w. Glückauf—Dec. 2, 1899.

The Process of Generating High Temperatures by the Combustion of Aluminum, with some Technical Applications Thereof (Verfahren zur Erzeugung Hoher Temperaturen durch Verbrennen von Aluminium und einige Anwendungen desselben in der Technik). Dr. Hans Goldschmidt. An illustrated account of the author's process for generating high temperatures by burning aluminum. with many applications, such as welding and repairing, and obtaining chemically pure metals. 4000 w. Glückauf—June 2, 1900.

**Rail Welding.**—The Goldschmidt Process of Rail Welding. Abstracts of two papers describing this novel and interesting method. Ill. 2000 w. St Ry Jour—Feb. 3, 1900.

## ALUMINUM.

See also **ALUMINUM INDUSTRY; SHIPBUILDING MATERIAL.—Nickel Steel and Aluminum.**

Aluminum. A commentary upon its properties, production, and future. 1200 w. Builder—Aug. 27, 1896.

Aluminum: A New Comer Among the Metals. The history of the early difficulties with this metal, the success and uses. 3800 w. Am Rev of Revs—Oct., 1897.

Aluminum Considered Practically in Relation to Its General Application in the Arts and Mechanics. Joseph A. Steinmetz. Enumerates the uses that have proved satisfactory and cautions the improper use of the metal. 4500 w. Jour Fr Inst—Oct., 1900.

Aluminum: Its Present and Future. Part first reviews early investigation of this metal, and the processes used. 2500 w. Engr, Lond—April 2, 1897.

Aluminum. J. B. Some of its characteristics. 900 w. Can Eng—Sept., 1896.

Aluminum and Its Uses and Treatment. J. H. Henderson. Abstract of a paper read before the Manchester Junior Elec. Engs. Describes the methods of extraction, and its peculiarities as an electrical conductor. 1000 w. Ind & Ir—Dec. 15, 1899.

Aluminum the Metal of the Future. From "The Wonders of Modern Mechanism." In what its value lies and its uses, with a review of its properties. 1500 w. Prog of the Wld—June, 1896.

Notes on Aluminum. Jesse M. Smith. Much information of this metal, its properties. uses, cost, etc., with discussion. 11000 w. Jour Assn of Engng Socs—Jan., 1896.

The Present Position of Aluminum. The uses to which the metal has been put, especially those having regard to the requirements of the engineer. 1800 w. Prac Engr—Dec. 30, 1898.

The Progress of Aluminum. A review of progress during the past two years in the manufacture and utilisation of aluminum and its alloys. 4500 w. Engr, Lond—Feb. 17, 1899.

The Progress of Aluminum. A review of the position and prospects, and general information. 4500 w. Engr, Lond—March 23, 1900.

The Properties and Applications of Aluminum ((Sur les Propriétés et les Applications de l'Aluminum). A. Ditte. Particularly devoted to the durability of the utensils used by the French soldiers in Madagascar, and indicating the metal to be less adapted for such purposes than has been supposed. 3000 w. Comptes Rendus—March 27, 1899.

The Utilisation of Aluminum in the Arts. Alfred E. Hunt. Discusses the use of aluminum in the manufacture of steel ingots and castings, in cast-iron, nickel aluminum, cooking utensils, in chemical laboratories, in surgical instruments and appliances. bicycle parts, lithographic work, etc. Serial. Jour Fr Inst—Aug., 1897.

**Acoustical Properties.**—See **ACOUSTICS—Researches.**

**Alloy.**—See **ALUMINUM ALLOY.**

**Analysis.**—Aluminum Analysis. James Otis Handy. The method is described with apparatus used, and analysis given. Special methods are also given for determinations other than silicon, copper and iron. 6000 w. Jour Am Chem Soc—Sept., 1896.

**Applications.**—The Applications of Aluminum (Sur les Applications de l'Aluminium). A. Ditte. A reply to the communication of M. Moissan. 1800 w. Comptes Rendus—April 17, 1899.

The Applications of Aluminum (Sur les Applications de l'Aluminium). Henri Moissan. A note to the French Academy, with analyses of commercial samples of aluminum and data as to its endurance under various conditions. 3000 w. Comptes Rendus—April 10, 1899.

**Carriage Building.**—The Possibilities and Uses of Aluminum as Applied to Carriage Building. Percy W. Northey. Read before the Inst. of British Carriage Builders. Presents advantages justifying the use of this metal and the economy in manufacture effected. 1600 w. Auto Jour—Oct., 1899.

**Cast Iron.**—See **CAST IRON.—Aluminum.**

**Cooking Utensils.**—Tests of Utensils of Aluminum (Essai des Utensiles en Aluminium). M. Balland. Giving the results of chemical tests made upon the cooking utensils of aluminum supplied to the French Army. Comptes Rendus—June 8, 1897.

**Electrical Conductivity.**—Recent Determinations of the Electrical Conductivity of Aluminum. Joseph W. Richards and John A. Thomson. Gives the causes of the various values determined for the electrical conductivity of this metal, with experiments and conclusions. 900 w. Jour Fr Inst—March, 1897.

**Electrical Engineering.**—Aluminum and Its Uses and Treatment in Electrical Engineering. J. H. Henderson. Abstract of a paper read before the Manchester Junior Electrical Engineers. Considers its extraction, its uses as a conductor, and in the workshop. 1200 w. Prac Engr—Dec. 22, 1899.

**Electric Conductor.**—See **ELECTRIC CONDUCTOR.—Aluminum.**

**Electrode.**—See **ELECTRIC CURRENT RECTIFIER; ELECTRODE.—Aluminum.**

**Foundry.**—Aluminum and Its Use in the Foundry. Joseph Allison Steinmetz. General advantages claimed with general conclusions. 2000 w. Ir Age—April 15, 1897.

**French Army.**—The Use of Aluminum in the French Army (Emploi de l'Aluminium dans l'Armée Française). Showing the saving in weight by the use of aluminum cooking utensils, etc., and the extent to which they have been placed in the French army. 800 w. La Rev Tech—Sept. 25, 1898.

**Impurities.**—The Impurities in Aluminum (Sur les Impuretés de l'Aluminium). A. Minet. An examination of the influence of the method of producing aluminum upon the impurities contained in the resulting metal. 1800 w. Comptes Rendus —May 8, 1899.

The Impurities of Aluminum and Its Alloys. (Sur les Impuretés de l'Aluminium et de ses Alliages). P. Defacqz. A paper presented to the French Academy by M. Moissan; the principal impurities found were iron and silica; the methods of analysis are given. 1500 w. Comptes Rendus —Dec. 27, 1897.

**India.**—Aluminum in India. Report on the condition of the industry, by Alfred Chatterton. 1300 w. Jour Soc of Arts—May 25, 1900.

**Iron Alloys.**—Relations of Aluminum to Iron. Godfrey Melland. Abstract of a paper read before the So. Staffordshire Ir. and Steel Inst. Reviews facts ascertained, considering the alloys, and the use of aluminum in the treatment of malleable and cast iron. 2000 w. Ir & Coal Trds Rev—March 30, 1900.

**Knitting Machinery.**—Aluminum in Knitting Machinery. George D. Rice. Information useful to knitting machine builders who wish to try this new metal. Ill. 800 w. Mach, N. Y.—Aug., 1897.

**Latent Heat.**—The Latent Heat of Aluminum. E. Grafstrom. Brief illustrated account of experiments made by the writer. 600 w. R R Gaz—Feb. 23, 1900.

**Properties.**—Some Properties of Aluminum (Sur quelques Propriétés de l'Aluminum). A. Ditte. A communication to the French Academy devoted especially to a study of the materials by which aluminum is attacked. 2500 w. Comptes Rendus —Jan. 25, 1899.

The Properties of Aluminum (Sur les Propriétés de l'Aluminum). A. Ditte. A statement of the chemical properties of the metal, its resistance to attack by oxygen and acids. The conclusion is drawn that, before it is used for culinary or military utensils, the subject should be more fully studied. 1500 w. Bull de la Soc d'Encour—Dec., 1898.

**Protection from Sea Water.**—See **METAL PROTECTION.—Sea Water.**

**Sheet.**—The Spinning, Stamping and Working of Aluminum and Brass Sheet. From the "Aluminum World." The more general use of the aluminum sheet is noted and some facts related to its working. 1600 w. Sci Am Sup—Oct. 15, 1898.

The Working of Sheet Aluminum. From the "Aluminum World." The great secret is said to consist in the proper lubricant and the shape of the tool. Discusses lathe work, drawing, spinning, frosting and burnishing. 2300 w. Ir Age—April 29, 1897.

The Working of Sheet Aluminum. From the "Aluminum World." Describes lathe work, drawing, spinning, frosting, burnishing. 2500 w. Met Work—May 15, 1897.

**Shipbuilding.**—Aluminum in Shipbuilding. Review of a report recently made by M. Guillemoux upon the condition of two aluminum vessels of the French navy, which have been in use two years. The metal was found to have been attacked by salt water where the hull had been imperfectly protected by the paint. 500 w. Ir Age—April 16, 1896.

See also **METAL PROTECTION; SHIPBUILDING MATERIAL; YACHT —"Defender."**

**Sodium.**—Sodium in Aluminum. A paper read before the Academie des Sciences in Paris, by M. Moissan on the effects of various metals when associated with aluminum, stating that it is rapidly converted into alumina, especially in the presence of water. 1300 w. Ind & Ir—Dec. 27, 1895.

**Steel.**—See **STEEL.—Aluminum.**

**Warfare.**—Use of Aluminum in Warfare by the Armies and Navies of the World. From the "Aluminum World." Discusses how aluminum could be used to advantage. 2200 w. Sci Am Sup—Dec. 17, 1898.

## ALUMINUM ALLOY.

Aluminum Alloy to Replace Brass. An alloy which if it proves to possess the qualities claimed must prove of value in machine construction. 600 w. Mach—Feb., 1896.

**Magnalium.**—See **MAGNALIUM.**

**Mechanical Properties.**—Mechanical Properties of Certain Aluminum Alloys. R. C. Carpenter. Facts that have been definitely determined during investigations carried on at the laboratories of Sibley College, Cornell University. 3700 w. Am Soc of Mech Engs, No. 784—June, 1898.

## ALUMINUM BRONZE.

Aluminum Bronze and Its Uses in the Arts. From the "Aluminum World." Defines term, gives discovery, valuable qualities, uses, strength, etc. 2300 w. Foundry—Sept., 1896.

**Bearings.**—See **BEARINGS.—Aluminum Bronze.**

**Tubing.**—Aluminum Bronze Seamless Tubing. Leonard Waldo. Describes process of making, with difficulties. Abstract of a paper presented at the N. Y. meeting of the A. S. M. E. 1000 w. Eng News—Dec. 24, 1896.

## ALUMINUM INDUSTRY.

Present Position of Aluminum. Brief outline of the growth of the industry, with a table giving the price at various periods. In 1856 it was £18 per pound; in 1895 it was 1s. 6d. per pound. 900 w. Ind & Ir—Dec. 13, 1895.

Recent Progress in the Aluminum Industry. Joseph W. Richards. Remarks on recent advances and improvements in methods. 2800 w. Jour Fr Inst—June, 1900.

The Aluminum Industry. A summary of the latest facts and figures available, relating to the production and cost of aluminum. 1000 w. Engng—Sept. 17, 1897.

The Aluminum Industry. G. L. Addenbrooke. The last year has proved a quiet but eventful one in this industry, and the work accomplished is reviewed. 2200 w. Elec Rev, Lond—Jan. 31, 1896.

The Present Status of the Aluminum Industry (Der Heutige Stand der Aluminium Industrie). Dr. B. Neumann. A review of the development of the industries since the introduction of the Deville process; with data as to the production of the American, Swiss, and French establishments at the present time by electrical methods. 2500 w. Glückauf—July 30, 1898.

**Bauxite.**—See **BAUXITE.**

## ALUMINUM MANUFACTURE.

See also **ALUMINUM WORKS.**

**Bradley Patents.**—The Bradley Aluminum Patents. The invention relates to a process of effecting by the electric current the separation of aluminum from its ores or compounds. Specifications and drawings. 1500 w. Eng and Min Jour—Feb. 27, 1897.

Process in the Metallurgy of Aluminum Developed in 1897 (Procédes Mis en Oeuvre en 1897 dans la Métallurgie de l'Aluminum). Alfred Boudon. The first of a series describing the most recent advances in the isolation of aluminum, as well as some new alloys. Serial. La Rev Tech—Oct. 10, 1897.

**Electrolytic.**—The Electric Manufacture of Aluminum. Illustrated description of process with interesting matter bearing upon the subject. 2000 w. Elec Wld—Jan. 18, 1896.

The Electro-Metallurgy of Aluminum. Joseph W. Richards. Electro-metallurgy is defined, the methods used are classified, the operations for which each is capable of being used are enumerated, as an introduction to the subject. The properties of aluminum are considered and the different kinds of electric processes are taken up in detail, with illustrations. 6200 w. Jour Fr Inst—May, 1896.

**Europe.**—Aluminum Manufacture in Europe. Alfred E. Hunt. Reviews the history of aluminum manufacture, with the processes used, and gives information regarding prices and development. 3000 w. Ir Age—Dec. 10, 1896.

**Heroult-Hall.**—Aluminum at a Moderate Price. M. Heroult. Abstract of a paper before the International Congress of Mining and Metallurgy at Paris, giving a general account of the Heroult, or Hall, electrolytic process, with a brief review of the advance made in methods of producing aluminum. 1200 w. Eng & Min Jour—Sept. 15, 1900.

**Milton, Eng.**—Aluminum Manufacture, with Description of the Rolling Mills and Foundry at Milton, Staffordshire. E. Ristori. Read before the Inst. of Mech. Engs. at Derby, England. Description and plan of the works where aluminum is melted and refined until it attains a purity of 99.6 per cent. The manner of working, the alloys, and uses, are considered. Also discussion. 7500 w. Engng—July 29, 1898.

**Rolling Mill.**—See **ROLLING MILL.—Aluminum.**

**ALUMINUM WORKS.**

**Foyers.**—The Aluminum Works at Foyers. Illustrated description of the engineering features. 2800 w. Elec Rev, Lond—May 14, 1897.

Aluminum on Its Mettle. A lengthy illustrated description of the works of the British Aluminum Company, with information of this metal and its usefulness. 10800 w. Commerce—Dec. 14, 1898.

The British Aluminum Works at Foyers. Illustrated description. Serial. Elec Eng, Lond—April 24, 1896.

**Larne Harbor, Ireland.**—The Preparation of Aluminum from Bauxite. James Sutherland. Description of the processes used by the British Aluminum Co., at the Larne Harbor works in Ireland. 2200 w. Eng & Min Jour—Oct. 3, 1896.

Description of the Alumina Factory at Larne Harbor. James Sutherland. Read at the Belfast meeting of the Inst of Mech. Engs. Detailed description. 2400 w. Ind & Ir—July 31, 1896.

**Niagara.**—Electrical Equipment of Aluminum Works at Niagara Falls. Orrin E. Dunlap. Illustrated description. 1800 w. W Elect'n—July 11, 1896.

The Manufacture of Aluminum by Electrolysis, and the Plant at Niagara for its Extraction. Alfred E. Hunt. Read before the Inst. of Civ. Engs. The description is condensed and gives many details of the process. 1300 w. Col Guard—Feb. 14, 1896.

**AMALGAMATION.**

See also **GOLD METALLURGY.**

Alloys and Amalgamation of Gold. H. Van F. Furman, in the "Metal Miner." A summary of the effect of small amounts of impurities on gold bullion. 900 w. Min & Sci Pr—Oct. 31, 1896.

**Bryan Mill.**—See **Plate.**

**Copper Plates.**—Amalgamated Copper Plates. N. S. Keith. Describes a plan of preparation and treatment that has been found effective and inexpensive as compared with silver plating. 2300 w. Min & Sci Pr—July 1, 1899.

The Accumulation of Amalgam on Copper Plates. R. T. Bayliss. The author shows that the gold fineness of the amalgam on the plates is highest near the battery, while the corresponding silver fineness is highest further away. 2200 w. Trans Am Inst of Min Engs—Feb., 1896.

The Accumulation of Amalgam on Copper Plates. Communications in discussion of the paper of Mr. R. T. Bayliss, presented at the Pittsburg meeting, Feb., 1896. 3500 w. Trans Am Inst of Min Engs—July, 1896.

The Accumulation of Amalgam on Copper Plates. Facts observed in the 50-stamp "combination" mill operating the Drum Lummon mine, situated at Marysville, Montana. 1800 w. Aust Min Stand—May 21, 1896.

**Electric Driving.**—See **ELECTRIC DRIVING.—Amalgamator.**

**Electrolytic.**—Amalgamation of Metals, Normal and Electrolytic. J. H. Jory. Presents facts concerning amalgamation and the value of electrolytic amalgamation. 2000 w. Min & Sci Pr—April 21, 1900.

**Gold Pyrites.**—The Extraction of Gold from Auriferous Pyrites by Amalgamation. Thomas G. Davey. Read before the Inst. of Min. & Met., London. On the merits of the pan-amalgamation process, giving illustrated description. Ill. 2500 w. Eng & Min Jour—July 28, 1900.

**Laboratory.**—Notes on a Laboratory Amalgamating Device and Comparisons with Actual Mill Results. H. A. Guess. Illustrates the device, explaining the necessities that led to its adoption and outlining the method used in determining the milling value. 1100 w. Can Min Rev—Oct. 31, 1898.

**Pan.**—Theories of Pan Amalgamation. E. Herligendorfer. Discovers the reason why raw pan amalgamation can never recover all the silver from sulphurets. 900 w. Min & Sci Pr—April 24, 1897.

**Pan vs. Tina.**—Pan Versus Tina Amalgamation. Additions to and criticism of a paper by Mr. Pazos on the use of copper in amalgamation. The author gives the effect produced by substituting iron for copper at the Bolivian silver mills. 1500 w. Eng & Min Jour—Dec. 21, 1895.

**Plate.**—Note on Plate-Amagamation. Allan J. Clark. Gives results of experiments made on the large plate-surface in the mills of the Homestead Company, to determine whether silver gave evidence of a tendency to escape amalgamation. 700 w. Trans Am Inst of Min Engs—Sept., 1899.

Note on the Plate-Amalgamation of Gold and Silver. E. A. H. Tays. Data regarding plates from four battery aprons. 500 w. Trans Am Inst of Min Engs—Feb., 1900.

The Bryan Mill as a Crusher and Amalgamator Compared with the Stamp Battery. E. A. H. Tays. Discussion of this paper, which was presented at the California meeting, Sept., 1899. 700 w. Trans Am Inst of Min Engs—Aug., 1900.

**Silver Plating.**—The Silver Plating of Amalgam Plates for Gold Mills. Allan Jay Clark. Illustrates and describes the plant installed for retreatment of these plates, at Lead, South Dakota. 3000 w. Sch of Mines Quar—Nov., 1899.

**Temperature.**—Temperature in Amalgamation. Editorial calling attention to the fact, ascertained by experiment, that the cooling of the water used in the stamp-mill batteries very considerably increases the yield of gold. A few quotations from writers as to the cause of this difference are given. 1400 w. Eng & Min Jour—Jan. 29, 1898.

**Transylvania.**—The Amalgamation of Rich Free Gold-Ores. F. Hille. Relative economic results of ball-mill and mortar amalgamation in Transylvania. The former was run at about 1-10 the expense of the latter. 1000 w. Eng & Min Jour Feb. 8, 1896.

**AMERICAN ASSOCIATION.—Advancement of Science.**—See **SCIENTIFIC SOCIETY.—American Association.**

**AMERICAN COMPETITION.**

See **ENGINEERING COMPETITION.**

**AMMETER.**

See **AMPERE METER.**

**AMMONIA.**

See also **GAS MANUFACTURE.**

Discussion of Mr. Ritson's paper on "Sulphate of Ammonia." 2300 w. Jour Gas Lgt—Dec. 8, 1896.

Notes on Sulphate of Ammonia. T. N. Ritson. The importance of the product in agriculture, and the need of spreading information on this subject, with tables and diagram giving the relative prices of sulphate of ammonia and nitrate of soda from 1890 to 1895. 2200 w. Jour Gas Lgt—Dec. 1, 1896.

Report on Sulphate of Ammonia Experiments. Report of Mr. John Hunter on the statistics of competitions for root growing in 1898. 1400 w. Gas Wld—Dec. 16, 1899.

Sulphate of Ammonia. E. A. Harman. Read before the Manchester District Institution of Gas Engineers. The various methods for the disposal of ammoniacal liquor are reviewed with methods and systems adopted for making use of waste gases and recovering other by-products. Discussion follows. Ill. 5200 w. Jour Gas Lgt—Nov. 30, 1897.

The Market for Sulphate of Ammonia Last Year. Extracts from the Annual Review, issued by Messrs. Bradley and Hirsch, of Liverpool. 3300 w. Jour Gas Lgt—Jan. 24, 1899.

**Agriculture.**—The Sale of Sulphate of Ammonia. Norton H. Humphreys. Discussion of the best way to popularize the use of this product as a fertilizer. 2700 w. Jour Gas Lgt—Sept. 28, 1897.

Sulphate of Ammonia in Comparison with Other Manures. James Muir. Considers the application of sulphate of ammonia on potatoes, beans, clover, grass, land, etc. 4000 w. Gas Engs' Mag—Sept. 10, 1900.

Sulphate of Ammonia in Farming. John Hunter. Presents the merits of sulphate of ammonia in agriculture, as based on results obtained on the Dalmeny farms of Lord Rosebery. 2200 w. Gas Wld—March 12, 1898.

The Agricultural Value of Sulphate of Ammonia from Blast-Furnaces. F. J. R. Carulla. Read at Iron and Steel Inst. The value of this product as a fertilizer for agricultural purposes, and the causes of the seeming decrease in money value. 2300 w. Gas Wld—May 15, 1897.

The Agricultural Value of Sulphate of Ammonia. Extracts from the discussion of F. J. R. Carulla's paper. 4000 w. Jour Gas Lgt—Sept. 14, 1897.

The Utility of Sulphate of Ammonia in Agriculture. James Muir. Explains the manner of action of sulphate of ammonia, showing how it may best be used on the various crops of the farm with a view to profit. Serial. Jour Gas Lgt—July 18, 1899.

The Value of Sulphate of Ammonia Compared with Other Manures. Information gained at Lord Rosebery's experimental station at Dalmeny, from the series of agricultural experiments carried out on these grounds. 1700 w. Jour Gas Lgt—Feb. 1, 1898.

**Analysis.**—On the Methods Employed in the Analysis of Commercial Ammonia. A. Lunge and W. Hefter. Reviews methods recently published on this subject. 900 w. Am Gas Lgt Jour—May 8, 1899.

The Determination of Ammonia in Gas Liquor: A Simple Method. Dr. Lubberger. Summary of an article in the "Journal für Gasbeleuchtung." Describes a method giving data much nearer analytical results than are those obtained by Knubbauch's method. 900 w. Gas Wld—May 20, 1899.

**Coke Manufacture.**—The Recovery of Ammonia in Coke Manufacture. From "Stahl und Eisen." Investigations of noted scientists and their conclusions. 1000 w. Ir & Coal Trds Rev—May 1, 1896.

**Fogarty Process.**—A Noteworthy Curiosity from the U. S. Patent Office. Frederick Egner. An explanation of what is known as the Fogarty process for producing gas and ammonia, by which the gas is merely a by-product made without cost. 2000 w. Am Gas Lgt Jour—Aug. 8, 1898.

**Gas Liquor.**—Ammonia: Its Saving and Concentration. George Osius. Read before the Michigan Gas Assn. A description of how to save and how to prepare it for the market. 2000 w. Pro Age—March 1, 1900.

An Examination of Gas Liquors. Inquiries made to measure the scrubbing and washing efficiency and also to ascertain the distribution of the sulphur. 2500 w. Gas Wld—June 10, 1899.

Methods of Estimating the Value of Gas Liquors. O. O. Thwing. Read at Detroit meeting of the Western Gas Assn. Deals with the volumetric test of ammoniacal liquors. Discussion. 5500 w. Pro Age—June 15, 1898.

Sulphate of Ammonia. H. H. Cousins. Part first discusses its source and manufacture, purity and impurities, annual production, etc. 1300 w. Jour Gas Lgt—Jan. 26, 1897.

The Chemistry of Ammoniacal Liquor. W. Ivison Macadam. The obtaining of the maximum quantity of nitrogen from coal in the manufacture of gas. 1400 w. Jour Gas Lgt—Aug. 18, 1896.

The Production of Liquor Ammonia from Gas Liquor. An outline of the recent work of Dr. Otto Pfeiffer, concerning improvements in the process of manufacture which he claims have resulted in a reduction in the cost of production. 1800 w. Jour Gas Lgt—March 13, 1900.

Treatment of Gas Liquor. Abstracts from "The Mineral Industry" article upon "Recovery of Ammonia and Ammonium Sulphate from Gas Liquor," by Hans A. Frasch. 1700 w. Pro Age—Oct. 2, 1899.

Utilising Gas Liquor in Small Plants. B. P. Holmes. Paper read at meeting of Ohio Gas Lgt. Assn. Experimental results and conclusions, therefrom, with protracted discussion. First part gives the entire paper and a portion of the discussion. The paper gives description of apparatus and method. 6500 w. Am Gas Lgt Jour—March 30, 1896.

**Gas Manufacture.**—Does the Manufacture of Sulphate of Ammonia Pay in Small Works? J. Wilkinson. Read before the Manchester Dist. Inst. of Gas Engs. Discusses the subject, concluding that the intermittent still is the most efficient method to adopt at small gas works. Discussion. 4000 w. Jour Gas Lgt—March 2, 1897.

**Sources.**—Ammonia and Its Sources. Bruno Terne. Discusses the gains from the products of coke-ovens, the system of coking that yields the best results, and other sources of ammonia. 4000 w. Jour Fr Inst—Aug., 1898.

**AMMONIA CONDENSER.**—See also **MARGARINE—Monsted's Factory.**

**AMMONIUM AMALGAM.**

Ammonium Amalgam. H. C. Pocklington. Investigations of the substance known by this name with a view to settling questions relating to its character. 1200 w. Elect'n, Lond—July 29, 1898.

**AMMUNITION WORKS.**

**Kynoch's, Birmingham.** — Kynoch's Ammunition Works. Illustrated description of the Wilton Works, near Birmingham, Eng. 2200 w. Engng—March 4, 1898.

**AMPERE.**—See **ELECTRIC MEASUREMENT—Standard Ampere.**

**AMPERE METER.**—See **ELECTRIC METER; ELECTRIC MEASUREMENT; VOLT METER.**

**Amphitheatre.**—The Rapid Construction of Amphitheatres (Construction Rapide d'Amphitheatres). A discussion of the rapid construction of large stands of the amphitheatre form for enabling a great number of spectators to witness reviews and similar spectacles. Data concerning the examples at Mirecourt and at Chalons are given. 1500 w. La Rev Tech—April 10, 1898.

**ANALYSIS.**

See also **ASSAYING**; and under specific titles.

The Dignity of Analytical Work. C. B. Dudley. Presidential address delivered at the Washington meeting of the American Chemical Society. A discussion of analytical work, its value and importance, giving illustrations and examining the differences in the work of pure and applied chemists. 6300 w. Science—Feb. 11, 1898.

**Accuracy.**—The Actual Accuracy of Chemical Analysis. F. P. Dewey. Compares the results obtained by several chemists, working upon the same sample by various methods. 3500 w. Trans Am Inst Min Engs—Sept., 1896.

The Accuracy of Chemical Analysis. Frederic P. Dewey. The consideration of the subject is confined to analysis of metals, determination of manganese in steel, and phosphorous in pig iron. Analyses of copper, gold and silver are also discussed. 3500 w. Jour Am Chem Soc—Sept., 1896.

**Indirect.**—Indirect Analysis. Edward K. Landis. New formula for analysis, applicable upon the supposition that the present atomic weights should be modified, and applicable to any case wherein the atomic weights are not the same. 900 w. Jour Am Chem Soc—Feb., 1896.

**Metallurgical.**—A Proposed Schedule of Allowable Difference and of Probable Limits of Accuracy in Quantitative Analyses of Metallurgical Materials. E. D. Campbell. A valuable contribution giving, in tabular form, the variation usually allowed, and the limit of accuracy due to method, of all the substances usually determined in metallurgical work. 400 w. Jour Am Chem Soc—Jan., 1896.

**ANCHOR.**

A Novel Fixed Anchor Construction for Jetties, Buoys and Light Ships. Illustrates and describes the very efficient system of anchors employed in the construction of a small jetty built at Atlantic City, N. J., in 1897. 800 w. Eng News—July 7. 1898.

**ANCHOR BOLT.**

**Repairing.**—Repairing an Anchor Bolt. Charles A. Hague. Describes a difficult piece of work in repairing an anchor bolt which had broken about 40 inches below the upper nut. 900 w. Am Mach—Jan. 21, 1897.

**ANEMOMETERS.**

See **Hydrometers.**

**ANEROID.**

The Counter-Twisted Curl Aneroid. Carl Barus. Account of an experimental research to determine effects of modifications of the Bourdon tube. 4500 w. Am Jour of Sci—Feb., 1896.

**ANGULAR VELOCITY.**

On a Means of Producing a Constant Angular Velocity. A. G. Webster. Describes an arrangement used by the writer, with practical test of the method, showing it to be of undoubted usefulness in absolute determinations. 1500 w. Am Jour Sci—May, 1897.

**ANICUT.**

See **DAM.**

**ANIMAL MECHANICS.**

Chronophotography Applied to the Study of Muscular Action in Locomotion (La Chronophotographie Appliquée à l'Etude des Actes Musculaires dans la Locomotion). An important communication by M. Marey, analysing the mechanical motions of the horse by continuous photography. 3500 w. Comtes Rendus—May 23, 1898.

**ANIMAL POWER.**

Comparison of the Thermal or Dynamical Power of Simple Elements with Their Nutritive Power (Comparaison du Pouvoir Thermogène ou Dynamogène des Eléments Simples avec leur Pouvoir Nutritif). A. Chauveau. An investigation into the possible cause of the high efficiency of animal power based on the food consumed. A valuable investigation of the nature of animal power. 4500 w. Comptes Rendus—Dec. 20, 1897.

The Animal as a Machine. Robert H. Thurston. The length and breadth of the most attractive, yet most tantalising problem yet presented to man and yet wholly unsolved is here set forth. The conclusion is that muscular energy, whatever it may be, is not thermodynamic. 4500 w. N Am Rev—Nov., 1896.

The Development of Energy by a Man Raising and Lowering His Own Weight (Thermogénère et Depense Energétique chez l'Homme qui Elève ou Abaisse son Propre Poids). A. Chauveau. A very full account of the author's experiments upon animal energy, with measurements of the heat developed, and the work performed. 3500 w. Comptes Rendus—July 31, 1899.

The Influence of Frequency and Weight Upon the Maximum Power of the Muscles (De l'Influence de la Fréquence des Mouvements et du Poids Soulevé sur la Puissance Maximum du Muscle). A paper presented to the French Academy by MM. Broca and Richet, with valuable data and diagrams of muscular effort. 1200 w. Comptes Rendus—Feb. 7, 1898.

The Influence of Intermittent Periods of Repose and Effort Upon the Average Power of the Muscles (De l'Influence des Intermittences de Repos et de Travail sur la Puissance Moyenne du Muscle). A further contribution by MM. Broca and Richet to the French Academy upon the subject of muscular power. 1800 w. Comptes Rendus—Feb. 28, 1898.

**ANNEALING.**

See also **FOUNDRY; IRON MANUFACTURE; STEEL MANUFACTURE.**

Annealing. H. K. Landis. General remarks upon the importance of annealing in many operations. Its nature and effects. 2000 w. Ir Age—Nov. 5, 1896.

**Casehardening.**—Annealing and Casehardening. Joseph Horner. The first of a series of articles giving an account of the processes, furnaces, etc., employed in the work of annealing cast iron and of casehardening malleable iron. Ill. Serial. Mech Wld—Oct. 14, 1898.

**Cast Iron.**—The Annealing of Cast Iron. George C. Davis. Read at meeting of Foundrymen's Assn., Philadelphia. Reviews the opinions of various writers and gives conclusions from the writer's experience. 1600 w. Ir Age—Jan. 13, 1898.

**Malleable Castings.**—Annealing Malleable Castings. Alexander Cairns. Read at meeting of Foundrymen's Assn., in Philadelphia. A description of the process with short discussion. 2800 w. Ir Age—March 10, 1898.

**Molecular.**—Molecular Annealing of Cast Iron. Reviews interesting points in a recent paper by A. E. Outerbridge, and calling attention to the difference of conditions existing in cast iron bars which have been molecularly annealed, when turned or machined for tensile tests, and similar bars tested in "the rough" for transverse strength. 1800 w. Ir Trd Rev—Aug. 6, 1896.

**Steel.**—Brittleness Produced in Soft Steel by Annealing. John Edward Stead. Read before the Iron and Steel Inst., at the Stockholm meeting. A study of this subject giving the results of careful investigation. Ill. 5800 w. Bridges—July, 1899.

Brittleness Produced in Soft Steel by Annealing. John Edward Stead. Read before the Iron and Steel Inst., at Stockholm. Discusses this peculiarity, its cause and how to prevent it. Ill. 6400 w. Jour Am Soc Nav Engs—Nov., 1898.

**White Cast Iron.**—On the Annealing of White Cast Iron. Charles James. An abstract of results obtained from daily business practice. 2800 w. Jour Fr Inst—Sept., 1900.

**ANODE.**

See **ELECTRODE.**

**ANTIMONY.**

**Metallurgy.**—The Metallurgy of Antimony. A. Selwyn Brown. Gives a brief description of the early method of reduction, and the English process, now most largely used. Also outlines other methods used where conditions are favorable. 2300 w. Aust Min Stand—Nov. 24, 1898.

**Ore Determination.**—See **ARSENIC—Ore Determination.**

**APARTMENT HOUSE.**

Architecture of Apartment Buildings. Irving K. Pond. Presents various types for comparison and for contrast, discussing arrangement and conditions. Plans. Serial. Br Build—June, 1898.

Model Apartment Houses. Drawings of accepted designs to be built by the City and Suburban Homes Company, with description. 900 w. Arch & Build—Jan. 2, 1897.

**Flat House.**—An example of a Modern Flat House. Illustrated description of a house with apartments renting for $18 to $20 a month. 1400 w. Eng Rec—Dec. 3, 1898.

**London and Paris.**—London and Paris Flats. Gaspard Tournier. The disposition of apartments in Paris flats is criticized, and illustrations given of London apartment houses. 1000 w. Brit Arch—Feb. 3, 1899.

**Mechanical Plant.**—The Design of a Modern Apartment House. Illustrated description of the various portions of a mechanical plant which must be taken into consideration in planning such a structure, as exemplified in a New York apartment house. 3000 w. Eng Rec—Jan. 20, 1900.

**Munich**—The New Houses of J. Kalb, on Friedrichstrasse, Munich (Die Neubauten J. Kalb, Friedrichstrasse 9 u. 11 in München). Illustrated description of a fine block of buildings in harmony with its surroundings. 400 w. Deutsche Bauzeitung—March 17, 1900.

**New York.**—The Center Court Apartment House. Description, with plans, of a five-story and basement brick building recently built on 28th St., New York. 1100 w. Eng Rec—April 3, 1897.

**Paris.**—City Apartment Houses in Paris. Maurice Saglio. Description of French apartment houses, with short account of the tendencies of French architecture, and the principles which govern the construction of these houses. Ill. 6000 w. Arch Rec—April-June, 1896.

See also London; **ARCHITECTURE—Corner House.**

**Vienna.**—Apartment House in Vienna (Zinshaus in Wien). Ign. Sowinski. Plate, plan and brief description of an apartment house in the modern showy Viennese style. 200 w. Oesterr. Monatschr f d Oeffent Baudienst—Dec., 1896.

**APPRENTICE.**

See also **EDUCATION; TRADE UNION.**

Mechanics, their Relation to Each Other and to Mechanical Industries—Trade Schools. John E. Sweet. Excerpts from an address delivered at Rochester, N. Y. On the apprenticeship feature of the mechanical industries, and trade schools. 3700 w. Am Mach—Sept. 7, 1899.

Modern Apprenticeship Conditions. John E. Sweet. From an address before the manufacturers and mechanics of Rochester, N. Y. Considers the training of the schools and of the shops, and the duties of employers and employees. 4500 w. Ir Trd Rev—Jan. 18, 1900.

Presidential Address of Mr. Archibald Denny delivered before the Inst. of Junior Engs., upon the apprentice system, and the handling of young men in the drawing office, the workshop, and in business positions. 5500 w. Engr, Lond—Nov. 15, 1895.

Status of Apprenticeship in the Trades Concerned in the Production of Machinery. Letters from 116 of the most prominent machinery building establishments and important railway systems of the country, stating their practice and views regarding apprenticeship. 24000 w. Am Mach—Dec. 24, 1896.

The Improvement of the Apprenticeship System as a School for Mechanics. Discussion of the relation of employer and apprentice and the means of making this system of value, with reasons. 2800 w. Eng News—March 4, 1897.

**Brown and Sharpe Co.**—The Apprenticeship System under Modern Conditions. System employed in shops of the Brown and Sharpe Company. 800 w. Sci Am—July 4, 1896.

**Building Trades.**—Apprenticeship. Editorial on an article in the "London Technical Education Gazette," which was a summary of results of a systematic inquiry into the state of apprenticeship in the various trades of London, and views of various employers regarding the possibility of developing the system in the future. The article deals only with the building trades. 2800 w. Builder—Nov. 16, 1895.

**College Shops.**—An Apprenticeship System in College Shops. O. P. Hood. Read at the Columbus meeting of the Society for the Promotion of Engineering Education. Explains the opinions that led to a trial of an apprentice system, the results, and the writer's belief in its usefulness. 1600 w. Am Mach—Aug. 24, 1890.

**French Railway Shops.**—The Training of Apprentices. The system in use in the French railway workshops. The idea is to educate the apprentice in theory, simultaneously with his manual training. 1100 w. Engng—July 17, 1896.

## APRON.

See **FERRY APRON.**

## AQUEDUCT.

See also **BRIDGE; CANAL; PIPES; TUNNEL; WATER PIPES; WATER WORKS.**

**Alsace-Lorraine.**—Reconstruction of the Hessen Aqueduct. Illustrated account of the substitution of structural work for heavy masonry construction in Alsace-Lorraine. 800 w. Ry & Engng Rev—Feb. 12, 1898.

**Birmingham.**—The Construction of the Elan Aqueduct, Birmingham, England. Abstract of a paper by H. Lapworth, printed by Inst. C. E., describing the work on 12½ miles of aqueduct, involving special methods of trenching, tunneling and pipe-laying. 3900 w. Eng Rec—Sept. 29, 1900.

**Briare Canal, France.**—See **BRIDGE—Aqueduct.**

**Bridge.**—See **BRIDGE.—Aqueduct.**

**Colorado Springs.**—See **TUNNEL—Strickler, Colo.**

**Croton.**—See also **CONTRACT.**

**Croton Embankment.**—The Croton Aqueduct Embankment. H. K. Landis. Improvements made necessary the piercing of the Old Croton Aqueduct, and a view of the embankment is given, with historical review of the work. 1110 w. Eng News—Sept. 9, 1897.

**Genoa.**—The Conveying of Water and Power from Ferrari-Galliera to Genoa (Wasserleitungs-und Kraftanglagen Ferrari-Galliera zu Genua). P. Kresnik. An account of the plan to bring the water from lakes Bigio and Lungo to Genoa, with details of dam and aqueduct. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 12, 1900.

**Nashua, Boston.**—Nashua Aqueduct: Boston Water Supply. A comprehensive description of the various parts of the scheme, with two-page engraving. 2500 w. Eng News—Feb. 25, 1897.

The Nashua Aqueduct. Illustrated detailed description forming part of the works intended to supply the metropolitan district of Boston. 2400 w. Eng Rec—Feb. 22, 1896.

The Nashua Aqueduct. Illustrated description. 700 w. Eng Rec—June 20, 1896.

Tunnel Sections of the Nashua Aqueduct for the Meropolitan Water Supply. Copious extracts from the specifications. Ill. 2500 w. Eng News—Jan. 23, 1896.

**Nussdorf.**—The Construction of the Nussdorf Aqueduct (Ueber die Art der Ausführung der Alimentations-Canäle bei Nussdorf). Describing especially the construction of the inverted siphon under the Elbe. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—April 9, 1897.

**Wachusett Tunnel.**—See **DAM—Wachusett, Mass.**

**Washington.**—The Washington Aqueduct, 1853-1898. William R. Hutton. Illustrates and describes engineering features of the work, including graphical analyses of the 220-ft. masonry arch over Cabin John Brook, and 120-ft. arch of unsupported cast-iron water mains. 5500 w. Eng Rec—July 29, 1899.

**Washington Tunnel.**—Completing the Abandoned Aqueduct Tunnel at Washington, D. C. Gives a brief statement of the original work on this tunnel, which was abandoned ten years ago, and an illustrated description of the methods employed to complete the work. 18000 w. Eng News—Dec. 28, 1899.

## ARC.

See also **ARC LAMP; ARC LIGHTING.**

The Electric Arc (Ueber den Elektrischen Lichtbogen). W. Mathiesen. A general account of the electric arc considered independently of any especial lamp mechanism, including the use of electrodes of various materials. 2500 w. Die Elektrizität—June 11, 1898.

**Alternating.**—A Curious Alternate-Current Arc Phenomenon. Alfred Hay. Remarkable phenomenon observed in the course of some experiments on alternate-current arcs between metallic electrodes. 800 w. Elect'n—Aug. 13, 1897.

Notes on an Investigation of the Alternating Current Arc. J. A. Fleming and J. B. Petavel. Results obtained in investigations recently carried on in the electrical laboratory of University College, London. 3500 w. Elect'n—Dec. 20, 1895.

On the Alternate Current Arc. Review of a recent paper by H. Gorbes, descriptive of investigations chiefly carried out in Germany. 1300 w. Elec Rev, Lond—May 1, 1896.

Some Experiments on the Alternating Current Arc. Charles F. Smith. A short description of experiments and appliances used. Ill. 600 w. Elect'n, Lond—Oct. 22, 1897.

**Alternating Efficiency.**—The Factors Which Determine the Efficiency of the Alternating Current Arc. William Beckit Burnie. An illustrated account of experimental investigations with results. 4900 w. Elect'n, Lond—Oct. 22, 1897.

**Ayrton Research.**—On the Relations Between Arc Curves and Crater Ratios with Cored Positive Carbons. Mrs. Ayrton. Abstract of a paper read before the British Assn. at Toronto. Hypothesis, with conclusions and test of their accuracy. 1300 w. Elect'n—Aug. 27, 1897.

The Light Emitted by the Continuous Current Arc. Mrs. Ayrton. Abstract of a paper read before the International Congress, at Paris. A record of scientific investigation, with editorial comment. Serial. Elect'n, Lond—Oct. 12, 1900.

**Blondel Research.**—The Phenomena of the Electric Arc (Sur le Phénomène de l'Arc Electrique). An account of the experimental investigations of M. Blondel to determine the magnitude and nature of the resistance of the electric arc. 2000 w. Comptes Rendus—July 19, 1897.

On the Phenomenon of the Electric Arc. André Blondel. A study of the causes of the great difference of potential between the carbons. Experiments and conclusions. 1600 w. Elect'n—Sept. 3, 1897.

**Boring Metal.**—A New Application of the Electric Arc. J. Foster Symes. Describes a method of boring the rivet holes in armor plates, welding, and other uses. 1200 w. Yale Sci Am—Oct., 1898.

See also **SAFE—Electrical Burglar.**

**Counter E. M. F.**—Counter E. M. F. in the Electric Arc. Editorial discussion of views of various experimenters, especially criticizing the methods of research by which the conclusion that the counter E. M. F. does not exist, has been reached by two experimenters of the United States. 2400 w. Elect'n, Lond—Dec. 31, 1897.

Does the Counter E. M. F. Exist in the Arc? W. R. Bonham and Harold Almert. Records an experiment recently performed which throws some light on this subject. 600 w. Elec Eng, N. Y.—Nov. 11, 1897.

**Crater Brilliancy.**—On the Intrinsic Brilliancy of the Crater of the Arc. J. E. Pateval. An illustrated account of investigations. 2000 w. Elec Eng, Lond—June 8, 1900.

**Cutting Iron.**—Cutting Structural Iron by Means of the Electric Arc. J. R. Cravath. Brief account of manner of doing the work. 600 w. Am Elect'n—Oct., 1900.

**Freak.**—Curious Freak of a Voltaic Arc. Brief illustrated description of irregular performance, and the cause and remedy. 500 w. W Elect'n—March 27, 1897.

**Hissing.**—The Hissing of the Electric Arc. Mrs. Ayrton. Read before the British Inst. of Elec. Engs. An interesting and important record of investigations and results thus far reached. Serial. Elec Eng, Lond—March 31, 1899.

**Metals.**—Arcs and Non-Arcing Metals. George T. Hanchett. States phenomena observed and presents conclusions drawn, methods of avoiding arcs, etc. 1700 w. Am Elect'n—Jan., 1899.

**Metals and Carbon.**—Arcs Produced by Non-Symmetrical Currents Between Metals and Carbon (Sur les Arcs à Courants Alternatifs Dissymétriques entre Métaux et Charbons). A. Blondel. A communication to the French Academy discussing the peculiar nature of the arcs produced between metal and carbon points; with data and diagrams from numerous experiments. 2000 w. Comptes Rendus—March 20, 1899.

**Oscillographs.**—See **OSCILLOGRAPH—Arcs.**

**Photographic Study.**—A Photographic Study of the Electric Arc. N. H. Brown. Experimental research upon the seat of luminosity and method of formation of the arc, illustrated with three photogravure plates. 5000 w. Phys Rev—Nov., 1898.

**Potential Drop.**—The Drop of Potential at the Carbons of the Electric Arc. Mrs. Ayrton. Abstract of a paper read before the British Assn., Section A. An account of experiments made and results obtained. 1200 w. Elect'n, Lond—Sept. 23, 1898.

**Resistance.**—On the Resistance of the Electric Arc. Julius Frith and Charles Rodgers. Communicated to the "Phil. Mag. of the Physical Society." Resistance of the arc is defined, and account given of a series of experiments undertaken to determine the resistance of the arc under various conditions. 5000 w. Elect'n—Nov. 13, 1896.

The True Resistance and Back E. M. F. of the Arc. W. E. Ayrton. Pointing out some errors of Silvanus Thompson, with explanations. 2000 w. Elec Rev, Lond—Dec. 20, 1895.

The True Resistance of the Arc. Silvanus P. Thompson. In reply to claims made by Prof. Ayrton and in criticism of conclusions reached by him. 2400 w. Elec Rev, Lond—Jan. 3, 1896.

**Spectra.**—Arc Spectra. Arthur L. Foley. Abstract of a paper read before the Am. Assn. for the Advancement of Science. A photographic study of the spectra is explained. 1200 w. Elec Eng—Sept. 16, 1897.

Arc Spectra. Arthur L. Foley. Investigations undertaken for the purpose of verifying the results of previous research and of so extending the work as to make it possible to arrive at some more definite conclusion. 7500 w. Phys Rev—Sept., 1897.

**Telephone.**—The Electric Arc as a Telephone. Reports some curious experiments, described by Hermann Th. Simon, in "Wied. Ann.," which show that the electric arc is capable of acting either as a telephone transmitter or as a receiver. 500 w. Elec Rev, Lond—March 25, 1898.

**Temperature.**—On the Effect of Pressure in the Surrounding Gas on the Temperature of the Crater of an Electric Arc—Correction of Results in a Former Paper. W. E. Wilson and G. F. Fritz. Researches to determine, if possible, whether the temperature of the crater in the positive carbon varies with change of pressure in the surrounding medium. 2200 w. Elect'n—Jan. 8, 1897.

**Vapors.**—The Electrical Properties of the Vapors from the Carbon Arc. Ernest Merritt and Oscar M. Stewart. Describes experiments undertaken to study in detail the conducting property possessed by the arc vapors, giving results. 4300 w. Phy Rev—Sept.-Oct., 1898.

**Whistling.**—Whistling Arcs—A Case of Electrostatic Induction and the Remedy. Foree Bain. An account of a strange phenomenon and the experiments made to determine the cause, with the remedy adopted. 3300 w. W Elect'n—March 6, 1897.

## ARCH.

See also **BRIDGE; VIADUCT.**

The Arch. A statement of the development of the theory of the arch of masonry and metal. 1000 w. Eng Rec—Oct. 28, 1899.

The Development of the Arch Principle. Discusses the principle of the arch in its relation to metallic structures, citing examples and considering their merits. 2200 w. Engr, Lond—Oct. 6, 1899.

**Asphalt Covering.**—Impermeable Covering for Stone Arches. The covering herein described and discussed, with directions for preparation and application, is a mastic asphalt, used to prevent infiltration of rain water. 1000 w. Eng News—Aug. 27, 1896.

**Austrian Experiments.**—Arch and Vault Tests of the Austrian Society of Engineers and Architects. Report of the Committee, with illustrations. 1400 w. Arch & Build—Jan. 4, 1896.

Experiments on Arches. An extremely valuable and interesting series of experiments carried out by the Austrian Assn. of Engs. & Archs. on model arches of spans ranging from 4.42 ft. up to 75.4 ft. 2000 w. Engng—Feb. 21, 1896.

The Austrian Tests of Arches. Mansfield Merriman. A brief synopsis of each of the seven chapters of the report presented by the committee appointed by the Austrian Society of Engineers and Architects to undertake a series of experiments on arches. The article is well illustrated, showing the manner of testing with explanations and results. 2200 w. Eng News—April 9, 1896.

**Bellefield, Pittsburg.**—See **BRIDGE—Pittsburg.**

**Bourbonnais.**—See **Masonry.**

**Brick.**—Brick Archings. How to build a brick arch. Two methods considered. 1000 w. Br Build—March, 1896.

**Cabin, John.**—See **AQUEDUCT—Washington.**

**Cathedral, N. Y.**—A Great Arch, Cathedral of St. John the Divine. Illustrated description of the design and execution of a great masonry arch on the top of piers 86 ft. high. The span is 114 ft. out to out of vousoirs. 1800 w. Eng Rec—March 31, 1900.

**Concrete.**—A Concrete Arch Bridge with Granite Hinges. A description of the Imnau bridge condensed from an article in the "Zeitschrift für Bauwesen." Ill. 1000 w. Eng News—Feb. 16, 1899.

A Concrete Arch Bridge of Forty Feet Span. Illustrated description of concrete highway bridge of forty feet span built across Richmond Creek, Belleville, Ill. 600 w. Sci Am Sup—Nov. 14, 1896.

A Concrete Arch of 40-ft. Span at Belleville. Description of construction, illustrated by sections of arch and abutments. The bridge was tested by a load of 150 lbs. per sq. ft. The article gives the proportions of the ingredients of the concrete for the several parts of the bridge. 1300 w. Eng News—Feb. 6, 1896.

A Forty-Foot Concrete Arch Highway Bridge. Said to be the first concrete arch built of the size in the United States, being 40 ft. span, and 7 ft. rise, and built entirely of concrete. Ill. 1500 w. Eng Rec—Jan. 11, 1896.

Building a Concrete Arch. Series of views and detailed description of a good specimen of this class of work on the Erie & Pittsburg Div. of the Pennsylvania R. R. 1500 w. Ry Age—March 3, 1899.

Concrete Arches. Daniel B. Luten. An account of further experiments by the writer upon small model arches of neat Portland cement, bringing out points of interest in design. Serial. R R Gaz—May 11, 1900.

Construction of a Forty-Foot Concrete Arch. C. H. Nicolet. Abstract of a paper presented at the Springfield meeting of the Illinois Society of Engineers and Surveyors. Descriptive. 1000 w. Eng Rec—Oct. 30, 1897.

Tests of Small Model Cement Arches to Determine the Value of Tie Rods. Daniel B. Luten. Illustrated description of these tests and discussion of the results. 1400 w. Eng News—Feb. 15, 1900.

See also **BRIDGE.—Danube; Geneva; Illinois University; Towy River.**

**Concrete Reinforced.**—A Private Park Arch Bridge. Illustrated description of a concrete-steel bridge on the Vanderbilt estate, at Hyde Park, N. Y. 600 w. Eng Rec—Jan. 14, 1899.

Beton Bridge with Imbedded Iron Ribs (Betorbrücke mit Eisenrippen-Einlagen). A very light and effective Melan Arch of 72 feet span forming a roadway over the Klampenborg-Helsingör railway near Skodsborg, Denmark. 800 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 25, 1898.

Franklin Bridge, Forest Park, St. Louis, Mo. Illustrated description of a 60-ft. arch of concrete and steel. 600 w. Eng Rec—Dec. 10, 1898.

Two Recent Melan Arch Bridges. Illustrates and describes two bridges erected on the private estate of Mr. Frederick W. Vanderbilt at Hyde-Park-on-the-Hudson. 800 w. Eng News—Nov. 10, 1898.

See also BRIDGE—Concrete Reinforced; Draulitten; Mans; Oconomowoc; Park; Patterson; Steyr; Topeka; Zürich.—CONCRETE REINFORCED.

**Counterweighted.** — See BRIDGE — Riesa, Elbe River.

**Dewey.**—The Dewey Arch. Illustrated description of the arch being built by the National Sculpture Society. 1200 w. Sci Am—Sept. 16, 1899.

The Dewey Arch, New York. Illustrated description of the structural features and methods of construction of the arch and triumphal columns erected temporarily in Madison Square, West. 3800 w. Eng Rec—Sept. 30, 1899.

The Material for the Permanent Dewey Arch. Extract from an article by Russell Sturgis, in the "N. Y. Evening Post," discussing this subject. 2500 w. Stone—Oct., 1899.

**Elastic.**—The Elastic Arch (Sur la Voûte Elastique). Georges Poisson. A mathematical discussion of a particular case of the hydrostatic arch, considered in the light of the elastic theory. 1200 w. Comptes Rendus—Feb. 13, 1899.

**Foundation.**—A Massive Foundation Arch. Illustrated description of very heavy 32-ft. brick arches supporting a part of a heavy building on the line of large water mains. 1200 w. Eng Rec—June 23, 1900.

Notes on Foundation Arches (Einiges über Grundbogen). A. Francke. A mathematical study of inverted arches as used for masonry foundations. 2000 w. Schweiser Bauseit—Aug. 25, 1900.

**German Bridges.**—See BRIDGE—German Arch.

**Groined.**—See GROINED ARCH.

**Hartford.**—Hartford Memorial Bridge and Arch. Illustration and brief note relating to one of the handsomest stone arch bridges in the United States. 200 w. Stone—Sept., 1898.

**Hinged.**—Comparison of Weights of a Three-Hinged and Two-Hinged Spandrel-Braced Parabolic Arch. C. W. Hudson. Results of a comparison to determine the exact relative economy as regards weight of metal as given, with a brief explanation of the method used in calculating the stresses in the two-hinged arch. Ill. 2000 w. Pro Am Soc Civ Engs—Aug., 1899.

Comparison of Weights of a Three-Hinged and a Two-Hinged Spandrel-Braced Parabolic Arch. Henry S. Jacoby. Continued discussion of paper by C. W. Hudson. 2000 w. Pro Am Soc Civ Engs—Oct., 1899.

Theory and Calculation of the Two-Hinged Arch. Alex. Rice McKim. A mathematical treatment deriving the equations of condition and applying them to a practical example. 2800 w. Eng News—Aug. 24, 1899.

The Two-Hinged Arch. A discussion of the advantages of this type, with some comparisons with the three-hinged arch. 2000 w. Engr, Lond—Feb. 16, 1900.

The Three-Hinged Arch. Considers the origin of hinged arches, and the applications to which the three-hinged arch is adapted, with other information. 2000 w. Engr, Lond—Dec. 1, 1899.

See also BRIDGE—Danube; Kircheim; Pittsburg; Versam; Viaur.

**Hinged Masonry.**—Hinged Arches for Masonry Bridges (Ponts en Maçonnerie Articulés). Especially devoted to the construction of the hinge joints to be imbedded in the masonry at the springings and the key of articulated arch bridges. 1200 w. Génie Civil—Aug. 12, 1899.

Masonry Bridges Hinged at the Springings and the Key (Ponts en Maconnerie Articulés aux Naissances et à la Clef. M. Bourdelles. This is an able review of the subject. Beginning with an historical introduction, it discusses triple-hinged arches as compared with those made solid at the springings, gives details of construction of vaults, arches and bridges of triple-hinging, and ends with a description of the general method of calculating the curve of pressures by M. Jean Résal. It is illustrated with many diagrams. 12000 w. Ann des Ponts et Chaussées—Feb. 3, 1898.

Three-Hinged Masonry Arches, Long Spans Especially Considered. David A. Molitor. The aim of the paper is to demonstrate that masonry arches may be constructed on any good foundation, such as hard clay, and that they will admit of an accuracy and simplicity of design quite equal to that attainable with iron and steel. Ill. 12000 w. Pro Am Soc Civ Engs—June, 1898.

**Hinged Pointed.**—Hinged Pointed Arches (Der Spitzbogenträger mit Scheitelgelenk). Adolf Francke. An elaborate mathematical treatment, with plate showing various examples discussed. 3000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1900.

**Hingeless.**—The Hingeless Arch. Discusses the subject of stresses, including those due to change of temperature. 1800 w. Engr, Lond—April 27, 1900.

**Inclined.**—Inclined Arch Construction (Die Schrägstellung der Trägerwände bei Bogenbrücken). Karl Probst. An investigation of the construction of metal arch bridges with inclined roadways, with illustrations of recent structures in Switzerland. Two articles. 2000 w. Schweizer Bauzeit—Jan. 21, 28, 1899.

**Inclined Load Line.**—The Influence of an Inclined Load Line Upon a Symmetrical Arch (Einfluss Geneigter Nivelletten auf Symmetrische Gewölbe). An elaborate analytical investigation, showing the magnitude and direction of stresses for a given loading. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 8, 1897.

**Lead Joints.**—Stone Arches of Large Span with Articulated Joints of Lead. An account of some arched bridges built in Wurtemburg by M. Liebbrand, employing lead in the key joints and joints of rupture, with satisfactory results. 800 w. Eng News—Jan. 20, 1898.

**Masonry.**—Brick Arch with Stone Facing at the Entrance to Cornell University Campus, Ithaca, N. Y. Illustrated description of arch built in place of old cast iron bridge at the entrance to the campus. 900 w. Eng News—March 11, 1897.

Masonry for Bridges. C. E. Fowler. Illustrated examples of noted bridges are given with a few suggestions. 800 w. Stone—March, 1897.

Repairs of Masonry Arch. A. E. Harvey. Describes repairs to stone arches which are quite a departure from the usual practice. Ill. 1500 w. Technograph, No. 12—1897-8.

The Bourbounais Railway Arch. C. L. Eddy. A test of the different theories of the masonry arch by applying them to an arch which for years has successfully carried a heavy railroad traffic. 1500 w. Tech, No. 14—1899-1900.

The Merits and Permanency of the Masonry Arch Bridge. Albert W. Buel. With many handsome illustrations of masonry arches of various periods and countries, including a number of applications of reinforced concrete. 4000 w. Eng Mag—April, 1899.

The Strength and Failure of Masonry Arches. Henry Harrison Suplee. Showing that the laws of elasticity hold good for masonry as for metallic structures. Ill. 3300 w. Eng Mag—Sept., 1897.

The Theory and Design of the Masonry Arch. William H. Burr. A study of the stability of the arch, and methods of determining the pressures to which it is subjected. Diagrams. 6500 w. Sch of Mines Quar—Nov., 1898.

**Melan.**—See Concrete Reinforced.

**Metal Joints.**—See MASONRY—Metal Joints.

**Menier.**—See Concrete Reinforced.

**Müngsten.**—See BRIDGE.

**Niagara.**—See also BRIDGE—Budapest; Niagara.

**Railways.**—Arch Construction for Railroads. From a paper by J. W. Rollins, Jr., before the New England Railroad Club, with illustrations. Serial. Ry & Eng Rev—Sept. 22, 1900.

**Repairing.**—Repairing a Fractured Stone-Arch Bridge, P. and R. Ry. Illustrates and describes an interesting and somewhat unusual piece of masonry work. 1300 w. Ry & Engng Rev—March 31, 1900.

**Rigid Framed.**—Influence Lines for Rigid Framed Arches (Einflusslinien des Gelenklosen Bogens). A graphical discussion of the rigid braced arch, showing the positions of the possible lines of pressure. Three articles. 5000 w. Schweizerische Bauzeitung—Nov. 6, 13, 27, 1897

**Statical Diagrams.**—The Statical Investigations of Arches (Beitrag sur Statischen Untersuchung von Gewölben). M. Marcus. A graphical analysis of the statical reactions in voussoir arches, using the polar diagram and force polygon. 1200 w. Schweizerische Bauzeitung—Oct. 21, 1899.

**Stone.**—A Stone Arch Bridge of Moderate Cost. Illustrates a small stone arch built at Kankakee, Ill. 300 w. Eng News—March 30, 1899.

History of the Stone Arch. Malverd A. Howe. An interesting historical account, with illustrated descriptions of many ancient and modern structures in which the arch is used. 4200 w. Jour Assn of Eng Soc—Feb., 1898.

**Stone Rib.**—A Stone Arch Rib Railroad Bridge. Illustrated description of three 60-ft. masonry spans, each consisting of a pair of masonry ribs placed side by side like trusses. 500 w. Eng Rec—July 8, 1899.

**Strains.**—Strains in Arches. Joseph Marshall. The first of three articles giving the writer's theory regarding "Thrusts and Strains in Arches." Serial. Br Build—June, 1897.

**Strength.**—Note on the Strength of Arches between Rolled Beams (Ein Beitrag zur Reform der Gewölbstärken zwischen Walzträgern). Discusses the twisting action which the arches exert upon the beams and the risks which are incurred by neglecting it. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—April 2, 1897.

**Temperature Changes.**—The Influence of Temperature Changes on Arches (Einfluss von Temperaturschwankungen auf Gewölbe). J. Herrnanek. Analytical investigation of the stresses and distortions caused by temperature changes. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—July 2, 1897.

**Terra-Cotta.**—Simple Rules for Figuring the Strength of Terra-Cotta Arches. Henri G. Chatain and W. M. Everett. A statement of facts and principles with as little mathematics as possible. Ill. 1600 w. Br Build—April, 1899.

**Thrust.**—Calculation of the Thrust of Arches (Note sur le Calcul de la Poussée des Voûtes). M. Tourtay. Giving simple formulas and a table of coefficients by means of which the thrust can be determined for segmental arches of known loading. 3000 w. Ann des Ponts et Chausseés—Part II., 1897.

**Tie Rods**—See Concrete.

**Trussed.**—Trussed Arches with Reduced Horizontal Thrust (Bogenträger mit Vermindertem Horizontalschube). Prof. J. Melan. Showing arrangements for counter weighting each half of the span, thus making a partial cantilever construction. 1 plate. 3500 w. Oesterr Monatschr f d Oeffent Baudienst—July, 1897.

**Water Conduit.**—See WATER CONDUIT—Steel Arch.

**Suspended.**—Suspended Arch-Centers at the Port of Bordeaux. A novel feature of the construction is illustrated and described. The work was done in building the new quays at the port of Bordeaux, France, and made necessary by the conditions and the characters of the soil. 800 w. Eng News—Oct. 22, 1896.

### ARCH CENTERING.

**Vienna.**—Iron Centering Used in Constructing the Wienfluss Boulevard. Illustrates and describes the centering used in Vienna for covering the river Wien. 900 w. Engng—Sept. 15, 1899.

The Centering for the Arch over the River at Vienna (Das Lehrgerüst fur die Wienfluss-Einwölbung). Details and photographs of a well designed timber centering of 70 feet span. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—April 29, 1898.

**Arched Ribs.**—A Simple Method of Calculating the Curve of Equilibrium, or Line of Thrust, in Arched Ribs. Charles Leon. The method is explained by illustrations of the cases which may occur in practice. 1800 w. Engr, Lond—Aug. 3, 1900.

### ARCHITECT.

**Accounts.**—Accounts for Architects. Henry Calder Marshall. Read before the Society of Architects, London. Shows the advantages of keeping proper accounts, and explains a simple system suitable for the profession of an architect. Serial. Arch, Lond—Feb. 11, 1898.

**Austrian Society**—See Engineering Societies, Austrian.

**Brotherhood.**—The Brotherhood of Architects. An Essay. Paul Waterhouse. Originally delivered as a sessional paper before the Sheffield Society of Architects and Surveyors. 5200 w. Jour of Roy Inst of Brit Arch—Dec. 5, 1895.

**Contractor.**—The Architect and Contractor. Thomas A. Fox. Introduction to a series of papers that will deal with the problems growing out of the new conditions and requirements in architecture. The next paper will consider the relations between the architect and the contractor. Serial. Br Build—March, 1896.

**Education.**—See ARCHITECTURAL EDUCATION.

**Electrical Engineering.**—Electrical Engineering for Architects. Arthur Vaughan Abbott. Considers the proper manner of introducing electricity, the uses to which it may be applied, and the safeguards which should be observed in its installation. 4500 w. Cal Arch—Feb., 1900.

**Electric Lighting.**—See ELECTRIC WIRING—Architects.

**Engineers.**—General Practice in Regard to the Employment of Electrical, Heating and Sanitary Engineers. H. G. Bradlee. Read before the convention of the Am. Inst. of Archts. Discusses the mutual relations of architects and engineers, presenting both sides of the question, and offering suggestions to overcome difficulties. 7000 w. Am Arch—Nov. 12, 1898.

General Practice in Regard to the Employment of Electrical, Heating and Sanitary Engineers. Notes the great changes in architecture during the last fifty years, and discusses the relation of engineering and the way to secure the best results in erecting buildings requiring an engineer as well as an architect. 8000 w. Pro of Am Inst of Archt's—1898.

The Employment of Consulting Engineers by Architects. Abstract of paper by H. G. Bradlee, before the Am. Inst. of Arch'ts. 1500 w. Eng Rec—Nov. 5, 1898.

The Relations between the Purchaser, the Engineer, and the Manufacturer. William H. Bryan. Discusses the mutual obligations and responsibilities of the parties with especial reference to the relations of engineer and architect. 3500 w. Am Soc of Mech Engs, No. 781—June, 1898.

**Legal Duties.**—The Legal Duties of Engineers and Architects. Address of Pres. Jas. C. Bradford before the Engng. Assn. of the South. The relation of the architect and his employer is similar to that between lawyer and client, or of physician and patient. The moral and legal responsibilities involved in the relation are the theme of the address. 2200 w. Arch & Build—Aug. 29, 1896.

See also **ENGINEER—Legal Duties.**

**Office Methods.**—The Office Methods of H. H. Richardson. Describes an architect's system of directing design without making sketches himself. 800 w. Eng Rec—March 3, 1900.

Office Methods for Architects. Particulars of the office methods of a firm in Western Ontario with copies of their printed forms for various purposes. 1000 w. Can Arch & Build—Jan., 1896.

**Russia.**—See **ENGINEER—Russia.**

**Self-Helps.**—Self-Helps. C. H. Blackall. A suggestion of ways in which architects may improve constantly in their work. 2500 w. Am Arch—July 11, 1896.

**Sketch-Book Ethics.**—The Ethics of the Sketch-Book. Paul Waterhouse. A word to students on the changed conditions which changes the purpose of the sketch-book, but does not destroy its usefulness. 2000 w. Jour of Roy Inst of Brit Archs—July 23, 1896.

**Trade Unions.**—Architects and Trades Unions. Dankmar Adler. The relation of the architect to the union, and the necessity of employing union labor when buildings are to be completed on time contracts. 1400 w. In Arch—May, 1896.

**ARCHITECTURAL ACOUSTICS.**—See **ACOUSTICS—Architectural.**

### ARCHITECTURAL COMPETITION.

Architectural Competitions. John A. Fox. Read before the Boston Soc. of Archs. An introduction to a discussion followed by papers by R. D. Andrews, and H. Langford Warren, with reprint of the "Abstract in a Projected Tract on Competitions," published in this journal in Jan. 1876. 8500 w. Am Arch—June 20, 1896.

Architectural Competitions. Russell Sturgis. A statement of a number of instances illustrating the failure to conduct competitions honorably, with discussion of the subject and of the essential conditions. 4500 w. Arch Rev—Vol. IV., No. VI.

Competitions. Barr Ferree. The first of a series of papers inquiring into the cause of competitions not turning out fairly, and studying the proposed remedies. The present number is introductory. Serial. Am Arch—Sept. 4, 1897.

Conditions for Architectural Competition. Editorial comment on suggestions relating to this matter, recently made in the British Architect. 800 w. Eng Rec—Sept. 19, 1896.

General Code Governing Competitions in Design. The text of the General Code adopted by the Architectural League of New York, the National Sculpture Society, and the National Society of Mural Painters, with editorial. 2000 w. Arch & Build—Feb. 4, 1899.

**California University.**—See **UNIVERSITY BUILDINGS—California**

**Public Buildings.**—Architectural Competitions and Public Buildings. William Henman. The concluding portion of a presidential address at a meeting of the Birmingham Arch. Assn., with editorial. 2400 w. Brit Arch—Nov. 29, 1895.

**Vienna.**—Prise Designs for Business and Apartment Buildings in Vienna (Die Preisausschreibung für den Umbau des Hauses, I. Kärntnerstrasse Nr. 24, in Wien). Examples of modern Viennese architecture, with plans and elevations. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 3, 1897.

### ARCHITECTURAL EDUCATION.

Architectural Education. Dr. Rowland Anderson. Extract from presidential address to the members of the Edinburgh Architectural Assn., and editorial comment. 5000 w. Builder—Dec. 7, 1895.

Architectural Training. G. A. T. Middleton. Paper read at the meeting of the Soc. of Archs., London. 4200 w. Arch, Lond—Feb. 21, 1896.

On the Probable Influence of the Technical Education Movement Upon the Architect and His Work. Frank Caws. Read at meeting of the Northern Arch. Assn. Short discussion. 5600 w. Jour Roy Inst of Brit Archs—March 4, 1897.

On the Study of Architecture. George Aitchison. An address delivered before the Birmingham Arch. Assn. Some suggestions as to the proper course to be pursued by students, and the aims of true architects. 2300 w. Brit Arch—March 11, 1898.

The Advancement of Architecture. George Atchison. Presidential address before the Roy. Inst. of Brit. Arch'ts. Considers the need of proper teaching to advance architecture. Discusses some of the points requiring study, and the subject generally. 5000 w. Brit Arch—Nov. 11, 1898.

The Educational Training of the Architects. Leopold Eidlitz. Reviews the past practice in the training of architects and its effects. The influence of the science of mechanics on architecture; the influence of history. Discussion follows. 7000 w. Jour Roy Inst of Brit Arch—March 4, 1897.

The Educational Training of Architects.—A Rejoinder. Leopold Eidlitz. A reply to the discussion of a paper read before the Royal Institute March 1, 1897, answering the criticisms advanced by different speakers. 6000 w. Jour Roy Inst of Brit Arch—Sept. 23, 1897.

The New Architect: His Work and Registration. Howard Pentland. Inaugural address to the Archt. Assn. of Ireland. Considers present architectural practice, and the necessary training of architects, comparing the work with that required at earlier periods. 5700 w. Builder—Nov. 5, 1898.

The True Education of an Architect. Russell Sturgis. The importance of teaching young architects to build, to draw, to model. 6800 w. Atlantic M—Jan., 1898.

The Proper Study of Architecture. George Aitchison. Address delivered to the students of the R. I. B. A. Presents the importance of diligence, and reviews the things of greatest importance to the success of architects. 3200 w. Brit Arch—Jan. 22, 1897.

**Building Trades' Schools.**—Technical Education in Architecture and the Building Trades. W. R. Lethaby. Read before the International Congress on Technical Education. Defines architecture and style, reviews the past, and suggests that the unions take up the work of teaching architecture and building. 3800 w. Jour Soc of Arts—July 23, 1897.

The Union of Building Trades' Schools with Schools of Architectural Design. Robert D. Andrews. Synopsis of a paper read at the 9th An. Con. of the Nat. Assn. of Builders, at Baltimore. Outlining the method by which such union may be made valuable and explaining why it seems desirable. 3300 w. In Arch—Nov., 1895.

**Chicago Art Institute.**—Architecture and Decorative Art at the Art Institute of Chicago. P. B. Wight. Review of the work of the Art Institute of Chicago for the past year and subjects connected. 2000 w. In Arch—July, 1896.

**Columbia University.**—The Columbia University School of Architecture. William R. Ware. An explanation of the work being done for professional draughtsmen. 2500 w. Am Arch—Aug. 6, 1898.

The Study of Architectural History at Columbia College. William R. Ware. The writer claims that exceptional advantages are given. Besides instruction by text books and lectures, separate exercises are given in Historical Research, Historical Drawing, and Historical Designing. 4400 w. Sch of Mines Quar—Nov., 1895.

Professional Draughtsmen as Special Students in the School of Architecture. William R. Ware. Explains why this class of students are admitted and the advantages and disadvantages to those most interested. 2700 w. Sch of Mines Quar—July, 1897.

See also **DRAWING—Architectural.**

**Germany.**—A German Technical College from an English Point of View. Edwin O. Sachs. Deals principally with the architectural section and the courses available for students, with some historical and descriptive notes. 3000 w. Brit Arch—June 18, 1897.

**Handicrafts.**—Architecture in Relation to the Handicrafts. T. G. Jackson. Read at meeting of the British Arch. Assn. The authority of noted writers on architecture is given, the modern system discussed, and the changes in conditions which must be met, with the writer's suggestions. 5500 w. Arch, Lond—April 9, 1897.

**Harvard.**—See **LANDSCAPE ARCHITECTURE.**

**Paris.**—The Paris Training. John Galen Howard. A statement of what makes up the training in architecture in the course given in the Ecole des Beaux-Arts. 5500 w. Arch Rev—Vol. V., No. 1.

The Spirit of Design at the Ecole des Beaux-Arts. John Galen Howard. Presents some of the salient points of the scientific instruction, with the aim of forming a just idea of the province and influence of the school. 4000 w. Arch Rev—Vol. V., No. III., 1898.

**Summer School Excursion.**—The Summer School of Architecture for 1896 in Southern England, Normandy, and Touraine. Eleazer B. Homer. Interesting account, beautifully illustrated, of the excursion of the M. I. T. Summer School of Architecture, including about one thousand miles of bicycle travel in Europe. 8500 w. Tech Quar—March, 1897.

**Travel.**—How to Study Buildings. C. H. Blackall. Suggestions for students traveling for the study of architecture, illustrating the process by examples. Ill. 6800 w. Arch Rev—May, 1900.

**United States.**—Architectural Education in the United States of America. Arthur Cates. Reviews various courses available to students. 3400 w. Jour Roy Inst of Brit Archts—June 16, 1900.

Architectural Education in the States. A report presented at the An. Con. of Amer. Inst. of Arch., by the Committee on Education. 1800 w. Brit Arch—Nov. 15, 1895.

**University.**—Architecture in the University. S. H. Capper. Lecture to the students of McGill University, Montreal. Its right to a place in the curriculum; the general topic of art; the scope of architecture, etc. 6000 w. Can Arch & Build—Nov., 1896.

### ARCHITECTURAL EXHIBITION.

See **EXHIBITION.**

### ARCHITECTURAL PRACTICE.

**English vs. American.**—English and American Architectural Practice. R. Clipston Sturgis. A comparison of the present conditions of practice in these two countries. 4500 w. Arch Rev—Nov., 1899.

### ARCHITECTURE.—See also BUILDING CONSTRUCTION; and specific structures, such as Church, Hospital, House, Library, etc.

Architecture. An essay, with reference to the Geneva Exhibition (Exposition Nationale Suisse à Genéve. Essai d'Architecture). M. Louis Viollier. A discussion of the relations of the artistic and constructive sides of architecture, suggested especially by the Geneva Exposition. Two plates of interior. 1500 w. Schw Bauz—Oct. 3, 10, 1896.

Architecture: What Is It? J. A. Morris. A-paper read at a recent meeting of the Glasgow Arch. Assn. 8000 w. Builder—Jan. 11, 1896.

"The Old Paths, Where is the Good Way?" Comparing some old things with some new, viewed from an architectural standpoint, to try to find out "the good way" in the past, then proceeding to describe those points wherein the men of the present have undoubtedly improved "the old paths." Serial. Arch, Lond—June 5, 1896.

**Aberdeen.**—The Architecture of Our Large Provincial Towns—Aberdeen. An illustrated description of very interesting architecture, with some information of the city. 7000 w. Builder—May 14, 1898.

**Address.**—Address to Students at a Meeting of the Royal Institute of British Architects. George Aitchison. 3000 w. Builder—Jan. 28, 1899.

Inaugural Address of F. C. Penrose before the Royal Institute of British Architects. Touching upon the relation of architects to the public; building surveyors under local authorities; competitions in general; competitions and their promotors; development of architectural education; the metrical system of measurement, etc. 9000 w. Arch, Lond—Nov. 8, 1895.

Presidential Address before the Royal Institute of British Architects. William Emerson. Historical review of progress during the past century. Also discussion. 9500 w. Jour Roy Inst of Brit Archts—Nov. 11, 1899.

Presidential Address Before the Roy. In. of British Architects. William Emerson. A review of the architecture and architects of the past century. 900 w. Builder—Nov. 11, 1899.

Presidential Address before the Society of Architects, London. T. Walter L. Emden. Considers the profession, sanitation, art, and the drawbacks to the profession. 3800 w. Arch, Lond—Dec. 3, 1897.

Presidential Address of Prof. Aitchison before the Roy. In. of British Architects. Considers the means of advancing the art and profession of architecture. Also discussion. 7800 w. Builder—Nov. 6, 1897.

The Creation and Production of Architecture. George Aitchison. Presidential address delivered to students at the Roy. In. of British Architects. Remarks on the causes of the great architectural epochs of Europe, the necessary requirements to produce fine architecture, and the aim of true architects. 2000 w. Brit Arch—Jan. 28, 1898.

Truth in Architecture. W. E. Doran. Paper read before the Province of Quebec Association of Architects. Historical view revealing the state of civilization, manners, customs, etc., of the people. Also the development of a style that tells of the needs for which the building was intended, etc. Serial. Can Arch—May, 1896.

**Africa and New Mexico.**—Native Architecture in Africa and New Mexico. Illustrated description showing that similar conditions have caused a great similarity in the native architecture of these remote regions. 2000 w. Sci Am—Nov. 12, 1898.

**American.**—A Hopeful View of American Architecture. Allen B. Pond. Calls attention to the awakened interest in architecture, and to the indications of improvement. The restrictions and difficulties are also discussed. 1600 w. In Arch—Aug., 1897.

American Architecture and Architects, with Special Reference to the Work of the Late Richard Morris Hunt and Henry Hobson Richardson. John B. Gass. An interesting paper, tracing the growth of this art from the earliest American development. The influences that have shaped it, and the accomplished men that have aided its progress are also considered. 3800 w. Jour Roy Inst of Brit Arch—Feb. 6, 1896.

Architecture in America: A Forecast. John Stewardson. Probably the last contribution that the late John Stewardson made to the literature of architecture. 3500 w. Am Arch—Feb. 1, 1896.

Concerning Things American. Editorial review of the Catalogue of the Eleventh Exhibition of the Architectural League. 3000 w. Builder—March 28, 1896.

The Future of American Architecture. John Stewardson. Extracts from a paper published in 'Lippincott's Mag." 2400 w. Brit Arch—Feb. 28, 1896.

**American Cities.**—An Arraignment of American City Architecture. E. C. Gardner. Considering the nature and causes of the indifference to art that prevails in city building. Ill. 3600 w. Eng Mag—Oct., 1896.

**American Designs.**—The Tendency of American Designs as Exemplified in Recent Buildings. Robert D. Andrews. Comments on classes and types of design. The conspicuous growth of the "classic style" in recent buildings. The Gothic style for cathedrals is largely favored. 2500 w. Arch Rev—Vol. IV., No. VIII.

**American National.**—Two Interpreters of National Architecture. Henry Van Brunt. A comparison of the work and career of two eminent architects, John Wellborn Root and Charles Bulfinch, as set forth in recent publications, with much interesting information in relation to American architecture. 7500 w. Atlantic M—Feb., 1897.

**Ancient vs. Modern.**—Some Observations on Ancient and Modern Building. Arthur Dixon. The comparison of the architecture of ancient times with that of the present century, with a view to discovering why the more ancient impresses students as more beautiful. 2800 w. Jour Roy Inst of Brit Arch—March 5, 1896.

**Australia.**—Progress in Australia. Information from advance proof of an article in the "Year Book of Australia," concerning the building progress in these colonies. 3300 w. Arch, Lond—May 20, 1898.

Architecture in Australia. From the "Year Book of Australia." The year just ended is considered one in which architectural conception has been entirely absent. The work completed during the year is reviewed and somewhat criticised. 2200 w. Arch, Lond—April 17, 1896.

**Belfast, Ireland.**—The Architecture of Our Large Provincial Towns.—Belfast. Illustrations and description of the architecture, with something of the history, and general appearance. 2000 w. Builder—Nov. 19, 1898.

**Berlin Book.**—The Berlin Book of Buildings. A review of an illustrated and descriptive book of the architectural and constructional works of Berlin, issued in commemoration of the conference of the German architectural and engineering societies in the German capital. 2500 w. Builder—Dec. 12, 1896.

**Bermuda.**—Quaint House in the Bermudas. Mary F. Honeyman. Interesting description of the architecture of these islands, with general remarks. 2500 w. Chau—Sept., 1896.

**Birmingham, England.**—The Architecture of Birmingham, England. Critical description of the buildings, old and new, with illustrations. 4800 w. Builder—Nov. 27, 1897.

**Bradford, England.**—The Architecture of Our Large Provincial Towns. Illustrated description of the architecture of Bradford, England. 5800 w. Builder—Feb. 19, 1898.

**Brickwork.**—See **BRICKWORK.**

**Bridge.**—See also **BRIDGE—Architecture.**

**Bridges, Parapets and Balustrades.**—The Architecture of Bridges, Parapets and Balustrades. Illustrated discussion of principles of design suited to various materials. 2000 w. Bridges—May, 1899.

**Brisbane, Australia.**—Brisbane. Some interesting information of the architecture of this capital city of Queensland, Australia. Ill. 2300 w. Builder—Aug. 20, 1898.

**Bristol, England.**—The Ancient City of Bristol, England. Arthur Lee. Illustrated description of many of the ancient buildings. 1500 w. Stone—June, 1896.

**British Towns.**—The Architecture of Our Large Provincial Towns. The first of a series of articles which propose to review the architecture of the leading towns of Great Britain, giving illustrations, with remarks and criticisms. The present article deals with Liverpool. Serial. Builder—Sept. 26, 1896.

**Broadway, New York.**—Architectural Aberrations—585-87 Broadway, New York. Remarks on the changes wrought in middle Broadway, New York, between Canal and 10th Streets, and its faulty architecture, with special criticism of the building named. 2500 w. Arch Rec—Oct., Dec., 1897.

**Bruges.**—Bruges. George Spencer Morris. Descriptive accounts claiming the place to be of special interest to artists and architects. Ill. 1300 w. Am Arch—June 6, 1896.

**China.**—Notes Upon the Architecture of China. F. M. Gratton. Abridged from a paper read before the Roy. Inst. of British Architects. Historical account of cities, walls, temples, etc., in this first part. Serial. Arch & Build—May 9, 1896.

**China, Corea and Japan.**—Eastern Asia; or, China, Corea and Japan. C. T. Mathews. Illustrated description of the architecture of these countries. The first part is a study in China, dealing with its domestic architecture and palaces, pagodas, temples, tombs, etc.; followed by a brief account of Corea, which the writer claims was taught by China. 5000 w. Arch Rec—Jan., March, 1896.

**Cities.**—The Necessity for Official Control over Architecture in Our Towns and Cities. William Emerson. Read before the Roy. Inst. of Brit. Archts. Considers points for and against such control. Also discussion. 8000 w. Builder—June 23, 1900.

Civic Architecture from its Constructive Side. Charles Rollinson Lamb. The architectural development of New York, with suggestions and illustrations from numerous cities. Ill. 10000 w. Munic Af—March, 1898.

The Value of Good Architecture in Cities. Barr Ferree. Comparing the architectural taste of America and Europe, and pointing out the commercial and æsthetic advantages accruing to a people who practice good architecture. 4300 w. Eng Mag—Jan., 1896.

See also **Street Angles; MUNICIPAL ART; MUNICIPAL BUILDING; MUNICIPAL IMPROVEMENT.**

**Classic.**—Classic Architecture. Henry Van Brunt. From the point of view of an architect. A discourse before Johns Hopkins University. 4400 w. Sci Am Sup—Feb. 15, 1896.

**Colonial.**—Good and Bad Colonial Architecture. Clarence H. Blackall. Critical review on examples of this class of architecture of both early and recent types. Ill. 4000 w. Arch Rev—Vol. VI., No. 1—Jan., 1899.

**Color.**—Color in Architecture. John Gemmell. Presented at convention of Ontario Assn. of Architects, Toronto. Considers the use of materials and the lessons to be learned from nature. 2800 w. Can Archt—Feb., 1900.

The Architect's Use of Color. Extract from papers read at the Inst. of British Architects by Halsey R. Ricardo and Christopher Whall, with editorial. The necessity of architects acquiring a more practical acquaintance with materials and their possibilities in the way of color treatment. 2700 w. Brit Arch—April 24, 1896.

The Architect's Use of Color. I. Halsey R. Ricardo. II. Christopher Whall. Papers read at the general meeting of the Roy. In. British Architects, with discussion. The importance of studying materials and their possibilities in producing harmonious effects in architecture. 4000 w. Jour of Roy Inst of Brit Archs—April 23, 1896.

**Competition.**—See **ARCHITECTURAL COMPETITION.**

**Composition.**—Architectural Composition. F. T. Baggalley. Extract from paper read before the British Architectural Assn. Considers a few prominent points in the art of architectural composition. 3500 w. Brit Arch—Jan. 21, 1898.

Principles of Architectural Composition. John Beverley Robinson. The last of a series of articles showing that a pleasing appearance in constructional work is worthy the consideration of engineers, and discussing the principles of design. Ill. 5500 w. Arch Rec—April, June, 1899.

**Compulsory Standards.**—Restraints Upon the Practice of Architecture. John Beverley Robinson. Showing the injurious effects of compulsory æsthetic standards. 2100 w. Eng Mag—May, 1896.

**Constantinople.**—Stamboul. Old and New. Richard Davey. A paper read before the foreign and colonial section of the Society of Arts. Interesting impressions of a traveler. Serial. Arch, Lond—March 20, 1896.

**Corner Houses, Paris.**—Corner Houses in Paris. P. Franz Marcou. A study of those houses confined to apartment-houses. Interesting because of the advantages of location and designed to show the original work of French architects. 8300 w. Arch Rec—Jan., March, 1897.

**Corner-Stone Laying.**—See **BRIDGES—Corner-Stone Laying.**

**Country Estate.**—See **COUNTRY ESTATE.**

**Damascus.**—Damascus. From Baltimore "Sun." Its history and architecture. 2000 w. So Arch—July, 1896.

**Design.**—Authority in Architectural Design. John Beverley Robinson. The restrictions placed on architects in this country, with causes. The æsthetic sense of the French, and their achievements in architecture; criticism of American architecture, with discussion of best means for correcting its faults. 8500 w. Arch Rec—July, Sept., 1896.

Common Errors in Architectural Design. Frank Baggallay. Read before the Sheffield Soc. of Archts. and Surv. Considers the use and misuse of ornament; its quality, etc.; the wrong treatment of material; bad proportion; errors in planning and other faults. 9000 w. Builder—Jan. 21, 1899.

Evolution of Design. Editorial comment on the tendency to take an evolutionary view of everything, and its application to the study of design in architecture, with reference and remarks concerning a late book by Alfred C. Haddon. 2800 w. Builder—Feb. 8, 1896.

Modern Building Designs. W. R. Lethaby. An abridged report of a lecture given at the Central Art Department of the Technical Education Board, London. 2400 w. Builder—Nov. 2, 1895.

Modern Building Designs. Positive conditions. W. R. Lethaby, with editorial (Abstract of third lecture, with short discussion). 5500 w. Builder—Nov. 9, 1895.

The "Bases of Design." Walter Crane. A review of this book with some of the most valuable points noted. 2300 w. Arch Rev—Vol. V., No. VII.

**Domes.**—See **DOME.**

**Domestic.**—A Study of Domestic Architecture in the Eastern States of America in the year 1896. A. N. Paterson. Read at a meeting of Roy. Inst. of Brit. Arch'ts. Abstract. Describes various types, calling attention to special features due to climatic conditions, materials used and systems of heating. 1500 w. Arch, Lond—April 22, 1898.

Domestic Architecture. Grant Helliwell. Considered in its general and also its specific aspect. 3000 w. Can Arch—March, 1896.

From Liverpool to London. Wilson Eyre, Jr. An account of a sketching trip for architectural study. Illustrated description mostly of domestic work 1200 w. Arch Rev—Vol. IV., No. I.

The Architecture of Home-Making. Charles E. Benton. A discussion of the effect of home architecture on the home and the family. 3500 w. Eng Mag—July, 1896.

The Modern Woman and Domestic Architecture. F. W. Fitz-Patrick. The writer considers woman's influence has not been for good and urges a more intelligent study of good architecture and the planning of homes. 2500 w. In Arch—Feb., 1899.

See also **HOUSE.**

**Draughtsmen Students.**—See **ARCHITECTURAL EDUCATION—Columbia University.**

**Dublin.**—The Architecture of Our Large Provincial Towns. Historical and descriptive account with many fine illustrations. 14500 w. Builder—Jan. 7, 1899.

**Dundee, Scotland.**—The Architecture of Our Large Provincial Towns—Dundee. Illustrates and describes the architecture, gives brief history of the place, and remarks its recent growth. 9500 w. Builder—Aug. 13, 1898.

**Edinburgh.**—The Architecture of Our Large Provincial Towns—Edinburgh. Interesting historical account with illustrated descriptions of old and new architecture. 9500 w. Builder—Jan. 1, 1898.

**Education.**—See **ARCHITECTURAL EDUCATION.**

**Engineering.**—Architecture and Engineering. A. D. F. Hamlin. An address delivered before the Architectural League of New York. Setting forth some of the elements which distinguish architecture from building and engineering, and discussing its relations to the science and profession of engineering, etc. Serial. Eng Rec—March 21, 1896.

See also **ARCHITECT.—Engineer; BRIDGE—Architecture.**

**Egypt.**—Egypt, the Birthplace of Architecture. G. A. T. Middleton. Read before the Society of

Architects, England. Historical description of the architecture of this country. 3500 w. Arch, Lond—March 4, 1898.

**Form-Design.**—Some Principles of Form-Design in Applied Art. Hugh Stannus. The importance of studying the characteristic qualities of material. 2500 w. In Arch—Feb., 1899.

**France.**—See also **ARCHITECTURAL EDUCATION—Summer School Excursion.**

**French Literature.** The Architectural Literature of France. A Brief Historical Sketch and Review. Its source of inspiration and pioneers. 7500 w. Jour Roy Inst of Brit Arch—Jan. 2, 1896.

**Geometrical Designs.**—Designing Buildings. The Use of Practical Geometry In. W. R. Corson. A study of diagrams founded on geometrical figures and their use in planning, making reference to their recognized use by the ancients. Ill. 5000 w. Builder—Jan. 16, 1897.

**German Exhibitions.**—German Achievements in Exhibitions. L. von Krockow. The achievements of German architects in the fairs in Berlin and Dresden. 2000 w. Am Arch—Jan. 30, 1897.

**Glasgow.**—The Architecture of Our Large Provincial Towns. Considers the architecture of Glasgow in detail, giving many illustrations and general information. 6400 w. Builder— July 9, 1898.

**Gothic.**—A Short Description of the Rise and Decay of Gothic Architecture in England. F. J. Webber. Illustrated by cuts showing the evolution and decline described. Ill. 2200 w. Car & Build—Aug. 7, 1896.

The Beginnings of Gothic Architecture. Illustrated description and historical account of the earliest Gothic construction. Serial. Arch and Build—Feb. 29, 1896.

**History.**—An Historical Review of Architecture. William Ransom. A popular lecture given at the Victoria Institute. Serial. Arch, Lond—Dec. 20, 1895.

Choisy's History of Architecture. R. S. Critical review of a recent work very favorable to the writer. 3500 w. Arch Rev—Vol. VII., No. 1—Jan., 1899.

The Historical Development of Architecture. W. J. Anderson. Abstract of a course of lectures being delivered this Session before the Glasgow School of Art. Part first covers the first eight lectures. 2400 w. Jour Roy Inst of Brit Archs—Jan. 8, 1898.

The History of Architecture. Prof. Aitchison. Abstracts of four lectures on this subject, delivered in the Alexandra College, Dublin. 3500 w. Arch, Lond—Dec. 3, 1897.

The Making of Architecture. George Aitchison. Extracts from a lecture delivered at the Royal Academy. 3000 w. Brit Arch—Feb. 14, 1896.

See also **ARCHITECTURAL EDUCATION.**

**Hobart, Tasmania.**—Architecture in the Capital of Tasmania. A general and entertaining description of the principal architectural features of Hobart, said to be the most English-looking city in Australia. 3000 w. Builder—Aug. 8, 1896.

**Hull, England.**—The Architecture of Our Large Provincial Towns. Illustrated description of the town and its architecture. 5500 w. Builder—April 2, 1898.

**Imitation.**—Imitation in Architecture. A. C. Munos. Published in the Philadelphia "Times," and reproduced as an excellent example of the general direction pursued by modern thought in regard to present-day architectural design. 3400 w. In Arch—May, 1897.

**India.**—Architecture in India. Nanaji Narayan Waslekar. The first part is an outline of the several phases of architecture as found in India. Subsequent parts will contain detailed descriptions of some of the principal structures. 2000 w. So Arch—May, 1896.

See also **Mogul.**

**Italy.**—Every-Day Italy. Claude Fayette Bragdon. Illustrated description of travels for architectural study. The first part gives an account of Turin, Genoa, and Siena. Serial. Am Arch—Feb. 15, 1896.

The Modernizing of Italian Cities. From the New York "Times." Improvements in the cities of Italy since 1870. 1300 w. Am Arch—June 6, 1896.

**Japan.**—Japanese Architecture. C. T. Matthews. An interesting account of the history, domestic dwellings, palaces, castles, houses of the territorial nobility, ecclesiastical architecture, Buddhist temples, etc. 5000 w. Arch Rec—April, June, 1896.

The Early Architecture of Japan. Ralph Adams Cram. A historical and critical review. 3000 w. Ill. Arch Rev—Sept., 1898.

The Later Architecture of Japan. Ralph Adams Cram. An interesting illustrated account of Japanese architecture, noting the deviations and tracing the progress of changes to the present time. 4000 w. Arch Rev—Vol. V., No. VIII.

**Landscape Gardening.**—The Harmony of Architecture and Landscape Work. Downing Vaux. Stating the characteristics of landscape architecture in different nations, and the principles that guide the landscape architect in his work. Ill. 2900 w. Eng Mag—Sept., 1896.

See also **LANDSCAPE ARCHITECTURE.**

**London.**—Old Architecture in Greater London. Descriptive of interesting English architecture in and near London. Ill. 2000 w. Car and Build—Nov. 22, 1895.

**London Streets.**—London Street Studies. T. Raffles Davison. Illustrates and describes some of the best efforts, with critical comments. 2000 w. Brit Arch—Dec. 16, 1898.

**Malta.**—Notes on Renaissance Architecture in Malta, with Special Reference to the Buildings of the Order of St. John. Arthur S. Flower. A very interesting paper, giving an account of the beautiful architecture of the island, and much information. Discussion. Ill. 12000 w. Jour of Roy Inst of Brit Archs—Nov. 20, 1897.

**Material.**—The Influence of Material on Architecture. Banister F. Fletcher. Prize essay, written for the Inst. of Architects in 1896. Republished as a good résumé of an important aspect of architectural study. Part first consists of introduction; Chap. I. on Egypt; Mud and Reeds to Granite; and Chap. II. on Assyria; Mud to Brick, or Wood to Stone. Serial. Builder—July 24, 1897.

Tradition and Material in Architecture. Alexander M'Gibbon. An abridgment, by the author, of a paper read before the Perth Archt. Assn. Calls attention to the influence of materials on architecture, also the influence of tradition, and size, and gives a brief forecast of the future, based on the experiences of the past. 4000 w. Builder—Nov. 19, 1898.

**Mechanical Influence.**—Mechanical Influence in Architecture. G. W. Percy. The writer claims that the most influential factor in perfecting architectural forms has been purely mechanical, in devising the best methods of employing the materials, and the means used to overcome structural difficulties. 7700 w. Jour Assn of Engng Socs—April, 1899.

**Mediaeval.**—Optical Refinements in Mediaeval Architecture. William H. Goodyear. Report of the Brooklyn Institute Survey. The source of the picturesque in mediaeval building; causes of inferiority of modern architecture; a study and discussion of the construction, etc. Serial. Arch Rec—July, Sept., 1896.

**Modern.**—Good Things in Modern Architecture. Russell Sturgis. Illustrated description of recent work with critical comment. 5800 w. Arch Rec—July, Sept., 1898.

**Mogul, India.**—The Mogul Architecture of Fathpur Sikri. Deals with the historical relations, characteristic forms, and structural and decorative details. 3000 w. Ill. Builder—Sept 10, 1898.

**Newcastle, England.**—A Review of Newcastle Architecture. Frank W. Rich. A short but interesting review of the progress of architecture during the present reign, taken from the inaugural address before the Northern Architectural Assn. 2200 w. Builder—Nov. 20, 1897.

**Newcastle-on-Tyne.**—The Architecture of Our Large Provincial Towns—Newcastle-on-Tyne. An interesting illustrated description, with critical comment, and something of the history of the place. 7000 w. Builder—Oct. 8, 1898.

**New Mexico.**—See **Africa.**

**New York.**—American Architecture from a Foreign Point of View: New York City. Jean Shopfer. An illustrated article giving the effect produced by New York City on the mind of a European observer. 4500 w. Arch Rev—March, 1900.

**Norway and Sweden.**—Architecture of Norway and

Sweden. Geo. W. Maher. Historical description. 2500 w. In Arch—Feb., 1896.

**Oriental.**—Oriental Architecture. Cyrus K. Porter. Traces the development of Saracen or Moslem architecture through its various stages, calling attention to its beauties. 8000 w. Stone—Nov., 1897.

**Palestine.**—Ancient and Modern Buildings in Palestine. Beresford Pite. Abstract of a lecture, delivered before the Architectural Assn., London. Reviews the architecture and the influences that affected it, with hints of use to those who design buildings for Palestine, and a list of prices of material and work. 1600 w. Arch, Lond—Jan. 27, 1899.

**Paris Exposition.**—See **PARIS EXPOSITION.**

**Parks, Boston.**—Architectural Features of the Boston Parks. Sylvester Baxter. Part first describes the bridge architecture of these parks, which is highly praised. Serial. Am Arch—July 16, 1898.

**Progress.**—Progress in Architecture. Prof. Aitchison. First lecture on this subject to the students of the Royal Academy. 4000 w. Builder—Feb. 10, 1900.

**Pueblo.**—House Building by Ritual. Cosmos Mindeleff. Illustrated description of the houses built by the pueblo tribes of Arizona and New Mexico, with account of their customs. 2000 w. Sci Am—Sept. 4, 1897.

Pueblo Architecture. Cosmos Mindeleff. Illustrated description of aboriginal American house structures. Serial. 1st part. Am Arch—April 17, 1897.

See also **MASONRY.**

**Renaissance.**—An American Architect on Renaissance Architecture. An extract from an article by R. S. Peabody in the "Atlantic Monthly," showing how the architecture of this period affects the mind of an eminent architect. 1100 w. Builder—Nov. 16, 1895.

**Residential.**—Style in Residential Architecture. C. E. Jenkins. The subject is discussed principally from the Chicago standpoint, the styles exemplified in that city being chiefly referred to. 2000 w. In Arch—Aug., 1896.

See also **Domestic; HOUSE.**

**Restoration.**—A Note concerning Correct Restoration (Ein Wort zur Güte über Restauriren). Discusses the injuries often wrought to old buildings, monuments, etc., under the guise of restoration, and makes a plea for greater consistency and accuracy. 4500 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—April, 1897.

**Romanesque.**—Romanesque Architecture. Prof. Aitchison. The first Royal Academy lecture on architecture. The object of these lectures is to advance and improve architecture. 7000 w. Builder—Feb. 7, 1896.

Romanesque Architecture. Prof. Aitchison. The Second Royal Academy lecture on architecture this session. 4000 w. Builder—Feb. 15, 1896.

Romanesque Architecture. Prof. Aitchison. The Fourth Royal Academy lecture on architecture. Ill. 8000 w. Builder—Feb. 29, 1896.

Romanesque Architecture. Prof. Aitchison. The fifth Royal Academy lecture on Architecture this session. Ill. 4000 w. Builder—March 7, 1896.

Romanesque Architecture. Prof. Aitchison. The sixth and last Royal Academy lecture on architecture this session. 5000 w. Builder—March 14, 1896.

Romanesque Architecture. Grant C. Miller. A study of this style of architecture from the tenth century with illustrations. 4800 w. Tech—May, 1896.

**Sicily.**—Reminiscences of the Architecture of Sicily. A. C. Hutchinson. A brief description of the representative buildings of the different styles, and the impressions produced on coming in contact for the first time with the art of the Orient and Occident, where they met on this classic island. 2000 w. Can Arch & Build—Jan., 1896.

**Spanish in California.**—Modern Spanish Architecture in California. Caroline L. Overman. Illustrates some beautiful types found in Southern California, and comments on the climatic conditions which render this style especially appropriate. 800 w. House Beautiful—Dec., 1898.

**Specifications.**—Specifications. F. W. Macey. Read before the British Architects' Association. Suggestions of particulars that should be given, and matters affecting the clearness, order, etc. Discussion. 1500 w. Builder—May 6, 1899.

See also **SPECIFICATIONS—Architect.**

**Steel and Glass Construction.**—Influence of Steel Construction and of the Plate Glass Upon the Development of Modern Style. J. W. Yost and Robert D. Andrews contributed papers on this subject to the 30th An. Con. of the A. I. A. Mr. Andrews treats the subject in regard to the effect on masonry design. Mr. Yost calls attention to the change in proportions of modern buildings due to steel construction and the general advantages and additional comfort to mankind from the use of these two materials. 4500 w. Am Arch—Nov. 7, 1896.

The Influence of Steel Construction and of Plate Glass on the Development of Modern Style. G. F. Newton. One of the series on this subject read before the Am. In. of Archts at Nashville, Tenn. Defends the high building, and thinks the effect of these new materials on style must depend largely upon the instinct and artistic training of the architect. 1800 w. Arch & Build—Nov. 28, 1896.

The Influence of Steel Construction and Plate Glass Upon Style. Dankmar Adler. One of the series of papers on this subject read before the A. I. A., at Nashville, Tenn. Denies that the art of architecture ended with the Renaissance; denies that new materials and processes are incompatible with truly artistic work; thinks the influence of the new materials will tend to a more free treatment of architectural design. 2700 w. Arch & Build—Nov. 21, 1896.

**Street Angles.**—The Exterior Treatment of Sharp or Acute Angles in Street Building. A. W. Hennings. Read before the British Archt. Assn. Discusses the design of buildings to fit angular sites, when the land is valuable, considering special features, and giving many illustrations. Discussion. 6300 w. Builder—March 3, 1900.

**Style.**—The Possibility of a New Style of Architecture. D. B. Dick. Read before the Ontario Assn. of Archts. An interesting study of style in architecture; the great principles and the elements of architectural construction, and the outlook for future formation of a new style. 8500 w. Can Arch—Jan., 1897.

**Suburban.**—Privacy in Suburban Life. Editorial review of an article on "Suburban Homes" in "The Cosmopolitan" for June, by R. Clipston Sturgis, with criticism of the homes of Americans, and their lack of individuality, and the character of the grounds. 1500 w. Gar & For—July 8, 1896.

**Summer School Excursion.**—See **ARCHITECTURAL EDUCATION.**

**Tall Buildings.**—See **Steel and Glass Construction; TALL BUILDINGS.**

**Teutonic Order.**—The Architecture of the Teutonic Order, with special reference to the Restoration of the Marienburg. C. Fitz Roy Doll. A paper read at the Architectural Association, London, with discussion. 8000 w. Builder—March 28, 1896.

**United States Government.**—United States Government Architectural Work and Workers. Reviews the history of the United States government office of architecture, with the personnel and routine of workings. 7500 w. In Arch—April, 1898.

The Architecture of Our Government Buildings. William Martin Aiken. An exposition of the duties and methods of the supervising architect of the United States. Ill. 3100 w. Eng Mag—Feb., 1897.

**United States National.**—National Architecture; Certain Considerations Which Might Possibly Affect the Design and Construction of Our Buildings. William Martin Aiken. Read at the 30th An. Con. of A. I. A. Memoranda of principles, tending to the begetting of logical architecture. 1700 w. Am Arch—Nov. 7, 1896.

**Venice.**—Venice. Mowbray A. Green. Read before the Bristol Society of Architects. Descriptions of the architecture, with historical review. 7500 w. Builder—Dec. 10, 1898.

**Yucatan.**—The Ancient City of Yucatan. Historical and descriptive with illustrations of the peculiar architecture. 3200 w. Sci Am Sup—May 23, 1896.

**ARC LAMP.**—See also **ARC; ARC LIGHTING; ELECTRIC LAMP.**

Improvements in the Arc Lamp. Robert A. Ross. Reviews the history of the arc lamp from its commercial beginning in 1879, the various types of lamps, and the present practice. 2600 w. Can Elec News—Nov., 1898.

The Development of the Arc Lamp. J. Warren. The writer proposes to describe details of principle and construction in the matter of arc lamps, from the time of their first practical utilization to the present day. Serial. Elect'n, Lond—Oct. 30, 1896.

The Evolution of the Arc Lamp. L. H. Rogers. Read before the National Electric Light Assn. The development is traced from the beginning and the imperfections and difficulties discussed. 5500 w. Elec Rev—May 20, 1896.

Notes on the Electric Arc. Thomas Hesketh. Comments on the lack of attention given to developing the arc lamp, and gives a study of the factors influencing the efficiency of the direct current arc. 4000 w. Elect'n—Sept. 24, 1897.

The Choice of Arc Lamps. Wilbur M. Stine. Discusses the properties of such lamps, and their adaptability, efficiency and cost of installation and operation. 4000 w. Am Elect'n—July, 1900.

**A B C.**—The A B C Arc Lamps. An illustrated detailed description. 3000 w. Elec Rev, Lond—Feb. 10, 1899.

**Alternating.**—Modern Development in Alternating-Current Series Arc Lamps. R. Fleming. Read at Milwaukee meeting of the Northwestern Elec. Assn. Part first reviews the slow development of arc lighting by means of alternating currents. Serial. Elec Rev, N. Y.—Jan. 24, 1900.

Progress in Arc Lighting by Alternating-Current Lamps. H. W. Hillman. Read before the Ohio Elec. Light Assn. Discusses the subject in its relation to street lighting principally. 2500 w. W Elect'n—Sept. 1, 1900.

Street Lighting by Series Alternating-Current Arc Lamps. Arthur L. Rice. Describes two methods that might be used and give good results. 1800 w. Am Elect'n—Aug., 1900.

**Alternating Enclosed.**—See **ARC LAMP—Enclosed Alternating.**

**Alternating, Tests.**—Photometric Measurements of Arc Lamps using Alternating Current (Photometrische Messungen an Wechselstrombogenlampen). Dr. Wedding. Giving photometric curves from a large number of observations, together with tables showing the relations between current strength and illuminating power. 5000 w. Elektrotech Zeitschr—Nov. 25, 1897.

**Bardou Differential.**—Differential Arc Lamp with Recoil Mechanism for Continuous and Alternating Currents, on the Bardou System (Lampe Différentielle à Mécanisme de Recul pour Courants Continu et Alternatif Système Bardou). M. Aliamet. An illustrated description of arc lamp mechanism. 1400 w. Electricien—May 26, 1900.

**Bremer Compound Carbons.**—The Bremer Electric Light System (Das Neue Elektrische Licht System Bremer). W. Wedding. A paper before the Verband Deutscher Elektrotechniker, giving the results of experiments on the Bremer arc lamp, in which the carbons contain metallic salts, such as calcium and magnesium compounds. With curves and tables. 2000 w. Elektrotech Zeitschr—July 5, 1900.

**Carbons.**—Biography of an Arc Lamp Carbon. An account of the material used and how the carbons are made. Illustrating the processes used in the works of the Washington (Pa.) Carbon Co. 1600 w. Am Elect'n—Feb., 1899.

Electric Light Carbons (Kohlen für Elektrisches Licht). Francis Jehl. Describing the various processes used for making electric light carbons, and the successive improvements which have been made. 1800 w. Der Electro-Techniker—April 30, 1898.

Some Faults in Arc Lamp Carbons. W. M. Stein. Points relating to arc lamps and especially arc light carbons which should be considered by manufacturers. 1200 w. Elec Wld—July 11, 1896.

See also **CARBON—Electrical Purposes.**

**Condensers.**—The Employment of Condensers in Alternate Current Arc Lamps. George Claude. A new use for condensers is described, to improve the regulation of alternating current arc lamps. Past failures are explained. From "L'Industrie Electrique." 1500 w. Elect'n—Aug. 6, 1897.

**Constant Potential.**—Constant Potential Arc. O. M. Rau and F. A. Vaughn. Read before the Northwestern Electrical Assn. at La Crosse, Wis. The advantages and disadvantages of the several types of incandescent arc light systems and the development reached. 3000 w. W Elect'n—Aug. 28, 1897.

How to Make a Constant Potential Arc Lamp. Cecil P. Poole. Sketches and instructions that will enable any mechanic to make a reliable arc lamp, if he has a fair knowledge of electrical apparatus. 1700 w. Am Elect'n—Dec., 1896.

**Designs.**—Fashions in Arc Lamps and Supports. Illustrations of numerous designs and methods of suspending lamps, that have been in vogue at different periods and in different places, with brief descriptions. 800 w. Elect'n—Oct. 10, 1896.

**Distribution.**—Arc Lamp Distribution. Alton D. Adams. A discussion of the systems of arc lamp operation. 2500 w. Elec Rev, N. Y.—July 25, 1900.

**Duflos.**—A New Regulator for the Arc Lamp (Nouveau Régulateur de Lampe à Arc). Marcel Deprez. An illustrated description of the Combier & Duflos arc lamp, with an analysis of its action. 1500 w. Génie Civil—Jan. 21, 1899.

Duflos Arc Lamp. A. Z. in "L'Industrie Electrique." Illustrates and describes an arc lamp in which the regulation is effected by a shunt coil. 800 w. Elec Rev, Lond—Sept. 30, 1898.

The Duflos Arc Lamp (Lamp à Arc Duflos). A very simple arc lamp mechanism operated by an electro magnet in a derived circuit, without the use of any braking mechanism. 1000 w. Elect'n—Oct. 1, 1898.

**Electric Station Department.**—See **ELECTRIC STATION MANAGEMENT—Arc Lamp Department.**

**Enclosed.**—A Few Interesting Pointers Concerning Enclosed Arc Lighting. J. H. Hallberg. Notes causes of trouble and calls attention to the advantage of having the men who sell, install, and care for these lamps more familiar with the mechanical and electrical details. 2800 w. Elec Eng, N. Y.—July 14, 1898.

A Novel High-Tension Series Enclosed Arc System. J. H. Hallberg. Considers the requirements of the enclosed arc lamp for high-circuits, and calling attention to their advantages. 2200 w. Elec Rev, N. Y.—March 23, 1898.

Arc Lighting (L'Eclairage par Arc). A. Bochet. A general article, with special attention to enclosed arcs. 1900 w. Génie Civil—March 17, 1900.

Enclosed Arc Lamps (Ueber Bogenlampen mit Eingeschlossenem Lichtbogen). Describes photometric tests of the Jandus enclosed arc lamp, with curves of photometric intensity and tables of results. 7500 w. Elektrotech Zeitschr—Dec. 16, 1897.

Enclosed Arc Lamps. Discussion of paper by W. H. Freedman, H. S. Burroughs, and J. Rapaport, on "Efficiency and Life of Carbons in Enclosed Arc Lamps." 4400 w. Trans Am Inst of Elec Engs—Oct., 1897.

Enclosed Arc Lamp Statistics. L. B. Marks. Records of thirty-six central stations. 600 w. Elec Wld & Engr—Nov. 4, 1899.

Long Burning Enclosed Arc Lamps. William A. Turbayue. From a paper read before the Candadian Elec. Assn. Traces the improvements which led to the development of the long burning lamp, which has a life of 150 hours or more, the economies and other advantages. 2000 w. Can Engr—Aug., 1899.

Progress of the Enclosed Arc Lamp. Louis B. Marks. The development, progress and commercial success. 900 w. Elec Wld—June 5, 1897.

The Davy Enclosed Arc Lamp. Illustrated description of the lamp and its action. 600 w. Elect'n—Nov. 12, 1897.

The Enclosed Arc Lamp. W. H. Freedman, H. S. Burroughs and J. Rapaport. Results of a large number of tests are given. Tests were made upon the relation between length and voltage of arc, the regulation, life of carbons, ratio of consumption of positive and negative carbons, and the distribution of light. Ill. 5000 w. Trans Am Inst of Elec Engs—Aug. and Sept., 1897.

The Enclosed Arc Lamp. William H. Freedman. Illustrates and describes the mechanism, regulation, etc.; the life of the carbons, intensity and distribution of light, advantages and disadvantages. 2400 w. Am Elect'n—Jan., 1898.

The Enclosed Arc Lamp. E. L. Nichols. Read before the Cornell Electrical Soc. Considers some of the peculiarities of this lamp, its advantages, tests, etc. 1800 w. Sib Jour of Engng—June, 1897.

The Enclosed Arc Light. L. B. Marks. Read before the Société Internationale des Electriciens Paris, France. Points out the distinction between the ordinary arc and the enclosed arc; gives a sketch or the earlier history of the art of enclosing arc lighting, with details of the subject. Serial. Elec Eng—Jan. 27, 1897.

The Marks Ventilated Enclosed Arc. Illustrated description of an enclosed electric arc lamp designed by Louis B. Marks, in which a limited circulation of air takes place. 700 w. Elec Eng—Jan. 15, 1896.

Trimming and Cleaning of Enclosed Arc Lamps. J. H. Hallberg. Presents the importance of this work as affecting the efficiency and suggests a system for doing it. 1800 w. Elec Rev, N. Y.—May 11, 1898.

See also **Jandus**; **Sonja**; **ARC LIGHTING—Power Transmission Service.**

**Enclosed Alternating.**—Tests of an Alternating Current Enclosed Arc Lamp. Illustrated description of some experiments conducted by M. H. Baker, showing how a small variation of voltage causes a large variation of light, and stating the requirements of good service. 1100 w. Elec Wld—Dec. 11, 1897.

See also **PHOTOMETRY.—Enclosed Alternating Arc.**

**Enclosed vs. Open.**—A Comparison of Open and Enclosed Arc Lamps for Street Lighting. H. H. Wait. A review of some of the principal points. 2500 w. Am Elect'n—June, 1900.

**Fault Tests.**—Faults and How to Find Them. Attention is confined to the faults that are common to the various classes of arc lamps. 2200 w. Am Elect'n—Feb., 1897.

**Hand Feed.**—Hand Feed Electric Lamp for Lanterns. George M. Hopkins. Illustrated description. 800 w. Sci Am—Dec. 26, 1896.

**Heat Compensator.**—Improved Heat Compensator for Shunt Arc Lamps (Verbesseter Wärmekompensator bei Nebenschluss-Bogenlampen). The Körting and Mathiesen device consists of a compound zinc-iron expansion apparatus connected with the regulator so as to compensate for changes of temperature. 3000 w. Elektrotech Zeitschr—May 19, 1898.

**Inclined Carbons.**—Arc Lamp with Inclined Carbons (Bogenlampe mit Schräg gegen Einander Gestellten Kohlen). An illustrated description of a lamp in which the carbons are inclined to each other at a small angle with the horizontal and are kept at the proper distance apart by a non-conducting block. 500 w. Elektrizität—April 28, 1900.

**Jandus.**—The Jandus Arc Lamp. An account of a visit to the works of Messrs. Drake and Gorham, with the object of inspecting the working of the above named lamp, the principle of its action, and the facilities for its manufacture. It is claimed that this lamp, with a single pair of carbons will run without retrimming for 200 hours. Ill. 1800 w. Elect'n—Nov. 1, 1895.

The Jandus Lamp (Die Jandus Lampe). Report of tests upon the Berlin-Frankfort railway giving photometric results of the Jandus enclosed arc. 1200 w. Der Electro Techniker—April 30, 1898.

On a Slow Combustion Arc Lamp Suitable for Factories and Street Lighting. W. S. Squire. Read before the Soc. of Chemical Industry. Describes the mechanical construction of the Jandus lamp, and considers also the chemical side of the question. 2000 w. Sci Am Sup—Oct. 2, 1897.

**"Jandus" Tests.**—Tests made by Messrs. Körting and Mathiesen, Leutzsch-Leipzig, on the "Jandus" Arc Lamp. Light measurements which turned out very unfavorably to the "Jandus" lamp. Results given. 1600 w. Elec Rev, Lond—Oct. 2, 1896.

**Lantern Projection.**—The Electric Arc for Lantern Projection. E. P. Hopkins. The main difficulties with other forms of illumination are briefly presented, and the article describes in detail the arc light as applied to this use, pronouncing it the most perfect and ideal illuminant for the work. Serial, 1st part. Elec Eng—Dec. 16, 1896.

**Mechanism.** Arc Lamps and Their Mechanism. H. Franklin Watts. Part first criticises the arc lamps now in use, and thinks they may be improved by reducing the number of parts. Serial. Elec Eng—Sept. 30, 1897.

**95-Volt.**—A 95-Volt Arc. Alton D. Adams. Describes a new arc lamp which has an induction coil in shunt with its regulating spools. 900 w. Elec Eng, N. Y.—Feb. 23, 1899.

**Photometric Tests.**—See **Alternating, Tests.**

**Railway Circuits.**—See **INCANDESCENT LAMPS—Railway Circuits.**

**Regulation.**—Arc Lamp Regulation. Alton D. Adams. Discusses the power consumed in regulating resistance, and how it may be utilised. 1000 w. Elec Eng, N. Y.—Feb. 16, 1899.

Regulation of Arc Lamps. Calls attention to the work that is being done in Europe. Three distinct types of arc lamp are presented: the Eck arc lamp, Klosterman lamp "la moderne" and Barriére table lamp. Ill. 2200 w. W Elect'n—March 20, 1897.

**Regulator.** An Electro Magnetic Regulating System for Arc Lamps (Ueber Schaltungen von Regelungs Elektromagneten bei Bogenlampen). Th. Weil. Description of an improved arc lamp regulator; with mathematical discussion of the action of the regulating magnets. 3000 w. Elektrotech Zeitschr—June 30, 1898.

See also **Duflos.**

**Siemens-Halske.**—The Siemens & Halske Hanging Lamp (Seillampe von Siemens & Halske A. G.). Görges and Queisser. A discussion of the comparative merits of the differential and the shunt lamp, with especial reference to the Siemens & Halske differential lamp. 6000 w. Elektrotech Zeitschr—June 22, 1899.

**Sonja.**—The Sonja Long-Burning Lamp (Sonja-Dauerbrandlampen). An illustrated description of an improved enclosed arc lamp of simple construction, having a burning period of from 100 to 200 hours. Elektrotech Zeitschr—Sept. 29, 1898.

**Submarine.**—A Submarine Arc Lamp. Illustrated description of a device which promises to be of value in diving and wrecking operations. 900 w. Elec Rev, N. Y.—Oct. 19, 1898.

The Yale Submarine Arc Lamp. Southard Hay. An illustrated account of this lamp and the satisfactory tests. It is expected that it will prove satisfactory for submarine photography. 1300 w. Yale Sci M—March, 1900.

**Volta.**—A Comparison of the New Volta Lamps, with the Old System (Ueber die Beleuchtung durch die Neuen Volta Lampen im Vergleich zu dem Alten System). Dr. W. Wedding. A discussion of photometric tests, by which the greatly superior efficiency of the new lamp is shown; there being either an increase in illumination or a reduction in cost. 4500 w. Elektrotech Zeitschr—Jan. 19, 1899.

### ARC LAMP FACTORY.

**Peabody, Mass.**—A Modern Arc Lamp Factory. Illustrated description of the plant of the Standard Thermometer and Electric Co. at Peabody, Mass. 1500 w. Elec Rev, N. Y.—Jan. 4, 1899.

### ARC LAMP PATENTS.

Termination of the Brush-Western Electric Double-Carbon Lamp Litigation. A victory for the Western Electric Co. Record of the case. 2200 w. W Elect'n—Oct. 17, 1896.

**ARC LIGHTING.**—See also **ARC LAMP; ELECTRIC LAMP; ELECTRIC LIGHTING.**

Arc Lighting. Reviews the improvements made. 1000 w. Elec Rev, N. Y.—June 20, 1900.

Arc Lighting Practice. Alex Dow. Some reference to comments of Mr. John Hesketh on arc lighting practice in England, with other matter of interest on the subject. 3400 w. Elec Engng—April, 1896.

Arc Lighting Progress. Alex. Dow. Reviewing the progress made in arc lighting during the last two years. 3800 w. Elec Engng—Dec., 1895.

Fifteen Years' Progress in Arc Lighting. Elihu Thomson. A review of the period which covers nearly all the commercial development of arc lighting on a large scale. 2000 w. Elec Eng—Jan. 6, 1897.

Recent Progress in Arc Lighting. Elihu Thomson. Abstract of a paper read before the Niagara Falls convention of the National Electric Light Assn. The writer thinks the immediate future of the series arc lighting system appears to be in the development of large dynamos. Considers pulsating currents, constant potential arc work.

inclosed arcs, results of tests, etc. 5500 w. Elec Wld—June 12, 1897.

Series Arc Lighting. W. H. Turbayne. Read before the C. A. S. E. An explanation of the principles involved, with a short description of the functions of the mechanisms employed in a modern system in which a direct current of constant value is employed. 1800 w. Can Engr—March, 1899.

Twenty-Five Years Progress in Arc Lighting. R. E. Crompton. Historical review. 3300 w. Elec Rev, Lond—Nov. 12, 1897.

**Alternating.**—Alternating-Current Arc Lighting. E. P. Warner. Read before the Chicago Elec. Assn. Briefly reviews the early history of arc lighting and considers modern practice. 3800 w. Elec Rev, N. Y.—Jan. 31, 1900.

Arc Lighting from Alternating Current Lighting Stations. Frank Lewis. Brief discussion of the subject, making comparison with continuous current lamps. 1100 w. Elec Rev, Lond—July 3, 1896.

Series Arc Lighting from Constant Current Transformers. William Lispenard Robb. A record of the data obtained in the operation of these transformers. Also discussion. 7200 w. Trans Am Inst of Elec Engs—Nov., 1899.

Series Arc Lighting from Constant-Current Transformers. William Lispenard Robb. Read before the Am. Inst. of Elec. Engs. Describes the system of the Hartford Electric Light Co. 2500 w. Elec Rev, N. Y.—Oct. 11, 1899.

The Series Alternating Current Arc System in Hartford. Describes the extensions made and contemplated. Ill. 1500 w. Am Elect'n—July, 1899.

Transformers for Series Arc Light Circuits. A statement of the present state of the art of operating alternating-current arc lamps in series, as given in patent specification granted to Waldo A. Layman and Ferdinand Schwedtmann. 2000 w. W Elect'n—Nov. 18, 1899.

**Armory, New York.**—Electric Lighting of the New Armory of the Ninth Regiment, N. G. S. N. Y. Illustrated description of an interesting installation where the entire lighting of the main drill hall is accomplished by means of ordinary two-in-series open arcs. 1100 w. Elec Wld—April 3, 1897.

**Bordeaux Harbor.**—The Electric Lighting of the Harbor of Bordeaux, France (L'Eclairage Electrique du Port de Bordeaux). Paul Meunier. An account of the arc light system along the water front. 4000 w. 1 plate. Ann d Ponts et Chaussées—1st quarter, 1900.

**Chicago Parks.**—See **ELECTRIC LIGHT STATION—Chicago Parks.**

**Circuits.**—Insulation and Testing of Arc Circuits. Alex. Dow. A discussion regarding the insulation resistance necessary, and practical tests required, with circuits of 100 arc lamps in series, the conductor being "weatherproof" wire, strung on glass insulators in the usual manner. 2000 w. Elec Engng—Jan., 1896.

Testing Arc Light Circuits. W. H. Markland. Showing the superiority of the voltmeter to the electric call bell for this work, and asserting the unsuitibility of the galvanometer for arc circuits. 1000 w. Elec Engr, N. Y.—Sept. 8, 1898.

See also **Underground Circuits.**

**Constant Current.**—The Development of Constant Current Arc Lighting. H. M. Biebel. Read before the Chicago Elec. Assn. Treats of the generators used, and other related subjects. 2700 w. Elec Rev, N. Y.—Jan. 17, 1900.

**Cost.**—Cost of Arc Lighting. H. H. Wait. A communication in discussion of a paper by William Lispenard Robb, on "Series Arc Lighting from Constant Current Transformers." 4700 w. Trans Am Inst of Elec Engs—Nov., 1899.

Cost of Arc Lighting. Discussion of paper by H. H. Wait. 6000 w. Trans Am Inst of Elec Engs—Jan., 1900.

Cost of Light from the Electric Arc. Alton D. Adams. An analysis of costs for enclosed and open arc lamps, with the prediction that the high tension, open arc, will soon be displaced by the enclosed arc from constant pressure mains. 1700 w. Munic Engng—Aug., 1899.

**Depreciation.** The Depreciation of Electric Arc Lighting. Critical review of a paper by Albert Scheible, entitled "Illumination vs. Glare." 1300 w. Jour Gas Lgt—Jan. 21, 1896.

**England.**—An English Engineer's Views on Arc Lighting Progress. John Hesketh. Also gives a brief summary of the present state of this particular branch of the electrical industry in England. 1800 w. Elec Engng—Feb., 1896.

**Europe and America.**—Arc Lighting in America and Europe. C. Wiler. Abstract of paper read before the Chicago Elec. Assn. Showing the conditions under which arc lighting developed in Europe and America, and the results as a consequence of these varying conditions. 2800 w. Elec Eng—May 5, 1897.

**Factories.**—The Illumination of Manufacturing and Business Establishments by the Arc Light (Fabrik und Bureaubeleuchtung durch Bogenlicht). A discussion as to the best method of suspending, distributing and reinforcing arc lamps in the illumination of workshops, etc. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 5, 1898.

**Horry System.**—A New System of Series Arc Lighting. Thomas Spencer. An illustrated description of a system devised by William Smith Horry, called his "Reactive System" of arc lighting. 1500 w. Jour Fr Inst—Oct., 1896.

The Reactance System of Arc Lighting. William Smith Horry. An illustrated description of a method of working arc lamps in series from the primary circuit of alternators without using a transformer, resistances, fuses, etc., to each lamp, and which is quite comprehensive enough for modern times, since a whole city can by this method be lighted from one machine. 1800 w. Elec Eng—Nov. 13, 1895.

**Isolated.**—Economical Results in Modern Isolated Arc Lighting. F. E. Drake. A paper read at the Milwaukee meeting of the Northwestern Elec. Assn. Contains an itemised account and description of the plant owned by J. L. Hudson, Detroit. 400 w. Elec Wld—Feb. 15, 1896.

**London.**—Public Arc Lighting in St. Martin's Parish, London. Illustrates and describes details of the work. 2500 w. Elect'n, Lond—June 1, 1900.

**Power Transmission Service.**—Arc Lighting in Power Transmission Service. H. W. Hillman. Discusses the enclosed arc system; the troubles of the past and the remedies; the advantages, etc. Ill. Also discussion. 6500 w. Jour of Elec—Aug., 1900.

**Public.**—Arc Lamps for Street Lighting. Thomas Hesketh. A consideration of the qualifications desirable. 1200 w. Elect'n—April 9, 1897.

Public Lighting by Arc Lamps. André Blondel. The writer purposes making a close examination of the means actually employed in the production and utilisation of this source of light, indicating possible improvements. Serial. Elect'n—April 3, 1896.

Public Lighting Systems. Editorial reviews of various arc-lighting systems. 2300 w. Elect'n Lond—Oct. 20, 1899.

Street Lighting. H. H. Wait. Abstract of paper read before the Northwestern Elec. Assn. Discusses the cost of arc lighting and the relative economy of open and enclosed arc lamps. 1900 w. Am Elect'n—Aug., 1900.

The Scientific Principles of Public Lighting by Arc Lamps. F. W. Carter. A study of the principles and a discussion of the problem of finding a system of lights to satisfy stated conditions. Serial. Elec Rev, Lond—Dec. 22, 1899.

See also **ELECTRIC LIGHTING; LIGHTING.**

**Reactive System.**—See **HORRY SYSTEM.**

**Rectifier.**—See **ELECTRIC CURRENT RECTIFIER.**

**Rouen Harbor.**—The Electric Lighting of the Port of Rouen (Eclairage Electrique du Port de Rouen). M. Chateau. Especially devoted to the stationary arc lights disposed about the docks and quays of the left bank of the harbor. 3500 w. 8 plates. Ann des Ponts et Chaussées—1 Trimestre, 1898.

**Trimmer's Wagon.**—Tower Wagon for Arc Lamp Trimmers. Illustrated description. 600 w. W Elect'n—Nov. 21, 1896.

**Triple Connection.**—Triple Connection of Arc Lamps (Ueber die Dreierschaltung von Bogenlampen). W. Wedding. A record of electrical and photometric measurements made upon the Körting and Mathiesen arc lamps connected three in series. 2500 w. Elektrotech Zeitschr—April 13, 1899.

Triple Connection System for 110 Volt Differential Arc Lamps (Dreischaltungssystem bei 110 V Gleichstrom mit A. E. G. Differential Bogenlampen). J. Zeidler. A description of the new triple connection system of the Allgemeine

Elektricitäts-Gesellschaft. 2500 w. Elektrotech Zeitschr—March 30, 1899.

**Underground Circuits.**—Underground Circuits for Arc Lighting. S. H. Sharpsteen. Notes from the experience of the writer. 2400 w. Elec Eng, N. Y.—Dec. 2, 1897.

**AREA.**—See also **PLANIMETER.**

**Wiener Method.**—A New Graphical Method of Finding the Areas of Irregular Diagrams. Alfred E. Wiener. Gives a graphical method for measuring irregular planes. 1600 w. Am Mach—May 19, 1898.

The Truth and Errors of Mr. Wiener's Method of Finding the Area of Curvilinear Figures. J. J. Guest. A demonstration of the method in proof of its truth. 800 w. Am Mach—July 7, 1898.

Wiener's Method of Graphic Integration. Leicester Allen. Highly commending the method, and giving some points in its application. Ill. 1500 w. Am Mach—July 28, 1898.

**ARGAND BURNER.**—See **GAS BURNER.**

**ARGENTAURUM.**

Dr. Emmons's Transmutation of Silver into Gold. Letter from Stephen H. Emmons in reply to statements made by Prof. E. M. Endlich. 1000 w. Eng and Min Jour—Oct. 31, 1896.

The Transmutation of Silver into Gold. Correspondence from Von Schulz & Low, and F. M. Endlich in relation to this subject and Dr. Emmons's alleged discovery of "argentaurum. 2300 w. Eng and Min Jour—Oct. 3, 1896.

The Transmutation of Silver into Gold. Correspondence on this subject between the editor of the "Eng. and Min. Jour." and Dr. Stephan H. Emmons, who was announced in several New York papers as having discovered a chemical process by which silver could be transmuted into gold. 3500 w. Eng & Min Jour—Sept. 5, 1896.

**ARGENTINE REPUBLIC.**

The Argentine Republic: Commerce, Finance, and Industries in 1895. Copious statistics, covering the entire commerce of the country, with short papers on various branches of commerce and industry, by Consuls Baker, Buchanan, and Stephenson. 17500 w. U. S. Cons Rpts—April, 1896.

**ARGON.**

**Electric Discharge.**—On the Behavior of Argon and Helium When Submitted to the Electric Discharge. I. N. Collie and William Ramsay. Experiments carried out more with a view of obtaining practical help in recognizing the purity of argon and helium than of carrying out a research on the relative conductivities of gases. 1800 w. Elect'n—April 24, 1896.

**X-Ray Tubes.** The Behavior of Argon in X-Ray Tubes. L. Callendar and N. N. Evans. Read before Section A of the British Assn., at Toronto. Report of investigations. 2500 w. Nature —Oct. 28, 1897.

**ARMAMENTS.**—See also **ARTILLERY; GUN.**

**Europe.**—The Growth of the World's Armaments. H. W. Wilson. An examination of the position of the great nations of Europe, based on statistics of the last thirty years. Diagrams. 1800 w. Nineteenth Cent—May, 1898.

**ARMATURE.**—See also **DYNAMO.**

Armature Connections and Diagrams. Arthur L. Rice. Part first deals with the process of winding and connecting in various forms of armatures. Ill. Serial. Am Elect'n—Feb., 1898.

The Armature. W. H. Freedman. Lecture delivered before the Henry Electrical Club. The various types are classified and illustrated, and an attempt made to present a somewhat logical treatment. 1600 w. Elec Pow—Feb., 1896.

**Balancing.**—A "Surface-Plate" Balancing Rig. James F. Hobart. Some hints on the accurate mechanical balancing of armatures, with illustrations of a testing apparatus. 1000 w. Elec Wld—Oct. 23, 1897.

Practical Balancing of Armatures. George T. Hanchett. An illustrated explanation of the writer's ideas on this subject. 1300 w. Elec Eng, N. Y.—Dec. 29, 1898.

**Core.**—On the Construction of Armature Cores. William Baxter, Jr. Discusses past and present methods. Ill. 2300 w. Am Mach—Aug. 12, 1897.

On the Construction of Armature Cores. William Baxter, Jr. Directions with illustrations. 2200 w. Am Mach—Sept. 2, 1897.

**Core Insulation.**—The Insulation of Armature Cores. Louis Illmer, Jr. Considers the manner in which the general types of armatures are insulated. Ill. 1600 w. Am Elect'n—April, 1897.

**Dimensioning.**—On the Dimensioning of Armatures. George T. Hanchett. The effect of lengthening the drum armature is discussed, showing that in general long armatures are to be avoided. 1500 w. Elec Wld and Elec Eng—March 11, 1899.

**Disk Manufacture.**—Making Armature Disks. Outline of the various methods, with illustrations of several modern machines adapted to this work. 1400 w. Am Mach—Dec. 3, 1896.

**Eddy Currents.**—The Reaction of Eddy Currents upon Armatures (Die Anker Rückwirkung der Wirbelströme). A mathematical and graphical investigation. 1500 w. Electrotech Zeitschr—March 11, 1897.

**Electrodynamic Force.**—On the Seat of Electrodynamic Force in Ironclad Armatures. William Baxter, Jr. Objections to conclusions reached by Messrs. Houston and Kennelly. 1200 w. Elec Wld—Sept. 12, 1896.

On the Seat of the Electrodynamic Force in Ironclad Armatures. Edwin J. Houston and A. E. Kennelly. The authors have experimentally demonstrated that in the type of armature employed by them more than 98 per cent. of the entire torque was exerted on the iron, less than 2 per cent. being produced by the conductors. 1600 w. Ill. Elec Wld—July 4, 1896.

On the Seat of the Electrodynamic Force in Ironclad Armatures. Townsend Wolcott. Theoretical consideration of the question advanced by Messrs. Houston and Kennelly in a previous article. 1200 w. Elec Wld—Sept. 5, 1896.

The Seat of Electrodynamic Force. Account of, and remarks upon experiments performed by Houston and Kennelly. 1000 w. Elec Rev, Lond —Aug. 14, 1896.

**Faults.**—See **DYNAMO—Faults.**

**Grooved.**—Advantages of Grooved Armatures. William Baxter, Jr. The main point of superiority of the grooved armature is that it provides a perfectly rigid support for the wire. Other advantages are also shown. 2800 w. Am Mach—April 16, 1896.

**See also Slot; Toothed; Tunnel.**

**Grooved Insulation.**—How to Insulate Grooved Armatures. William Baxter, Jr. An article showing that the insulation can be made just as substantial and permanent with the grooved type as with the smooth core, without any material increase in cost of construction. 1700 w. Am Mach—June 11, 1896.

**Heating.**—Heating of Armatures. George Moffat. Treats of the cause of undue heating and the requisites for cool running. 1200 w. Elec Eng —May 26, 1897.

**Idle Currents.**—Idle Currents. A study of the problem of worthless currents and means of suppressing them. 1300 w. Elec Rev, Lond—Nov. 20, 1896.

**Inductance.**—Goldsborough on Armature Inductance. Discussion of paper by W. E. Goldsborough on "The Effect of Armature Induction upon the Electromotive Force Curves of an Alternator." 1700 w. Trans Am Inst of Elec Engs—Oct., 1897.

**Iron Losses.**—See also **ROTARY CONVERTER—Iron Losses.**

**Lines of Force.**—The Distribution of Lines of Force in Grooved Armatures (Ueber die Kraftlinienvertheilung in Nuthenankern). Dr. F. Niethammer. An elaborate mathematical treatment, with diagrams, to assist in the determination of the ampere windings. 6000 w. Elektrotech Zeitschr —Nov. 2, 1899.

**Reaction.**—See **ARMATURE REACTION.**

**Short-Circuited.**—Distribution of Currents and Energy in Short-Circuited Armatures (Stromvertheilung und Energieaufnahme von Kurzschlussankern). G. Roessler. A very exhaustive discussion of the action of the electrical currents in the Dobrowolski armature, using both graphical and analytical methods. Two articles. 10000 w. Elektrotech Zeitschr—Nov. 10, 17, 1898.

**Slot and Tunnel.** Some Remarks on the Slot and Tunnel Armatures. M. von Dolivo-Dobrowolsky. From the "Elektrotechnische Zeitschrift." Explanation of peculiarities and facts not generally understood. Ill. 1500 w. Elect'n—Aug. 20, 1897.

**Toothed.**—On Toothed Armatures. Michael V.

Dolivo-Dobrowolsky. From the "Elektrotechnische Zeitschrift." Considers a few matters needing explanation, in the belief that putting them straight will be of value and importance. 1800 w. Elec Eng, Lond—Aug. 6, 1897.

**Tunnel.**—The Magnetic Field in Tunnel Armatures. F. G. Baily. Discusses the problem of the relation of the mechanical and magnetic forces in conductors buried in a magnetic medium. 1800 w. Elect'n, Lond—Oct. 15, 1897.

### ARMATURE CURRENT.

**Losses.**—Energy Losses in Electric Machines Due to the Armature Current. Otto T. Blathy. Detailed results of recent experiments on the load-loss of a typical dynamo. 400 w. Elect'n—Aug. 7, 1896.

On the Dissipation of Energy Caused by the Armature Currents in Electrical Machinery. Otto T. Blathy. Announcement of the discovery of an apparent new source of energy loss in dynamo armatures. Elect'n—July 17, 1896.

The Dissipation of Energy Caused by the Armature Currents in Electrical Machinery. Editorial correspondence criticising paper by Otto T. Blathy. 1200 w. Elect'n—July 24, 1896.

The Load Losses Produced by Armature Currents. Harris J. Ryan. Claiming knowledge, since 1894, of the load losses recently discussed in paper by Mr. Blathy. 900 w. Elec Wld—Sept. 5, 1896.

### ARMATURE REACTION.

Armature Reactions. Alexander Rothert. Abstract of a paper read at the Berlin meeting of the Verband Deutscher Elektrotechniker. A new method for the dimensioning of generators in the use of alternating or polyphase currents, and to account for their mode of action, and especially for the loss of pressure in the cases of inductive and non-inductive loads. Illustrated by diagrams. 4500 w. Elect'n—Nov. 6, 1896.

Armature Reaction and the Theory of Commutation. C. C. Hawkins. Part first considers the reaction of a single inductor, the steady E. M. F. of a single inductor unaffected, and self-excitation with separate magnet winding. Serial. Elect'n—April 30, 1897.

Armature Reactions in a Continuous Current Dynamo. C. A. Bessey. Reports results of a study of armature reactions, made at the Univ. of Nebraska. 500 w. Elec Eng, N. Y.—May 12, 1898.

See also **ROTARY CONVERTER—Armature Reaction.**

### ARMATURE WINDING.

The Construction of Armature Coils. William Baxter, Jr. Explains methods of construction and forms, with illustrations. 1700 w. Am Mach—July 1, 1897.

**Dead Wire.**—Dead Wire on Armatures. Richard Pfund. Gives the writer's reason for the wire on the inside not being as active in developing e. m. f. as that on the outside. 800 w. Elec Eng—Feb. 10, 1897.

**Double.**—Double-Wound Armatures. Alton D. Adams. Considers the class of double-wound armatures in which each winding is entirely independent of the other has its own commutator. 2700 w. Am Elect'n—March, 1900.

**Drum.**—Winding Drum Armatures. William Baxter, Jr. Illustrates and describes the usual means for winding drum armatures and also an apparatus designed by the writer, showing the advantages of the latter machine. 1200 w. Am Mach—July 29, 1897.

**Mechanical Stresses.**—Mechanical Stresses on Dynamo Coils. P. M. Heldt. An explanation of the phenomenon observed, with proof of the subject in general and investigation of a few special cases. Ill. 2200 w. Elec Wld & Elec Engr—May 27, 1899.

**Modern.**—Modern Armature Windings and Connections. Cecil P. Poole. The general principles that govern all armature windings being first enunciated, the author gives illustrated descriptions of modern armature windings. 2000 w. Am Elect'n—Aug., 1896.

**Motor Generators.**—On a Winding for Motor Generators. P. M. Heldt. Describes a winding combining the advantages of the windings for both continuous and alternating currents. 800 w. Elec Wld—July 18, 1896.

**Polyphase.**—Windings of Polyphase Armatures. J. P. Stone. Illustrated description of how these windings are made, showing that it is rather unessential what type of connections are used as far as behavior and output of machines is concerned. 1200 w. Am Elect'n—Jan., 1898.

**Right-and-Left-Handed.**—Right-and-Left-Handed Armature Winding. C. C. Hawkins. Explains the governing principles for determining the "hand" of an armature-winding, and gives illustrated applications to the various kinds of armatures, and directions for winding. Elect'n—Sept. 10, 1897.

**Separable Coils.**—Separable Armature Coils. William Baxter, Jr. Their shape and construction; also their advantages and disadvantages. 2300 w. Am Mach—March 19, 1896.

**Theory.**—Armature Winding and Connecting Considered as a Mathematical Problem. Harrison H. Wood. An illustrated article in which the author develops the problem as a purely mathematical one, paying no attention to practical methods and devices made use of in winding and connecting, nor to the relative advantages of different methods, where such exist, of grouping the conductors and of connecting them to the commutator. Serial. Elec Wld—Nov. 23, 1895.

The Theory of Armature Windings (Beitrag zur Theorie der Ankerwickelungen). Ch. Westphal. A brief mathematical discussion, with especial reference to continuous current dynamos. 1200 w. Elektrotech Zeitschr—Feb. 9, 1899.

**Wenström.**—Armature Winding and Connections. Arthur L. Rice. A description of the Wenström windings, with diagram showing the manner in which the wire is laid upon the armature. 1000 w. Am Elect'n—Sept., 1898.

### ARMORED CRUISER.

See also **WARSHIP.**

**"Amphitrite" Trials.**—The Steam Trials of H. M. S. "Amphitrite." This article was written when only one trial had been completed, the 3600 indicated horse-power trial which is reported very satisfactory. 1300 w. Engng—April 14, 1899.

**"Asama."**—The Japanese Armored Cruiser "Asama." Brief illustrated description of this twin-screw cruiser recently built. 500 w. Engng—March 3, 1899.

**"Askold."**—The First-Class Russian Cruiser "Askold" (Der Russische Kreuzer I. Klasse "Askold"). A short illustrated description of this new 6000-ton cruiser, built at the Germania yard. 500 w. Stahl und Eisen—April 1, 1900.

**"Askold" and "Chateaurenault."**—Two Notable High-Speed Foreign Cruisers. Illustrates two of the latest high-speed cruisers built in European yards—the "Askold" and the "Chateaurenault." 1000 w. Sci Am—June 30, 1900.

**"Bayan."**—The Imperial Russian Cruiser "Bayan." Illustrates and describes the armoring system, equipment and novel features. 1200 w. Engr, Lond—Aug. 31, 1900.

**British.**—The New Armored Cruisers. Describes the new vessels recently ordered by England. 1200 w. Engng—March 25, 1898.

**"Brooklyn."**—The United States Armored Cruiser "Brooklyn." Illustrated description. 1800 w. Am Eng & R R Jour—Oct., 1896.

The United States Armored Cruiser "Brooklyn." Illustrated description of this vessel and her armament, with report of official speed trial. 2800 w. Sci Am—July 16, 1898.

United States Armored Cruiser "Brooklyn" Present at British Naval Review. Illustrated detailed description. 1300 w. Marine Engng—July, 1897.

**"Brooklyn" Trial.**—Contract Trial of U. S. Armored Cruiser "Brooklyn." W. C. Herbert. Illustrated description of the vessel, with data of trial. 6500 w. Jour Am Soc of Naval Engs—Nov., 1896.

Official Speed Trial of the Armored Cruiser "Brooklyn." W. N. Little. Description of the vessel and summary of data obtained during the trip. 2000 w. Power—Oct., 1896.

**"Chateaurenault."**—See **"Askold."**

**"Cressy."**—Launch of H. M. S. "Cressy." This is a sister ship of the "Sutlej," previously described, so the description is principally devoted to special features, peculiar to this vessel. 2500 w. Engr, Lond—Dec. 8, 1899.

**"Cristobal Colon."**—The Spanish Armored Cruiser "Cristobal Colon" (Le Croiseur Cuirassé Espagnol "Cristobal Colon"). A description of this powerful addition to the Spanish navy, with photographs of the vessel and of her water tube boilers. 2500 w. Rev Tech—July 10, 1897.

The Spanish Cruiser "Cristobal Colon." Illustrated description with some interesting explanations relating to the rapid work. 2000 w. Engng—Feb. 18, 1898.

**"Essex."**—H. M. S. "Essex." Illustrated description, with comparison of the powers of offence and defence with the "Bayan" and "Prinz Heinrich." 2000 w. Engr, Lond—Oct. 12, 1900.

**Fürst Bismarck.**—See **BATTLESHIP—"Friedrich der Grosse."**

**"General Belgrano."**—The Argentine Armored Cruiser "General Belgrano." Illustrates and briefly describes this sister ship to the "Cristobal Colon." 600 w. Sci Am Sup—Dec. 17, 1898.

**"Jeanne d'Arc."**—The French Armored Cruiser "Jeanne D'Arc." Details of this vessel, with illustration; also very severe criticism, comparing her with the British vessels, the "Powerful" and "Diadem." 1500 w. Engr, Lond—June 9, 1899.

**"Noord Brabant."**—The Dutch Cruiser "Noord Brabant." Illustrates this vessel and its engines, giving a brief description. 400 w. Engr, Lond—Nov. 10, 1899.

**"Powerful."**—H. M. S. First-Class Cruiser "Powerful." Illustrated description. 1300 w. Engr, Lond—Oct. 2, 1896.

H. M. S. "Powerful." The first part treats of the boiler installation. Illustrated description. 3000 w. Engng—Sept. 25, 1896.

The "Powerful" and Her Critics. Editorial on the unjust criticisms of this vessel, claiming that they are not justified by facts. 2000 w. Engr, Lond—March 25, 1898.

See also **CRUISER—"Niobe," "Doris," "Powerful."**

**"Powerful" Trials.**—H. M. S. "Powerful." Description of second set of trials with editorial comment. 2300 w. Engr, Lond—Oct. 16, 1896.

The Trials of the "Powerful." Describes the successful series of trials of exceptional severity of Her Majesty's first-class cruiser "Powerful," built and engined by the Naval Construction and Armament Co., of Barrow-in-Furness. 3600 w. Engr, Lond—Dec. 4, 1896.

Recent Trials of the Cruisers "Powerful" and "Terrible." A. J. Durston. Read before the Inst. of Naval Arch'ts. A description of the trials with data obtained therefrom. Also discussion. 10000 w. Engng—April 9, 1897.

**"Prinz Heinrich."**—The German Cruiser "Prinz Heinrich." Illustrated description, with comparison with other vessels. 1200 w. Engr, Lond—Sept. 21, 1900.

**Spanish.**—Spain's Armored Cruisers. Gives data with regard to these vessels and compares the American vessels. Ill. 1100 w. Engr, Lond—April 29, 1898.

**"Terrible" Trials.**—H. M. S. "Terrible." Report of the steam trials, with details of her performance, and editorial on the facts brought out. 3200 w. Engr, Lond—Jan. 15, 1897.

The Steam Trials of H. M. S. "Terrible." A review of the results of recent trials. 2800 w. Engng—Sept. 30, 1898.

The Trials of H. M. S. "Terrible." Full account of the official steaming trials, with results and details. The great success of the Belleville boiler. Serial. Engng—Jan. 15, 1897.

See also **"Powerful" Trials.**

**United States.**—Ships of the Armored Cruiser Type. An account of the work done by this type of vessel in the naval engagement at Santiago, showing their efficiency, and referring to the probability of others being constructed for the U. S. navy. 1600 w. Marine Rev—Aug. 11, 1898.

**"Variag."**—Russian Cruiser "Variag." Illustration and brief description of vessel built in the United States for Russia. 800 w. Marine Rev—July 5, 1900.

**"Yakumo."**—The Imperial Japanese Cruiser "Yakumo." Illustrated descriptive comparison with the "Asama." 350 w. Engr, Lond—May 4, 1900.

**ARMORED SHIPS.**

Armor Clads. Osborne Atwater Day. Historical account of the use of armor for the protection of vessels. 1300 w. Yale Sci M—April, 1898.

**"Monitor"—"Merrimac."**—The First Battle Between the "Merrimac" and "Monitor," and its effect on naval shipbuilding. 5000 w. Loc Firemen's Mag—May, 1898.

**ARMOR PLATE.**

See also **ARTILLERY; GUN; PROJECTILE.**

Armor Plates. A review of progress in the manufacture in the different countries. 2500 w. Engng—April 6, 1900.

Armor Plates (Les Plaques de Blindages). L. Baclé. A most exhaustive treatise on the history and development of armor-plate manufacture in Europe and America, with many illustrations. Two articles. 50000 w. Bull de la Soc d'Encour—Nov., Dec., 1899.

Progress in the Manufacture of Armor Since 1889 (Progrés Réalisés dans la Fabrication des Blindages). E. Delmas. A review of the improvements due to the severe tests to which plates have been subjected, showing the great progress made in ten years. 2500 w. Mem Soc Ing Civ de France—Sept., 1900.

Recent Developments and Standards in Armor and Heavy Ordinance. W. H. Jacques. Read before section G. of the British Assn., Liverpool. A review of the progress made, with examination of tests made in various countries. The record is most satisfactory. 2000 w. Ir Age—Oct. 22, 1896.

Some Notes on the Development of Armor for Naval Purposes. Discusses the various forms and qualities of armor, and the cost at which it has been supplied at different periods. 4700 w. Ir & Coal Trds Rev—April 13, 1900.

The Production and Supply of Armor for Naval Purposes. Introduction and outline of subject, with early armor experiments and their results comprise this first part. Ill. Serial. Ir & Coal Trds Rev—Sept. 23, 1898.

**American.**—See also **United States.**

**American, for Russian Battleship.**—American Armor Plate for a Russian Battleship. Illustrates recently tested armor plates manufactured by the Carnegie Co.; giving an account of results. 900 w. Sci Am—Nov. 25, 1899.

**American vs. European.**—American and European Armor Compared. W. L. C. From a paper by Captain O'Neil filed with the Senate Committee on Naval Affairs, discussing the relative superiority of American armor plate over that manuactured by the leading European firms. 3500 w. Ir Age—Feb. 10, 1898.

**Austrian Tests.—See Witkowitz.**

**Beardmore Process.**—Beardmore Process Armor Plates. Brief report of a severe test of plates supplied to the Danish Government by Messrs. Beardmore, Glasgow. 700 w. Engr, Lond—Nov. 25, 1898.

**Bethlehem Works.**—See **GUN MANUFACTURE—Bethlehem Works.**

**Carpenter Process.**—The Carpenter Process for making Armor Plate. A letter from J. H. Carpenter explaining the nature of the process, with euitorial comment questioning the merits, and the correctness of the estimate of cost. 1400 w. Eng News—Sept. 16, 1897.

**Electric Annealing.**—The Electric Process of Annealing Armor Plate. An illustrated detailed description. 2500 w. Ir & Coal Trds Rev—March 16, 1900.

Local Annealing of Hard Faced Armor Plates. Herman Lemp, Jr. Paper read before the Amer. Inst. of Elec. Eng., with discussion. Illustrated description of the process and apparatus neccessary. Experiments described, and methods formerly used explained. 5300 w. Trans Amer Inst of Elec Eng—Oct., 1895.

The Electric Process of Annealing Armor Plate in the Construction of War-Ships. Charles J. Dougherty. Treats of the process of the Thomson Electric-Welding Co., of Lynn, Mass. Illustrated description, with discussion. 3000 w. Pro Engs Club of Phila—Feb., 1900.

**European.**—British, French and German Armor. A comparison of thick armor recently tested. Ill. 1900 w. Engr, Lond—Nov. 19, 1897.

**Fortifications.**—Armor for Fortifications. From "Der Stein der Weisen." Showing how armor has become more and more indispensable on account of the developments of projectiles, and how the struggle between guns and armor is no longer restricted to naval warfare. 1400 w. Sci Am—Dec. 26, 1896.

**Germany.**—Armor Plate Manufacture in Germany.

Brief consideration of the effect upon this industry of the scheme for increasing the German navy. 1200 w. Engr, Lond—April 13, 1900.

**Harvey.**—Hardened Plates and Broken Projectiles. L. E. Bertin. Read at the International Congress of Naval Architects and Marine Engineers. On Harveyed plates, their trials, etc. Part first presents a summary analysis of Mr. Ellis' tables, contained in a study of the American Navy. A study of the penetration. Serial. Engng—July 30, 1897.

Recent Trials of Cemented Steel Armor Plates. Essais Récents de Plaques en Acier Cémenté). L. Baclé. A discussion of recent trials on hardened armor plates, with tabulated data and results from tests made in England, America, Russia and other countries. Two articles. 4000 w. Génie Civil—May 20, 27, 1899.

**Harvey Tests.**—A Victory for the Gun over the Armor (Une Victoire du Canon sur la Cuirasse). A review of the American tests of Harveyized steel armor, with especial reference to the piercing of a 10 in. plate by a Johnson projectile. 2500 w. La Rev Tech—March 25, 1898.

The Attack of Harveyed Armor-Plates by Armor-Piercing Projectiles. A table giving results obtained against treated armor of the highest class, with discussion of the same. 1500 w. Engr, Lond—Oct. 15, 1897.

**Krupp.**—Cammell's Krupp Process Plate. Illustrated account of the trials of this plate at Shoeburyness, and recording another success in the manufacture of thick Krupp process armor. 1500 w. Engr, Lond—Nov. 11, 1898.

Krupp Armor—Its Application to Defeat Shell Fire in Warships. A discussion of recent makes of Krupp armor, the alterations that have been made in applying armor to vessels, and some things learned from the Santiago fight. 2000 w. Engr, Lond—Nov. 4, 1898.

Krupp Armor Plate. W. L. C. Two interesting communications to the U. S. Naval Committee from Captain O'Neil concerning development of the manufacture of armor plate, and advance in the Krupp process. 3800 w. Ir Age—March 2, 1899.

See also **ARMOR PLATE—U. S. Navy.**

**Krupp Tests.**—Krupp Armor Plate Tests. Illustrated description of recent tests. 600 w. Sci Am Sup—Dec. 2, 1899.

Test of a Bethlehem-Krupp Armor Plate. Official report of tests recently made at the Redington proving grounds, with results. 500 w. Ir Age—Nov. 24, 1898.

Test of a Six-Inch Experimental Krupp Plate. Illustrates and describes the tests at the Indian Head Proving Ground, reporting the results. The plate was made by the Carnegie Company. 1500 w. Sci Am—Aug. 27, 1898.

The Carnegie Krupp Armor Plate. W. L. C. Reports the test of the first armor plate made in this country under the Krupp process, the results being most gratifying. Ill. 700 w. Ir Age—Aug. 18, 1898.

Tests of Some Recent Krupp Armor Plates (Beschussprobe einiger Neueren Kruppschen Panzerplatten). J. Castner. With photographs showing the remarkable resistance of some of the latest specimens of Krupp's hardened nickel-steel plates, tested before the Japanese commissioners. 1200 w. Stahl und Eisen—Dec. 1, 1899.

**Nickel Steel Patents.**—The Nickel Steel Armor Patents. Gives facts of a notable case recently decided by the President, with the basis for the decision. 2400 w. Ir Age—Feb. 9, 1899.

**Perforation Formulae.**—Formulae for Calculating the Perforation of Armor. Formula suggested by Captain Tresidder, of Brown's Armor Plate and Steel Works, which might, he urged, be adopted with advantage internationally on the following grounds: (1) Close agreement with actual results obtained at various velocities; (2) theoretical soundness; (3) simplicity. It is claimed that this formula gives results for high velocities which are much more nearly correct than the recognized British formulae of Maitland or Fairbairn. 1800 w. Engr, Lond—April 24, 1896.

**Sheffield.**—The Manufacture of Armor Plate at Sheffield. Illustrates and describes the Cyclops Works of C. Cammell & Co., Ltd. 3700 w. Ir & Coal Trds Rev—Dec. 15, 1899.

**Test.**—Tests of Armor Plates. Report of tests giving information of considerable value in regard to surface cracks, laps, etc. 1000 w. Engng—Sept. 3, 1897.

See also **Harvey; Krupp; United States; Witkowitz.**

**U. S. Navy.**—The Carnegie Company on Armor Plate Costs. Extract from written statement submitted to the Senate Committee on Naval Affairs by H. C. Frick, upon the question as to what should be the price of armor plate. 600 w. Am Mfr & Ir Wld—Feb. 12, 1897.

The Armor Plate Imbroglio. W. L. C. A statement of the situation, with letters from the Illinois Steel Co., the Carnegie Steel Co. and the Bethlehem Iron Co., with suggestions from Secretary Long. 3800 w. Ir Age—April 15, 1897.

The "Kearsarge" and "Kentucky" Plates. W. L. C. Report of Acting Secretary McAdoo's views, the report of the Steel Board and comments of Chief Hichborn, of the Bureau of Construction. 2800 w. Ir Age—Jan. 7, 1897.

The Cost of Armor Plate. Summary of Secretary Herbert's letter to Congress. 4000 w. Ir Age—Jan. 7, 1897.

The Cost of American Armor Plate. Editorial review of the report of Secretary Herbert and of that of Secretary Whitney in 1886, with comment. 1500 w. Eng News—Jan. 14, 1897.

The Armor Plate Report. A full abstract of the report presented to the Secretary of the United States Navy, by the Naval Armor Factory Board. 7500 w. Ir Age—Dec. 9, 1897.

The Armor Plate Question. A summary of American armor plate history down to the present time. 5000 w. Bull Am Ir & Steel Assn—Dec. 20, 1897.

The United States Authorities and Krupp Process Armor. An important paper submitted to the U. S. Senate Committee on Naval Affairs by Capt. O'Neil, on the relative qualities and efficiency of European and American armor plate for warships, with English comment on the trial. 5000 w. Engr, Lond—April 22, 1898.

The Armor Plate Imbroglio. An extract from a memorandum prepared by Admiral O'Neil, discussing the advantages of the Krupp process and the advisability of a government armor plate plant. 4000 w. Ir Age—Dec. 21, 1899.

Armor Plates for the United States Navy. Reviews the history of the conflict between Congress, the government officials, and the manufacturers, during the last thirteen years, as given by the Am. Ir. and Steel Assn. 6200 w. Engr, Lond—March 16, 1900.

**U. S. Tests.**—American Plate Trials. Description of the trials, with half-tone illustrations showing condition of the plates and of the projectiles after impact. 1400 w. Engr, Lond—Aug. 7, 1896.

Trial of Side and Deck Armor for the United States Battleships Kearsarge and Kentucky. Engraving of test plate with particulars of test. 700 w. Sci Am—May 1, 1897.

**Witkowitz Tests.**—Comparative Armor Tests in Austria (Essais Comparatifs en Autriche sur le Plaques de Blindage). Discussing the results of test of armor plate of the various European makers with especial reference to hardened and non-hardened surfaces. 4500 w. Génie Civil—June 12, 1897.

Tests of Armor Plates at the Witkowitz Iron Works (Schiessversuche gegen Panzerplatten im Eisenwerke Witkowitz). Comparative tests of Harveyized and nickel-steel plates, both showing good results, rather favoring the latter. 2000 w. Stahl und Eisen—April 1, 1897.

The Witkowitz Armor Plate Tests (Tir d'Essai contre des Plaques de Blindage à l'Usine de Witkowitz). A full account of the Austrian armor plate tests, with photographs of the action of projectiles upon steel plates, Harveyized and non-Harveyized, also plates of nickel steel. 3000 w. La Rev Tech—Oct. 10, 1897.

Witkowitz Steel Plates. A report of trial of these plates and the verdict, with observations and criticisms. 2200 w. Engr, Lond—June 18, 1897.

## ARMORY.

**Buffalo.**—The Seventy-fourth Regiment Armory, Buffalo. Illustrated description of a 550x250-foot armory, said to be the largest in the country. Special attention is paid to the details of the iron work, particularly the 227-foot arch trusses of the drill hall. 2800 w. Eng Rec—June 9, 1900.

**Cleveland, O.**—The Central Armory, Cleveland, O. General description, elevations, longitudinal section, transverse sections, features of construction, plumbing, heating and ventilating are given in part first. Serial. Eng Rec—Dec. 5, 1896.

**ARMY.**

**U. S. General Staff.**—Our Army Supply Departments and the Need of a General Staff. John H. Parker. Discusses the quartermaster, commissary, and ordnance departments, and their work in the war with Spain, and offers recommendations tending toward the improvement of that military service. 9300 w. Am Rev of Revs—Dec., 1898.

**ARRASTRA.**

How to Build and Operate an Arrastra. E. L. Ballou. Illustrated description. 3000 w. Min & Sci Pr—Jan. 14, 1899.

How to Build and Operate an Arrastra. William H. Washburn. Gives drawings of a typical arrastra in Oregon, with description. Also particulars of other similar work. 3000 w. Min & Sci Pr—Jan. 28, 1899.

The Arrastra. Arthur Lakes. Illustrates and describes an ancient and effective device for treating ores, which can be cheaply constructed in inaccessible regions. 1200 w. Mines & Min—Sept., 1899.

**ARSENAL.**

**Watertown, Mass.**—The Watertown Arsenal. Illustrated description, historical and general, of foundry, shops, tools, appliances and arms manufactured. Serial. Mach., N. Y.—Sept., 1896.

**Watervliet.**—Busy Times at Arsenals. The rush of preparing materials for war is described, with illustrations of the U. S. Arsenal at Watervliet, N. Y. 1000 w. Harper's Wk—April 9, 1898.

**ARSENIC.**

**British.**—The British Arsenic Industry. Some facts relating to the methods used in the manufacture of arsenic from the ore, and the effect upon the workmen. 2500 w. Engng—May 4, 1900.

**Ore Determination.**—On the Separation and Determination of Arsenic and Antimony in Ores. O. C. Beck and H. Fisher. Compares the different known methods in order to determine which is the shortest and most accurate. 2200 w. Sch of Mines Quar—July, 1899.

**ART BUILDING.**

**New York.**—New York's New Art Academy Building. Edwin Emerson, Jr. Information concerning this building, with illustrations of the accepted design. 1200 w. Harper's Wk—Nov. 27, 1897.

**ARTESIAN WELL.**

See also **WELL.**

Artesian Bored Tube Wells. Maurice Ockenden. Read before the Civil and Mech. Engs. Soc. of London. Reviews the means adopted for boring or drilling wells, giving ancient methods and the more important ones in present use. 2000 w. Col Guard—April 29, 1898.

Artesian Tube Wells. J. E. Discusses the work of tube lining and subsequent discharge. Ill. 1800 w. Ind Engng—May 15, 1897.

Artesian Wells. Abstract of a paper by A. A. de Bonneville, contributed to the "Stevens Indicator" for July. Definition of an artesian well, the conditions necessary for such wells, and various methods for sinking or boring them. 1800 w. Eng Rec—Sept. 26, 1896.

**Boring.**—How Wells May Be Driven. Brief history of artesian wells and methods of boring. 1500 w. Fire & Water—March 25, 1899.
See also **WELL BORING.**

**Camden, N. J.**—See **WATERWORKS—Camden, N. J.**

**Chatham, N. J.**—Artesian Wells for the Water Supply of Chatham and Madison, N. J. Louis L. Tribus. A description of the methods adopted and of the geological peculiarities resulting from glacial action and deposit. 900 w. Eng News—Aug. 10, 1899.

**Galveston.**—Artesian Water Supply of Galveston, Tex. R. H. Peek. Describes a system consisting of 30 artesian wells, 27 being 7 ins. and three being 9 ins. in diameter, connected by an influent pipe directly with the 30-in. conduit to the receiving tank. Ill. 1900 w. Eng News—March 3, 1898.

**Savannah, Ga.**—The Restoration of the Water Supply at Savannah, Georgia. Thomas T. Johnson. An account of steps taken to restore what appeared to be a decaying artesian water supply. Ill. 6000 w. Jour of W Soc of Engs—Dec., 1897.

Savannah and Its Artesian Wells. Describes the methods adopted to restore the water to old wells when it had failed. Serial. Fire & Water—April 15, 1899.

**Test.**—A Novel Test of the Flow of an Artesian Well. W. D. Pence. Water bearing stratum reached at 700 feet below surface. Tests were made for determining head as well as flow. 2200 w. Ill Soc of Engs & Surv—11th An Rept., 1896.

**ARTILLERY.**

See also **ARMAMENT; ARMOR PLATE; BALLISTICS; GUN.**

**Artillery** Construction (Le Matériel d'Artillerie). Colonel X. Discussing and illustrating the latest improvements in breech-closing devices, both wedge and screw; also rapid fire guns and carriages for field pieces with improved cushioning devices. Five articles. 30000 w. Rev de Mécan—June, July, Sept., Oct., Dec., 1897.

**Battle.**—The Artillery in Battle. John P. Wisser. A discussion of tactics considering the attack, the defense, night combats, rapid-fire guns, etc. 3800 w. Jour of U. S. Art—July, Aug., 1898.

**Canet Field Guns.**—Canet's Quick-Firing Field Guns. Describes the Canet new model, an important type of quick-firing gun combined with a carriage, and the different ways in which the desired conditions have been partially attained. Serial. Engng—Dec. 4, 1896.

**Coast Mounting.**—New Mountings for Coast Artillery. Abstract of a paper contributed by Sir George Clarke to the "Proceedings of the Royal Artillery Institution," describing new mountings devised to give rapid operation. Ill. 2800 w. Engr, Lond—Dec. 17, 1897.

**Creusot Exhibit, Paris.**—The Creusot Pavilion at the Paris Exhibition. An illustrated description of the ordnance and harbor improvement exhibits of Messrs. Schneider & Co. 3000 w. Engng—Sept. 14, 1900.

**Disappearing Carriages.**—Disappearing Gun Carriages in the United States. G. H. Powell. A description by the Secretary of the Board of Ordnance, of the mountings which distinguish the U. S. coast defences from those of Europe. 1800 w. Eng Mag—June, 1900.

**English Light.**—English Light Artillery. E. Rollin, in "Revue d'Artillerie." A summary review of the evolution of the matériel. 1300 w. Jour U S Artillery—Nov.-Dec., 1898.

**Field.**—Modern Field Artillery. Illustrations of modern field guns, their carriages and equipments, with descriptions. Serial. Engng—March 2, 1900.

The New Field Artillery. Discusses the transformations taking place. 3800 w. Jour U S Artillery—Nov.-Dec., 1898.

**French Field.**—Concerning Our New Cannon (A Propos Notre Nouveau Canon). Leo Dex. A discussion of the present French field piece in comparison with guns of the Maxim-Nordenfelt type. 1500 w. La Rev Tech—June 25, 1898.

**Krupp in Cuba.**—The Krupp 7.5 Cm. Rapid Fire Gun in the Cuban Campaign. Antanasio Torres. Reviews the causes that led to the adoption of this gun in the Spanish army, the difficulties which interfered with the proper equipment of the batteries, and a discussion of its use in the Cuban campaign. 6500 w. Jour U S Artillery—May-June, 1898.

**Mortar Recoil Cylinder—See Recoil Cylinders.**

**Mountain.**—Improved Dismounting Cannon (Nouveaux Canons Démontables). Col. Fix. Describes the improved system of Col. Lycoudis of dismounting field pieces for use in mountainous countries. Two mules only are required instead of three as formerly. Two articles. 3500 w. La Rev Tech—Aug. 10-25, 1897.

Rapid Fire Mountain Gun of the Mexican Army (Le Canon de Montagne à Tir Rapide de l'Armée Mexicaine). F. Schiff. An illustrated description of the Mondragon system of light rapid fire mountain artillery, as constructed by the St. Chamond works. Photographs and detailed drawings are given. 2000 w. 1 plate. Génie Civil—Jan. 28, 1899.

**Rapid Fire.**—Quick Firing Field Guns. Illustrated detailed description. 2000 w. Engr, Lond—Sept. 25, 1896.

Rapid Fire Guns (Canons à Tir Rapide). G. Canet. A paper read before the French Society of Civil Engineers reviewing the progress made since the exposition of 1889. 3500 w. Mem Soc Ing of Civ de France—Sept., 1900.

**Recoil Cylinder.**—Compressed Air Recoil Cylinders for Heavy Mortars. Illustrated description of design by H. A. Spiller. 600 w. Sci Am—Jan. 2, 1897.

**Siege**—A Sketch of the Siege Artillery Train at Camp Rodgers, Tampa, Florida, During the Summer of 1898. E. W. Hubbard. An account of the development of a powerful collection of artillery, with an outline of some of the difficulties met and conquered. 1600 w. Jour U S Art—March-April, 1900.

Siege Artillery. G. N. Whistler. Discusses the question of siege artillery and the conditions which have been produced by the introduction of the modern high-powered gun. 6500 w. Jour U S Artillery—No. 40, 1899.

### ARTISTIC ENGINEERING.

See **AESTHETIC ENGINEERING.**

### ASBESTOS.

Asbestos. A. Selwyn Brown. Describes this peculiar mineral and gives interesting information concerning the locations of deposits, the production, uses, etc. 2000 w. Aust Min Stand—March 1, 1900.

Asbestos. George Heli Guy, in "New York Evening Post." What it is; where found; the process of manufacture; its uses. 1800 w. Arch & Build—July 11, 1896.

Asbestos. George Heli Guy. The importance of asbestos to the human race, its characteristics, where found, process of manufacture, uses, and newest departures. 3400 w. Elec Eng—June 10, 1896.

Asbestos. Paul Kersting. Communication from the Laboratory of the Royal Technical High School, at Berlin. The properties of this substance, where principally found, the varieties, with analyses. 1800 w. Am Mfr & Ir Wld—June 3, 1898.

On the Strange Singularity of Color in Some Forms of Asbestos. Robert H. Jones. Contains information as to the colored varieties of asbestos, especially the blue variety which comes from the Cape of Good Hope. 4400 w. Can Min Rev—Jan., 1898.

**Asbestic.**—Asbestos and Asbestic: With Some Account of the Recent Discovery of the Latter at Danville in Lower Canada. Robert H. Jones. Its nature and historical relations; its adaptations and extensive use; with description of asbestos, etc. Also discussion. 11700 w. Jour Soc of Arts—April 30, 1897.

**Diluvial.**—Diluvial—A New Form of Asbestos. Robert H. Jones. Read before the Asbestos Club, Black Lake. Information relating to this curious fibre and to its origin or formation. 3500 w. Can Min Rev—Oct., 1897.

**Thetford, Canada.**—Asbestos Mining and Dressing at Thetford. H. Nelles Thompson. Conducted by quarrying. The methods are explained. 1600 w. Can Min Rev—March, 1897.

The Asbestos Mines at Thetford, Canada. L. P. Gratacap. Illustrates and describes the deposits and their workings, with information concerning the value, uses, etc. 1100 w. Sci Am—April 7, 1900.

### ASH.

**Fusibility.**—Relation Between the Composition of Coal Ash and Its Fusibility (Relation entre la Composition des Cendres de Houille et leur Fusibilité). A notice of the investigations of M. Eugene Prost, showing that the fusibility of an ash depends upon the relation between the lime, magnesia and oxide of iron on one part, and the silica and alumina on the other. 1500 w. Mon Ind—Dec. 11, 1897.

### ASHLAR.

See **MASONRY—Ashlar.**

### ASPHALT.

See also **ASPHALT PAVEMENT; BITUMEN.**

Asphalt and Related Hydro-Carbons. J. Ohly. The nature and origin, deposits and interesting history of its use. Serial. Min Rept—Oct. 5, 1899.

Origin and History of Asphalt. Bernard Bienenfeld. Reviews the ancient uses and enduring qualities of this substance, its chemical mixture, and the probable origin. 3400 w. Munic Engng—May, 1897.

Recent Discussions of Asphalt. General review of some of the latest literature of the subject. 2500 w. Pav & Mun Eng—Feb., 1896.

**Analysis.**—On the Use of Acetone in the Technical Analysis of Asphaltum. S. F. Peckham. A comparison of tests of acetone and of petroleum ether in parallel experiments, with a statement of results from which the author concludes that acetone cannot be made an equivalent for petroleum ether in the technical analysis of asphaltum. 1200 w. Jour Fr Inst—March, 1896.

**Arch Covering.**—See **ARCH—Asphalt Covering.**

**California.**—California Asphaltum. Arthur Lakes. Describes some of the principal deposits and the methods of refining and handling the mineral. 1500 w. Mines & Min—Oct., 1899.

See also **PETROLEUM—California.**

**Cements.**—The Physical Properties of Asphalts and Asphaltic Cements. W. H. Broadhurst. Read before the Am. Soc. of Munic. Imp. Gives a detailed examination of the properties, and account of tests. 1500 w. Munic Engng—Nov., 1899.

**Chemical Relations.**—The Chemical Relations of Asphaltum. S. F. Peckham. A résumé of work done in this field up to date, and an indication of the lines upon which future chemical investigation should be directed. 1500 w. Pav & Mun Engng—May, 1896.

**Chemical Tests.**—The Value of Chemical Tests of Asphalt Mixtures. W. H. Broadhurst. Read before the Am. Soc. of Mun. Imp. On the mistakes in preparing asphalt mixtures which can be detected by chemical analysis. 1500 w. Eng Rec—Sept. 1, 1900.

**Flux.**—Asphalt Fluxes. W. H. Broadhurst. A report read before the A. S. M. I. of studies made at the Brooklyn municipal laboratory of the value of fluxes for bitumen employed in pavements. 1000 w. Eng Rec—Oct. 14, 1899.

Petroleum Residuum as a Flux for Asphalt. Describes experiments made in Washington to determine whether petroleum residuum was a good softener for asphalt. 3000 w. Eng Rec—Feb. 18, 1899.

Residuum as Flux for Asphalt. Clifford Richardson. A criticism of statements made by A. W. Dow in his annual report, with results of experiments made by the writer. 800 w. Munic Engng—June, 1899.

Softening Agents for the Production of Asphalt Cement for Paving and Other Purposes. Clifford Richardson. States the popular fallacies in regard to petroleum residuum, describes petroleum residuum, and gives information and results of experiments. 2000 w. Munic Engng—June, 1897.

**Indian Territory.**—An Albertite-like Asphalt in the Choctaw Nation, Indian Territory. Joseph A. Taff. History of the development and report of the material, and the associated rocks. 2000 w. Am Jour of Sci—Sept., 1899.

**Laboratory Production.**—The Laboratory Production of Asphalts from Animal and Vegetable Materials. William C. Day. Describes experimental work, giving a statement of the results obtained, and discusses the origin of natural asphalts. 5500 w. Jour Fr Inst—Sept., 1899.

**Laboratory Tests.**—Advantage of an Asphalt Testing Laboratory. N. P. Lewis. Outline of work done in a small laboratory in Brooklyn. 3000 w. Munic Engng—Nov., 1896.

Laboratory Tests of Asphalt. A. W. Dow. Gives a copy of the report of S. P. Sadtler to the city clerk of Los Angeles, Cal., with criticisms of the conclusions drawn from the results obtained. 2800 w. Munic Engng—June, 1898.

One Year's Work with a Chemical Laboratory for Testing Asphalts. George W. Tillson. An account of the work done at the laboratory in Brooklyn. 2500 w. Munic Engng—Nov., 1897.

Tests of Artificial Asphalt (Prüfung von Künstlichem Asphalt). Data of tests made at the Royal Testing Laboratory at Berlin, with an account of methods, and tables of results. 4500 w. Mitt aus d Kg Tech Versuchsanstalten—Part I., 1897.

The Work of the Brooklyn Asphalt Laboratory. An account of the results of the work of Mr. G. W. Tillson in investigating the chemical nature of paving asphalts used in Brooklyn. 2000 w. Eng Rec—Sept. 17, 1898.

**Mixtures.**—Theory and Practice of Asphalt Mixtures. A. W. Dow. An explanation of the phenomena met with in asphalt construction, and the importance of selecting the proper sand. 2000 w. Munic Engng—Dec., 1898.

**Nomenclature.**—The Nomenclature of Asphalt and Mineral Bitumen or Pitch. Leon Malo. The distinctions between asphalt and bitumen are set forth and the nomenclature published in the "Annales des Ponts et Chaussées," in 1861, is confirmed. 1500 w. Munic Engng—Sept., 1896.

**Pavement.**—See **ASPHALT PAVEMENT.**

**Petroleum Residuum.**—See **Flux.**

**Reservoir Lining.**—See **RESERVOIR—Asphalt Lining.**

**Specification.**—Specification Requirements for Asphalt, Asphalt Mixtures and Tests. A. W. Dow. Definitions of terms used in specifications, and an attempt to advance towards a standard specification for an asphalt mixture. 5400 w. Munic Engng—Nov., 1896.

**Tests.**—See **Chemical Tests; Laboratory Tests.**

**Trinidad.**—On Trinidad Pitch. S. F. Peckham and Laura A. Linton. An excellent description of the Trinidad pitch lakes with map and a full discussion of the analysis of the asphalt and tabulated analyses. 5000 w. Am Jour of Sci—March, 1896.

**U. S. Production.**—Production of Asphalt in the United States. Statistics compiled from the sixteenth annual report of the U. S. Geol. Surv. 800 w. Pav & Mun Engng—March, 1896.

**Viscosity.**—The Relative Viscosity of Asphalts and Allied Bodies. A. W. Dow. From the report of the operations of the Engineering Department of the District of Columbia for the year 1898. Describes methods of testing. 2400 w. Munic Engng—March, 1899.

**Water Action.**—The Action of Water on Asphalt. Brief review of the investigations made by G. C. Whipple and D. D. Jackson on the influence of water of various kinds on asphaltum. 700 w. Eng Rec—March 17, 1900.

The Action of Water on Asphalts. George C. Whipple and Daniel D. Jackson. Read before the Brooklyn Engineers' Club. An account of investigations undertaken to determine the relative action of water upon some of the most important asphalts, with reference to their use for reservoir lining. 4200 w. Eng News—March 22, 1900.

The Action of Water on Asphalt Pavements. Daniel B. Luten. An account of a series of experiments made by the writer, and the conclusions drawn. 2600 w. Eng News—Aug. 16, 1900.

**ASPHALTITES.**

**Utah.**—The Uinta and the Uncompahgre Asphaltites of Utah. Extracts from monograph on these deposits by George Homans Eldridge, in the report of the Geological Survey are given, with remarks. 2500 w. Eng & Min Jour—July 3, 1897.
27, 1895.

**ASPHALT PAVEMENT.**

See also **ASPHALT; PAVEMENT; STREET—Grades and Cross Sections.**

Asphalt and Asphalt Pavements. George W. Tillson. Describes asphalt from various localities, and its use for pavements, with the questions related. 8800 w. Pro Am Soc of Civ Engs—April, 1897.

Asphalt and Asphalt Pavements. George W. Tillson. Slightly abbreviated from a paper read before the Am. Soc. of Civ. Engs., May 5, 1897. Discusses asphalt in the forms used for pavements, and the various questions related to its use. 8500 w. Eng News—Sept. 2, 1897.

The Construction of Asphalt Pavements. Paper by G. W. Tillson, before Am. Soc. of Munic. Imp., on the foundation, binder, wearing surface, asphaltic cement, sand, and method of laying. 2500 w. Eng Rec—Sept. 1, 1900.

**Chicago Contract.**—The Ethics of Certain Chicago Paving Contracts. Reviews a decision of the Supreme Court of Illinois concerning a contract between an asphalt company and lobbyists employed to promote its interests. 2300 w. Eng Rec—Dec. 17, 1898.

**Cincinnati, O.**—Maintenance of Asphalt Streets in Cincinnati, O. Describes particularly the methods of repairing street openings and keeping pavements in repair along tracks. 1000 w. Eng Rec—Dec. 2, 1899.

**Failures.**—Failures in Asphalt Pavements. A paper by A. W. Dow on the different influences which will cause the premature destruction of such pavements, and the remedies. 4000 w. Eng Rec—Jan. 6, 1900.

**Guaranties.**—Asphalt Paving Guaranties. Review of decision of New Jersey Court of Appeals upholding contracts for asphalt paving with a 5-year guaranty clause. 600 w. Eng Rec—July 23, 1898.

**Machinery.**—A New Development in Machinery for Asphalt Paving. Illustrated description of a portable plant for practical work, invented by Frederick A. Hetherington, of Indianapolis, Ind. 1400 w. Sci Am—Oct. 2, 1897.

**Manufacture.**—The Manufacture of Asphalt Pavements. A statement of the method of producing hard or soft pavements by changes in the process of manufacture. 1100 w. Eng Rec—Nov. 19, 1898.

**Municipal Maintenance.**—Municipal Maintenance of Asphalt Pavements. Edward P. North. Gives the specifications for maintenance in New York City, and discusses the difficulties. 1100 w. Eng Rec—Sept. 4, 1897.

**Portable Plant.**—A Portable Asphalt Paving Plant of Large Capacity. Illustrated description of a plant carried on two railway flat cars, containing all the machinery of an asphalt plant. 700 w. Eng News—Nov. 23, 1899.

Railway Asphalt Plant. An illustrated description of a portable plant for the preparation of asphalt used in paving, so that this industry may be extended to small cities and towns. 1800 w. Ry & Engng Rev—Sept. 2, 1899.

**Repairs.**—Minor Repairs to Asphalt Pavements. F. E. Puffer. The object of the article is to show how minor repairs to asphalt pavements may be made in an economical and substantial manner without the use of a large asphalt plant. 500 w. Munic Engng—Aug., 1898.

Repairs of Asphalt Pavements. E. B. Guthrie. Classification and general discussion of asphalt pavement repairs. 2200 w. Munic Engng—Nov., 1896.

Repairs to Asphalt Pavements. A decision of the U. S. Circuit Court of Appeals concerning various methods of repairing asphalt pavements involving the heating of the old surface and the substitution of fresh material for old. 1800 w. Eng Rec—Aug. 19, 1899.

**Repair Specifications.**—Specifications for Repair of Asphalt Pavements. Gives the specifications for repair during the year 1896 of asphalt pavements in Buffalo. 1200 w. Munic Engng—Dec., 1896.

**Tests.**—Asphalt Paving Tests. F. E. Puffer. Explains simple tests that may be undertaken by city engineers. 1000 w. Munic Engng—May, 1900.

**Utah and Kentucky.**—Utah and Kentucky Asphalt Pavements. Information condensed from a number of sources. 1800 w. Eng Rec—Sept. 4, 1898.

**Washington.**—Recent Municipal Work in Washington. Describes mainly the asphalt paving work. 2200 w. Eng Rec—Feb. 11, 1899.

See also **PAVEMENT.**

**ASSAYING.**

See also **ANALYSIS; MINTING; SAMPLING.**

Anyone Can Assay. Alex. Roy. Describes an easy method of making a test for gold. 900 w. Can Eng—May, 1897.

Laboratory Testing of Ores for Concentration and Amalgamation. H. Van F. Furman. Information relating to how laboratory tests should be made, and the importance of making them before a mill-run is made. 2000 w. Min Ind & Rev—Jan. 13, 1898.

Losses in the Determination of Gold and Silver in Copper Bullion. Their Causes, and a Method for Overcoming Them. W. Randolph Van Liew. Serial. Eng & Min Jour—April 21, 1900.

Remarks on Assays and Samples. W. F. Robertson. Suggestions for securing accuracy in sampling and assaying. 1700 w. B C Min Rec—Aug., 1900.

Scorification and Cupellation Without Muffle. —A New Furnace and Method for Gold and Silver Assays. George A. Koenig. Describes a new departure in assaying, the furnace used, and the process. Ill. 5800 w. Trans Am Inst of Min Engs—June, 1898.

The Assay Practice of the West Compared with That of the School of Mines. Charles Fulton.

An account of methods used in both places. 1200 w. School of Mines Quar—July, 1900.

The Position of the Assay Department in Mining Economics. Franklin White. The necessity for correct assays and the work of the competent assayer. 1600 w. Jour of Chem & Met Soc of S Africa—June, 1898.

**Amalgamation and Blowpipe.**—The Assay by Prospects of Auriferous Ores and Gravels by Means of Amalgamation and the Blowpipe. William Hamilton Merritt. The method of field testing of gold ores, as practiced in the Kingston School of Mining, is described, pointing out some points in which it differs from that presented in a recent paper by R. W. Leonard. 1500 w. Trans Am Inst of Min Eng—April, 1896.

Assay of Auriferous Ores and Gravels by Amalgamation and the Blowpipe. R. W. Leonard. The method consists in amalgamating with mercury, then cupelling with lead and measuring the bead with Plattner's scale. Results are compared with parallel tests with the stamp mill and fire assay. 1200 w. Trans Am Inst of Min Eng—Nov., 1895.

**Balance.**—An Auxiliary Assay Balance. Robert Law. Read before the Chemical Society. Description of a new form of balance, which has been designed to meet a want felt by the writer when weighing the cornets obtained when pursuing the ordinary routine of gold bullion assay. 1200 w. Ind & Ir—Sept. 25, 1896.

**By-Products.**—The Assay of By-Products. H. F. Lofts. Discusses the question of pot assays and scorification assays with the view of drawing out a discussion of the best general method. 1800 w. Jour of Chem & Met Soc of S Africa—Dec., 1898.

**Coinage.**—"The Trial of the Pyx," or the Proceedings of the Assay Commission for Testing the Weight and Fineness of the U. S. Coinage. A history of the ancient custom and a description of the methods of sampling and assaying which are now practiced in the United States. Ill. 3300 w. Mines and Min—April, 1899.

**Copper.**—Assays of Copper and Copper Matte. Discussion of the results presented at the Florida meeting, 1895. 3300 w. Trans Am Inst of Min Engs—Feb., 1896.

See also **COPPER ASSAYING.**

**Copper Iodide.**—The Copper Assay by the Iodide Method. Albert H. Low. The method is described and the writer states that for most accurate technical work he prefers it to all other methods. 1600 w. Jour Am Chem Soc—May, 1896.

**Copper—Gold—Silver.**—The Assay of Copper Materials for Gold and Silver. L. D. Godshall. Brief review of two methods used and description of a method recommended by the writer. 900 w. Trans Am Inst of Min Engs—Feb., 1900.

**Cyanide Bars.**—Liquation in Cyanide Bars. Dr. Stockhauser. Abstract of paper read at meeting of Chemical and Metallurgical Society of South Africa. Discussing the fact that alloys of gold and silver with base metals do not solidify homogeneously, and that therefore errors may be made in assaying and sampling. Also discussion. 1500 w. Aust Min Stand—June 17, 1897.

**Electrolytic.**—See **COPPER ASSAYING.**

**Estimation.**—The Estimation of Gold in Ore, and Data on Dry-Crushing Experiments. Franklin White. Read before the Chemical and Metallurgical Society of South Africa. Tables showing the possibility of assaying ore before crushing with sufficient accuracy to afford very useful information. One set of calculations refers to wet milling, one to a dry-crushing test. 1700 w. Jour Chem & Met Soc of S Africa—Oct. 16, 1897.

**Fire.**—Remarks on Fire Assaying of Gold-Bearing Materials. William Bettel. Discusses the losses of gold, collection of finely divided gold, and other points which affect the accuracy of results. 4500 w. Jour of Chem & Met Soc of S Africa—Nov., 1898.

**Gold and Silver.**—Assaying of Gold and Silver. Jacob B. Eckfeldt. Part first describes the assaying of gold, as conducted at the U. S. Mint in Philadelphia. Serial. Min & Sci Pr—July 3, 1897.

Gold and Silver Assaying at Guanajuato, Mexico. W. N. Cummings. Description of a crucible used, which commends itself for the large number of fusions that can be made at once, the celerity and fuel economy. Ill. 500. w. Eng & Min Jour—Aug. 28, 1897.

The Assaying of Gold and Silver Ores. William B. Gamble. Describes all the preparatory operations, the system of assay weights, the assay, and the care needed in the operations. 2200 w. Sci Am—June 2, 1900.

**Gold Bullion.**—The Assaying of Gold Bullion. C. Whitehead and T. Ulke. Gives the method used by the United States mints and assay offices in assaying "unparted bars." 1600 w. Eng & Min Jour—Feb. 12, 1898.

**Ground-Graphite Crucibles.**—Notes on Assaying Ground-Graphite Crucibles. Andrew F. Crosse. Describes a method found to give satisfactory results in making assays on this class of material. Short paper with discussion, including interesting notes by the president, Charles Butters, on the gold that is found in the by-products. 5700 w. Chem & Met Soc of S Africa—Sept. 18, 1897.

**Iodometric Determination.**—The Iodometric Determination of Gold. F. A. Gooch and Frederick H. Morley. Gives results of experiments. 1400 w. Am Jour of Sci—Oct., 1899.

**Muffle.**—An Improved Assay-Muffle. Arthur S. Dwight. Calls attention to an improvement on the method of temperature-regulation, which has been in use in the assay department of the Colorado Smelting Co., at Pueblo, and was devised by Howard F. Wierum, with the co-operation of F. L. Capers. 1000 w. Trans Am Inst of Min Engs—May, 1897.

**Nickel and Cobalt.**—Nickel and Cobalt Assaying. M. E. D. Merry. Describes a speedy and accurate method in use for about fifty years, and never before published. 1500 w. B C Min Rec—April, 1900.

**Practical.**—Practical Assaying at Mines and Works. H. Van F. Furman. Showing the methods of securing rapidity and accuracy in metallurgical works. 3000 w. Eng Mag—March, 1896.

**Sampling.**—See **SAMPLING.**

**Scorification.**—The Scorification Assay. John Daniell. Notes from the writer's experience in the estimation of gold and silver by this process. 1300 w. Jour of Chem & Met Soc of S Africa—March, 1898.

**Silver.**—Notes on the Assay of Rich Silver Ores. Edmund H. Miller and Charles H. Fulton. The object of this work is to locate the loss of silver in the different operations, essential to the assay of a rich silver ore, by determining the amounts which can be recovered from the slags and cupels. Also to determine the best method of assaying two particular ores. 2700 w. Sch of Mines Quar—Jan., 1896.

**Silver Bullion.**—The Assaying of Silver Bullion. C. Whitehead and T. Ulke. An explanation of methods used. 3300 w. Eng & Min Jour—Feb. 26, 1898.

**Silver-Sulphides.**—The Assay of Silver-Sulphides. Discussion of the paper of Mr. Furman bringing out the fact that iron nails are not only unnecessary, but may occasion loss in assays of rich sulphide. 700 w. Trans Am Inst of Min Engs—Feb., 1896.

**Telluride Ores.**—Assaying Telluride Ores for Gold. Richard W. Lodge. Describes experiments with scorification and crucible methods, illustrating points of interest to assayers. 900 w. Tech Quar—June, 1899.

The Assay of Telluride Ores. Charles H. Fulton. Describes work undertaken to determine where the difficulty and losses lie, and if possible to remedy these defects of the assay by proper methods and precautions, giving conclusions. 1800 w. Sch of Mines Quar—July, 1898.

### ASYLUM.

See also **HOSPITAL.**

**West Bangour, Wales.**—West Bangour New Lunatic Asylum. Describes a new asylum designed by Hyppolyte J. Blanc, the result of much study and travel, with the aim of making the building as perfect as possible. 1500 w. Arch, Lond—Aug. 12, 1898.

### ATLAS BRONZE.

**Propellers.**—Atlas Bronze. A description of this high tension bronze and of tests of propellers made of it, and a list of vessels whose screws are made of this alloy. 1200 w. Engr, Lond—July 24, 1896.

### AUER LIGHT.

See **INCANDESCENT GAS LIGHTING.**

**AUDITORIUM.**

**Philadelphia.**—See **HALL.**

**AUTOMATA.**

Some Remarkable Automata. W. F. Durfee. Remarks with description of three ingenious exhibits, as given in the Descriptive Inventory of James Cox, of London. 1100 w. Am Mach—Sept. 9, 1897.

**AUTOMOBILE.**

See also **ELECTRIC VEHICLE; GASOLINE VEHICLE; MECHANICAL ENGINEERING**—Great Britain, 1897; **MOTOR CYCLE; STEAM VEHICLE.**

A Study of Automobile Vehicles (Etudes sur les Automobile Vehicles). P. Crépy. Begins with a review of the various types, discussing recent performances. Serial. Part I. 2000 w. La Rev Tech—August 25, 1897.

Automobiles for the Average Man. Cleveland Moffett. Facts about horseless carriages, with their advantages and their disadvantages. Ill. 3800 w. Rev of Revs—June, 1900.

Automobiles Up-to-Date. From "The Blacksmith and Wheelwright." Discusses the degree of success attained by the motor vehicle of to-day, claiming there is not yet a perfectly successful or reliable automobile. 4000 w. Am Mfr & Ir Wld—March 22, 1900.

Automobile Vehicles (Automobile). L. Czischek. A general review of the subject, with many illustrations and tabulated details of performances. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—April 29, May 6, 1898.

Horseless Carriages. George N. Crouse. Brief review of progress in France, England and the United States. 1800 w. Yale Sci M—Oct., 1899.

Horseless Road Locomotion. A. R. Sennett. Read before the British Assn. Illustrated description of vehicles and what has been done in this field. 10500 w. Ind & Ir—Nov. 13, 1896.

Mechanical Propulsion and Traction. G. Forestier. Part first considers animal traction, and the reasons for substituting mechanical, and the progress made. Ill. 4800 w. Auto Mag—Dec., 1899.

Mechanical Road Carriages. W. Worby Beaumont. A course of Cantor lectures on this subject. Ill. Serial. Jour Soc of Arts—Dec. 27, 1895.

Mechanical Traction (La Traction Méchanique). A. Barbet. The introductory article of a series, treating in a general way of the use of common roads for motor vehicles and to be followed by a discussion of the various improvements in mechanical traction. 5000 w. Rev de Mécan—Nov., 1897.

Modern Locomotion. David Solomons. Excerpt from a paper before the Anglo-French Assn. Concerning motor cars, the power, steering mechanism, and other points. 3000 w. Auto Jour—June, 1900.

Motor Road Vehicles. Joseph Sachs. Brief review of efforts to solve this problem, and a presentation of general features needing consideration. Ill. Serial. Jour Fr Inst—Sept., 1897.

Motor Vehicles. Alex. Craig. Excerpt from a paper read before the Cycle Engs. Inst., Coventry, Eng. Considers motive power, transmission gear, etc. 3200 w. Auto—Jan., 1900.

New Motor Vehicles. Brief illustrated descriptions of the Humber motor vehicles, the "Star" motor car, and the "Swiss Mountaineer" car. 1000 w. Ind & Ir—Dec. 8, 1899.

Present Time Motor Cars. Illustrated description of various makes. 4000 w. Ind & Ir—Nov. 13, 1896.

Recent Developments in Mechanical Road Carriages. W. Worby Beaumont. A full paper, reviewing the causes that have retarded the progress of invention, the different races and trials of motor carriages, the construction of the vehicles, with illustrations and subjects related. 11500 w. Jour Soc of Arts—Nov. 27, 1896.

Road Locomotion. H. S. Hele-Shaw, with appendices by experts. Discusses the general principles of the engineering features of the question; the behavior of the wheel upon the road, steering and turning, motive power and transmission, etc. Ill. 17500 w. Inst Mech Engs—1900.

Road Wagons and Motors. Hugh Dolnar. A concise statement of the standing of the motocycle motor. Ill. 2500 w. Am Mach—June 8, 1899.

Self-Propelled Vehicles. Sir David Salomons. Abstract of the inaugural address to the Liverpool branch of the Self-Propelled Traffic Assn. General discussion of legal, technical and practical aspects of the subject. Serial. 1st part. 4300 w. Ind & Ir—Oct. 30, 1896.

Self-Propelling Vehicles. A. R. Sennett. Interesting review of prophecies and progress. 8000 w. Ind & Ir—Nov. 13, 1896.

The Autocar of To-day in Europe and America. Henry Sturmey. Read before the Automobile Club of Great Britain and Ireland. Reviews the advances made, the types used, the progress in different countries, etc. 3000 w. Auto Jour—April, 1900.

The Automobile. R. H. Thurston. A discussion of the types of motor, finding use at present, the cost of operation, rated powers, etc., and statement of points proved in its construction and use. 13800 w. Sib Jour Engng—June, 1900.

The Automobile in Traction. Robert H. Thurston. Reviews the past history and present progress, considering the outlook most promising. Ill. 3500 w. Auto Mag—Jan., 1900.

The Automobile Movement—Styles of Vehicles Required—Separate Tractors. M. C. Krarup. Discusses the difficulties to be overcome, and the conditions in Europe and the United States. 2300 w. Am Mach—Jan. 25, 1900.

The Horseless Carriage of the Future. Editorial. Problems connected with horseless carriages and their present status. 1200 w. Engr, Lond—Sept. 18, 1896.

The Motor, or Horseless Carriage. James Long. The first part deals with existing obstacles to the use of the horseless carriage in the United Kingdom. The series will present descriptions of the best types of motor carriages. Serial. Ind & Ir—Sept. 18, 1896.

The Motor Carriage. Illustrated description of motor carriages of the past and present, with an account of the work of W. J. Still, and of a service to be opened between the City of Toronto and Richmond Hill. 3000 w. Can Eng—April, 1898.

The Motor Carriage Industry. A review of the growth of this industry in various countries with an account of its present standing. Ill. 2000 w. Can Eng—Oct., 1898.

The Possibilities of Mechanically Propelled Vehicles for Common Roads. Editorial. The subject is discussed in relation to the questions: (1) To what sphere of usefulness are such vehicles best adapted? (2) In what direction had we best work in design and construction to fulfill the conditions of desirable, efficient and safe modes of conveyance? It is thought the motor carriage will be of greatest use when applied to mercantile purposes, for delivery, etc., of goods in cities, for which purpose long distance capacity and high speed are not needed. 3200 w. Eng News—March 5, 1896.

The Present Status of the Horseless Carriage Industry. W. Worby Beaumont. A descriptive article, comparing the various automobiles and their achievements, and showing that, while the motor vehicle is not yet perfect, it has reached the practical stage. Ill. 5000 w. Eng Mag—Sept., 1897.

Trend of Progress of the Automobile. R. H. Thurston. Part first considers the design, running gear, type of motor, etc. Serial. Auto Mag—June, 1900.

**Accumulator.**—See **ACCUMULATOR—Automobile; ELECTRIC VEHICLE—Accumulator.**

**Acetylene.**—Acetylene and Its Adaptability as a Motive Power for Vehicles. E. C. Oliver. Reviews the history of acetylene, its manufacture, properties, etc., and discusses its use in motors. 2400 w. Horseless Age—June 20, 1900.

Acetylene in Explosion Engines. Discusses the advantages and disadvantages of this gas in reference to its use for the propulsion of motor vehicles. 2100 w. Auto Jour—Sept., 1900.

Acetylene Motor Wagons and Carriages. Illustrates a victoria and the running gear of a standard truck for delivery wagons, operated by acetylene gas. 800 w. Sci Am—Nov. 11, 1899.

Some Properties of Acetylene. Herbert L. Towle. Considers generators, reports tests, etc. 2700 w. Horseless Age—June 20, 1900.

The Accumulators of Acetylene. From "Echo des Mines." Methods of storage and transport are considered. 800 w. Horseless Age—June 20, 1900.

Will Acetylene Be the Coming Power for Motor Vehicles? D. N. Long. Presents the advantages for power purposes thus far demonstrated. 1800 w. Horseless Age—June 20, 1900.

**Acetylene and Alcohol.**—Acetylene and Alcohol Versus Gasoline as Fuels. Isaiah L. Roberts. A comparison of the value of petroleum, acetylene and alcohol as fuels for use in the propulsion of self-moving vehicles by explosion in the cylinders of their engines, and use as a fuel to generate steam. 2000 w. Horseless Age—June 20, 1900.

On Some French Experiments on Acetylene and Alcohol as Motor Fuels. P. M. Heldt. Discusses the cost and calorific power. 2000 w. Horseless Age—June 20, 1900.

**Acetylene and Gasoline.**—Acetylene and Gasoline. L. Berger. A comparison. 600 w. Horseless Age—June 20, 1900.

**Air Resistance.**—Air Resistance to Moto Cars. H. E. Wimperis. Comments on the little known of this subject, and suggests methods of making experiments. 1500 w. Auto Jour—Feb., 1899.

**American Association.**—A National Automobile Association. An editorial calling attention to features of the situation which make the organization of such a body desirable. 1000 w. Elec Rev, N. Y.—July 19, 1899.

A National Automobile Association. Editorial suggesting the organization of such an association. 400 w. Elec Rev, N. Y.—July 12, 1899.

**Austrian Army.**—See **Military.**

**Balancing Motors.**—Balancing of Motors. H. E. Wimperis. Considers points most important in connection with balancing motors and reducing vibration. Serial. Auto Jour—Oct., 1899.

**Cabs, Paris.**—The Automobile Vehicles of the Northern Railway of France (Les Voitures Automobiles du Chemin-de-Fer du Nord). An account of the steam and electric cabs operated in connection with the Paris terminal of the Northern Railway of France. 2500 w. Moniteur Industrielle—May 28, 1898.

**Combination.**—The Pieper Combination Carriage. Illustrated description of a vehicle fitted with both a gasoline motor and a storage battery electric motor. 500 w. Horseless Age—March 7, 1900.

Two Novel Automobiles. Frank H. Mason. Describes two vehicles exhibited recently in Berlin, the Pieper double motor carriage and the "Electra." 1200 w. Am Mfr & Ir Wld—Nov. 2, 1899.

**Combination Systems.**—Combination Systems. P. M. Heldt. Description, with two illustrations, of these systems, with remarks on their advantages and disadvantages. 1700 w. Horseless Age—May 9, 1900.

**Commercial Operation.**—The Motor Vehicle in Commercial Operation. G. Herbert Condict. Considers the electric motor the form of power presenting the least objectionable features, discusses the station, wheels, etc. 1800 w. Elec, N. Y.—March 1, 1899.

**Comparative Systems.**—A Lecture on Automobiles. Hiram Percy Maxim. Abstract of an address at the Knickerbocker Athletic Club of N. Y. Interesting comparisons of electric, gasoline and steam vehicles. 1300 w. Elec Rev, N. Y.—March 28, 1900.

Compressed Air versus Steam for Motor Vehicles. Henry F. Bryant. Gives results of investigations which generally favor steam as a motive power. 3200 w. Horseless Age—Jan 31, 1900.

Motor Traffic. Technical Considerations. Sir David Salomons. The subject of self-propelled traffic is discussed and the writer thinks benzine motors probably have the advantage. Steam promises to be the power when real work is called for and electric energy has a great field in towns as a luxury. Also discussions. 15400 w. Jour Soc of Arts—May 14, 1897.

**Competition.**—See **AUTOMOBILE COMPETITION.**

**Compressed Air.**—A Compressed Air Automobile (Une Automobile à Air Comprimé). Daniel Bellet. A description of the Molas, Lamielle and Tessier vehicle, with details of the compressed air motor and differential gearing. 3000 w. Rev Tech—Feb. 10, 1900.

**Construction.**—Automobile Construction and Constructors. Thomas Clarkson. Discusses some of the difficulties met, the choice of motive power, wheel construction, etc. 2200 w. Horseless Age—Oct. 17, 1900.

Recent Progress in Automobile Construction. W. Worby Beaumont. A review of the progress in details of motor vehicle construction during the past two years, showing the lines of advance in the removal of the mechanical imperfections revealed by experience. 3000 w. Eng Mag—Jan., 1900.

The Final Automobile. Hugh Dolnar. The first of a series of six papers dealing with the primal mechanical requirements of automobiles. This paper considers permanent bearings. Ill. 4000 w. Auto Mag—Oct., 1900.

**Design.**—Design of Automobiles. M. C. Krarup. Discusses the construction and the requirements of the public under the present road and street conditions, offering suggestions. 3500 w. Am Mach—Jan. 4, 1900.

Some New Features in Motor-Vehicle Design. Thomas H. Parker. Read before the Liverpool Self-Propelled Traffic Assn. Describes the work of the writer in this field and the success attained. 2800 w. Ind & Ir—March 3, 1899.

**Detachable Motor.**—A Missing Link Vehicle. Illustrates a detachable motor that may be substituted for the front wheels of any vehicle and so convert it into an automobile. 1600 w. Auto Mag—Oct., 1899.

**Driving Wheels.**—Stresses in Driving Wheels. H. E. Wimperis. Wooden wheels are mainly considered. 1000 w. Auto—May 15, 1899.

The Design of Driving Wheels. A discussion of needed improvements in design to satisfy the requirements of safety and comfort. Suggested by the Harrow accident. 1200 w. Auto Jour—March, 1899.

**Dust Van.**—Motor Dust Vans. T. W. E. Higgens' report to the vestry of the parish of Chelsea, on the purchase of motor dust vans. 3000 w. Elec Eng, Lond—March 18, 1898.

**1896-7.**—Self-Propelled Road Vehicles, 1896-7. W. Worby Beaumont. A paper read before the Liverpool Section of the Self-Propelled Traffic Assn. Reviews what has been accomplished in this field during the last year, especially in regard to heavy traffic, giving a list of British vehicles that have been brought out, with comments. 3500 w. Ind & Ir—Dec. 3, 1897.

**1898.**—The Year's Progress in Motor Road Locomotion. A lenghty review of the progress in different countries, of all classes of vehicles, and of the factories and industries connected with their manufacture. Many illustrations. 37000 w. Ind & Ir—Nov. 25, 1898.

**Electric.**—See **ELECTRIC VEHICLE.**

**Electric Tramways Compared.**—Electric Traction. Rankin Kennedy. Considers the probability of the motor car eventually driving out electric traction. 1100 w. Elec Rev, Lond—July 13, 1900.

**England.**—Views on Automobilism. Sir David Salomons. Discusses the use of motor cars in England, the things that retard the progress, the pleasure to be derived, speed, etc. 2000 w. Auto Jour—Nov. 15, 1898.

**England, 1896.**—The Motor Car in England in 1896. Considers the characteristic features of the motor car of 1896, as shown in England. Considers it very far from possible perfection. 2000 w. Engr, Lond—Dec. 4, 1896.

**English Company.**—The Automobile Association (Limited). Illustrates and describes the more important vehicles in the collection of this company in England. They propose to supply all makes of moto-vehicles, including the best English and French types. 3800 w. Auto Jour—Sept., 1898.

**Europe.**—Automobilism in Europe. C. L. Durand. The principal automobile events in Europe during the Paris Exposition. 1500 w. Elec Rev, N. Y.—March 28, 1900.

**Europe, 1897.**—Twelve Months' Continental Progress in Motor Road Vehicles. Brief review of progress giving the first place to France and merely mentioning work in Germany, Belgium and Italy. 1200 w. Ind & Ir—Dec. 3, 1897.

**Evolution.**—The Evolution of the Motor Car. E. Shrapnell Smith. Excerpt from a paper read before the Univ. College Students' Engng. Soc. Thinks the problems most pressing are to combine strength, lightness and efficiency and to de-cure sufficient adhesion on greasy surfaces. 1100 w. Auto Jour—Feb., 1899.

**Exhibition.**—See AUTOMOBILE EXHIBITION.

**Fire Engine.**—A New Automobile Fire Engine. From "La Nature." Illustrates and describes a fire engine found to operate most successfully. 500 w. Sci Am Sup—Aug. 5, 1899.

The Horseless Fire Engine. Captain Cordier. Illustrates and describes various machines in use or being constructed with experimental information. 2800 w. Auto Mag—Dec., 1899.

**Fore-Carriage.**—The Practical Automobile of the Future. E. E. Schwarzkopf. In praise of the fore-carriage and its economy. Ill. 1100 w. Auto Mag—April, 1900.

**France.**—One Year's Progress of Automobilism. Félicien Michotte. A review of the advances made during the year in France. Ill. 1800 w. Auto Mag—Feb., 1900.

The French Automobile Industry in 1897. Lucien Périsse. Except from a paper contributed to the French Soc. of Civ. Engs. Classification of vehicles, the advantages and inconveniences, and improvements desirable. 2200 w. Auto Jour—Dec., 1898.

**Freight Wagons.**—Automotor Freight Wagons and Freight Rates in England. Stating the desire for self-propelled freight road wagons in Great Britain, and the success thus far attained. Invites American competition. 2000 w. U. S. Cons Repts, No. 338—Jan. 31, 1898.

**French Club.**—The Automobile Club of France. Baudry de Saunier. Illustrations of the Club House and history of the society. 2000 w. Auto Mag—Oct., 1899.

The Automobile Club of France. Francis P. Mann. Gives the history of the club and the work carried out. 2700 w. Elec Rev, N. Y.—Sept. 13, 1899.

The Automobile Club of France. Francis P. Mann. History of the organisation. 2500 w. Sci Am Sup—Sept. 30, 1899.

**French Law.**—The French Law Relating to Automobilism. A free translation of the new law lately passed by the States Council. 2200 w. Auto Jour—Oct. 15, 1896.

The Law Relating to Motor Vehicles in France. Rules for traffic on the public roads with editorial. 3000 w. Auto Jour—April, 1899.

**French Regulations.**—Automobile Regulations in France. A review of the new French regulations governing the use and sale of self-propelled vehicles of every type. 2100 w. Eng Rec—Aug. 12, 1899.

**Front-Driven.**—Front-Driven Motor Carriages. Illustrates and describes various vehicles utilising this idea. 2800 w. Auto Jour—Aug., 1900.

**Future Prospects.**—The Modern Moto-Vehicle and Its Future. Excerpt from a lecture delivered at Liverpool, by Prof. Hele-Shaw. Inquires into the causes of failures of making moto-vehicles a success sixty or more years ago, when they were quite largely used, and discusses their future prospects. 1400 w. Auto Jour—Nov. 15, 1898.

**Gasoline.**—See GASOLINE VEHICLE.

**Gearing.**—Gearing for Automotors. Rhys Jenkins. Some of the most interesting schemes for transmitting the motion of the motor to the driving wheels are briefly noticed. 900 w. Auto Jour—June, 1898.

**Gearing, Differential.**—The De Dion and Bouton Differential Gear. Reviews what is known of this invention and gives illustrated description of the gear named which is claimed to be the best form of differential yet devised. 1000 w. Auto Jour—April, 1899.

**Gearing Variable Speed.**—See also CONE WHEEL —Automobile Gear.

**Germany.**—Revolution in Traffic. Adolph Schulze. Translated from "Ueber Land und Meer." On the progress of automobile carriages in Germany. 2200 w. Chau—Jan., 1899.

**Great Britain, 1897.**—A Year's Progress in Motor Road Vehicles in Great Britain. A general survey of the results with description of some of the more noticeable productions, and systems introduced. Ill. 7000 w. Ind & Ir—Dec. 3, 1897.

**Gurney Coach, 1829.**—The First Motor Ride. John Grand Carteret. An account of a ride in a motor carriage in 1829. Ill. 1500 w. Auto Mag—Nov., 1899.

**Heavy.**—A Study of Mechanical Traction on Roads (Etude d'une Voiture à Traction Mécanique sur Routes). G. Forestier. A discussion of the conditions of heavy haulage on roads and in city streets, with reference to the design of motor trucks for such service. Serial. Génie Civil—May 27, 1899.

Heavy Motor Vehicles for Road Service. Fred M. Maynard. Gives valuable data of cost, compared with railway, canal, and horse haulage, and discusses the essential principles of design of heavy wagons. Serial. 1st part. 3600 w. Eng Mag—Aug., 1900.

Heavy Motor Vehicles for Road Service. F. M. Maynard. Mr. Maynard's second paper gives interesting details of design, construction and performance of leading British types of vehicles, with many illustrations of successful machines. 3000 w. Eng Mag—Sept., 1900.

Heavy Motor Wagons for Liverpool Traffic. Arthur Musker. Read before the Liverpool Engng. Soc. Describes the experience of makers in an effort to make a motor wagon having a tare of 3 tons, to carry loads varying from 5 to 10 tons. 3000 w. Auto—Jan., 1900.

Some Points in the Design of Automobile Vehicles Intended for Heavy Traffic. George Herbert Little. Abstract of a paper read before the Self-Propelled Traffic Assn., of Liverpool. Part first considers the means of effecting cheap internal transport by means of automobile vehicles, existing practice in handling heavy loads, the features of the most recent examples of automobile vehicles, etc. Serial. Ind & Ir—Jan. 28, 1898.

The Automobile Wagon for Heavy Duty. Arthur Herschmann. States the conditions which make these vehicles most desirable, considering the construction, propulsion, etc. Ill. 6500 w. Trans Am Soc of Mech Engs, No. 853—May, 1900.

**History.**—Old-Time Motor Cars. Illustrated description. 1700 w. Ind & Ir—Nov. 13, 1896.

Progress Toward the Age of Horseless Carriage. T. A. De Weese. Illustrated historical sketch of progress in this field. 3400 w. Cos—Feb., 1896.

Some Early Forms of the Automobile. Illustrated historical account of early mechanical road carriages, dating back to 1763. 1300 w. Sci Am—May 13, 1899.

The Evolution and Present Status of the Automobile. William Baxter, Jr. Historical review dating back to the middle of the sixteenth century, and illustrating many early vehicles. 8000 w. Pop Sci M—Aug., 1900.

The Genesis of the Automobile. John Grand Carteret. Review of progress since the 17th century, giving illustrations. 2000 w. Auto Mag—Oct., 1899.

The Genesis of the Automobile. A. Neuberger. Brief historical review showing the idea of mechanically propelled vehicles dates back to the time of the Pharaohs. 1300 w. Auto Mag—Oct., 1900.

**Horse Haulage Compared.**—Motor vs. Horse Haulage. An Account of Our Nine Months' Experience. S. H. Sparkes. Read before the Liverpool Self-Propelled Traffic Assn. Gives particulars of the service of a motor-van used by Messrs. Fox Brothers & Co., owners of large woolen mills in England. Serial. Ind & Ir—Jan. 20, 1899.

**Horse-Powers.**—The Truth About Motor Horse-Powers. Georgia Knap. An explanation of the horse-power of automobile motors, based upon brake tests made and repeated. 3300 w. Auto Mag—Jan., 1900.

**Ideal.**—The Ideal Automobile. William Howard Paine. Considers the advantages and disadvantages of several types of carriages now in use, favoring the steam vehicles. 1700 w. Mod Mach —March, 1900.

**Imperfections.**—Automobile Imperfections. W. H. Booth. Compares the automobile with the horse, and shows the need of wheel guards when the horse is no longer used. 1200 w. Am Mach—July 26, 1900.

**Improvements.**—The Future of the Automobile—Suggested Improvements. A discussion of the use of excessive powers, means of rendering the motor more elastic, etc. 2700 w. Sci Am Sup —Aug. 25, 1900.

**Italy.**—Automobiles and their Future in Italy (Gli Automobili ed il loro Avvenire in Italia). Guiseppe Spera. A report to the Commissioner of

Public Works, discussing the relation of the automobile to the improvement of highways and the possible competition of automobile traction with railways. 2000 w. Rivista Gen dell Ferrovie—Oct. 29, 1899.

**Koch Oil Motor.**—The Koch Heavy Oil Motor Car. Illustrates this motor, which is considered the most successful of heavy oil motors which has appeared, and calls attention to some features. 1200 w. Engr, Lond—Feb. 3, 1899.

**Light Carriages.**—The Light Road Carriages. Edward de Nôreme. Discusses the class termed by the Frenchmen a "voiturette," illustrating various types and describing the characteristic features. 2500 w. Auto Mag—April, 1900.

**Liquid Air.**—See also **LIQUID AIR—Automobile.**

**Local Transit.**—The Automobile in Local Transit. Sylvester Baxter. Discusses cab service in large cities, and the motor-omnibus service soon to be installed in some American cities. 2500 w. Auto Mag—Feb., 1900.

**Long Run.**—A Remarkable Automobile Trip. An account of the trip of a Winton motor carriage from Cleveland, O., to New York, a distance of 707.4 miles, being accomplished in 47 hours, 29 minutes. 1000 w. Can Engr—June, 1899.

**Machinery.**—Motor-Car Machinery. T. Clarkson. Excerpt of paper read before the Automobile Club, London. Discusses the propelling machinery. 1100 w. Auto Jour—April, 1898.

**Mail Van.**—Automobile Postal Service. Perry S. Heath. Illustrations of vehicles used and review of tests made in various cities of the United States and in Europe. 2100 w. Auto Mag—Feb., 1900.

Post-Office Motor Vans. An account of the trials made in England with self-propelled vehicles for carying mails. 500 w. Engr, Lond—Dec. 24, 1897.

The Performance of the Post-Office Motor Mail Vans. Reviews the trials that have been made with automobiles for Post-Office use and the degree of success attained and makes a few remarks concerning their adoption. 900 w. Auto Jour—April 16, 1898.

**Manufacture.**—The Manufacture of Motor Cars. The harm to the industry from the lack of technical education by many taking up this work. 1700 w. Auto Jour—June, 1900.

**Military.**—A Military Motor Carriage. Illustrates and describes a three-wheeled motor carriage for military use, designed by R. P. Davidson. 450 w. Eng News—Dec. 7, 1899.

Motor Vehicles for the Austrian Army. From "Die Reichswehr," Vienna. On the advantages and disadvantages of these vehicles for army purposes. 1000 w. Auto Jour—Dec., 1898.

The Automobile in Modern Warfare. From "L'Illustration." Illustrates and describes the vehicles used in recent manœvres of the French army. The traction engines gave the most satisfactory results. 1000 w. Sci Am Sup—Oct. 13, 1900.

The Automobile in War. Edwin Emerson, Jr. Illustrates and describes the various automotor guns and gun-carriages, discussing their efficiency and utility. 3800 w. Auto Mag—Nov., 1899.

The Future of Automobilism in the Army (L'Avenir de l'Automobolisme dans l'Armeé). The first article of a serial discussing the influence of improvements in transportation upon military manœvrues. 3500 w. Rev Tech—Jan. 10, 1897.

War and Power Traction. J. H. A. Macdonald. Read before the Automobile Club, London. On the great service that could be rendered by successful construction of transport vehicles. 5500 w. Auto Jour—May 17, 1900.

War Automobiles. From "La Nature." Illustrations and particulars concerning the advantages of traction engines. 700 w. Sci Am Sup—March 10, 1900.

**Military Transport.**—Automotors and Military Transport in Campaigns. M. De Capitaine Bardonnant in "La Revue du Cercle Militaire." Abstract and criticism of an article by Major Mirandoli, published in the "Rivista di Artigliera e Genio." 2000 w. Auto Jour—March 15, 1899.

**Motive Power.**—Automobile Vehicles. Louis Derr. A discussion of the various methods by which vehicles of the present moment are propelled. 5300 w. Jour Assn of Engng Socs—July, 1900.

Automobiles. T. J. Martin. Considers the motive powers in practical use at present, with their comparative costs of operation. Also discussion. 2400 w. Jour Assn of Engng Socs—July, 1900.

Methods of Obtaining Motive Power for Motor Carriages. A free translation of an article by Marcel Depres, from "Génie Civil." Gives statement compiled by M. Barbet on the Mékarsky system, discusses the use of liquified gases, of hot-water under pressure, etc. 2000 w. Automotor—Oct., 1897.

Motor Vehicles and Their Motors (Die Motorwagen und ihre Motoren). A general review of the motors best adapted for automobile service. The first portion is devoted to electric motors. Serial. Zeitschr d Ver Deut Ing—Jan. 6, 1900.

**Motorcycle.**—See **MOTORCYCLE.**

**Motor-Wheel.**—Motor-Wheel for Vehicles. Illustrated description of a wheel that may be attached to vehicles and bears much the relation to them that a locomotive does to a train. 500 w. Sci Am—Jan. 6, 1900.

**Municipal Work.**—Motor Wagons for Municipal Work. F. J. Warden-Stevens. A discussion of the suitability of these vehicles for this work, the kind of power to be adopted, etc. 2000 w. Arch, Lond—Feb. 11, 1898.

Report on Motor Vehicles for Municipal Purposes. T. W. E. Higgens. Report presented to Chelsea Vestry on the various vans inspected. 1600 w. Auto Jour—March, 1900.

**Newport Parade.**—Newport in the Lead. Edwin Emerson, Jr. An illustrated description of the vehicles. 2800 w. Auto Mag—Oct, 1899.

The Automobile Parade at Newport, R. I. Spencer C. Crane. A brief account of this parade with illustrations of the floral decorations. 800 w. Elec Wld & Engr—Sept. 16, 1899.

**Omnibuses.**—Automobile Omnibuses for Service in Cities. Describes types used in European cities, illustrating two of them. 500 w. Sci Am Sup—April 28, 1900.

**Operating Cost.**—The Cost of Working an Automobile. Dr. Calbet, in "La France Automobile." Statement of expenses for the year 1898, with comments. 1000 w. Automotor—May 15, 1899.

**Pavement.**—Motor Carriages and Street Paving. Thomas Conyngton. On the progress and outlook for these vehicles and the effect on the life in cities that would result from their general use. 1700 w. Munic Engng—April, 1899.

**Petroleum.**—See **GASOLINE VEHICLE.**

**Phaetons.**—Phaetons at the Exposition of the Automobile Club. The first of a series of articles discussing the vehicles exhibited at the recent exposition in Paris. 1200 w. Sci Am Sup—Aug. 26, 1899.

**Physician's.**—On the Choice of a Moto-Vehicle. Considers the choice of moto-carriages for the use of medical men. 1200 w. Auto Jour—Dec., 1898.

**Pieper.**—See **Combination.**

**Race.**—See **AUTOMOBILE RACING.**

**Rear Driving.**—Effect of Rear Driving to Roughen the Road for the Automobile. M. C. Krarup. Discusses the effects of rear driving and its drawbacks. 1800 w. Am Mach—March 8, 1900.

**Resistance.**—Resistance of Road Vehicles to Traction. Abstract of a paper read by Prof. Hele-Shaw before the British Assn. On the need of investigation and proposed experiments, with brief report of preliminary experiments. 1700 w. Auto Jour—Sept., 1900.

**Sanitary Advantages.**—Some Sanitary and Allied Advantages Attending the Introduction and Use of Moto-Vehicles. E. Schrapnell Smith. Excerpt from a paper read before the Sanitary Inst. of Birmingham, Eng. The advantages claimed are considered under the divisions of improvement in sanitary conditions, and reduction in public expenditure. 2700 w. Auto Jour—Oct. 15, 1898.

Some Sanitary and Allied Advantages Attending the Introduction and Use of Motor Vehicles. E. Schrapnell Smith. Full paper as read before the Municipal and County Engrs. Deals with improvements in sanitary conditions and reduction of costs. 1200 w. Jour San Inst—April, 1899.

**Stanley Show, London.**—See **BICYCLE EXHIBITION—Stanley Show, London.**

**Steam.**—See **STEAM VEHICLE.**

**Steering.**—A Study of Double-Pivot Steering Devices (Etude sur la Direction à Deux Pivots).

C. Bourlet. A general examination of the various methods of connecting the steering wheels of automobiles, by which the desired varying inclination is obtained. The practice of various builders is given. Two articles. 4500 w. Génie Civil—Sept. 2, 9, 1899.

The Pivot Steering Gear in Practice. P. M. Heldt. Illustrated description. 800 w. Horseless Age—May 2, 1900.

The Steering of Automobiles with Divided Axles (Du Virage des Automobiles à Essieux Brisés). D. Dujon. An analysis of the action of independently adjustable steering wheels, showing the method adopted for the prevention of slippage on short turns. 1200 w. Rev Tech—Aug. 10, 1899.

The Steering of the Motor-Car: An Interesting Study. C. A. Matthey. It is proposed to study the subject in a broad way, pointing out the good and bad points in existing gears and endeavoring to indicate means of securing more satisfactory results. Ill. 2000 w. Ind & Ir—March 18, 1898.

**Still.**—The Autocar Industry. Illustrates a pleasing and novel construction, the invention of W. J. Still, and describes its special features. Also gives late news in reference to the use of compressed air in New York. 2500 w. Can Engr—Feb., 1899.

**Stock Market.**—Motor Vehicles in the Stock Market. Editorial discussing and warning, considering the four kinds of motive power used, and reviewing the standing of the industry. 2000 w. Eng News—Nov. 2, 1899.

**Storage of Energy.**—Storage of Energy in Motor Cars. Abstract of lecture by M. Marcel Depres at the Automobile Club de France, with comments. 1500 w. Engr, Lond—Jan. 15, 1897.

**Street Car.**—The Street Car of the Future. Waldon Fawcett. Considers the automobile in its relation to electric lines in the city and suburbs, in parks and boulevards, etc. Ill. 2000 w. Auto Mag—March, 1900.

**Street Cleaning.**—Some Actual Working Costs of Motors for Street Watering and Dust Removal. E. Schrapnell Smith. Paper before the Association of Cleansing Superintendents of Great Britain, giving the results in some English towns. 2000 w. Autocar—Sept. 8, 1900.

**Street Cleaning Costs.**—Some Actual Working Costs of Motors for Street Watering and Dust Removal. E. Schrapnell Smith. Read before the Assn. of Cleansing Supt. of Great Britain. Excerpts. A report of recent vehicles for the purposes named. 2100 w. Auto Jour—Sept., 1900.

**Sweeper and Sprinkler.**—An Automobile Street Sweeper and Sprinkler. From "La Nature." Gives illustrations and particulars of an apparatus which has given very satisfactory results in Paris. 500 w. Sci Am Sup—Oct. 7, 1899.

**Testing.**—Formulæ for Designing and Testing Automobiles (Formeln zur Berechnung und Prüfung von Automobilen). Dr. Walter Kummer. Theoretical discussion of the determination of the efficiency of self-propelling vehicles. 1000 w. Elektrotech Zeitschr—May 3, 1900.

**Thermodynamics.**—Some Thermodynamics of Vehicle Motors. Hudson Maxim. Data on relative efficiencies of various motor fluids in their application to vehicle propulsion. 7300 w. Horseless Age—April 5, 1899.

**Trial.**—See **AUTOMOBILE COMPETITION.**

**Trolley.**—A Trolley Carriage to Run on Common Roads. Gilbert P. Coleman. Illustrated description of a motor carriage now in operation at Greenwich, Conn., which will probably lead to the establishing of a "trolley stage" line. 1300 w. Eng News—July 20, 1897.

Automobile Trolley for Use on Highways (Trolley Automoteur pour les Transports Automobiles sur Routes). Ch. Dantin. An illustrated description of the Lombard-Gerin system, using an electrically propelled trolley and overhead wires for motor vehicles. 2500 w. Génie Civil—Feb. 10, 1900.

Distribution by Wire for Electric Traction on Roads (Application de la Distribution par Fils à la Traction Electrique sur Routes). N. de Tedesco. The Lombard-Gerin system enables electric vehicles to obtain current from overhead wires, by means of an automatic trolley. 2000 w. Rev Tech—Feb. 25, 1900.

Self-Moving Road Vehicles with Automobile Double Trolleys. E. Hospitalier, in "L'Industrie Electrique." Illustrated description of an automobile trolley, designed by M. Lombard-Gerin. 800 w. Elec Rev, N. Y.—March 7, 1900.

The Caffrey Trolley Road Wagon. W. G. Caffrey. Explains a system of transportation, naming the requisites the writer considers necessary for its success. Ill. 1200 w. Elec Eng, N. Y.—Jan. 20, 1898.

**United States.**—American Self-Propelled Carriages. A very thorough review of the state of the art in America, with illustrations and general description of the principal carriages of this class that have been brought out in the United States. 4400 w. Engr Lond—Jan. 3, 1896.

Motor Vehicles in the United States To-Day. A general survey of this new industry, giving manufacturers and inventors work, with gasoline, electricity and steam. Ill. 23300 w. Horseless Age—Oct., 1898.

Recent Developments in America of Mechanically-Propelled Road Carriages. First part is a general review of progress in the art, with illustrated descriptions of various carriages of the class, and will be followed by more or less detailed descriptions of other examples of this kind of vehicles. Serial. Eng News—Feb. 27, 1896.

Some American Motor Carriages. Illustrated description. 1800 w. Sci Am—Feb. 15, 1896.

The Automobile Vehicle. Fred. J. Newman. A mechanical description of some of the best American vehicles, discussing the features of different types, and some of the engineering problems. 4000 w. Wis Engr—Jan., 1900.

**Weight.**—The Tare Weight of Motor Vehicles.. H. Wilcke. Letter to the editor reviewing the leading points connected with this matter from an English point of view. 2200 w. Engng—Jan. 12, 1900.

The Weight of Motor Wagons. Editorial discussion of the British Light Locomotives Act of 1896. 3000 w. Engng—March 16, 1900.

## AUTOMOBILE ACCIDENT.

**Harrow, Eng.**—The Harrow Moto-Car Accident. Description of the accident which caused the loss of two lives, and which is attributed to faulty design or imperfection in a wheel. Report of the inquest, letter, and discussion of the cause. 3300 w. Auto Jour—March 15, 1899.

## AUTOMOBILE COMPETITION.

Motor Carriage Trials. E. C. Oliver. Describes apparatus for testing automobiles, and the method of conducting such trials so that all conditions shall be kept constant, and results comparable. 2500 w. Horseless Age—April 18, 1900.

**Agricultural Society.**—See **Heavy, Birmingham.**

**Boston.**—The Boston (U. S. A.) Moto Vehicle Contest. An account of the entries and the points considered, with extracts from the judges' report. 4000 w. Auto Jour—Feb. 15, 1899.

**Cab, Paris.**—Competition of Automobile Hackney Carriages. Illustrates some of the vehicles that took part in the competition in France. 400 w. Sci Am Sup—July 2, 1898.

Motor Cab Trials in Paris. An account of the trials with description of the vehicles entered. 3500 w. Engr, Lond—June 16, 1899.

The Automobile Cab Competition (Le Concours de Fiacres Automobiles). C. Bontain. A detailed account of the prize competitions of the Automobile Club of Paris, with photographs of the vehicles, and a map of the routes. 3000 w. 1 plate. Rev Tech—June 25, 1808.

The Competition for Automobile Cabs (Concours pour Voitures de Place Automobiles). A general account of the Automobile Club competition, with a review of the performance of the various competing vehicles. 2500 w. Génie Civil—June 25, 1808.

The Competition of Automobile Cabs (Concours des Voitures de Place Automobiles). The official report of the recent competition of automobile cabs in Paris, under the auspices of the Automobile Club of France. A plate of profiles of the three routes is given, and illustrations of the vehicles. Two articles. 1 plate. 12000 w. Génie Civil—Sept. 3, 10, 1898.

The Paris Cab Trials. Translated from "Le Génie Civil." An account of the June trials, with description of the vehicles. Ill. 6400 w. Automotor—Aug., 1899.

The Paris Motor-Cab Competition. An account of the trials promoted by the French Automobile Club, with illustrated descriptions of the vehicles entered. 4300 w. Auto Jour—July, 1898.

The Second Competition of Automobile Cabs (Deuxième Concours des Fiacres Automobiles). With descriptions of the competing vehicles, and a summary of the results of the trials. 4000 w. Génie Civil—June 24, 1899.

**Chicago.**—American Self-Propelled Carriages. A statement of the conditions of the Chicago competition, and an illustrated account of the entries and results. 4000 w. Engr, Lond—Nov. 22, 1895.

Official Report on the American Horseless Carriage Trials. Complete text of the report of the judges of the competitive trials at Chicago. 7000 w. Engr, Lond—March 13, 1896.

**Efficiency.**—The Agricultural Hall Exhibition Efficiency Trials. Gives complete results of these trials. 1600 w. Automotor—Aug., 1899.

**Electric Vehicles.**—See also ELECTRIC VEHICLE.

**England.**—The Recent Trials of Motor Vehicles. H. S. Hele-Shaw. Supplementary paper to the one on "Road Locomotion," read before the Inst. of Mech. Engs. 1200 w. Horseless Age—July 18, 1900.

**France.**—Motor Vehicle Competitions in France. Report of the competitions of 1898, of heavy weights, and of 1899, of motor-cars plying as street cabs. 1200 w. Horseless Age—Aug. 22, 1900.

The Motor Car Competitions in France. G. Forestier. Reports two competitions, showing conveyances can now be propelled by mechanical power with greater economy than by horses. 1200 w. Am Mfr & Ir Wld—May 31, 1900.

The Competition of Heavy Weights, 1898, and the Second Competition of Automobile Cabs, 1899 (Concours des Poids Lourds de 1898, et le Deuxième Concours de Fiacres Automobiles en 1899). M. G. Forestier. A review of the reports and a general discussion of the automobile situation. 8000 w. Mem de la Soc Ing Civ de France—Aug., 1899.

The Motor Competition of the "Locomotion Automobile" (Le Concours de Moteurs de la "Locomotion Automobile"). Gaston Sencier. With details of the methods of testing, and tabulated data of the results; these relating to internal combustion motors of various kinds. Two articles. 6000 w. Rev Tech—Jan. 10, 25, 1900.

The Recent French Motor Car Competition. An account of the arrangements, the preliminary test and the long race. In this trial the importance of pneumatic tires was shown, and also the fact is noted that petroleum entirely superseded steam. 3300 w. Engng—Nov. 6, 1896.

**Heavy, Birmingham.**—The Royal Agricultural Society's Trials of Moto-Vehicles. The judge's report, description of vehicles, summary of times and speeds, consumption of fuel and cost of running, with conclusions. 5000 w. Auto Jour—Oct. 15, 1898.

The R. A. S. E. Trials of Self-Moving Vehicles at Birmingham. Abstract of report of judges, signed by W. C. Unwin, and published in the Journal of the Royal Agricultural Society. Serial. Ind & Ir—Oct. 7, 1898.

Motor Vehicle Trials at Birmingham. Illustrated account of the second of the annual trials of the heavy automotors. 1400 w. Auto Jour—June 15, 1898.

**Heavy Car Trials.**—Heavy Motor Car Trials in France. An account of the recent trials of these vehicles made under direction of the Automobile Club de France. 4000 w. Engr., Lond—Aug. 20, 1897.

**Heavy, France.**—Heavy Motor-Car Trials in France. An account of the trials with illustrations of the vehicles. 3200 w. Engr, Lond—Oct. 28, 1898.

Road Motors in France. An account of the efforts of the Automobile Club of France to initiate a new class of heavy-weight vehicles, for carrying passengers and baggage. Ill. 1600 w. Engng—Nov. 5, 1897.

Report on Motor Vehicles in France (Bericht über die Motorwagen in Frankreich). A translation of the report on the recent "heavyweight" competitions of automobiles in France. Serial. Glaser's Annalen—June 1, 1898.

**Heavy, Liverpool 1898.**—Excerpt from the Official Report of the Judges on the Trials of Moto Vehicles for Heavy Traffic Held in Liverpool. Gives particulars of the competition, illustrated descriptions of vehicles entered, the costs of working, and conclusions. 8500 w. Auto Jour—Nov., 1898.

Motor Vehicles for Heavy Traffic. A report of the trials of the Liverpool Self-Propelled Traffic Assn., with illustrations of two of the vehicles. 1600 w. Sci Am Sup—May 12, 1900.

Motor Wagons. Illustrated description of two vehicles that have been entered for the competition at Liverpool, under the auspices of the Self-Propelled Traffic Assn. 1100 w. Engng—May 20, 1898.

Motor Wagon Trials at Liverpool. Illustrated description of the four vehicles which competed. 2000 w. Engr, Lond—May 27, 1898.

Motor Wagon Trials at Liverpool. Profile and maps of the routes traversed, with additional information of results. 700 w. Engr, Lond—June 3, 1898.

Steam Vehicles for Heavy Traffic. Editorial discussion of the recent competition at Liverpool. Thinks the experiments so far are encouraging for good traffic by motor wagons. 2200 w. Engng—May 27, 1898.

Steam Vehicles for Heavy Traffic. Further account of the trials at Liverpool giving the results obtained in the last three days. 2300 w. Engng—June 3, 1898.

The Liverpool Trials of Heavy Motor Vehicles. A statement of the conditions, and full account of the trials, the routes traveled, the vehicles, etc. Ill. 15000 w. Auto Jour—June 15, 1898.

**Heavy, Liverpool, 1899.**—Auto-Car Trials at Liverpool. Letter to the editor containing remarks and impressions in refernce to the hill-climbing trials on July 31. 2200 w. Engr, Lond—Sept. 1, 1899.

The Liverpool Heavy Motor Vehicle Trials. A full account of the trials, with illustrated description of the vehicles. Also editorial. 11800 w. Automotor—Aug., 1899.

The Liverpool Motor-Wagon Trials. Brief account of the second annual series of trials of motor-vehicles for heavy traffic. Describes vehicles and tests. 1500 w. Transport—Aug. 4, 1899.

The Liverpool Trials of Motor Vehicles. Summary of the report of the judges who conducted the trials from July 31 to Aug. 2, 1899. Ill. 3800 w. Automotor—Jan., 1900.

**Heavy, Liverpool, 1901.**—Proposed Trials of Motor Vehicles. Gives the programme of trials to be held in June, 1901, by the Liverpool Self-Propelled Traffic Assn. 1800 w. Engr, Lond—June 15, 1900.

**Heavy, Paris.**—Heavy Motor Car Trials in Paris. An account of recent trials in which ten vehicles competed, comprising four steam cars, five patrol vehicles, and one electric van. Ill. 3800 w. Engr, Lond—Oct. 19, 1900.

The Competition of the Heavy-Weight Vehicles (Concours des Poids Lourds). The official report of the commission of the Automobile Club of France, with illustrations of the various vehicles, tables of weights, map and profile of the road, and full details of the performance of each automobile. Two articles. 20000 w. 1 plate. Génie Civil—Nov. 20, 1897.

The "Heavy Weights" Competition of the Automobile Club. From "La Nature." An account of the international competition which recently took place in Paris, with illustrations of the principal types of the vehicles that competed. 1300 w. Sci Am Sup—Oct. 9, 1897.

**Heavy, Versailles.**—Commission's Report on the Test of Heavy Motor Vehicles, Held at Versailles, in October, 1898. Gives the conclusions of the commission and tabulated report of the tests made. 900 w. Eng News—Sept. 7, 1899.

Heavy Motor Car Trials in France. Comments on features of interest at the trials held at Versailles. 1600 w. Engr, Lond—Oct. 20, 1899.

Les Poids Lourds Concours. Illustrates and describes the vehicles that took part in the heavy weight trials at Versailles, France, and reports their performance. Also editorial. 4000 w. Auto Jour—Nov. 15, 1898.

Second Concourse of Heavy Weights (Deuxième Concours des Poids Lourds). Ch. Talausier. Short description of the concourse with table of data of competing vehicles. 2400 w. Génie Civil—Oct. 15, 1898.

The Heavy Motor Car Trials in France. Discusses the recent trials and what they have proved. 2000 w. Engr, Lond—Nov. 4, 1898.

The International Competition of Heavy Weights (Concours International des Poids Lourds). The official report of the commission upon the exhibits and trials at the competition of the Automobile Club of France, in Oct., 1898; with many illustrations. Three articles, 1 plate. 2500 w. Génie Civil—July 29, Aug. 5, 12, 1899.

**London Engineer's.**—The Present Status of Motor-Driven Vehicles for Common Roads. Editorial comment on the competitive trial planned by the London "Engineer." 2300 w. Eng News—July 1, 1897.

"The Engineer" 1100 Guinea Road-Carriage Competition. The full conditions of this competition are given, with classification, names of judges, and directions for those who desire to compete. 3000 w. Engr, Lond—April 17. 1896.

**Motor Cars.**—Motor Cars at the Crystal Palace. An account of the entries and trial, in response to the prizes offered by this journal, with editorial comment. Ill. 6500 w. Eng, Lond—June 4, 1897.

**Paris.**—French Motor Trials. An account of the series of trials carried out in Paris to determine the actual power of motors as fitted to automobile vehicles, with tabulated results. 1400 w. Auto Jour—Feb., 1900.

The Competition of the Automobile Club of France (II. Concours des Voitures de Place Automobiles). G. Forestier. The full report of the commissioners, with many illustrations and tablets, on this competitive exhibition, held in June, 1899. Serial. Génie Civil—March 24, 1900.

**1000-Mile.**—The Automobile Club's 1000-Mile Trial. A general account of the vehicles completing the run and of their performance. 2000 w. Engr, Lond—May 18, 1900.

The Automobile Club's 1000-Mile Trial. Gives the itinerary and the important features of the vehicles entered. 2500 w. Engr, Lond—April 27, 1900.

The Thousand-Miles Automobile Trials. W. Worby Beaumont. A critical review of the recent British trials, with illustrations of the principal vehicles, by one of the judges of the competition. 4500 w. Eng Mag—Oct., 1900.

The 1000-Mile Trial of the Automobile Club of Great Britain and Ireland. An account of the vehicles, hill climbing records, and speed trials. 7000 w. Auto Jour—May 17, 1900.

**Vincennes.**—Motor Car at Vincennes. Brief account of the trials of touring vehicles. 1500 w. Engr, Lond—May 25, 1900.

### AUTOMOBILE CONGRESS.

**Paris, 1900.**—International Automobile Congress. Abstract from report on the details of construction of vehicle frames and their parts made by A. Bolée, Sr., to the third section of the Congress. Touches on piping and pipe joints, loosening of nuts, and the use of aluminum and its alloys. 2000 w. Horseless Age—Sept. 12, 1900.

### AUTOMOBILE EXHIBITION.

**Berlin.**—The International Motor-Carriage Exposition at Berlin. An account of the opening of this exposition with illustrated description of some of the vehicles. 2500 w. U. S. Cons Repts, No. 561—Oct. 24, 1899.

See also **ELECTRIC VEHICLE—Berlin Exposition.**

**Chicago "Inter-Ocean," 1900.**—The "Inter-Ocean" Tournament. E. C. Oliver. Reviews the exhibits of the automobile exhibition at Chicago. Ill. 1100 w. Horseless Age—Sept. 26, 1900.

**New York, 1899.**—Automobiles at the Late Cycle Exhibition. Illustrations showing types of most of the vehicles, with brief descriptions. 1500 w. Sci Am—Feb. 18, 1899.

**Paris, 1898.**—The Automobile Exhibition of the Tuileries (L'Exposition d'Automobiles des Tuileries). The first of a series of articles illustrating and describing the vehicles exhibited at the exposition held by the Automobile Club, after the cab competition in Paris. Serial. Rev Tech—July 10, 1898.

The Exposition of Automobiles at the Tuileries, Paris (L'Exposition des Automobiles des Tuileries). M. Barbet. A description of the vehicles exhibited, with 57 illustrations. 7000 w. Rev de Mécan—Dec., 1898.

**Paris, 1899.**—Automobile Exhibition at Paris. Editorial on the second exhibition of automobiles held under the auspices of the Automobile Club of France, calling attention to tendencies in the evolution. 2200 w. Engng—July 21, 1899.

Motor Cars in Paris. Comments on the vehicles at the late exhibition, the lack of novelty, but evidences of improvement, the power used, etc. 2200 w. Engr, Lond—July 14, 1899.

**Paris, 1900.**—Automobile Carriages at the Paris Exhibition. The first of a series of articles describing the large and important collection of exhibits. Serial. Engr, Lond—July 20, 1900.

Automobiles at the Paris Exhibition. G. F. Desjaques. Gives a brief review of the automobile history of France, showing why steam has fallen into disfavor, as introductory to a very complete review of the interesting exhibits in this field. Serial. Engng—Oct. 19, 1900.

The Paris Exhibition. Illustrated description of the more important exhibits of motor vehicles. 11800 w. Auto Jour—Oct., 1900.

### AUTOMOBILE RACING.

Motor Racing. Edwin Emerson, Jr. An interesting illustrated account of vehicles and races, discussing the factor of speed, and the proposed races to be run during the Paris Exposition. 3000 w. Auto Mag—Feb., 1900.

**Galesburg, Ill.**—An American Auto Race. Brief report of the race at Galesburg, Ill. 800 w. Auto Mag—Nov., 1899.

**New York Suburbs.**—Two Automobile Road Races. An account of the races of March 31 and April 14, 1900, organized by the Automobile Club of America. 2500 w. Auto Mag—May, 1900.

**Paris—Amsterdam.**—The Automobile Race between Paris and Amsterdam (La Course d'Automobiles Paris-Amsterdam-Paris). A general description of this important road competition with numerous photographs of the competing machines. Serial. Rev Tech—July 25, 1898.

**Rules.**—Official Time-Keeping Rules. Considers methods and instruments employed, and sources of error. 2500 w. Auto Mag—Feb., 1900.

**Rules, France.**—The French Racing Rules. Translation of the racing rules drawn up by the French Automobile Club. 4700 w. Auto Mag—Feb., 1900.

**Rules, United Kingdom.**—Automobile Club Racing. A copy of the rules and regulations of the Automobile Club of Great Britain and Ireland. 5000 w. Auto Jour—March, 1900.

### AUXILIARY ENGINE.

See also **MARINE ENGINE.**

Auxiliary Engines and Transmission of Power on Naval Vessels. George W. Dickie. A presentation of the subject, with comparisons and conclusions, not aiming to show the superiority of any one system. 7200 w. Trans Am Soc of Mech Engs—Dec., 1897.

Auxiliary Engines in Screw Steamers. Not only auxiliary engines but other marine engine accessories are discussed in this article. 3500 w. Engr, Lond—May 15, 1896.

**Steam Consumption.**—Consumption of Steam by Warship Auxiliary Machinery. A Few Figures. F. W. Roller. Reports a careful investigation of the steam consumption of the auxiliary machinery in common use on the U. S. S. "Nashville." 1300 w. Am Elect'n—Feb., 1899.

Steam Consumption of Auxiliary Engines in Warships. Editorial noting some of the machinery difficulties in connection with higher pressures and the efforts being made to overcome them. 3000 w. Engng—April 21, 1899.

**Steam Consumption, "Minneapolis."**—Steam Consumption of the Main and Auxiliary Machinery of the U. S. S. "Minneapolis." W. W. White. Prize essay. Full description of the apparatus for testing, the methods adopted, with tabulated results, discussion and plates. 3000 w. Jour Am Soc of Nav Engs—Feb., 1898.

### AVALANCHE.—See LANDSLIDE; SNOWSLIDE.

### AXLE.

**Car.**—See **CAR AXLE.**

**Locomotive.**—See **CRANK PIN—Stresses; LOCOMOTIVE DESIGN—Stresses.**

**Stresses.**—See also **CRANK PIN—Stresses.**

### AXLE BEARING.—See CAR BEARING; LOCOMOTIVE AXLE BEARING.

# B

**BABBITT METALS.**

Babbitt Metals. C. Vickers, in "Machinery." Proportions for a number of alloys are given with general information. 700 w. Sci Am Sup—July 10, 1897.

**BACTERIA.**

See also **SEWAGE DISPOSAL; WATER ANALYSIS; WATER SUPPLY.**

A Study of Some Gas-Producing Bacteria. A. A. Bennett and E. E. Pammel. Chemistry of gaseous bacterial products and excretions, together with a bibliography of the literature upon this subject. 2400 w. Jour of Am Chem Soc—Feb., 1896.

The Practical Results of Bacteriological Researches. George M. Sternberg. Address of the president of the Biological Society of Washington, delivered Dec. 14, 1895, under the auspices of the joint Commission of the Scientific Societies of Washington. A résumé of progress in bacterial research from its beginning down to present date. 6500 w. Pop Sci M—April, 1896.

**Carbonated Water.**—Bacteria and Carbonated Waters. G. C. Frankland. A statement of discrepancies in the results and conclusions of different observers, upon the hygienic importance of gaseous aeration of water from a bacterial point of view, is followed by a statement of the behavior of pathogenic bacteria in such water, upon which the results show much better agreement. 1600 w. Nature—Aug. 20, 1896.

**BACTERIOLOGY.**

The James Forrest Lecture on Bacteriology. A review of Dr. G. S. Woodward's address before the Institution of Civil Engineers. 2000 w. Eng Rec—Jan. 29, 1898.

**BALANCE.**

The Design and Construction of a Sensitive Laboratory Balance. N. R. Hopkins. A statement of the physical principles involved, of the proportions of the different parts of the apparatus, and the mechanical operations of its manufacture. Ill. 2200 w. Sci Am Sup—Sept. 10, 1898.

**BALATA.**

The Demand for Balata and the Supply. The sources of supply and its merits as a substitute for guttapercha. 900 w. Ind Rub Wld—July 10, 1896.

**BALCONY.**

**Concrete—Steel.**—A Monolithic Concrete Cantilever Balcony. Illustrates a balcony of concrete and twisted iron, projecting 4 ft. and carrying a uniform load of 400 lbs. per sq. ft. 500 w. Eng Rec—June 18, 1898.

**BALING MACHINE.**

**Cylindrical.**—A Machine for Making Cylindrical Bales. Illustrated description explaining the theory and construction of the machine and its operation. 1500 w. Eng News—Dec. 16, 1897.

**BALL.**

**Steel.**—See **BALL BEARINGS—Strength of Balls; Tests.**

**BALLAST.**

**Track.**—See **MAINTENANCE OF WAY; TRACK; PERMANENT WAY.**

**Water.**—Water Ballast for Steamers and Sailing Ships. M. W. Aisbitt. A history of ballasting is given, followed by a practical consideration of water ballasting as applied in modern marine engineering. 2700 w. Steamship—Jan., 1896.

Water Ballast in Steamers. Side Tanks. Archibald McGlashan. Read at meeting of Northeast Coast Institution of Engineers and Shipbuilders, at West Hartlepool. An inquiry into the question of how far recent developments in shipbuilding and in the working of steamers affect this subject. Discussion. 2500 w. Steamship—Feb., 1898.

**BALLASTING.**

**Ships.**—Ballasting. H. P. Wortley. Written for the Shipmasters' and Officers' Society, London. A discussion of this subject and of the evils of sending ships to sea insufficiently immersed. 2500 w. Naut Gaz—Sept. 7, 1899.

**BALL BEARINGS.**

See also **ELASTICITY—Steel Balls and Plates; ROLLER BEARINGS.**

Making Balls for Bearings. Horace L. Arnold. Full illustrated description of method and appliances. 4500 w. Am Mach—Oct. 1, 1896.

A Ball Bearing Experience. C. P. Benns. Describes an arrangement including balls which cannot possibly roll, and investigates the two-point bearing and the three-point bearing. Ill. 1600 w. Am Mach—Oct. 13, 1898.

Experiments with New Forms of Ball Bearings. F. A. Farnsworth. Drawings, with description of several new forms of ball bearings with which the author has experimented. 900 w. Ir Age—Aug. 5, 1897.

A Theoretical Study of Ball Bearings (Étude Théorique sur les Roulements à Billes). C. Bourlet. A valuable discussion, with many diagrams, showing the mechanical action of the various forms in use with their advantages and disadvantages. Two articles. 6000 w. Génie Civil—July 2, 9, 1898.

A Theoretical Study of Ball Bearings (Étude Théorique sur un Roulement à Billes). Prince Gagarine. A mathematical examination of the action of the ball bearings in the Stokes anemometer, but valuable also as a general discussion of the subject. 1500 w. Génie Civil—Oct. 7, 1899.

Ball Bearings. C. R. Gerrard. A discussion of some of the important features of anti-friction bearings as they stand at present. Ill. 2500 w. Mech Engr—Dec. 24, 1898.

Fundamental Facts Relating to Ball Bearings. Reynolds Janney. Illustrated discussion of fundamental principles. 2000 w. Am Mach—Jan. 5, 1899.

The Theory and Construction of Ball Bearings. W. H. Hale. Considers the principles of ball bearings and the improvements needed to make them practical and successful. Ill. 2400 w. Sci Am—July 1, 1899.

Ball Bearings. D. T. Randall. Notes on the number and size of balls to be used. 2200 w. Mach, N. Y.—July, 1900.

**Carriages.**—Ball Bearings and Rubber Tires for Carriages. From "La Nature." Gives an illustrated sketch of the history of the introduction of these devices, dating ball bearings back to 1857. 1000 w. Sci Am Sup—Dec. 7, 1895.

**End Thrust.**—End Thrust Ball Bearings. Thomas Hill. A report of investigations and conclusions. Ill. 800 w. Am Mach—Jan. 5, 1899.

**Formulæ.**—Formulæ for Ball Bearings. H. Rolfe. Some supplementary remarks called forth by Mr. Babbitt's letter on this subject, taking into account the matter of clearance between the balls. 1000 w. Am Mach—Dec. 3, 1896.

**Race.**—The Ball Race. Mark Barr. Discusses the accuracy of ball races. 800 w. Elec Rev, Lond—Nov. 25, 1898.

**Side Pressure.**—Side Pressure Ball Bearings. Describing and illustrating the application of ball bearings to street railway car service. 1400 w. Ry Wld—May, 1896.

**Strength of Balls.**—Strength of Steel Balls. J. F. W. Harris. Gives an account of tests made at the Rose Polytechnic Inst. to determine the breaking strength. 700 w. Trans Am Soc of Mech Engs, No. 844—Dec., 1899.

**Tests.**—The Elasticity of Steel Balls and Plates. Alton L. Smith. Cocncerning ball bearings and tests recently made. Ill. 2000 w. Jour of Worcester Poly Inst—Nov., 1899.

Tests of Novel Types of Ball Bearings. Presents the result of tests made by George D. Rice, of Medford, Mass., of several types of ball bearings, with illustrations. 1000 w. Ir Age—Dec. 10, 1896.

**Tramways.**—The Application of Ball Bearings to Tramways (Anwendung von Kugellagern bei Strassenbahnen). R. v. Podoski. With illustrations of the bearings used on various Swiss tramways, and very full data of traction tests, with numerous diagrams. Two articles. 6000 w. Elektrotech Zeitschr—Jan. 26, Feb. 4, 1899.

**BALLISTICS.**

See also **GUNNERY.**

Ballistic Problems in Indirect and Curved Fire. James M. Ingalls. Mathematical discussion, giving formulas and tables. 4500 w. Jour U S Artillery—Jan., Feb., 1898.

**Air Resistance.**—See **AIR RESISTANCE—Projectiles.**

**Direct Fire Table.**—New Ballistic Table for Direct Fire. James M. Ingalls. Gives ballistic tables for direct fire, based on the quadratic law of resistance. 1800 w. Jour U S Art—July, Aug., 1899.

**Electric Deflection.**—The Course of Bullets Changed by Electric Currents. Account of a curious phenomenon recently observed by the committee of the Swiss Federal Rifle Meeting at Winterthur, with results of experiments. 700 w. Elec Rev—July 1, 1896.

**Jump Determination.**—The Determination of the Jump in Guns. John P. Wisser. Illustrates and describes a method of charting and measuring vibration by the use of electrical methods. 1200 w. Elec Rev, N. Y.—Dec. 27, 1899.

**Krupp Rapid-Fire.**—Ballistic Tests of the Krupp 15-Cm. Rapid-Fire Naval Gun (Ballistiche Angaben über Kruppsche 15-cm. Marine Schnelllade-Kanonen). J. Castner. A comparison between the light and heavy 15-cm. guns, with ballistic tables and an example of the target practice. 1200 w. Stahl und Eisen—Dec. 15, 1899.

**Photo-Chronograph.**—See **PHOTO-CHRONOGRAPH.**

**Pressures.**—The Law of Pressure at the Muzzle of a Gun (Sur la Loi des Pressions dans les Bouches à Feu). E. Vallier. A communication to the French Academy discussing the distribution of pressures at various points in the barrel of a gun. 1200 w. Comptes Rendus—May 29, 1899.

The Law of Pressure in Gun Barrels (Sur la Loi des Pressions dans les Bouches à Feu). E. Vallier. Giving formulas and tables for various weights of charges, projectiles and initial velocities. 1200 w. Comptes Rendus—July 31, 1899.

**BALLOON.**

See **ÆRONAUTICS.**

**BALL RACE.**

See **BALL BEARINGS—Race.**

**BAND-SAWING.**

**Bevel Pinion.**—Band-Sawing a Bevel Pinion. W. H. Freeman. Illustrated description of the method used. 1200 w. Am Mach—July 20, 1899.

**BANK.**

The Architecture of Modern Bank Buildings. R. W. Gibson. Explaining the requirements of different types of banks in the matter of interior space arrangement, and the methods of meeting these. Ill. 3500 w. Eng Mag—March, 1896.

**Buffalo.**—The Buffalo Bank of Commerce. Illustrates a modern fireproof structure built for a large bank, and gives details of construction. 1500 w. Eng Rec—March 26, 1898.

The Buffalo Savings Bank. Illustrated description of a banking building containing two domes, one above the other, pendentive ceilings and other special features, including heating arrangements. 4000 w. Eng Rec—Nov. 25, 1899.

**Chicago.**—The Most Unique and Complete Banking Building in America. Illustrated detailed description of the Illinois Trust and Savings Bank, in Chicago. 10000 w. In Arch—May, 1897.

**Madras.**—The First Prize Design for New Premises, Bank of Madras. Submitted by "Hope." S. S. Jacob. Illustrated description, with plans, specifications and abstract of estimated cost. 2000 w. Ind Engng—April 4, 1896.

**Rochester, N. Y.**—A Bank and Safe-Deposit Building. Illustrated description of the recently-constructed building for the Security Trust Company, of Rochester, N. Y. 700 w. Eng Rec—Nov. 6, 1897.

**Westfield, N. J.**—The Westfield, N. J., Bank Building. Illustrated description. 800 w. Eng Rec—March 14, 1896.

**BARCELONA.**

Provincial Public Works, Barcelona (Obras Publicas Provinciales, Barcelona). Victoriano Felip. An argument for greater activity in the planning and construction of highways, waterworks, and other public works demanding attention. 6000 w. Revista de Obras Publicas—Jan. 4, 1900.

**BARGES.**

**Steel.**—Schooner Rigged Steel Tow Barges for Deep Water Trade. Illustrates and describes vessels designed especially for this service. 1000 w. Marine Engng—May, 1900.

**BAR IRON.**

See **IRON MANUFACTURE.**

**BARRACKS.**

**Teschen, Austria.**—The Archduke Frederick Barracks and Military Hospital at Teschen (Die Erzherzog Friedrich Kaserne und das Truppen Spital in Teschen). With photographic views and plates of details of these important buildings. 2500 w. 3 plates. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1897.

**BASE LINE.**

See **SURVEYING—Base Line.**

**BATH.**

The Arrangement and Operation of Public Baths (Ueber Badeeinrichtungen in Gewerblichen Betrieben). A. Herzberg. With especial reference to douche and spray baths for workmen's and military baths. 3000 w. Gesundheits Ing Feb. 15, 1899.

Public Baths. A. Saxon Snell. Read before the London Archt. Assn. A detailed description of the various parts of the building, with brief survey of the general plan. Discussion. 11000 w. Builder—March 11, 1899.

Public Baths and Wash Houses. A. Hessell Tiltman. Abstract of paper read before the Royal Inst. of Brit. Archt's, with discussion. Deals with the requirements of such establishments. 3500 w. Builder—Feb. 11, 1899.

Public Baths and Wash Houses. A. Hessell Tiltman. Views of a writer who has had many years' experience in the planning, erection and administration of such establishments. Ill. 14-500 w. Jour Roy Inst of Brit Archt's—Feb. 11, 1899.

Public Baths. E. Foster. Condensed from a paper read at meeting of the Assn. of Munic. and Co. Engs., at Cardiff. The improvements effected in modern baths are discussed, and the kinds of baths best suited to the general public. 1600 w. San Plumb—Sept. 1, 1899.

Prize Plans for Public Baths (Preisentwürfe für Volksbäder). Franz Loewenstein. An illustrated account of the plans which received prizes at a recent competition instituted by the Deutsche Gesellschaft für Volksbäder, in Berlin. Serial. 2 parts. 1 plate. 3400 w. Gesundheits Ing—May 31, June 15, 1900.

**Berlin.**—The Municipal Baths of Berlin (Die Städt. Badeanstalten Berlins). An abstract of the report for 1897-98, with an account of the construction, use and management. 2500 w. Gesundheits Ing—March 15, 1899.

**Bilston, Eng.**—The Public Baths of Bilston, Staffordshire, England. James H. Fuertes. Illustrated description of the arrangements of an establishment designed to accommodate 4,000 people per week. 700 w. Eng Rec—Jan. 20, 1900.

**Birmingham.**—Birmingham (Eng.) Baths. Information from a book prepared by J. Cox, superintendent and engineer of the baths department, giving a history of the public baths, their cost, maintenance, etc. 2000 w. Arch, Lond—Sept. 10, 1897.

**Boston.**—Boston's Free Municipal Bathing Plant. J. A. Stewart. Illustrtaed detailed description. 1200 w. Sci Am Sup—June 24, 1899.

Public Baths and Gymnasia in Boston. Some facts given by Hon. Josiah Quincy in an address before the People's Inst., New York. 900 w. Eng News—March 16, 1899.

**Brookline, Mass.**—Brookline's Model Bath-House. Illustrated detailed description. 2300 w. Eng Rec—March 6, 1897.

**Chicago.**—The Wentworth Avenue Free Baths, Chicago. Description and plans of the largest public bath-house yet established in this country, having a capacity of nearly 100 baths an hour. 1700 w. Eng Rec—Dec. 11, 1897.

**Europe.**—Public Baths in Europe. Edward Mussey Hartwell. An account of the origin and history of the public bath-house movement in certain of the leading industrial countries of Europe, showing what the experiences of the cities teaches as to the best methods of locating, planning and maintaining baths for the people. Ill. 22500 w. Bull Dept of Labor—July, 1897.

**Free Water.**—Free Water for Private Baths. L. N. Case. Extract from a paper presented at the recent convention of the Am. Water-Works Assn., condemning the project. 1000 w. Eng Rec—June 18, 1898.

**Germany.**—Public Baths (Volksbäder). A general account of the various kinds of public baths, and a plea for their wider introduction in Germany. The providing of baths is held to be as much of a public duty as that of general water supply. 3500 w. Gesundheits Ing—June 30, 1898.

**Liverpool.**—Baths for the Poorest. W. R. Court. From a report on the baths proposed for Liverpool, dealing with the plans and methods of administration. 1800 w. Arch, Lond—Sept. 29, 1899.

**Munich.**—The Mueller Public Baths at Munich. Description with floor plans and elevation, of one of the most elaborate public baths constructed in modern times, covering an area of about 172-000 sq. ft. 1600 w. Eng Rec—Feb. 18, 1899.

**New York Athletic Club.**—The New York Athletic Club's Swimming Bath. Illustrated description of a large tank built under difficult conditions. 2000 w. Eng Rec—May 20, 1899.

**Paris.**—See **Rouen.**

**Philadelphia.**—An Open-Air Swimming Bath-House. Illustrates and describes a Philadelphia bath having a capacity of about 100 bathers per hour, which has attracted considerable attention on account of its utility. 1600 w. Eng Rec—April 29, 1899.

**Pirna on Elbe.**—Public Baths at Pirna on the Elbe (Volksbad in Pirna a. d. Elbe). Description, plan and elevation of convenient new bath building of moderate cost. 1000 w. Deutsche Bauzeitung—March 23, 1898.

**Pittsburg.**—A Pittsburg Bath-House. Illustrates a public bath with 22 rain baths and other less important fixtures. 700 w. Eng Rec—April 9, 1898.

**Rain.**—The Introduction of Public Rain Baths in America. Harvey E. Fisk. Historical sketch. Difficulties met with and overcome by the promoter of this system. Illustrated description of these baths, and a statement of their sanitary advantages and the economy of the system. 7500 w. San—June, 1896.

A Plea for Rain-Baths in the Public Schools. Advocates the introduction of rain-baths in the tenement district, showing why this form is the best. Serial. 1st part. 4500 w. Am Archt—July 14, 1900.

**Reichenberg, Austria.**—The Francis Joseph Jubilee Baths at Reichenberg (Kaiser Franz Josefs Jubiläumsbad in Reichenberg). P. P. Brang. With elevation, plans and section of these fine new public baths in Austria. 2000 w. Zeitschr Oesterr Ing u Arch Ver—Aug. 10, 1900.

**Rouen and Paris.**—Public Douche Baths at Rouen and Paris (Les Bains-Douches à Bon Marché à Rouen et à Paris). Paul Sarrey. A description of the inexpensive buildings and apparatus which have been found most effective in the production of public health and cleanliness in France. 3000 w. 1 plate. Génie Civil—May 6, 1899.

**Sutro, San Francisco.**—Sutro Baths of San Francisco. F. W. Parsons. Illustrated description. 700 w. Sci Am—April 29, 1899.

The Sutro Baths, San Francisco. Describes the structural features of a large bathing establishment in a terrace quarried out of the face of a cliff. 900 w. Eng Rec—Nov. 11, 1899.

**Vienna.**—The Municipal Public Baths in Vienna (Die Städtischen Volksbäder in Wien). H. Bernaneck. With plans of the buildings, and data and tables showing the operation and extent to which the baths are used. Two articles. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—March 25, April 1, 1898.

The Municipal People's Baths of Vienna. W. P. G. Describes two of these bath-houses, giving illustrations of details. 2700 w. Arch & Build—April 15, 1899.

**Wissahickon, Philadelphia.** — The Wissahickon Heights Swimming Pool. Illustrated description of an 81x30-ft. pool used for summer bathing, built in a superior residence portion of Philadelphia. 1000 w. Eng Rec—May 26, 1900.

**Yonkers.**—The Yonkers, N. Y., Public Bath. Illustrated description of a bath with 22 showers, 2 tubs and two toilet rooms. 700 w. Eng Rec—May 28, 1898.

**New York.**—The Development of the Bath-tub in New York. A reprinted article discussing the increasing demand for bath-tubs in even the cheapest tenements, the kinds of tubs most used, bathroom accessories, etc. 1000 w. San Plumb—Sept. 1, 1898.

**BATHOMETER.**

See **SOUNDING.**

**BATHROOM.**

The Proper Arrangement of Water Closet and Bath Apartments. William Paul Gerhard. A discussion of the proper arrangement of the rooms or apartments in which such fixtures are placed in the different classes of buildings. Ill. Serial. Arch & Build—Jan. 11, 1896.

See also **PLUMBING.**

**BATTERY.**

**Electric.**—See **ELECTRIC CELL.**

**Secondary.**—See **ACCUMULATOR.**

**Storage.**—See **ACCUMULATOR.**

**BATTLESHIP.**

See also **WARSHIP.**

Absence of Standard in Battleship Design. Ridgely Hunt. A comparison of the navies of the world with regard to size, gunpowder, armor, speed and coal capacity. 3700 w. Eng Mag—Nov., 1896.

British and Foreign Types of Battleships. Editorial calling attention to some features in the most important types of warships. 900 w. Engr, Lond—March 18, 1898.

The Battleship of the Future. F. C. Goodall and A. C. Holzapfel. Read before the Congress of Naval Archts., in Paris. Outlines the type of vessel which recent improvements in armor plate and guns has made possible, advocating increase in size. 2000 w. Naut Gaz—Aug. 9, 1900.

The Evolution of Battleship Construction (Note sur l'Evolution de la Construction des Navires de Combat). L. de Chasseloup-Laubat. A general examination of the work of various nations, with especial reference to the later vessels of the French navy. 4500 w. Mem Soc Ing Civ de France—Feb., 1900.

The Trial of the Battleship. Park Benjamin, in the "Independent." Comments on the complexity of the mechanical structure and increased liability to injury. 800 w. Am Mach—May 12, 1898.

The Modern Armor-Clad. Translated from "Le Monde Moderne." Reviews the history of the armor-clad ship-of-war, and the progress in the manufacture of armor plates and projectiles. Ill. Serial. Sci Am Sup—Dec. 2, 1899.

**"Alabama" Class.**—The Latest American Battleships. Philip Hichborn. Describes and illustrates the special features of the "Alabama" class. 1800 w. Eng News—Dec. 10, 1896.

The New Battleship. Philip Hichborn. Abstract of a paper read before the Soc. of Naval Archts. and Marine Engs. Description of the special features of the "Alabama" class, the most recently designed battleships of the U. S. Navy, with a tabular statement of the general particulars of the designs. 1600 w. R R Gaz—Nov. 20, 1896.

"Alabama" Class Battleships. Illustrated description of the "Alabama," "Illinois" and "Wisconsin," sister ships, soon to be added to the U. S. navy. 1600 w. Marine Rev—Aug. 11, 1898.

Three Great Battleships. Robert G. Skerrett. Brief description with illustration of the sister ships "Illinois," "Alabama" and "Wisconsin." 700 w. Harper's Wk—April 16, 1898.

**"Alabama" vs. "Prince George."**—Comparison between the "Alabama" and the "Prince George" (Comparison entre le Cuirassé Américain "Alabama" et le Cuirassé Anglais "Prince George"). Reviewing a discussion in the "London Engineer" concerning the alleged inferior stability of the American vessel. 1600 w. Génie Civil—July 10, 1897.

The "Alabama" and the "Prince George." A comparison between the dimensions and other features, with diagrams. 1800 w. Engr, Lond—April 2, 1897.

**"Albion."**—H. M. S. "Albion." Describes the vessel and her armament, calling attention to interesting features in the design. 2200 w. Engng—June 24, 1898.

H. M. S. "Albion." Illustrated description of a vessel recently launched, with her equipment. 800 w. Engr, Lond—June 17, 1898.

**"Amphitrite."**—H. M. S. "Amphitrite." Illustration with description of ship and armament. 900 w. Engr, Lond—July 15, 1898.

**"Asahi."**—The Imperial Japanese Battleship "Asahi." Illustrated detailed description, with comparison and comments. 1700 w. Engr, Lond—April 13, 1900.

The Japanese Battleship "Asahi." Drawings and full description of the largest battleship afloat. Serial. Engng—May 25, 1900.

The Japanese Batteship "Asahi." Illustration, with some general particulars and results of the speed trials. This is the largest battleship afloat. 1200 w. Engng—April 6, 1900.

**"Bouvet."**—The French Battleship "Bouvet." An illustrated description of the largest and finest iron-clad at present in the French navy. 900 w. Engr, Lond—Nov. 4, 1898.

**British.**—Naval Review at Spithead. Illustrated account, with description of the various battleships belonging to Great Britain. Also editorial. 2000 w. Engr, Lond—June 18, 1897.

**"Canopus."**—Launch of H. M. S. "Canopus." Illustrated description, dimensions, special features and fittings, of one of a new class of battleships, designed by W. H. White. 1800 w. Engr, Lond—Oct. 15, 1897.

The "Canopus." Illustration with notes on some details not previously noticed. 600 w. Engr, Lond—July 14, 1899.

**"Charles Martel."**—The French Battleship "Charles Martel." Some particulars of this vessel, with general view, and two-page plate of a section of her bain engines. 800 w. Engng—Oct. 28, 1898.

**"Formidable."**—Launch of the First-Class Battleship "Formidable." Describes the vessel and its equipment, giving special illustrations showing various features. 2000 w. Engng, Lond—Nov. 18, 1898.

**French.**—A Representative Battleship and Coast Defense Vessel of the French Navy. Illustrates and describes two important types of vessels designed by French naval architects. 1800 w. Sci Am Sup—Feb. 4, 1899.

**"Friedrich der Grosse."**—Two New German Battleships (Zwei Neue Deutsche Panzerschiffe). Illustrated description of the launch of the battleship "Friedrich der Grosse," at Wilhelmshaven, together with an account of the armored cruiser "Fürst Bismarck." 2500 w. Stahl und Eisen—Oct. 15, 1897.

**"Fuji."**—Thames-Built Battleships. Illustrations and general descriptions of the "Fuji," built for the Japanese Navy by Thames Iron Works. 4400 w. Engng—March 12, 1897.

The Japanese Warship "Fuji." Illustrated general description. 700 w. Engr, Lond—April 3, 1896.

**"Georgia" Class.**—Proposed Armament for Our Three Latest Battleships, "New Jersey," "Georgia," and "Pennsylvania," with favorable comment. 1400 w. Sci Am—Sept. 9, 1899.

United States Battleship "Georgia" and Class. Illustrated description. 1300 w. Sci Am—June 9, 1900.

**"Glory."**—H. M. Battleship "Glory." Brief illustrated description. 700 w. Engng—March 17, 1899.

**"Goliath" Trials.**—Steam Trials of the Battleship "Goliah." The engines are of the three-cylinder, inverted, triple-expansion type. The trials are described. 1000 w. Engr, Lond—Dec. 8, 1899.

**"Hatsuse."**—The Imperial Japanese Battleship "Hatsuse." Illustrated detailed description of this example of latest development in naval architecture. 1500 w. Engr, Lond—June 30, 1899.

**"Henri Quatre."**—A New Type of Battleship—The French "Henri Quatre." Illustrated description of an experimental ship built by France. 1400 w. Engr, Lond—Sept. 8, 1899.

The New French Armor-Clad "Henri Quatre." Brief illustrated description. 500 w. Sci Am—Dec. 9, 1899.

**High-Speed.**—The Demand for Faster Battleships. Editorial urging the importance of speed, and commenting on the lessons to be learned from the recent destruction of the Spanish fleet. 2500 w. Eng News—July 21, 1898.

Higher Speed for Our New Battleships. Editorial on the necessity of future battleships being vessels of large coal endurance and high speed. 1400 w. Sci Am—Aug. 6, 1898.

The Speed of Battleships. Editorial discussion of the value of speed, urging that if it is gained at the sacrifice of guns and armor the advantage is doubtful. 1500 w. Engr, Lond—Aug. 11, 1899.

Wanted: Faster Battleships. Editorial protest against the action of the Board of Construction of the Navy Department in deciding that the three new battleships provided for by the U. S. Congress should have speeds of only 15 or 16 knots. Also reviews the fast battleships of foreign nations. 2800 w. Eng News—June 23, 1898.

**"Illinois."**—Our Latest Battleship. Brief description of the "Illinois," which was launched Oct. 4, 1898. 1200 w. Sci Am—Oct. 15, 1898.
See also "Alabama" Class.

**"Illustrious" Trials.**—Gun and Steam Trials of H. M. S. "Illustrious." An account of the trials which mark a distinct advance as a consequence of the introduction of many mechanical devices. 2000 w. Engng—March 18, 1898.

**"Indiana."**—Contract Trial of the United States Coast Line Battleship "Indiana." Harry Hall. Full description of the machinery and tests, with infolding plates and tabulated results. 6500 w. Jour Am Soc of Nav Engs—Nov., 1895.

The First-Class Battleship "Indiana." Illustrated description. 1800 w. Sci Am—Aug. 22, 1896.

The United States First-Class Battleship "Indiana." Illustrated description. 1600 w. Sci Am—Aug. 15, 1896.

**"Iowa."**—The United States Sea-Going Battleship "Iowa." Description with brief report of trial trip. Ill. 900 w. Am Eng & R R Jour—May, 1897.

The Vitals of a Battleship. Richard Lee Fearn. Description of the battleship "Iowa." Ill. 2200 w. Chau—Aug., 1898.

**"Iowa" Trial.**—Contract Trial of the United States Sea-Going Battleship "Iowa." J. M. Pickrell. Illustrated detailed description of the vessel and its equipment with report of speed trial. 8400 w. Jour Am Soc of Nav Engs—Aug., 1897.

**"Jauréguiberry."**—The French Battleship "Jauréguiberry." Describes the armament and the steam generating outfit, the latter being of special interest with reference to a recent accident which occurred therein, resulting in the death of several stokers. 800 w. Engng—July 3, 1896.

**"Kaiser Wilhelm der Grosse."**—The Launch of the "Kaiser Wilhelm der Grosse." This vessel is one of a group of three turret ships building for Germany. Gives dimensions, illustrations and particulars. 600 w. Engr, Lond—July 7, 1899.

Launch of the Battleship "Kaiser Wilhelm der Grosse" (Stapellauf S. M. Linienschiff "Kaiser Wilhelm der Grosse"). With reproductions of photographs of the vessel on the ways and in the water. A brief account of the launch and a description of the ship are given. 1000 w. Stahl und Eisen—July 1, 1899.

**"Kearsarge."**—Our Latest Battleship, the "Kearsarge." Brief illustrated account of the new American battleship and its armament. 1000 w. Sci Am—July 15, 1899.

The New Double-Deck Turret Battleship "Kearsarge." Illustrated description. 1800 w. Sci Am—June 27, 1896.

**"Kearsarge" Trial.**—Contract Trial of the United States Seagoing Battleship "Kearsarge." Claude B. Price. Illustrated description of vessel and equipment, with report of trial. Plates. 6500 w. Jour Am Soc of Nav Engs—Nov., 1899.

**"Kearsarge" and "Kentucky."**—Launch of the United States Battleships "Kearsarge" and "Kentucky." Illustrated description of these vessels with principal data of the launch. 3300 w. Marine Engng—May, 1898.

Battleships "Kearsarge" and "Kentucky." An interesting illustrated description of these two vessels nearing completion, with their equipment. 3 plates. 5500 w. Marine Rev—Aug. 11, 1898.

**"Kentucky" Trial.**—Contract Trial of the United States Battleship "Kentucky." Harrie Webster. Illustrated description of the vessel and its equipment, with report of trial. 3800 w. Jour Am Soc of Nav Engs—Feb., 1900.

**"Koningin Regentes."**—The New Dutch Ironclad "Koningin Regentes." Illustrations, with brief description. 500 w. Engr, Lond—Feb. 9, 1900.

**"London."**—H. M. S. "London." A recently launched vessel of a new class, of interest because of her armor system. 500 w. Engr, Lond—Sept. 29, 1899.

**"Maine."**—The United States Battleship "Maine." Illustration and description of this typical vessel of the three battleships recently ordered by the U. S. Congress. 1500 w. Engr, Lond—July 7, 1899.

United States Battleship "Maine." A description of the new "Maine." 2200 w. Marine Rev—Feb. 8, 1900.

The First-Class Battleship "Maine." An accurate engraving, with description of the new battleship bearing this name. 1800 w. Sci Am—Dec. 3, 1898.

**"Maine" Class.**—United States Battleships, "Maine," "Missouri" and "Ohio." Gives the chief characteristics of these sea-going coast-line battleships authorized by Congress. 5500 w. Jour Am Soc of Naval Engs—Aug., 1898.

**"Maine" Disaster.**—Destruction of the U. S. Battleship "Maine" by an Explosion in Havana Harbor. Technical information of the construction and equipment of this vessel, with engravings illustrating the warship and her machinery. 8500 w. Marine Engng—March, 1898.

The Destruction of the "Maine." Editorial on the report of the court of inquiry concerning this disaster, and advancing a possible hypothesis to account for the upward bend in the bottom as reported. 2300 w. Engng—April 22, 1898.

The Destruction of the United States Battleship "Maine." J. T. Bucknill. An examination and criticism of the work of the Court of Inquiry, with the aim of arriving at the truth concerning the disaster. Serial. Engng—May 27, 1898.

The "Maine" Disaster. Editorial holding the opinion that the explosion was outside the vessel on the port side. 800 w. Ind & Ir—April 22, 1898.

**"Marshall Deodoro."**—The New Brazilian Armorclad "Marshall Deodoro." C. Field. Brief description with illustration. 500 w. Sci Am—March 24, 1900.

**"Massachusetts."**—Queen of Battleships. The "Massachusetts" makes a record of 16.5 knots. For six hours she steamed 17.3 knots, which eclipses all records for vessels of her class. A premium of $100,000 earned by her builders. 1700 w. Sea—April 30, 1896.

**"Massachusetts"—Repairs.**—Repairing the Keel of a Battleship. Illustrated account of the repairs to the "Massachusetts," being carried on at the Brooklyn Navy Yard. 1000 w. Sci Am—Feb. 18, 1899.

**"Massachusetts"—Trial.**—Contract Trial of the United States Coast-Line Battleship "Massachusetts." C. H. Hayes. Full illustrated description of trial with extensive tabulated data. 8500 w. Jour Am Soc of Nav Engs—May, 1896.

The Speed Trial of the United States Battleship "Massachusetts." Illustrated popular description. 900 w. Sci Am—May 9, 1896.

**"New Jersey."**—See **"Georgia"** Class.

**"Oregon."**—The work of the Battleship "Oregon." An account of the remarkable trip from the Pacific Coast and the performance after joining the fleet and during the battle at Santiago, with list of officers. 2800 w. Am Mach—Aug. 25, 1898.

Recent Performances of the U. S. "Oregon." Charles A. E. King. An interesting report of the voyage of this vessel from Puget Sound to Florida, her fine condition, and her part in the battle of July 3, 1898. 1600 w. Jour Am Soc of Nav Engs—Aug., 1898.

**"Oregon"—Grounding.**—The Damage to the "Oregon." A description of the damage caused by grounding on a submerged rock in Chinese waters, illustrated from photographs. 600 w. Sci Am—Sept. 29, 1900.

**"Oregon"—Trial.**—Contract Trial of the United States Coast-Line Battleship "Oregon." Leo D. Morgan. Illustrated description of the ship and an account of the trial, with data. 9000 w. Jour Am Soc of Nav Engs—Aug., 1896.

**"Pelayo."**—The Spanish Battleship "Pelayo." A brief description of the new boiler installation with leading particulars and dimensions. 1100 w. Engng—April 22, 1898.

The Spanish Battleship "Pelayo." Describes and illustrates this formidable vessel of the Spanish navy, and its armament. 2800 w. Sci Am Sup—July 16, 1898.

**"Pennsylvania."**—See **"Georgia"** Class.

**"Prince George."**—Her Majesty's Battleship "Prince George." An illustrated description of this great battleship, which is one of a series of nine similar vessels. 18000 w. Engr, Lond—Dec. 18, 1896.

See also **"Alabama" vs. "Prince George."**

**"Renown."**—H. M. S. "Renown." Editorial discussion of the points in this new ship, which made her full speed contractor's trial trip on April 6, the ship being the prototype of the five new battleships of the 1896 programme. 1800 w. Engng—April 10, 1896.

**Russian-American.**—American-Built Warships for the Russian Navy. Illustrations of the vessels, with details of their construction and equipment. 1700 w. Sci Am—Nov. 5, 1898.

A New Russian Battleship. Illustration and description of the vessel being built at the shipyard of Messrs. Cramp & Co., Philadelphia, U. S. A. 1500 w. Engr., Lond—Dec. 30, 1898.

**"Shikishima."**—Launch of the Japanese Battleship "Shikishima." Illustration and description of the vessel and its equipment and a brief account of the launching. 2000 w. Engr, Lond—Nov. 4, 1898.

The Japanese Battleship "Shikishima" (Le Cuirassé Japanis le "Shikishima"). A short account of this fine man-of-war, with two illustrations. 600 w. Le Yacht—March 31, 1900.

**Speed.**—See **High Speed.**

**"Suffren."**—The New French Battleship "Suffren" and Her Predecessor. C. Field. Brief illustrated description. 500 w. Sci Am—March 24, 1900.

**"Texas."**—Secretary Herbert's Report on the "Texas." Editorial criticism of the report. 1500 w. Sci Am—Dec. 26, 1896.

The "Texas" in Action. Reviews briefly the history of this warship, with illustrated description of the damage wrought by Spanish shells during the Santiago engagement. 1800 w. Sci Am—Aug. 20, 1898.

**"Texas"—Trial.**—See also **MARINE ENGINE—Battleship "Texas."**

**United States.**—Battleships and Monitors Now Building for the Navy. Illustrates and describes the eight battleships and four monitors in process of construction. 1900 w. Sci Am—Feb. 25, 1899.

Chief Characteristics of Battleships and Monitors Provided for in Naval Shipbuilding Programme of 1898-99. Outlines the leading features of design of the battleships and monitors to be constructed. 2200 w. Marine Engng—Oct., 1898.

Some Notes on the Speed Trials and Experience in Commission of Our New Battleships. Philip Hichborn. From a paper read at the New York meeting of Naval Architects and Marine Engineers. The battleships referred to are the American ships "Indiana," "Massachusetts," "Oregon" and "Iowa." 1300 w. R R Gaz—Nov. 19, 1897.

The Battleships of 1899. Illustrated description of the five fine vessels now being completed in American ship yards. 2500 w. Naut Gaz—Jan. 5, 1899.

**"Vengeance."**—The New British Battleship "Vengeance." Description of a first-class battleship in process of construction. 2200 w. Engng—July 21, 1899.

**"Wisconsin."**—See also **"Alabama"** Class.

**"Wisconsin"—Trial.**—Trial Trip of the "Wisconsin." Illustrates and describes the vessel, and reports it the fastest battleship in the American Navy. 2000 w. Marine Rev—Oct. 18, 1900.

**"Yashima."**—The Japanese Battleship "Yashima." General illustrated description. Details are promised in a future article. A plan and vertical section with dimensions are presented in this article. 2600 w. Engng—March 6, 1896.

The Japanese Battleship "Yashima." Brief illustrated description. 2000 w. Engng—Feb. 5, 1897.

**BAUXITE.**—See also **ALUMINUM.**

**Alabama and Georgia.**—The Bauxite Industry. W. M. Brewer. Report of this industry in Alabama and Georgia. The shipments for 1897 were about 20000 tons. 1000 w. Eng & Min Jour—April 2, 1898.

**BAZIN ROLLER SHIP.**—See **ROLLER SHIP—Bazin.**

**BEACON.**

See also **LIGHTHOUSE.**

**United States Coast.**—Methods Used in Placing the Skeleton Steel Beacon Coast Signals. Brief description of these beacons, designed for use in shoal water as day marks and for survey stations. 700 w. Eng News—Sept. 7, 1899.

The United States Light House Board's New Metal Beacons. Illustrated description of beacons intended for day marks and for survey stations. 1000 w. Eng News—Sept. 30, 1897.

**BEAM.**

See also **BRIDGE DESIGN; GIRDER.**

The Action of Continuous Beams and Girders in Structural Work (Ueber den Einfluss der Kontinuität der Balken und Träger im Hochbau). A mathematical treatment giving formulas from which tables are computed for various arrangements of supports. Two articles. 2500 w. Deutsche Bauzeitung—Nov. 26, 30, 1898.

Resistance of Materials (Resistance des Materaux). A discussion in mathematical and graphical form, of the deformations of beams under various conditions of loading. Serial. Rev Tech—Sept. 10, 1900.

**Bending Moments.**—Bending Moments in Simple Beams Due to Wheel Loads. Thomas J. Brereton. The paper derives a formula for maximum bending moments due to non-uniform loads, and illustrates some of its uses. Ill. 2000 w. Sch of Mines Quar—Jan., 1899.

**Concentrated Loads.**—Bending Moment Due to Concentrated Loads. H. Szlapka. Mathematical demonstration of method used by the author. 500 w. Eng News—June 24, 1897.

**Built-Up Wooden.**—The Efficiency of Built-Up Wooden Beams. Edgar Kidwell. The experiments described were made in the mechanical laboratory of the Michigan College of Mines, with the object of obtaining data upon the relative efficiency of various forms. Ill. 19000 w. Trans Am Inst of Min Engs—Feb., 1898.

The Efficiency of Built-Up Wooden Beams. Edgar Kidwell. Discussion of this paper which was presented at the Lake Superior meeting, July, 1897. 6300 w. Trans Am Inst of Min Engs—June, 1898.

The Efficiency of Built-Up Wooden Beams. Edgar Kidwell. Summary of results obtained from a series of tests of such beams. Ill. 1500 w. Eng News—March 11, 1897.

The Design of Compound Beams. An editorial discussion, with especial reference to the investigations of Prof. Kidwell. 1000 w. Eng Rec—Sept. 10, 1898.

Compound Beams (Zusammengesetzte Träger). A. Schneider. A mathematical discussion of the strength of built-up timber beams, with tables for various loadings and examinations of special cases. Three articles. 12000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 24, Dec. 1, 9, 1899.

**Composite.**—Beams of Materials of Variable Coefficients of Deformation (Träger aus Materialien von Veränderlichem Formänderungs-Coefficienten). Josef Anton Spitzer. With a special discussion of the conditions immediately proceding the instant of rupture. Two articles. 1 plate. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—April 29, 1898.

**Computations.**—The Statical Computations for a Beam Reinforced by a Catenary (Zur Statischen Berechnung des durch einen Balken Versteiften Kettenträgers). Anton Rytid. A very full mathematical treatment for various conditions of loading, forming a valuable contribution to analytical mechanics. 10000 w. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1898.

**Design.**—The Design of Beams. W. H. Atherton. Part first deals with engine beams, gun beams, cranes, bridge girders, shafts and sundry examples. Ill. 1700 w. Mech Wld—April 16, 1897.

**Diagram.**—A Diagram for Determining the Size of Beams of Rectangular Cross Section. John H. Gregory. Diagram with explanation of its use. 300 w. Eng News—Nov. 4, 1897.

**Elastic Line.**—Application of the Equations of the Elastic Line (Ermittlung der Gleichungen der Elastischen Linien). Professor Ramisch. A mathematical treatment of the application of the elastic theory to a beam of uniform cross section resting upon two supports and bearing loads at definite points. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 9, 1900.

**Formula.**—A Simple Derivation of the Formula for the Strength of Beams. Water Ferris. A very successful attempt to explain the derivation of the formula, without the use of calculus, which explanation, though somewhat more cumbrous than is given by the calculus, is yet quite easily followed by those who can handle simple algebraic equations of the first degree. 1500 w. Am Mach—April 16, 1896.

**Irregular Loading.**—A Method of Determining the Size of a Beam or Girder from Irregular Loading. Robert D. Kinney. A theoretical discussion with derivation of formula and solution of a problem. 1200 w. Power—April, 1896.

**Load Diagram.**—Beam Dimensions and Load by Diagram. Henry Hess. Method is explained. 1500 w. Mach, N. Y.—July, 1897.

**Maximum Moment.**—The Determination of the Maximum Moment of a Simple Beam (Bestimmung des Maximalmomentes Einfacher Trager). Alexander Coulmas. A discussion by the graphical method, taking into account independent loads at various points. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—April 14, 1899.

**Moment of Inertia.**—The Moment of Inertia of Built-up Beams. E. A. Dixon. An explanation of a method for finding the moment of inertia. 1500 w. Am Mach—Dec. 15, 1898.

**Moment of Resistance.**—See **MECHANICS.**

**Neutral Axis.**—The Position of the Neutral Axis in Stone and Iron Beams (Der Lage der Neutralen Achse im Gebogenen Balken aus Stein und aus Gusseisen). E. Roser. A review of existing experiments by Barlow, Navier and Föppl, with a discussion of the results in the light of the elastic theory. 3500 w. Zeit d Ver Deutscher Ing—Feb. 25, 1899.

**Pine.**—See **PINE—Oregon.**

**Stresses.**—The Determination of the Stresses in a Horizontal Beam Suspended in the Middle (Zur Bestimmung der Spanmunger, in den durch einer Geraden Balken mit Mittelgelenk Versteiften Hängeträgern). J. Melan. A mathematical treatment applicable to the case of a combined suspension and truss bridge. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 7, 1900.

**Tests.**—Supports for Beams in Tests of Transverse Strength. William T. Magruder. Presented at meeting of the Am. Assn. for the Adv. of Science. Illustrated description of tests made at the Ohio State Univ. 900 w. Eng News—Jan. 11, 1900.

See also **U. S. Government Tests.**

**Thick**—The Flexure of Thick Beams (Sur la Flexion des Pièces Epaisses). M. Ribière. A mathematical discussion, showing that when the depth of a beam is greater than one-tenth of its length, the stresses at various points of the section depart from the usual trapezoidal law, and are indicated by curves rather than straight lines. 1800 w. Comptes Rendus—Jan. 31, 1898.

**Train Load.**—Investigation of the Maximum Efforts Developed in a Horizontal Beam of Single Span by the Passage of a Train (La Recherche des Efforts Maxima Développés en un Point dans une Poutre Horizontale à une Travée par le Passage d'un Train). An analytical investigation by M. G. Rogie. 5500 w. Ann des Ponts et Chaussées—Part II., 1897.

**Transverse Sections.**—The Resistance Areas of Transverse Sections. A. E. Sharp. Read before the Northeast Coast Inst of Engs. An explanation of the first principles of questions relating to beams and girders. 2000 w. Ind & Ir—Jan. 22, 1897.

**Transverse Strength.**—The Transverse Strength of Beams as a Direct Function of the Tensile and Crushing Stresses of Material. M. Lewinson. The author contends that the neutral axis does not pass through the center of gravity of the cross section of a beam. 2500 w. Trans Am Soc of Civ Engs—March, 1896.

**U. S. Government Tests.**—Relation of Compression Endwise Strength to Breaking Load of Beam. S. T. Neely. From Circular No. 18, Division of Forestry, U. S. Dept. of Agriculture. Data, diagrams and tables, giving information obtained by tests. 2400 w. Ry & Engng Rev—July 9, 1898.

**Vibrations.**—The Vibrations of a Beam under a Moving Load (Die Schwingungen eines Trägers mit Bewegter Last). A paper before the German Railway Society by Dr. Zimmermann, discussing the problem by the use of hyperbolic functions. 2500 w. Glaser's Annalen—June 15, 1897.

**Z.**—Bending Stresses in Z-Beams in Ship-Construction (Die Biegungsspannungen der Z-Eisen zu Schiffbauzwecken). A. Meyerhof. A graphical study of the bending stresses, with very complete tables of the moments or resistance for various sections. 6000 w. Zeitschr d Ver Deutscher Ing—May 27, 1899.

**BEARINGS.**

See also **BALL BEARINGS; CAR BEARINGS; LOCOMOTIVE AXLE BEARINGS; ROLLER BEARINGS.**

Machinery Bearings. John Dewrance. The results of a series of experiments undertaken by the author to determine the frictional resistance to shafts revolving in bearings under varying loads when subjected to different conditions. 3800 w. Ind & Ir—July 17, 1896.

Machinery Bearings. John Dewrance. The results of a series of experiments undertaken to determine the frictional resistance to shafts revolving in bearings under varying loads, when subjected to different conditions. Also "The Bearings of the Marine Engine." Ill. 6500. Jour Am Soc of Nav Engs—Feb., 1897.

**Aluminum.**—Machinery Bearings of Aluminum. F. A. Farnsworth. Experiments showing that aluminum bronze need not be a failure as a bearing metal. Ill. 700 w. Am Mach—June 24, 1897.

**Aluminum Bronze.**—Experiments with Aluminum Bronze Machinery Bearings. George D. Rice. Illustrated description of some practical experiments made with these bearings. 1200 w. Ir Age—Jan. 21, 1897.

**Antimonial Alloys.**—On Antimonial Alloys for Axle Bearings. H. Behrens and H. Baucke. An account of chemical and microscopic examination of several cushions of Babbitt metal with a view of ascertaining the causes leading to hot boxes. 3000 w. Met—Jan., 1900.

**Automobile.**—Axle Bearings. Myron and Frederick B. Hill. A study of the advantages and disadvantages of various bearings. Ill. 3000 w. Auto Mag—Nov., 1899.

**Babbitting.**—Babbitting and Fitting Bearings. All the babbitted surfaces met with in an ordinary engine are discussed and illustrated, with instructions. 2500 w. Power—Dec., 1897.

**Babbitt Metal.**—See also **BABBITT METAL.**

**Ball.**—See **BALL BEARINGS.**

**Car.**—See **CAR BEARINGS.**

**Glass.**—Concerning Glass Machinery Bearings. F. A. Farnsworth. Illustrated description of experiments made. 1000 w. Ir Age—April 29, 1897.

Experiments with Glass Bearings. George D. Rice. Illustrated description of experiments with glass bearings, which shows that while not reliable in cases of emergency, they may yet find a place for special purposes. 1000 w. Ir Age—Oct. 22, 1896.

**Hot.**—The Treatment and Prevention of Hot-Bearings. F. Bruton. A few suggestions and directions. 800 w. Elec, Lond—April 22, 1898.

See also **CAR BEARINGS.**

**Microstructure.**—See **CAR BEARINGS.**

**Roller.**—See **ROLLER BEARINGS.**

**Thrust.**—See **THRUST BEARINGS.**

**White Metal.**—White Metals for Bearing Surfaces. Robert Davison. Extract from paper read before the Bristol Centre of the Institute of Marine Engineeers. Deals with the application of these metals in the working parts of marine engines. The higher pressures and speeds now in vogue have greatly increased the use of these metals, and their substitution for brass where the latter has been used in engine construction. 1700 w. Prac Eng—April 17, 1896.

**White Metal vs. Gun Metal.**—White Metal or Gunmetal for Bearings. W. H. Booth. Discusses the conditions that have caused the more extensive use of white metal in America than in England and the importance of the best lubrication obtainable. 800 w. Am Mach—March 1, 1900.

**BELL FOUNDING.**

**Cincinnati.**—Cincinnati's Great Bell. W. J. Tobin. Illustrated description of the moulding and casting of the largest bell ever yet made in the United States. The bell with its appendages weighs 43000 lbs. 2000 w. Foundry—Dec., 1895.

**England.**—Bell Founders in England. Interesting information of this industry which dates from mediæval times. 1400 w. Mach, Lond—Oct. 15, 1897.

English Bell Founding. Brief interesting review of the bell founders' art in England. 600 w. Arch, Lond—April 15, 1898.

**Savoyarde, Paris.**—The Savoyarde—The Bell of the Church of the Sacred Heart, Paris. From "Le Génie Civil." An illustrated account of the founding of the largest bell in France (18 tons), and of its transportation over common roads by means of a special truck, drawn by twelve yoke of oxen. Incidently a brief account of many other large bells is given and a description of the process of bell founding in general is also presented. 3000 w. Sci Am Sup—Dec. 21, 1895.

**BELT HOLES.**

Plotting Belt Holes in Floors and Partitions by Proportion. M. H. Avery. Letter to editor, with illustration, explaining method used by writer. 500 w. Am Mach—June, 1898.

**BELTING.**

See also **POWER TRANSMISSION—Belts and Pulleys; ROPE; ROPE DRIVING.**

About Belts—Theory and Rules for Belting. Thomas Hawley. Extract of lecture in Lowell Free Course, at Wells Memorial Inst., Boston. Contains a very thorough résumé of theoretical and practical information upon the subject. 3500 w. Bos Jour of Com—Feb. 29, 1896.

Belt Driving. John Tullis. Read at the West of Scotland Technical College Scientific Society. Deals with the manufacture, use, care, speed, etc., of belts, and subjects related. Serial. Prac Eng—March 18, 1898.

Belt Experiments. A general review of results obtained by various experimenters, including experiments of Morin, Briggs and Towne, Leloutre, Lewis, Lanza, Fauquier, and the recent experiments at Lille. 2000 w. Bos Jour of Com—Feb. 8, 1896.

Belts. Horace K. Sharpe. Suggestions for their care and regulation. The size of the pulley and speed of the belt in relation to the transmission of power, etc. 2500 w. Engr, U. S. A.—Sept. 15, 1899.

Rope and Belt Transmission. V. Dubreuil. Abstract of a paper read before the Society of the Civil Engineers of France. Treats of diameters of pulleys and ropes; linear velocity; distance between pulleys; position of slack and tight strands; ratio of pulleys; kind of ropes; number of ropes; sectional area of ropes; wear of cables at work; balancing pulleys; shafting and bearings; shape of grooves; oiling ropes; friction of ropes and belts. A very practical discussion. 2300 w. Prac Eng—Dec. 6, 1895.

Rules for Belting. Calls attention to rules that should be observed to obtain the greatest economy and most satisfactory results. Serial. Engng Mech—March, 1897.

Rules for Belting. Presents conclusions arrived at from practical rather than theoretical considerations with a view to drawing out discussion. A nine years' experiment in belting in the machine shop of the Midvale Steel Co., Phila., is given. 3000 w. Engng Mech—May, 1897.

Rules Governing the Width of Leather Belting. J. J. Flather. Considers the problems of belting, the things to be considered in determining the size of belts, tests of strength, durability, cost, and related matters. 3500 w. W Elec—June 12, 1897.

Notes on Belting. G. R. MacLeod. Describes various kinds of belting in use and gives tests of leather, rubber, cotton and other belts. 8500 w. Can Elec News—Nov., 1898.

Notes on Belting; Tests of Leather, Rubber, Cotton, and other Belts. G. R. MacLeod. From "Digest of Physical Tests." A very thorough discussion of stresses, joints, and fastenings, and of the results of tests on many specimens of many varieties of belting. 5800 w. Brick—Sept., 1898.

A Study of Leather Belting (Etude sur les Courroies de Transmission). Robert Moulin. A discussion of leather belts, particularly of their strength and adhesion. 1800 w. Revue Technique—June 10, 1900.

Notes on Belting. Fred W. Taylor. A paper presented to the A. S. M. E. three years ago, but reprinted because of its value as a complete treatise on the subject. Serial. 1st part. 4500 w. Engr, Lond—Feb. 5, 1897.

Selection, Handling and Care of Belts. Charles

H. Garlick. Some advice on this subject, giving serviceable rules for obtaining width, length, etc., and discussing the value of rubber and leather belts, and matters relating to the adjustment. 1800 w. Min & Sci Pr—Jan. 22, 1898.

**Brown & Sharpe Works.**—Distribution of Power at the Works of Brown and Sharpe. Ill. A good study in belts and belting practice. 700 w. Ir Age—Jan. 2, 1896.

**Centrifugal Tension.** — See **ROPES—Centrifugal Tension.**

**Dressing.**—A New Belt Dressing. Extracts from a report of R. C. Carpenter in regard to tests recently made of a new dressing made by the Cling-Surface Manufacturing Co., of Buffalo, to determine the effect of running with and without the preparation under the various conditions of loading. 900 w. R R Gas—May 5, 1899.

Effect on Transmitting Power of Belts of Dressing with Special Materials. R. C. Carpenter. A report of Sibley College Tests, showing that carrying capacity of a belt may be very much increased by dressings. Ill. 1600 w. Sib. Jour of Engng—Dec., 1899.

**Friction Losses.**—Transmission of Power. M. W. Danielsen. The losses due to friction in belt driving are shown to be much larger than are generally supposed, and practical suggestions for reducing them are presented. 600 w. Age of St—June 13, 1896.

**Horse-Power.**—Rules for Determining the Horse-Power of Belts. Abstract of a paper read by John J. Flather before the North-West Ry. Club. A practical discussion of the belting problem, with rules and tables for making all necessary calculations. 2500 w. Mach, N. Y.—April, 1899.

The Horse-Power of Belting. Rules for computing the horse-power which can be safely transmitted by a given belt, etc. 1000 w. Power—Jan., 1899.

**Lacings.**—Odd Belt Lacings. B. F. Fells. Twelve unusual varieties of lacing are illustrated and the method of making each described. 500 w. Am Mach—May 28, 1896.

**Laying Out.**—Laying Out Belting. Thomas Hawley. To drive shafting in various positions. Illustrated description of the various ways in which belting is applied in use and methods of laying out work in their application are presented. 2200 w. Bos Jour of Com—May 2, 1896.

**Length.**—Length of Belts. A demonstration of the ways of solving the problem. 1200 w. Prac Engr—Feb. 16, 1900.

**Lille Experiments.**—Report on the Lille Experiments on the Comparative Efficiency of Ropes and Belts for the Transmission of Power. Abstract of a paper read before the Inst. of Mech. Engs., and translated by David S. Copper. 2500 w. Engr, Lond—Dec. 13, 1895.

The Comparative Efficiency of Belts and Ropes. M. E. A critical review of the experiments carried out by the Société Industrielle du Nord de la France, at Lille. 1400 w. Am Mach—Jan. 30. 1896.

**Machine-Shop.**—Machine-Shop Belts. E. J. Armstrong. Suggestions concerning the care and attention needed to secure the maximum output. 1000 w. Am Mach—April 12, 1900.

**Tensions.**—The Variation of Belt Tensions with Power Transmitted. William S. Aldrich. The purpose of the paper is to open a discussion on questions relating to belt tensions. Gives the writer's conclusions drawn from experiments. 2000 w. Trans Am Soc of Mech Engs, No. 802—Nov., 1898.

**Tension and Power.**—Relation Between the Initial Tension and Power Transmitted by a Belt. F. L. Emory. Formula for finding the initial tension on a belt when still, in order to transmit or develop a certain work when running, with graphical illustrations. 500 w. Trans Am Soc of Mech Engs—May, 1899.

**Tests.**—Tests of Leather Belting. Charles H. Benjamin. These tests relate to the strength and elasticity of belting, without reference to strength of lacings. 900 w. Am Mach—Nov. 14, 1895.

**Wide.**—The Wide Belt Heresy. W. L. Cheney. The belief that a wide belt on a wide pulley exerts greater friction than a narrow one, other things being equal, is the "heresy" herein combatted. 1000 w. Mach, N. Y.—Sept., 1896.

**Width.**—A New Formula for Determining the Width of Leather Belting. John J. Flather. Presented before Sec. D, Am. Assn. for the Advancement of Science, Detroit. Gives formula with additional information. 2200 w. Am Mach—Oct. 28, 1897.

**BENZINE MOTOR.**

See **GASOLINE ENGINE; GASOLINE LOCOMOTIVE; MOTOR CYCLE—Benzine.**

**BENZOL.**

Benzol and Its Value as an Illuminating Agent (Das Benzol und Seine Bedeutung als Leuchtstoff). Discussing especially the value of benzol as an enriching material for poor gases. 6000 w. Glückauf—May 15, 1897.

The Importance of Benzol as an Illuminant. Dr. Kramer. Abstract of a communication to the Verein fur Gewerbefleiss. Discusses the recovery and purifying of benzol, and its value as an illuminant. 2400 w. Jour Gas Lgt—June 22, 1897.

**BESSEMER.**

A Metallurgical Revolutionist. Brief review of the life and many inventions of Sir Henry Bessemer. 1500 w. Transport—March 18, 1898.

Sir Henry Bessemer. Sketch of his life and work. 2200 w. Engr, Lond—March 18, 1898.

Sir Henry Bessemer and His Work. Reviews his career. 2000 w. Jour Gas Lgt—March 22, 1898.

The late Sir Henry Bessemer. An account of the interesting career of this well-known metallurgist, with portrait. Ill. 6000 w. Ir & Coal Trds Rev—March 18, 1898.

The Late Sir Henry Bessemer. Biographical sketch with some of the episodes of his career. 3500 w. Engng—March 18, 1898.

See also **BESSEMER PROCESS—Invention.**

**BESSEMER PROCESS.**

See also **STEEL MANUFACTURE; STEEL WORKS.**

The Bessemer Process (Der Bessemer Process). A review of the present status of the Bessemer process, presented at the Düsseldorf Convention by Herr Mals. 2500 w. Stahl und Eisen—May 15, 1897.

The Manufacture of Bessemer Steel. Brief description, illustrated by a view in a continental works, from "Black and White." 1100 w. Sci Am Sup—April 18, 1896.

**Basic.**—The Basic Bessemer Process. Extracts from a German circular on the importance of basic steel. Germany has contributed about half the world's production. 800 w. Ind & East Eng—Oct. 19, 1895.

Regulating the After-Blow in the Basic Process. The article recommends the reduction of time in the after-blow in the basic Bessemer converter, thus reducing the quantity of iron in the slag and increasing the dephosphorisation. 800 w. Ir & Coal Trds Rev—Jan. 31, 1896.

The Basic Blow. F. E. Thompson. The conditions and method of working are ably described, much data derived from practice being given; the regulation of temperature is fully treated. 3400 w. Ir Age—Dec. 19, 1895.

**See also STEEL WORKS—Troy Basic Bessemer.**

**Cupola Practice.**—Concerning Cupola Practice in Bessemer Steel Works. S. M. Rodgers. Read and discussed before the Pittsburg Found. Assn. Considers the circumstances and conditions governing the manipulation of the cupola in the Bessemer steel works. 3000 w. Ir Trd Rev—June 21, 1900.

The Cupola Practice in Bessemer Steel Works. S. M. Rodgers. Considers the circumstances and conditions governing the proper manipulation of the cupola. 1800 w. Foundry—Aug., 1900.

**Flame Spectrum.**—The Spectrum of the Bessemer Flame and the Hardening of Steel. John Parry. A correspondent's discussion of Prof. Hartley's paper on "Thermo-Chemistry of the Bessemer Process." He gives some results of his own researches on the effect of temperature on the spectrum of iron, says that iron is not a simple element, and discusses Mr. Howe's paper on "The Hardening of Steel." 800 w. Engng—Nov. 8, 1895.

**Hot Blast.**—The Use of Hot Blast in the Bessemer Process. J. Wilbrough. Read before the Ir. and Steel Inst. On the advantage of the use of the hot blast for the basic Bessemer process and for small converters. 2000 w. Col Guard—May 5, 1899.

**Invention.**—Historical and Technical Sketch of the Origin of the Bessemer Process. Sir Henry Bessemer. A brief account of the early origin of the Bessemer process of steel manufacture as developed at the bronze powder manufactory in London. Ill. 6000 w. Am Soc of Mech Engs—Dec., 1896.

"The Invention of the Bessemer Process." Jos. D. Weeks. An answer to the criticisms on the address of the writer in which he claimed that the honor of the invention belonged to William Kelly. 2500 w. Am Mfr & Ir Wld—May 29, 1896.

The Invention of the Bessemer Process. An interesting letter from Sir Henry Bessemer, replying to a paper read by Mr. J. D. Weeks before the Am. Inst. of Min. Engs. He shows how Mr. Kelly, who it is claimed conceived the present Bessemer process, never produced any successful results and therefore invented nothing. 5000 w. Ir St Trds Jour—March 21, 1896.

The Invention of the Bessemer Process. Editorial discussing Bessemer's claim to the honor of inventing the process that goes by his name, in opposition to the assertion of the president of the American Institute of Engineers that he was not the original inventor,—the real inventor being an American named Kelly. 3000 w. Engng—March 27, 1896.

The Invention of the Bessemer Process. Joseph D. Weeks. Portions of the presidential address at the Pittsburg meeting, Feb., 1896, which have historical value. Ill. 3500 w. Trans Am Inst of Min Engs—May, 1897.

The Inventor of the Bessemer Process. Editorial review and criticism of the claims made for William Kelly as the original inventor of the Bessemer Process, by J. D. Weeks in the annual address of the American Institute of Mining Engineers, and also a review and approval of Sir Henry Bessemer's answer to Mr. Weeks. 1400 w. Ry Age—April 11, 1896.

William Kelly's Own Account of His Invention of the Pneumatic Process. An account prepared by Mr. Kelly in 1884 for incorporation in the "History of the Manufacture of Iron in All Ages." 1500 w. Bull the Am Ir & St Assn—June 1, 1896.

**Small Converters.**—Small Bessemer Plants for Steel Castings (Die Klein-Bessemerei für Stahlformguss und Temperguss). Carl Rott. A description of the use of small Bessemer converters, of less than 1000 pounds' capacity, for use in making steel castings for general purposes. Details of operation are given, and the increasing use of such furnaces predicted. 3500 w. Zeitschr d Ver Deutscher Ing—Feb. 3, 1900.

**Thermo-Chemistry.**—The Thermo-Chemistry of the Bessemer Process. Noel Hartley. Gives an outline of the process and its modifications, and an account of the phenomena observed while the process is in operation. Illustrates and describes various converters. 3 parts. 7000 w. Jour Soc of Arts—July 8, 15, 22, 1898.

Thermo-Chemistry Study of the Refining of Iron. Honoré Ponthière. The object of the paper is to explain, as far as possible, from existing analytical and thermo-chemical data, the phenomena which occur during a blow in a converter. 1200 w. Ir & Coal Trds Rev—Aug. 13, 1897.

**United States, Southern.**—The Bessemer Process. A M. Shook. The ability of the South to manufacture steel is demonstrated. 2500 w. Tradesman—Jan. 1, 1897.

**Walrand-Legenisel.**—The Latest in "Baby Bessemer" Practice. H. L. Hollis. Synopsis of a paper entitled "Notes on the Walrand-Legenisel Process for Steel Castings," read at the Pittsburg meeting of the Amer. Inst. of Min. Engs. 1200 w. Ir Trd Rev—Feb. 27, 1896.

Notes on the Walrand-Legenisel Steel-Casting Process. H. L. Hollis. Brief statement of process with some recent changes in practice. 1700 w. Trans Am Inst of Min Engs—July, 1896.

The Walrand-Legenisel Process. H. L. Hollis. Read at the Pittsburg meeting of the Am. Inst. of Min. Engs. This consists essentially in adding ferrosilicon at the time the flame drops in a Bessemer converter and making an after-blow, with the idea of preventing blow-holes in castings. 1500 w. Ir Age—March 5, 1896.

The Walrand-Legenisel Steel-Casting Process. H. L. Hollis. Gives some details of the process, which is practically an addition to the Bessemer process, giving quiet and more fluid steel, and furnishes information regarding physical properties of the metal obtained. From a paper read before the Am. Inst. of Min. Engs. 1700 w. Col Guard—Aug. 7, 1896.

### BEVEL GEAR.

See **BICYCLE—Chainless; GEAR—Bevel; GEAR CUTTER.**

### BICYCLE.

The First Bicycle. From "La Nature." Illustrated description of machines of 1819, with historic data from book of M. Baudry de Saunier. 600 w. Sci Am Sup—Nov. 21, 1896.

The Bicycle. Illustrated history, beginning with the tandem wheeled hobby-horse of the last century. 1800 w. Sci Am—July 25, 1896.

The Evolution of the Cycle. W. K. Starley. Introductory remarks upon locomotion generally, followed by a revival of the types of cycles, describing the principles and parts of the machine which are still in use to-day. Discussion. 12000 w. Jour Soc of Arts—May 20, 1898.

The Evolution of the Safety Bicycle. Historical review of the progress of the rear driven chain geared safety. Ill. 2800 w. Ir Age—April 1, 1897.

The Form and Construction of Bicycles (La Bicyclette. Historique,—Forme—Construction). A general account of the development of the bicycle from the early hobby-horse to the modern machine, with many illustrations. 700 w. Three articles. Génie Civil—May 28, June 4, 11, 1898.

**Brake.**—See **BRAKE—Bicycle.**

**Chains.**—Bicycle Chains. George H. Waltman. Gives illustrated description of the different chains, and their strength as determined by experiment. 1800 w. Mach, N. Y.—July, 1899.

**Chainless.**—Chainless Bicycles. Howard Lee Davis. Describes the difficulties overcome, the construction, and tests made. Ill. 2000 w. Yale Sci M—Jan., 1898.

Chainless Bicycles (Les Machines sans Chaine). Illustrated description of the Drzewiecki bicycles and tricycles, in which the chain is replaced by internal gear and pinion. 1000 w. Le Génie Moderne—Feb. 15, 1897.

The Chainless Bicycle. Report of the efficiency tests by Professor Denton, made for the Pope Manufacturing Co., giving detailed data, method, description, etc., with general conclusions. 4500 w. Ir Age—Oct. 21, 1897.

The Columbia Chainless Bicycle. Illustrated description of the mechanical details of the driving gear, and of the machine which has been designed for cutting the epicycloidal teeth of the bevel gears. 1200 w. Sci Am—Oct. 30, 1897.

The Columbia Chainless. Russell Stone. Illustrated description and the history of the invention. 4500 w. McClure's Mag—Nov., 1897.

The Tuttle Chainless Bicycle. Illustrated description of a bicycle embodying unique and ingenious features. 1000 w. Ir Age—Sept. 2, 1897.

**Design.**—Some Comments on the Essentials of Bicycle Design. E. H. Ehrman. Discusses points in design and new features, giving special attention to bearings, driving gear and frame. Ill. 6000 w. Technic—1897.

**Efficiency.**—Bicycle Efficiency Tests. A. H. Eldredge and G. B. Preston. A description of the method of testing, with a comparison of the efficiency of different types of bicycles under various conditions, and the relative efficiency of solid, cushion and pneumatic tires. Ill. 4000 w. Mach, N. Y.—July, 1898.

The Efficiency of Bicycles. R. C. Carpenter. Part first explains the meaning of the term "efficiency" as used, and discusses the efficiency of bearings and of driving mechanism, giving diagrams. Serial. Engng—Aug. 19, 1898.

Conclusions Deducted fro Efficiency Tests of Bicycles. R. C. Carpenter. Explains the meaning of "efficiency" as here used, gives various tests which show little loss of power in the ball bearings, great loss in the tire, and considerable in the gearing. 2400 w. Sib Jour of Engng—Jan., 1898.

The Efficiency of Bicycles. R. C. Carpenter. Discussing the efficiency as a machine, dynamometer tests, etc. Ill. Serial. Sib Jour of Engng—Nov., 1899.

The Efficiency of the Bicycle. Robert H.

Fernald. A study of the bicycle as a machine, calling attention to interesting points in connection with its efficiency. Ill. 2500 w. Jour Assn of Engng Socs—March, 1899.

Tests of the Efficiency of the Bicycle. Jno. G. D. Mack. Trans Am Soc of Mech Engs—Vol. XVIII.—May, 1897.

**Folding.**—See **Military.**

**Gears.**—Changes of Speed for Bicycles. E. Hospitalier. A study of gears, examining the principal solutions of the problem so far as they have received practical sanction. 1500 w. Sci Am—Jan. 16, 1897.

The Running Gear of Bicycles (Die Bewegungsmechanismen des Fahrrades). R. Frank. A general detailed discussion of the various portions of bicycle driving gear. The first portion is devoted to the theory and practice of ball-bearing construction. Serial. Zeitschr d Ver Deutscher Ing—Jan. 27, 1900.

**Mechanics.**—Cycle Mechanics. H. K. Landis. The statics and dynamics of cycle propulsion, weight, distribution, strength of parts, center of gravity, traction, work done, etc. 3300 w. Sci Am Sup—Aug. 22, 1896.

Relation between Forward Movement and Lateral Inclination of a Bicycle (Relation qui Existe, dans la Bicyclette roulant sur un Sol Horizontal, entre la Mouvement de Progression et le Mouvement d'Inclinaison). J. Boussinesq. A. mathematical study of this relation which is finally defined in a differential equation of the second degree. 1200 w. Comptes Rendus—Nov. 28, 1898.

**Military.**—The Bicycle as a Vehicle and in Military Service (Das Fahrrad als Verkehrsmittel und im Heeresdienst). Giving an account of the extent to which the bicycle has already been adopted in various armies, with suggestions for future use. 4500 w. Stahl und Eisen—July 15, 1897.

The Bicycle for War Purposes. B. F. S. Baden-Powell. Discusses its uses, the best type of machine, and the equipment required. Ill. 8000 w. Jour U S Art—July-Aug., 1899.

The Folding Military Bicycle. From "La Nature." Particulars and illustrations of recent improvements in this machine. 900 w. Sci Am Sup—May 20, 1899.

**Pedal Power.**—The Power Transmitted by a Pedal. Adapted from an article in "L'Industrie Velocipédique et Automobile." Gives experiments and results. 1200 w. Auto Jour—Nov., 1899.

**Pedal Screw Threads.**—A Question in Mechanical Design. R. W. King. The question discussed relates to screw threads of bicycle pedals. Which side of the bicycle should be the pedal with the left hand thread? 1000 w. Can Eng—July, 1896.

**Spoke Tension.**—Tension of Spokes in Bicycle Wheels. D. W. Hering. A study of this subject, examination being made of the wheels of five high-grade machines. 2000 w. Eng News—Aug. 12, 1897.

**Steering.**—On the Steering of the Bicycle. G. T. McCaw. An investigation of the causes which affect steering, with a view to determining the best design of the steering head. 2000 w. Engr, Lond—Dec. 9, 1898.

**Transportation.**—The Carriage of Bicycles. Editorial comment giving both sides of the question. 1300 w. R R Gaz—Feb. 28, 1896.

**Weight.**—The Increasing Weight of the Bicycle. Editorial comment on the increase in weight of American wheels, considering it a distinctly retrograde step. 1400 w. Sci Am—Aug. 27, 1898.

**Women's.**—The Women's Bicycle and Its Predecessors. E. D. Sewall. Illustrated historical account of the development of the bicycle, especially as used by women. Serial. Ir Age—May 6, 1897.

## BICYCLE EXHIBITION.

**Stanley Show, London.**—Cycles and Motor Cars at the Stanley Show. Editorial review of the exhibits, noting the novel features. 4200 w. Engng—Nov. 24, 1899.

Some Lessons of the Stanley Show. Joseph Horner. Comments on the exhibits of machinery for bicycle-making being confined to American firms and discusses the reasons. 3000 w. Engng—Dec. 3, 1897.

The Stanley Cycle Show. Comments on the features of the machines shown, and on points needing attention in the design of bicycles and in their use. 3000 w. Engng—Nov. 26, 1897.

## BICYCLE INDUSTRY.

**United States.**—The Cycle Industry in the United States. From the "London Times." An interesting article showing the surprising development of this industry. 2000 w. Cons Repts—Dec., 1896.

## BICYCLE MANUFACTURE.

Cycle Construction and Design. Archibald Sharp. This first lecture deals with the construction and design of the frame of the present-day type. Serial. Ill. Jour Soc of Arts—Aug. 18, 1899.

Machinery and Tools for Bicycle Construction (Maschinen und Geräte zur Herstellung von Fahrrädern). With numerous illustrations of special devices for bicycle manufacturing and assembling, mostly from American sources. Serial. Zeitschr d Ver Deutscher Ing—Oct. 2, 1897.

Points in Cycle Construction. F. J. Osmond. Synopsis of a paper read at recent meeting of the Inst. of Mech. Engs. at Birmingham, Eng. Importance of rigidity, factor of safety, design, etc., are considered. 1200 w. Ir Trd Rev—Aug. 19, 1897.

Some points in Cycle Construction. F. J. Osmond. Read before the Inst. of Mech. Engs. Considers the causes of inefficiency to be want of rigidity and friction. Discusses also the factor of safety, large tubes, aluminum frames, testing of tubes, chain stays, gear and crank length, etc. 4000 w. Engr, Lond—July 30, 1897.

Some points in Cycle Construction. F. J. Osmond. From a paper read before the Institution of Mechanical Engineers, England. Considers friction and rigidity in their relation to the efficiency, and discusses points affecting these. 3300 w. Am Mach—Nov. 18, 1897.

**American.**—The American Bicycle: Its Theory and Practice of Construction. Leonard Waldo. An interesting consideration of bicycle manufacture, especially the question of chain versus chainless driving. Discussion follows. 6000 w. Jour Soc of Arts—Dec. 3, 1897.

**Brazing.**—Bicycle Brazing. Hugh Dolnar. Illustrated description, with historical review of the art. 2400 w. Am Mach—Nov. 19, 1896.

**Handle-Bar Bending.**—Handle-Bar Bending. Hugh Dolnar. Illustrated description of current methods. 1000 w. Am Mach—Nov. 5, 1896.

**Hydraulic Jointing.**—Machinery for Hydraulic Jointing. Illustrated detailed description of the machinery of this system of cycle frame making as manufactured by Johnson & Philips, of Charlton, Kent. 900 w. Engr, Lond—Feb. 18, 1898.

**Machining Forgings.**—Machining Cycle Forgings. Onondaga. A description in detail of the method of machining the bottom bracket forgings, and the proper method of designing the forgings is illustrated and described, also tools and special jigs used. Serial. Mach—Jan., 1897.

**Magnetic Chucks.**—Magnetic Chucks for Bicycle Work. Illustrated description of a device intended especially for chucking bicycle parts such as cups, cones, etc., while being ground after hardening. 500 w. Am Mach—April 29, 1897.

**Press and Die Work.**—Press and Die Work on Bicycles. An illustrated outline of the general principles. 2300 w. Am Mach—Nov. 26, 1896.

**Rear-Fork End.**—A Rear-Fork End—How to Make It. W. A. Warman. Illustrated detailed description. 600 w. Am Mach—Sept. 2, 1897.

**Rim-Drilling.**—Automatic Rim-Drilling Machine. Describes a machine designed for making wooden rims for bicycle wheels at a very rapid rate. Ill. 700 w. Am Mach—Sept. 30, 1897.

**Sprocket.**—Laying Out Bicycle Sprockets. A. L. Bowen and F. H. Bullard. An important practical article, illustrated with diagrams, and showing that this mechanism can not be laid out analogously with the teeth of spur-gearing, with good results. 1600 w. Am Mach—Aug. 27, 1896.

**Sprocket Wheel Machine.**—Machine for Shaping Sprocket Wheels by Broaching. Illustrated description of a machine for broaching all the teeth of a bicycle sprocket wheel at one stroke. 400 w. Am Mach—July 30, 1896.

Sprocket-Wheel Finishing Machine. Illustrated description of a machine designed for boring, tapping, facing, and forming sprocket wheels for bicycles, but adapted to other work of like nature. 600 w. Am Mach—Nov. 4, 1897.

**Stampings.**—Cycle Stampings. Hugh Dolnar. Illustrated description of work and one set of tools of Matthews Co., of Seymour, Conn. 2800 w. Am Mach—Dec. 17, 1896.

**Steel Tubing.**—See **TUBE MANUFACTURE —Steel Bicycle.**

**BICYCLE PATENTS.**

Patents and the Bicycle. E. Ralph Estep. On the worthlessness of many patented appliances. 1600 w. Ir Age—Nov. 18, 1897.

**BICYCLE TRACKS.**

See also **CYCLE WAY.**

**Inclination.**—Effect of Different Speeds and Radii of Curves Upon the Inclination of Bicycle Tracks. John C. Quade. Describes existing tracks and their construction, discusses the theory of bicycle-track construction, and considers the Garfield Park track in Chicago. and the Racine, Wis., track. 3000 w. Jour W Soc of Engs—April, 1899.

**Manhattan Beach.**—Race Track of the National Cycle & Athletic Club at Manhattan Beach, L. I. A full description, including a general view, plan and sections. The track is a model bicycle racing track designed for high speed. 2000 w. Eng News—March 19, 1896.

**BICYCLE TRADE.**

The Cycle Market. G. Lacy Hillier. Briefly reviews the history of the development of the bicycle and the causes of the overproduction, predicting a severe crisis in the near future. 3000 w. Contemporary Rev—Aug., 1897.

**American Exports.**—American Bicycles and Vehicles in England. Extracts from the annual report of Consul Halstead, of Birmingham, concerning the bicycle business. Discusses the condition of the market in England, the status of the English manufacturer, etc. 4000 w. U S Cons Repts, Vol. LIX.—Feb., 1899.

Reports on Bicycles. Information in the interests of trade concerning Norway, China, and Korea. 2000 w. Cons Repts, No. 125—May 26, 1896.

The Export of American Bicycles and Tires. The encouraging outlook for this industry, with table of details of bicycle exports from New York for the three months ending June 30, 1896. 1600 w. Ind Rub Wld—July 10, 1896.

**BICYCLE WORKS.**

**Elmira, New York.**—A Trip Through a Large Bicycle Factory. Illustrates the design and manufacture of bicycles as carried out at the factory of the Eclipse Bicycle Company, of Elmira, N. Y. 2000 w. Sci Am—Nov. 6, 1897.

**Pope, Hartford.**—An American Bicycle Manufactory. An illustrated detailed description of the Works of the Pope Company. Serial. Engng—July 16, 1897.

**BIDS.**

**Withdrawal.**—The Right to Withdraw Erroneous Bids. Full text of a decision by the United States Circuit Court of Appeals in the case of Moffett, Hodgkins & Clarke Co. vs. City of Rochester, which refuses to allow a contractor to withdraw a bid on the ground of mistake in the figures. 4500 w. Eng Rec—March 4, 1899.

**BILGE KEEL.**—See **NAVAL ARCHITECTURE—Bilge Keel.**

**BIN.**

**Steel.**—A Novel Design for a Steel Bin for the Storage of Coal, Grain, Sand or Cement. A. S. Berquist. Illustrates and describes the construction of a bin erected for the American Coffee Co., of Brooklyn. N. Y. 1200 w. Eng News—July 27, 1899.

**Strains.**—The Computation of Strains in Coal and Grain Bins. A number of letters presenting many diverging views, called out by an article printed in this paper, Sept. 23, 1897, with comments. 4800 w. Eng News—Nov. 4, 1897.

**BINARY-VAPOR ENGINE.**

Increasing the Efficiency of Steam Engines. Descriptions of experiments by Prof. E. Josse of Germany with a process for utilizing the heat of exhaust steam for evaporating another liquid having a lower boiling point than water. Ill. 1500 w. U S Cons Repts, No. 663—Feb. 26, 1900.

Investigations Upon the Increase of the Thermal Efficiency of Steam Engines (Versuche sur Erhöhung des Thermischen Wirkungsgrades der Dampfmaschinen). A review of the studies of Professor Josse, of Berlin, with details of the investigations, and indicator diagrams from the 40 h. p. experimental engine. 2500 w. Glückauf—Dec. 16, 1899.

The Behrend-Zimmermann Binary-Vapor Engine. A description of an engine invented by G. Behrend and Dr. Zimmermann, and improved by Prof. Josse, in which the heat of exhaust steam evaporates sulphurous acid and the cold vapor thus generated does work in an auxiliary cylinder amounting to half the power developed in the steam cylinders. 1100 w. Eng Rec—May 5, 1900.

The Behrend-Zimmermann Cold Vapour Engine (Die Behrend - Zimmermannsche Kaltdampfmaschine). An account of Prof. E. Josse's experiments with an engine in which the heat of the exhaust steam is utilized in evaporating another liquid having a lower boiling point than water. 1400 w. Stahl und Eisen—April 15, 1900.

The Binary-Vapor Engine. R. H. Thurston. Gives the recent experiments by Prof. Jorn, described by Mr. Frank Mason, commenting on the results, and giving additional information. Ill. 2000 w. Sib Jour of Engng—April, 1900.

**BISMUTH.**

**New South Wales.** Bismuth Ores in New South Wales. J. A. Watt. Gives some of the characteristics and uses of this comparatively rare metal, with a list of the localities in New South Wales from which bismuth ores have been recorded. Serial. 1st part. 3800 w. Aust Min Stand—May 4, 1899.

**Tasmania.**—Bismuth Ores in Tasmania. E. M. Weston. Part first describes the Belmont district as regards the local conditions and deposits. Serial. Aust Min Stand—Nov. 9, 1899.

**BISULPHIDE OF CARBON ENGINE.**

The Bennett Bisulphide of Carbon Engine. Lucius T. Stanley. Descriptive of an engine arrangement, designed by J. R. Bennett, of Philadelphia and being introduced by the Giant Power Co. Ill. 1200 w. Elec Eng—Jan. 1, 1896.

**BITUMEN.**

See also **ASPHALT; PETROLEUM; SHALE OIL.**

**California.**—Phenomena Attending the Accumulations of Bitumen. A. S. Cooper. Describes phenomena observed in California. Ill. Serial. Min & Sci Pr—Dec. 2, 1899.

The Technology of California Bitumens. S. F. Peckham. Facts relating to this vast accumulation, showing them to be of value, and reporting investigations and conclusions. 40000 w. Jour Fr Inst—July, 1898.

**BITUMINOUS ROCK.**

**California.**—A Bituminous Rock Deposit in Santa Barbara County, California. A. S. Cooper. Illustrated description showing why it is difficult to locate with any great certainty a subterranean it is difficult to locate with any great certainty reservoir of petroleum. 1500 w. Eng & Min Jour Sept. 3, 1898.

**BITUMINOUS SCHIST.**

See **SHALE OIL.**

**BITUMINOUS SHALE.**

See **SHALE OIL.**

**BLACKSMITHING.**

**Railway.** — Kinks in Blacksmithing on the Louisville & Nashville Railroad. Description with illustrations, of special methods in use. 2500 w. Loc Engng—Dec., 1897.

**BLACKSMITH SHOPS.**

**Modern.**—Modern Blacksmith Shops. S. H. Stupakoff. An account of the progress and changes, the tools used, etc. 2500 w. Ir Trd Rev—May 11, 1899.

**BLAST.**

**Cupola.**—See **CUPOLA—Blast.**

**Water.**—See **COMBUSTION—Steam Jet; FORGE—Water Spray Blast; WATER BLAST.**

**BLAST FURNACE.**

See also **IRON MANUFACTURE; IRON WORKS; PIG IRON; STEEL WORKS.**

Forty Years of Progress in the Pig Iron Industry. John Birkinbine. A large part of the article is devoted to the development of blast furnaces, giving diagrams of the types of 1855, 1890, and 1895. 5000 w. Ir Age—Jan. 2, 1896.

Blast Furnaces. Past and Present. Part first reviews briefly the past history of this industry. 1600 w. Ir & St Trds Jour—July 4, 1896.

The Evolution of the Blast Furnace. A. H. Sexton. Abstract of a paper communicated to the Philosophical Society of Glasgow. Historical review of progress. 2000 w. Col Guard—Feb. 3, 1899.

The Evolution of the Blast Furnace. A. H. Sexton. Extract from a paper read before the Phil. Soc. of Glasgow, showing how modern methods of iron production are related to the ancient methods. 1400 w. Mines & Min—Dec. 1899.

Modern Blast-Furnace Practice and the Pig-Iron Manufacture of Different Countries. Presidential address of E. Windsor Richards before the Inst. of Mech. Engs. An interesting record of the competitive circumstances of the leading iron making countries of the world in reference to this branch of the iron trade, and supplying facts of value to all who are concerned in this industry. Serial. Ir & Coal Trds Rev—May 1, 1896.

Modern Blast Furnaces and Production of Iron in Various Countries. Translated from a continued article in "La Métallurgie. The first part deals with the subject as related to the United States, Germany and Luxemburg. 2200 w. Col Guard—Sept. 4, 1896.

**Alabama.**—A Furnace Plant in Alabama. "Englasia." Well illustrated description of furnace, coking ovens, hoist and cars. 900 w. Foundry—Feb., 1896.

Alabama Furnace Burdens. William B. Phillips. Comments upon the frequent change of burden as an unfavorable feature in Alabama practice. 2000 w. Ir Trd Rev—Aug. 20, 1896.

**American Practice.**—American Blast Furnace Practice. Jno. L. Stevenson. The first paper gives particulars, with drawings, of a blast furnace plant for a minimum nominal make of 200 tons per day of twenty-four hours per furnace, from ores containing 50 per cent. of iron for which the furnaces were designed. Specifications of a plant of two furnaces built in the United States. Serial. Engr, Lond—July 10, 1896.

American Blast Furnace Practice. A reply to the statement made by John L. Stevenson, in the "Engineer," London, that the methods used in this country have not been very successful when adopted in England. Followed by illustrated description of furnace which has given excellent results. 900 w. Am Mfr & Ir Wld—Oct. 23, 1896.

**American vs. British.**—American and English Blast Furnace Practice. J. Stephen Jeans. Showing the growth of the system of intensified production. 3300 w. First paper. Eng Mag—April, 1897.

American and British Blast Furnace Practice. J. Stephen Jeans. Showing comparative labor costs in the United States and Europe. Second paper. 4400 w. Eng Mag—May, 1897.

Comparison of American and British Blast Furnace Practice. T. B. Rogerson. Read before the West of Scotland Ir. and Steel Inst. Describes the methods of work in Scotland and the United States, and form a comparison. 4000 w. Col Guard—March 16, 1900.

**Blast Temperature.**—The Equalization of the Varying Temperatures of Hot Blast. Lawrence F. Gjers and Joseph H. Harrison. Read before the Iron and Steel Inst. Illustrated description of apparatus which delivers the blast at an even mean temperature. 1300 w. Col Guard—May 11, 1900.

**British Capacity.**—The Capabilities of Our Blast Furnace Plant. Though the number of furnaces has decreased in England, the productive capacity has increased; but this capacity is much greater than the actual production. 1100 w. Ir & Coal Trds Rev—Nov. 22, 1895.

**Burdens.**—On Blast Furnace Burdens. Walter Macfarlane. Read at the Dudley meeting of the South Staffordshire Iron & Steel Inst. Discusses various problems in the making of pig iron. 2200 w. Ir & Coal Trds Rev—Nov. 3, 1899.

**See also Alabama Burdens.**

**By-Products.**—The By-Products of the Blast Furnace. A Humboldt Sexton. The importance of the blast furnace in the industries; the vastness of the material which they consume and reproduce in another form; a study of what goes on in the furnace; value and use made of the by-products; with history of the pioneers of the recovery process. 4500 w. Phil Soc of Glasgow—1896.

The Recovery of By-Products of the Blast Furnace. A. Humboldt Sexton. A review of the various methods employed for the recovery of pitch, oil, paraffin and sulphate of ammonia from the discharge gases of blast furnaces; with reference to the practical operation of plants in the West of Scotland. 3500 w. Eng Mag—March, 1898.

**See also BLAST FURNACE GAS.**

**Calcined Lime.**—Shall We Use Calcined Lime in the Blast Furnace? O. W. Davis. Facts developed from the discussion of this subject in England. 1500 w. Am Mfr & Ir Wld—Oct. 9, 1896.

**Carbon-Brick.**—Note on Carbon-Bricks in the Blast Furnace. R. W. Raymond. The bricks have proven quite satisfactory but have not been used long enough to determine the life. 600 w. Trans Am Inst of Min Engs—Feb., 1896.

**Charcoal.**—Most Modern of Charcoal Furnaces. Complete description of furnace, stoves, dust catcher, charcoal ovens, well illustrated by sections, plans and views. The furnace is 60 ft. high with 12-ft. bosh. Ill. 1900 w. Ir Trd Rev—Jan. 2, 1896.

**Compressed Air.**—See **COMPRESSED AIR —Blast Furnace Plant.**

**Construction.**—Progress in Blast Furnace Construction. W. O. Amsler. Improvements in design and construction are reviewed, with description of the furnace as at present constructed, and improvements coming into use. 4000 w. Sib Jour of Engng—Nov., 1896.

**Dauber's Gas.**—Dauber's Gas Blast Furnace. Illustrated description. 350 w. Am Mfr & Ir Wld—Aug. 21, 1896.

**Dover, Ohio.**—Notes on Six Months' Working of Dover Furnaces, Canal Dover, Ohio. Arnold K. Reese. A statement of unusual results obtained during a period of six consecutive months, giving conditions and figures. Ill. 1800 w. Trans Am Inst of Min Engs—Nov., 1897.

**Duquesne, Pa.**—The Duquesne Furnaces of the Carnegie Steel Company, Limited. Illustrated intersting description of this new furnace plant. 3500 w. Ry Rev—April 3, 1897.

The Duquesne Furnace Plant of the Carnegie Steel Company, Limited. Illustrated detailed description, with general plan and supplement. 5000 w. Ir Age—March 25, 1897.

**Dynamite.**—Dynamite in Blast Furnace Practice. John S. Kennedy. The method, with precautions, is described and the method of applying cartridge is illustrated. 900 w. Ir Trd Rev—Feb. 13, 1896.

**Eight Hours Day.**—Blast Furnace Men and the Eight Hours Day. Editorial discussion of the complications that arise in considering the management of blast furnaces in this connection. 2300 w. Engr, Lond—July 16, 1897.

Blast Furnace Men and the Eight Hours Day. Editorial presenting the conditions and the difficulties in solving the problem. 1800 w. Engng—July 9, 1897.

**Elba.**—See **IRON REGION—Elba.**

**Explosions.**—Note on Slips and Explosions in the Blast Furnace. F. B. Richards. Illustrated description of an explosion occuring where the ores from the Lake Superior districts are used, given in the hope that suggestions of theory as to the cause may be elicited. 800 w. Trans Am Inst of Min Engs—Dec., 1898.

**See also Top Explosions.**

**Filling.**—Note on the Forms Assumed by the Charge in the Blast Furnace, as Affected by Various Methods of Filling. Frank Firmstone. Information accumulated from careful measurements in the furnace, afterwards recorded for comparison in drawings. Most of the measurements were made at Glendon Iron Works where the fuel used was anthracite, and the ore mixtures about ⅔ New Jersey magnetic ores and ⅓ brown ores. 3500 w. Trans Am Inst of Min Engs—Aug., 1898.

**Fine Ores.**—Furnace Construction and Fine Ores. Guy R. Johnson. A letter to the editor referring to Mr. F. E. Bachman's paper on the deposition of carbon in the Mesabi ores, etc., and making suggestions aiming to overcome difficulties mentioned in the named paper. 500 w. Ir Trd Rev—May 7, 1896.

**Ford and Moncur Stove.**—The Ford and Moncur Hot-Blast Stove. Benjamin James Hall. Paper read before the Iron and Steel Inst. A description of the Ford and Moncur patent, which has given excellent results for 12 years. 1800 w. Col Guard—May 8, 1896.

**Gas.—See BLAST FURNACE GAS.**

**Handling Material.**—The Handling of Material at the Blast Furnace. Axel Sahlin. Briefly records some of the most important steps which have been taken to solve this problem, and offers a few suggestions. Ill. 7200 w. Trans Am Inst of Min Engs—May, 1897.

**See also Mechanical Charging.**

**Heat Balance.**—The Heat Balance of the Blast Furnace (L'Equilibre Calorifique du Haut Fourneau). G. Rocour. A discussion of the thermal interchanges which take place in the smelting of iron, with examples of the method of computing the thermal efficiency of the blast furnace. 12000 w. 3 plates. Revue Universelle des Mines—April, 1896.

**Heat Balance Sheet.**—Blast Furnace Heat Balance Sheet. H. H. Stoek. Translated from the French of M. de Billy's "Fabrication de la Fonte." Formulae are derived and all the heat generated in the furnace accounted for. 1000 w. Eng & Min Jour—April 11, 1896.

**Iron Shaft.**—A Blast Furnace Shaft without Brickwork. Franz Büttgenbach. Translated from the "Oesterreichische Zeitschrift für Berg-und-Hüttenwesen." The author has built furnaces with three rows of bricks and would build one having no bricks, simply an outside sheet iron casing. 900 w. Ir & Coal Trds Rev—April 3, 1896.

A New Kind of Blast Furnace Construction (Ueber eine Neue Hochofenconstruction). F. Burgers. A paper before the Verein Deutscher Eisenhüttenleute, giving an illustrated description of blast furnaces built almost entirely of iron, with only a thin lining of brick, and cooled by water flowing over the outside. Serial. Stahl und Eisen—July 1, 1900.

A New Method of Constructiug Blast Furnaces. F. Burgers. Paper read before the Verein Deutscher Eisenhüttenleute. Describes a new system in which the shaft of the furnace is made of iron instead of fire-brick. Ill. 1800 w. Ir & Coal Trds Rev—July 27, 1900.

**"Kraft," Stettin.—See IRON WORKS—"Kraft," Settin.**

**Lighting by Grates.**—Lighting of Blast Furnaces. F. Bicheroux. Prize memoir of the Liège section of the Belgian Association of Mining Engineers. Translated from "La Revue Universelle des Mines et de la Metallurgie," etc. A description of the system coming into vogue of lighting furnaces by means of grates. Serial. Col Guard—April 2, 1896.

**Lime and Magnesia Desulphurization.**—The Relative Desulphurizing Effect of Lime and Magnesia in the Iron Blast-Furnace. O. R. Foster. Describes laboratory experiments carried out in the metallurgical laboratory of Columbia University, New York, to determine the desulphurizing action of lime-magnesia silicates when fused together with sulphurous cast-iron. 1800 w. Trans Am Inst of Min Engs—Sept., 1899.

The Protection of Blast-Furnace Linings. S. S. Hartranft. Discussion of the best management, and comments on American practice. 1500 w. Trans Am Inst of Min Engs—Aug., 1900.

**Lining Destruction.**—Destruction of Blast-Furnace Lining by Carbon. F. W. Luermann. Translated from "Stahl und Eisen." Considers it due to iron pyrites in the fire clay, and the furnace gases entering the brick. 1200 w. Am Mfr & Ir Wld—March 11, 1898.

**Management.**—The Management of Blast Furnaces. E. S. Cook. An account of the writer's experiences, discussing fluxing, fuels, ores, blast, management and modern construction. 10500 w. Can Min Rev—Aug., 1898.

Management of Blast Furnaces. E. S. Cook. Lecture delivered to third year students in metallurgy in the Schools of Mines and Chemistry, Columbia University, New York. Relates the writer's experience, discussing fluxing, fuel, and ores. Serial. Ir Trd Rev—July 21, 1898.

Blast Furnace Management. F. Louis Grammer. Concerning officers and their duties, and some practical points in regard to furnace work. 5700 w. Mines & Min—Feb., 1899.

Management of Blast Furnaces—Transition from "Rule of Thumb" to Application of Scientific Methods. E. S. Cook. An account of the writer's experience, discussing furnaces, fluxing, fuel, ores, limestone, pig iron, furnace management, modern construction, etc. 10500 w. Sch of Mines Quar—April, 1898.

**Mechanical Charging.**—Projects for the Mechanical Charging of Blast Furnaces (Vorschläge zur Mechanischen Beschickung von Hochöfen). F. W. Lürmann. Various plans for traveling cranes for conveying ore, coke and flux to the mouths of two or more furnaces. 500 w. 1 plate. Stahl und Eisen—June 1, 1900.

**Metallurgy.**—The Extraction of Iron from Its Ores in the Blast Furnace. James Tomkins. From a paper read before the Derbyshire Metallurgical and Engineering Assn. Deals with the treatment of the iron ore in the furnace. 2500 w. Col Guard—Sept. 30, 1898.

**Obstructions.**—Serregas (Obstruction) in Blast Furnaces. E. Bernard. Translated from "Revue Universelle des Mines," etc. Information relating to obstructions in the body of the furnace. 1100 w. Col Guard—Sept. 25, 1896.

**Reactions.**—Blast-Furnace Reactions. Translated from the French of M. E. de Billy. Discusses the action of manganese, silicon, sulphur, phosphorus, arsenic, lead, zinc, copper, etc., in the furnace. 3000 w. Mines & Min—July, 1899.

**Scaffolding.**—Blast Furnace Scaffolds. E. Bernard. Communication made to the Engng Assn. of the Liège School, translated by H. H. Stoek. The writer thinks it possible to explain scaffolding simply by the method of fusion of blast furnace slags. 1400 w. Am Mfr & Ir Wld—Oct. 9, 1896.

**Stack.**—A Sketch of a Modern Blast Furnace Stack. A. P. Gaines. Describes and discusses briefly the blast furnace stack only. 3400 w. Eng Assn of the South—April, 1896.

**Steel from Ore.—See STEEL MANUFACTURE—Direct from Ore.**

**Top Explosions.**—Mesabi Ores and Top Explosions. F. E. Bachman. A letter giving an account of experiments made which seem to support the writer's theory that the prevention of explosions is reduced to the selection of an ore mixture not depositing an excessive amount of carbon. 600 w. Ir Trd Rev—April 23, 1896.

**United States.**—Increasing Blast Furnace Capacity. Tabulated information of the blast furnaces of the United States, with editorial. Shows the number of furnaces to have decreased greatly, while the weekly capacity has increased. 2000 w. Am Mfr & Ir Wld—Dec. 10, 1897.

Blast Furnaces, Aug. 1, 1896. A tabular statement of number, condition, fuel and output. Am Mfr & Ir Wld—Aug. 14, 1896.

Blast Furnaces, July 1, 1897. Showing the condition of blast furnaces of the United States at this date. Tables. Am Mfr & Ir Wld—July 16, 1897.

Blast Furnaces, Dec. 1, 1898. Tabulated statement of the number and capacity of furnaces in and out of blast in the United States. 1200 w. Am Mfr & Ir Wld—Dec. 9, 1898.

Condition of the Blast Furnaces of the United States, September 1, 1900. Tables giving various statistics. 1000 w. Am Mfr & Iron Wld—Sept. 13, 1900.

**Youngstown, Ohio.**—The Youngstown Blast Furnaces of the National Steel Company. An illustrated detailed description of this new furnace plant. 4000 w. Ir Age—Dec. 21, 1899.

### BLAST FURNACES GAS.

See also **GAS ENGINE.**

Blast-Furnace Gas for Gas Engines. A review of reports on the subject in various publications. 2400 w. Eng Rec—Jan. 6, 1900.

Further Progress in the Application of Blast Furnace Power Gas (Weitere Fortschritte in der Verwendung von Hochofenkraftgas). F. W. Lürmann. A paper before the Verein Deutscher Eisenhüttenleute, giving very full computations as to the mechanical and commercial economy to be expected in the use of furnace gases for motive power. Also discussion. Two articles. 15000 w. Stahl und Eisen—May 15, June 1. 1899.

Heat and Power from the Waste Gases of Blast Furnaces. F. W. Gordon. Discusses what amount of heat should be used for the blast furnace, and what would remain. Ill. 4000 w. Ir Age—Oct. 18, 1900.

New Proposals for the Utilization of Blast Furnace and Producer Gases. Description of a system now being tested for the utilization of a blast furnace as a gas producer, the production of iron being a secondary operation. 1600 w. Ir & Coal Trds Rev—Feb. 7, 1896.

On the Production and Use of Power from Blast Furnace Gas. Horace Allen. Read before the So. Staffordshire Ir. and Steel Inst. States the conditions affecting the combustion, the difficulties attending the economical application of blast-furnace gas for raising steam, reviewing the objections made to gas engines in iron works, etc. 2500 w. Ir & Coal Trds Rev—April 27, 1900.

On the Use of Blast Furnace Gas for Motive Power. Adolphe Greiner. Read before the Iron and Steel Inst., England. A summary of investigations that have been made in this field, with the advantages accruing from the use of gas. 2500 w. Ind & Ir—May 13, 1898.

On the Utilization of Blast Furnace Gases by Means of the Gas Engine. William Galbraith. Results of the working at Wishaw, Scotland. 2700 w. Prac Eng—Jan. 7, 1898.

Pig Iron as a Possible Secondary Product of the Blast Furnace. B. H. Thwaite. Calls attention to improvements aiming to increase the power-supply, profit-earning capacities of the furnace, to an extent that will make the question of iron-making an indifferent essential. 1500 w. Ir & Coal Trds Rev—Jan. 29, 1897.

Plants for Utilizing Blast Furnace Gases. H. Savage. Abstract of a paper in the "Revue Universelle des Mines." Concerning plants in Belgium and Germany. Also editorial. Ill. 2200 w. Eng & Min Jour—Oct. 7, 1899.

Practical Considerations Involved in the Generation of Power by Blast Furnace Gas. Particulars of its working and of the results obtained in practice. Serial. Elec Rev, Lond—Sept. 28, 1900.

The Actual State of the Question of Gas Engines Operated by Furnace Gas (Etat Actuel de la Question des Moteurs à Gaz de Haut-Fourneau). H. Savage. A review of the experiences which have been had in use of furnace gases in motors in Belgium, Germany and Scotland, showing that the matter has passed the experimental stages. 4000 w. Rev Univ des Mines—July, 1899.

The Application of Blast Furnace Gases for Direct Power Generation (Verwendung der Hochofengase Zur Unmittelbaren Krafterzeugung). F. W. Lürmann. A paper presented at the Düsseldorf convention of the Verein Deutscher Eisenhüttenleute with discussion. The practical difficulties are dealt with, and points from the limited experience available are given. 10000 w. Stahl und Eisen—March 15, 1898.

The Blast Furnace as a Source of Power. Horace Allen. From a paper read before the South Staffordshire Inst. of Iron and Steel Works' Managers. Discusses steps in economic progress, especially the use of waste gases. 4500 w. Col Guard—Dec. 16, 1898.

The Direct Utilization of Blast Furnace Gases (Utilisation Directe de Gaz des Hauts Fourneaux). Aug. Dutreaux. A general review of the results thus far attained at Seraing and elsewhere, with excellent photographs of motors of 150 to 250 h. p. for use with furnace gases. Two articles. 4500 w. Génie Civil—July 23, 30, 1898.

The Economical Use of Blast Furnace Gases. A. S. Keith. Abstract of paper read at the Cleveland Institution of Engineers, England, with short discussion. 2500 w. Ir & Coal Trds Rev—April 17, 1896.

The Production of Power from Blast Furnace Gases. Andrew Stewart. Discusses the progress made in utilizing these gases and the effect on the iron industry. Serial. Elect'n, Lond—Aug. 17, 1900.

The Use of Blast Furnace and Coke Oven Gases. Enrique Disdier. Read before the British Iron and Steel Inst. Considers the disadvantages of these gases as compared with others, and discusses methods of installing coke ovens adjacent to blast-furnaces, and the advantages that accrue 3500 w. Ind & Ir—May 12, 1899.

The Use of Lean Gases in Gas Engines. M. Lencauchez. Read before a session of the Société de l'Industrie Minerale. Reports conclusions from tests made at the Hoerde (Westphalia) Iron Works, and gives further information. 1500 w. Pro Age—March 15, 1898.

The Utilization of Blast Furnace Gases. Editorial review of what has been already accomplished, considering the future outlook encouraging. 1500 w. Engr, Lond—Feb. 10, 1899.

The Utilization of Blast Furnace Gases. Abstract of paper by Dr. F. Lürmann, read at meeting of German Iron Masters' Union. The paper stated all the objections to the use of gas engines in a blast-furnace plant, but the discussion regarded the subject more hopefully. 1200 w. Eng & Min Jour—April 30, 1898.

The Utilization of Blast Furnace Gas in Gas Engines. F. W. Lürmann. Condensed translation of a paper read before the general meeting of the Verein Deutscher Eisenhüttenleute. Part first deals with the efficiency of the gas engine, and the dust contained in furnace gases. Serial. Am Mfr & Ir Wld—April 8, 1898.

The Utilization of Blast Furnace Gases (Zur Ausnutzung der Hochofengase). F. Zeyringer. A discussion of the chemical and thermal questions involved in the production and utilization of furnace gases in internal combustion motors. 2000 w. Stahl und Eisen—July 15, 1899.

Utilization of Blast Furnace Gas in Engines. Emile Demenge. From a lecture to the Société Industrielle de l'Est de la France. Observation on the quality and quantity present and future utilization, principal engines used and blowing engines. Ill. 5000 w. Col Guard—May 25, 1900.

Utilization of High Furnace Gases for Power in Gas Engines. Bryan Donkin. Discusses the application of these gases to produce power, and describes the two-cycle engine. Ill. Serial. Engr. Lond—Nov. 24, 1899.

**Action on Ores.**—Action of Blast Furnace Gases Upon Various Kinds of Ores. F. E. Bachman. Additional information given in discussion of paper on this subject by O. O. Laudig, from "Trans Am Inst of Min Engs." 2500 w. Am Mfr and Ir Wld—Jan. 1, 1897.

Action of Blast Furnace Gases Upon Various Iron Ores. O. O. Laudig. Experiments made in the laboratory of the Buffalo Furnace Co. 2700 w. Trans Am Inst of Min Engs—July, 1896.

**Analysis.**—Analysis of Blast Furnace Gas While Blowing In. Ralph H. Sweetser. Describes investigations made at Sparrow Point, Md. 1600 w. Trans Am Inst of Min Engs—Oct., 1899.

**Belgium.**—See also ELECTRIC POWER.

**By-Products.**—The Recovery of Tar and Ammonia from Blast Furnace Gases. Andrew Gillespie. A paper read before the Inst. of Engineers and Shipbuilders in Scotland. 3000 w. Col Guard—March 20, 1896.

The Recovery of Tar and Ammonia from Blast-Furnace Gases. A. Gillespie. Read at meeting of the Inst. of Engineers and Shipbuilders in Scotland. Subject treated in the main as a practical question of economy in the manufacture, with a review of processes available for the purpose. 3000 w. Jour Gas Lgt—April 7, 1896.

**Charcoal.**—Utilizing Charcoal Blast Furnace Gases. F. Zeyringer. Abstract of article in "Stahl und Eisen." Enumerates the factors which determine the constitution and quantity of the waste gases, and describes a set of furnaces worked with charcoal fuel. 1200 w. Eng & Min Jour—Aug. 12, 1899.

**Differdingen.**—The Application of Blast Furnace Gases for Operating Gas Engines (Die Verwendung der Hochofengichtgase zum Betriebe von Gasmotoren). E. Meyer. A general examination of the applicability of furnace gases for motive power, and details of trials made with blast furnace gas upon a 60 horse-power motor at the Differdingen furnaces in Luxemburg. Two articles. 10000 w. Zeitschr d Ver Deutscher Ing—April 22 and 29, 1899.

Blast Furnace Gas Blowing Engine at Differdingen (Hochofengasgebläse für Differdingen). Brief description with photograph of a large blowing engine with gas engine power cylinder operated by blast furnace gases, as recently erected at Differdingen. 500 w. Stahl und Eisen—Jan. 1, 1900.

The Direct Utilization of Blast Furnace Gases in Explosion Motors (Utilisation Directe des Gas des Hauts Fourneaux dans les Moteurs à Explosion). Aug. Dutreux. A general discussion of the subject, based on the paper of Prof. Meyer, of Göttingen. 2000 w. Génie Civil—Aug. 26, 1899.

**Electric Power.**—The Utilization of Blast Furnace Gases for Electrical Power Transmission. W. H. Booth. Analyzes the amount of heat contained in waste gases and gives calculations for the horse-power of a blast furnace. Serial. Elec Rev, Lond—April 22, 1898.

The Utilization of Blast Furnace Gases for Generating Electric Power (Die Verwendung der Gichtgase zur Erzeugung Elektrischer Energie). A general account of the use of waste gas from blast furnaces in gas engines. 1600 w. Die Elektrizität—March 17, 1900.

The Utilization of Blast-Furnace Gases in the Generation of Electricity. Considers its applicability, discussing its thermal and chemical qualities, and the methods tried. Serial. Elec Rev, Lond—Dec. 15, 1899.

**Electric Power Stations.**—Possible Future Motive Power for Tramways. W. H. Booth. Discusses the possibility of using blast furnace gases by putting down gas engines and dynamos, and manufacturing electricity. 2200 w. Ry Wld—Sept. 8, 1898.

**Europe.**—The Utilization of Furnace Gas for Power. A record of European work in this field is commenced. Part first gives abstract of papers by Enrique Disdier and by Fritz W. Lürmann. Serial. Ir Age—June 29, 1899.

**Liège Experiments.**—The Application of Furnace Gases for Motive Power (Die Verwendung der Hochofen Gichtgase zur Erzeugung Motorischer Kraft). Showing that better economy is obtained by using furnace gases in gas engines than by burning them under steam boilers. A review of the experiments at Liège. Two articles. 7500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 30, Nov. 6, 1897.

**Power.**—The Use of Blast Furnace Gas for Power Purposes. W. H. Booth. Considers the important facts when it is proposed to utilize blast furnace gas as a means of power generation, and gives related information. 1400 w. Am Mach—Feb. 8, 1900.

**Seraing.**—The Direct Application of Blast Furnace Gases for Power Generation (Verwendung der Hochofengase zur Unmittelbaren Krafterzeugung). An account of the practical success of the installation at the Cockerill Work at Seraing, and the report of Prof. Hubert thereon. 3000 w. Stahl und Eisen—April 15, 1898.

The Utilization of Blast Furnace Gases (De l'Utilisation des Gaz des Hauts Fourneaux). H. Hubert. A discussion of the chemical and thermal features of the problem in the light of the experience at Seraing. 2500 w. Rev Univ des Mines—May, 1898.

The Utilization of Blast Furnace Gas (De l'Emploi des Gaz de Hauts Fourneaux). A. Greiner. A detailed report of the results of the use of blast furnace gases in gas engines, at the Cockerill Works at Seraing, Belgium, by the General Manager of the company. 3000 w. Rev Univ des Mines—May, 1898.

The Utilization of Blast Furnace Gas as Motive Power (De l'Emploi des Gaz de Hauts Fourneaux comme Moteurs). An account of the experiments at Seraing, Belgium, with illustration of the 200 horse-power gas engine operated by furnace gases. 3000 w. La Rev Tech—July 10, 1898.

The Utilization of Blast Furnace Gas in Gas Engines at the Cockerill Company's Works. Translated abstract from an article by Prof. Hubert in the "Annales des Mines de Belgique." Illustrates the arrangement in use, and explains the system briefly. 1000 w. Ir & Coal Trds Rev—April 29, 1898.

**Seraing and Wishaw.**—The Application of Furnace Gases for the Direct Generation of Power (Verwendung der Hochofengase zur Unmittelbaren Krafterzeugung). F. Lürmann. A general review of the results obtained at Seraing and Wishaw and of the discussion at the meeting of the Iron and Steel Institute. 7500 w. Stahl und Eisen—June 1, 1898.

The Utilization of Blast Furnace Gas (De l'Emploi des Gaz de Hauts Fourneaux). A discussion of the results obtained with blast furnace gases in gas engines at Seraing, Belgium, and Wishaw, Scotland. 3000 w. Génie Civil—May 21, 1898.

**Thwaite Apparatus.**—Blast Furnace Gas for Motive Power. W. H. Booth. An account of experiments with the Thwaite apparatus, with suggestions for the treatment of American gas. 2500 w. Mod Mach—Aug., 1899.

**Thwaite-Gardner.**—On Commercial Methods of Utilizing Blast Furnace Gases for Power Production, and Other Possible Effects on the Pig Iron Industry. B. H. Thwaite. Read before the conference of British Iron Trade Assn. Records the success of the Thwaite-Gardner blast furnace power system and its economic results, discussing the great thermal economies that may be effected. Serial. Elec Engr, Lond—May 13, 1898.

The Blast Furnace as a Power Producer. A short illustrated account of the Thwaite-Gardner system of using blast furnace gases in gas engines. 1000 w. Ir & Steel Trds Jour—Sept. 15, 1900.

**Water-Tube Boilers.**—See **WATER-TUBE BOILER.—Blast Furnace Gas.**

**Wishaw, Glasgow.**—The Utilization of Blast Furnace Gas for the Production of Power. W. H. Booth. A very complete discussion, showing the theoretical value of blast furnace gases for use in gas engines, and also an account of the successful practical application and tests at Wishaw, near Glasgow. 3500 w. Eng Mag—June, 1898.

## BLASTING.

See also **EXPLOSIVE.**

**Coal Mines.**—Blasting in Mines. From "Allgemeine bergmännische Zeitschrift." Discusses the choice of explosives, arrangement for charges, igniters, etc. 2000 w. Col Guard—Nov. 17, 1899.

Improvements in Blasting Operations in Collieries. M. C. Ihlseng. A review of the conditions present, and the best practice in view of these conditions. 3300 w. Can Min Rev—Aug., 1896.

Improvements in Blasting Operations in Collieries. M. C. Ihlseng. Read before the joint meeting of W. P. C. M. I. and the O. I. M. E. A review of the different explosives in use, showing why some are unfit for use in certain mines, and urging improvement in the grade and greater care in the use of these materials. 2800 w. Am Mfr & Ir Wld—June 26, 1896.

Lessening the Danger of Blasting in Fiery Pits. Franz Brzezowski. Abstracted from "Oesterreichische Zeitschrift für Berg und Hüttenwesen. The safety measures at present at disposal are central fire cartridges, moss stemming, good cartridge covers, safety explosives, removal of coal dust by spraying, and finally skilled workmen. 1400 w. Col Guard—March 6, 1896.

Measures Adopted for Diminishing the Danger of Shot Firing. Abstract from an official report by Bergassessor Dröge, Saarbrucken, published in the "Zeitschrift für das Berg, Hütten, und Salinenwesen." Gives particulars relating to the condition of the collieries, and the regulations in force as regards shot firing. Serial. Col Guard—Jan. 14, 1898.

The Problem of Safe Blasting. H. W. Halbaum. Review of the report of the North of England Inst. Flameless Explosives Committee. The report is severely criticised. 2200 w. Col Guard—Aug. 14, 1896.

See also **Electric; Fuse; Igniter. EXPLOSIVE—Coal Mine.**

**Electric.**—Blasting by Electricity. Describes briefly the application of electricity to methods of discharging explosives, discussing the advantages and disadvantages. 1500 w. Min & Sci Pr—Dec. 9, 1899.

Electrical Firing in Fiery Mines. J. von Lauer. From "Oesterreichische Zeitschrift für Berg und Hüttenwesen. Describes several different methods and the systems of firing, calling attention to the advantages. 4000 w. Col Guard—Jan. 22, 1897.

Electric Blasting. William Maurice. Abstract of a paper read at meeting of the Chesterfield and Midland Counties Inst. of Engineers, Nottingham, Eng. Discusses low and high tension fuses, selection of igniters and detonators. 1800 w. Ir & Coal Trds Rev—Dec. 17, 1897.

Electric Shot Firing in Mines. Presents the advantages of the electric method over the fuse method, and gives essential particulars that should be carried out to obtain the best results. 1800 w. Elec Engr, Lond—May 13, 1898.

Electric Ignition of Mine Shots. Bergassessor Heise. From a report in "Glückauf," of a lecture to the Assn. of Technical Mine Managers for the Dortmund District. Discusses heat ignition, spark ignition, safety in firedamp, etc. 1600 w. Col Guard—March 20, 1897.

Progress in the Electric Ignition of Explosives (Fortschritte auf dem Gebiete der Elektrischen Zündung von Sprengschüssen). Bergassessor Heise. With a description of the electric igniters now in practical use and a discussion of the electrical features of the work. 3000 w. Glückauf—May 20, 1899.

Progress in the Electric Firing of Mine Shots. From a communication by Bergassessor Heise to "Glückauf." Gives an idea of the progress made by electric ignition during the last two years, illustrating and describing apparatus. 3500 w. Col Guard—July 7, 1899.

The Electric Ignition of Blasting Explosives. Article from a recent issue of "Arms and Explosives," special reference being made to the part played by Mr. Frank Brain, of the Electric Blasting Apparatus Company, Cinderford, in the introduction of electric blasting to mining operations. 2200 w. Col Guard—Oct. 23, 1896.

The Use of Electricity in Mining Operations. The method of firing shots by means of an electric fuse is described and the method of making connections illustrated. Serial. Ir & Coal Trds Rev—Jan. 31, 1896.

**Fuses.**—Percussion Fuses and Their Suitability for Fiery Mines. J. van Lauer. "Oesterreichische Zeitschrift für Berg und Hüttenwesen." A comparison of advantages of various fuses is made, and the advantages of the friction fuse discussed. 1100 w. Col Guard—Feb. 7, 1896.

Dangers from the Use of "Safety" Fuse in Fiery Mines. From a communication to "Glückauf" by Bergassessor Winckhaus, with reference to some observations by Bergrath Kaltheuner, of Gelsen Kirchen. 2600 w. Col Guard—June 12, 1896.

**High Explosives.**—Blasting with High Explosives. Harold Bouser. Deals with the methods of igniting, the coal shots, choice of explosives, etc. Ill. 3400 w. Ir & Coal Trds Rev—Jan. 26, 1900.

**Hole Diameter.**—On the Influence of the Diameter of Holes in Blasting Operations. James Ashworth. From "Colliery Guardian" experiments proving that a great difference in results is obtained by the mode of application, and that correct understanding of the subject is necessary to safety. 1100 w. Stone—Oct., 1896.

**Ice Gorge.**—Ice Gorge Blasting at Niepolomice (Die Eissprengung bei Niepolomice). Describing the effective use of dynamite to remove ice gorges in the Vistula. 5000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—April, 1897.

**Igniter.**—Safety Shot Igniter. Illustrated description of a French device by which a fuse may be safely fired in a gassy mine. 1300 w. Mines & Min—July, 1900.

**Meinhard Igniter.**—Meinhard's Improved Igniter for Blasting Charges. From "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrated description of the apparatus, with results of experiments. 800 w. Col Guard—April 20, 1900.

**Pike's Peak Power Co., Colo.**—The Big Blast and Power Development of the Pike's Peak Power Co. Illustrated description of a large blast to secure granite to build a dam, with account of the work. 900 w. Eng News—May 17, 1900.

**Pole-Line Construction.**—Blast in Pole-Line Construction. I. J. Macomber. Description of a piece of work in charge of the writer, where nearly half the distance required rock blasting in setting the poles, showing the necessity of carefully examining the route of a proposed pole-line, before making a final estimate of cost. 1500 w. Sib Jour of Engng—April, 1896.

**Priming and Firing.**—Methods of Priming and Firing Mine Shots. From a communication by Victor Watteyne and Lucien Denoël. Notes various solutions of the problem, but concludes that electric firing is the method most to be recommended. 1200 w. Col Guard—Jan. 26, 1900.

**Under Water.**—Rock-Blasting Under Water. The methods employed in such work are described, and operations in the East River, N. Y., on the Danube, Rhine, etc., mentioned. 1400 w. Sci Am Sup—Jan. 7, 1899.

**Water Cartridges.**—Water Cartridges in Blasting. L. Jaroljmek. Water is used as tamping' and acts at the same time on the quicklime termination of the dynamite cartridge, generating sufficient heat to fire the fulminate cap. 2000 w. Col Guard—Jan. 24, 1896.

### BLAST METER.

See **CUPOLA—Blast Meter.**

### BLEACHING.

**Electrolytic.**—Bleaching by Electricity (Die Elektrische Bleiche). H. Wartner. Discussing the bleaching of cotton goods by means of chlorine solutions produced by electrical decomposition, with data of the commercial results obtained in Germany and in Russia. 1200 w. Elektrochem Zeitschr—March, 1898.

Electrical Bleaching (Elektrische Bleiche). Victor Engelhardt. A description of the process and apparatus used at the bleachery of Gebauer at Charlottenburg, with data of production and cost. 1000 w. Elektrochem Zeitschr—May, 1899.

The Application of Electrolysis to the Production of Bleaching Material (Ueber die Anwendung der Electrolyse zur Darstellung von Bleichmitteln). A description of the electrolytic bleaching method of Dr. Kellner, as applied by Messrs. Siemens & Halske. Two articles. 7000 w. Elektrochem Zeitschr—Aug., Sept., 1897.

The Electrolytic Decomposition of the Chlorides of Sodium and Magnesium. M. C. Beebe. Abstract of a thesis submitted at the Univ. of Wisconsin. Also editorial. An account of investigations and experiments to ascertain under what conditions a bleaching solution can be economically prepared, and thus determining whether electrolytic bleaching can compete with the chemical methods. 6500 w. Elect'n, Lond—Jan. 21, 1898.

### BLEACHING.

**Electrolytic.**—See also **ELECTRO-CHEMICAL WORKS; ELECTRO-CHEMISTRY.**

### BLOCK SIGNALS.

See also **INTERLOCKING; RAILWAY ACCIDENT—British Board of Trade Report; RAILWAY SIGNAL.**

Block Signalling. Notes on a lecture delivered by George W. Blodgett. Treats very briefly absolute and permissive blocking, running trains by telegraph and signalling in yards. 1400 w. Trans Assn of Civ Engs of Cornell Univ—June, 1896.

Block Signalling and Interlocking. Abstract of discussion at the meeting of the American Society of Railroad Superintendents, at Niagara Falls. 1400 w. Eng News—Sept. 24, 1896.

Railway Signals. C. Francis Jenkins. Brief illustrated description of the "block system" and the latest system which is a combination of the manual and automatic. 1000 w. Sci Am—Dec. 9, 1899.

**A., T. & S. F. Ry.**—Block Signaling on the Atchison, Topeka & Santa Fe Railway. Describes the system of this road which has about one-fifth of its line operated on this plan. 1300 w. Eng News—March 30, 1899.

The Block System on the Atchison. Details of the regulations under which trains are run, with facts of interest concerning the apparatus. Ill. 1200 w. R R Gaz—Dec. 23, 1898.

**Austria.**—Electric Block Signals in Austria-Hungary (Die Electrischen Blocksignale in Oesterreich-Ungarn). L. Kohlfürst. A detailed description of the systems used on the Austrian State railways, with diagrams. 2000 w. Elektro-Tech—Feb. 28, 1899.

The Arrangement of Electric Distance Signals in a Block System (Ueber die Einreihung Elektrischer Distanzsignale in Blocklinien). Martin Boda. An illustrated description of the signal system used on the Austrian railways, in which an electrical distant signal is used in addition to the usual semaphore. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—July 8, 1898.

The Signal System at Glandorf Station (Die Sicherungsanlage der Station Glandorf). A full description of this electric block signal system on the Austrian State Railways, with scheme diagrams showing the connection system. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—June 3, 1898.

**Automatic.**—Automatic Block Signalling. Edward C. Carter. Compares the semaphore and disc signals, stating the objections to each and discussing their operation and maintenance, installation, etc. 3500 w. R R Gaz—Jan. 12, 1900.

Automatic Block Signals for Railways (Verschluss der Fahrstrassen durch Stellwerke). A paper read before the German Railway Society by Herr Leschinsky describing a variety of automatic electric block systems operated by the passing trains. 6000 w. Glaser's Annalen—Jan. 1, 1899.

The Arrangement of Signals with Electrical Release for Operation by the Train (Einrichtung von Mastsignalen mit Elektrischer Auslösung durch die Züge). Description and details of the system by which the block signal is automatically set for "clear track" when the train leaves the block.

5000 w. Oesterr Monatschr f d Oeffent Bandienst —Oct., 1897.

See also Cin., N. O. & Texas; Electric; Illinois Central; Southern Pacific.

**Automatic vs. Manual.**—Manual Controlled and Automatic Signals. Alexander Holley Rudd. Considers the disadvantages of each system, and the advantages that may be gained by combining the two. 4000 w. Eng News—May 10, 1900.

The Controlled Manual and Automatic Block Signaling Systems. C. C. Anthony. A comparison of the degree of safety, facility of moving trains, general satisfaction, first cost, and cost of operation and maintenance. Serial. R R Gaz—May 25, 1900.

**Boston and Albany.**—Electric Block Signals on the Boston and Albany. George W. Blodgett. Illustrated description of signal apparatus used, with discussion of systems and their operation, and showing that for some purposes and conditions, wire circuits can be used to better advantage than rail circuits. 3300 w. R R Gaz—July 22, 1898.

**British.**—Railway Block Signaling. J. Pigg. The first part is devoted to statement of some general principles, and the features of certain special signal codes, all based upon British practice. Serial. Elec Engr, Lond—July 3, 1896.

**Chic., St. P., Minn. & Omaha.**—Block Signaling and Interlocking on the Chicago, St. Paul, Minneapolis & Omaha Ry. Describes the operation of the telegraph block system, the automatic signals and the interlocking plants. Ill. 2500 w. Eng News —May 25, 1899.

**Cin., N. O. & Texas.**—Automatic Block Signals on the Cincinnati, New Orleans & Texas Pacific. Illustrations and description. 1400 w. R R Gas —Nov. 12, 1897.

**Del., Lackawanna & Western.**—See Union Automatic.

**Double-Blade Semaphore.**—A Double-Blade Semaphore for Block Signaling on the Park Avenue Viaduct, N. Y. Central R. R. Description of special form of signal designed for special work. 1200 w. Eng News—Oct. 22, 1896.

**Electric.**—Electric Block System (Ueber Elektrische Block Anlagen). Paper read before the German Railway Society by Herr Nitschmann, describing a system including indicators by which the condition of the switches and signals is constantly in view. 5000 w. Glaser's Annalen—May 1, 1897.

Improvements in Track Circuit Controlling Devices for Electricity Controlled Block Signals. R. J. Hewett. Considers improvements which provide a track circuit arrangement for actuating track relays at both ends of the track circuit. 1600 w. Ry & Engng Rev—July 16, 1898.

The Closing of Block Signals by Electric lease for Operation by the Train (Einrichtung von Stellwerksanlagen mit Elektrischem Weichenstrassen-Verschlusse an Blocklinien). Martin Boda. An elaborate analysis of electric block signals as applied to the railways of Austro-Hungary. 6000 w. Zeit d Oesterr Ing u Arch Ver—Feb. 17, 1899.

See also Austria; Automatic; Siemens-Halske; Virgillite.

**Electric Railways.**—An Automatic Block System for Single-Track Electric Railways. Illustrates, and describes a system which has been in successful operation on a branch of the Lowell & Suburban Ry. in Massachusetts, and has just been installed on the main road. 1600 w. Eng News—May 25, 1899.

**Fog.**—Extra Block-Signal Safe Guards in Time of Fog. Editorial discussing English methods, and suggesting methods of protecting trains during fog. 1300 w. R R Gaz—April 20, 1900.

**French Northern Ry.**—Improvements in French Block Systems (Neuerungen im Französischen Blocksysteme). Oskar Walzel. A review of the improved signal system recently installed on the Northern Railway of France. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 19, 1898.

**Illinois Central.**—Automatic Semaphore Block Signals on the Illinois Central. Illustrated description of these signals, with diagram of the electric circuits by which they are automatically moved. 2200 w. R R Gaz—Dec. 3, 1897.

**Inspection.**—Inspection of and Repairs to Automatic Block Signals. W. A. D. Short. Read before the Ry. Signaling Club of Phila. Discusses the distribution of labor, and what should be required of inspectors, the methods, etc. 1200 w. R R Gaz—Feb. 24, 1899.

Inspection of Automatic Block Signals. Comments by G. W. Blodgett, with editorial. 2800 w. R R Gaz—March 17, 1899.

Maintenance and Inspection of Automatic Electric Block Signals. H. S. Balliet. Read at meeting of the Ry. Sig. Club, Chicago. Describes the system and the maintenance force necessary for its efficient operation. 1600 w. Ry Age—April 6, 1900.

**Lightning.**—Automatic Block Signal Failures Due to Lightning. H. D. Miles. Read before the Ry. Sig. Club. A brief account of steps taken by the Michigan Central R. R. to overcome difficulties due to lighting. 1700 w. Ry & Engng Rev—Sept. 8, 1900.

**Manual vs. Automatic.**—See Automatic vs. Manual.

**Normal Danger.**—Automatic Signals; Normal Safety or Normal Danger. A. J. Wilson. Presented at Boston meeting of the Railway Signaling Club. Favors the normal danger system as more economical in operation. 600 w. Eng News—Nov. 9, 1899.

Disadvantages Attending the Operation of Automatic Signals on the Normally Danger System. J. P. Coleman. Shows some causes of relay failures, and how much more seriously the failures affect the normally danger system than they do the normally clear system. 2700 w. Ry & Engng Rev—Jan. 8, 1898.

**Payne.**—The Payne Block and Train Order Signal. Describes and illustrates a signal that has been in operation for six months on the L. S. & M. S. Ry. 800 w. Ry & Engng Rev—Nov. 5, 1898.

**Quadruple.**—Quadruple Block Signal System (Einrichtung von Blocklinien mit Viertheiligen Streckenblockwerken). A system for obtaining greater security against rear end collisions by doubling the number of blocks between trains. 2 plates. 6000 w. Oesterr Monatschr f d Oeffent Bandienst —June, 1897.

**Rules.**—The October Discussion of Block-Signal Rules. Some editorial criticism of the work of the committee of the Amer. Ry. Assn. on block-signal rules, with numerous notes and some references. 1900 w. R R Gaz—Nov. 29, 1895.

**Semaphore.**—A Semaphore for Permissive Block Signaling. Illustrated description of a semaphore signal recently devised by the National Switch and Signal Co. for giving either a permissive or an all-clear go-ahead signal, while yet not using the intermediate position, as is done with the common three position semaphore. 900 w. R R Gaz—Dec. 11, 1896.

**Siemens-Halske.**—The Application of Current Formulas to the Siemens Block System (Die Stromlauf-Formeln and ihre Anwendung zur Schaltung Siemens'scher Blockwerke). A mathematical investigation of the conditions of operation of the Siemens and Halske system of block signaling, with many practical examples. Four articles. 1 plate. 12000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 12, 19, 26, Dec. 3, 1897.

The Connections of the Siemens' Signal System (Schaltung Siemens'scher Blockwerke). O. Walzel. Giving schematic diagrams showing the application of the graphical method to the arrangement of block signal systems of Siemens' & Halske. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 21, 1898.

**Single-Track.**—Block-Signal System for Single-Track Railroads (Streckenblockeinrichtung für Eingeleisige Bahnen). Georg Rank. Description of a system designed by Siemens and Halske, with diagrams. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—April 13, 1900.

Operation and Maintenance of the Block System on Single Track; C., N. O. & T. P. Ry. W. A. D. Short. Abstract of a paper read at the Pittsburg meeting of the Ry. Signalling Club. Considers the combination of the telegraphic block and the automatic electric block; also the electric train-staff system. 4000 w. Eng News—March 10, 1898.

The Distinguishing Signal System of Single-Track Blocking. R. J. Hewett. Part first describes a system invented by the writer, capable of indicating the direction of train movement. Serial. Ry & Engng Rev—Aug. 13, 1898.

**Southern Pacific.**—Automatic Block Signals on the Southern Pacific at Los Angeles. Brief description of automatic semaphore block signals worked by electric motors. 350 w. R R Gaz—March 17, 1899.

**Three-Position.**—Possibilities of Three-Position Signalling. Frank Rhea. Condensed from a paper presented at Boston meeting of the Railway Signal Club. Discusses the possibilities of three-position signals used with an automatic block system, and with interlocking. 1100 w. Eng News—Nov. 16, 1899.

Three-Position Signals and Permissive Blocking. J. W. T., Jr. A word in defense of permissive blocking. 400 w. R R Gaz—April 17, 1896.

**Tunnel.**—The Protection of Railroad Traffic Through Tunnels. Charles Hansel. Describes an arrangement lately installed on the Chesapeake & Ohio R. R. for controlling the traffic between the stations of Lowell and Hilldale, Va. A tunnel 6500 ft. long and a bridge 528 ft. long in a distance of 4.2 miles. An absolute block system. 2000 w. Eng News—Feb. 24, 1898.

**Union Automatic Semaphore.**—The Union Electric Semaphore Signal. Illustrated description of a signal operated by an electric motor placed in a box at the base of the post. 2000 w. R R Gaz—Dec. 3, 1897.

Union Automatic Signals on the Lackawanna. A diagram showing the arrangement of signals. The signals are semaphores, worked by electric motors. 600 w. R R Gaz—Aug. 10, 1900.

**United States.**—American Practice in Block Signalling. B. B. Adams. The first of a series of articles giving a thorough revision of matter published eight years ago, and aiming to treat the subject from a practical standpoint. Ill. Serial. R R Gaz—Jan. 5, 1899.

Block Signaling. J. P. Coleman. Illustrates and describes some modern methods used extensively in America, showing the advancement made on early practice. 7000 w. Wis Engr—May, 1899.

**Virgillito Electric.**—Virgillito's Automatic Electric Block-Signal System (Virgillito's Elektrisch Selbstthätige Eisenbahn-Blocksignale). L. Kohlfürst. The equilibrium of two opposing currents is disturbed by the entrance of a train on the block. 2500 w. Elektrotech Zeitschr—March 8, 1900.

## BLOOMING MILL.

See **ROLLING MILL—Blooming Mill.**

## BLOWER.

See also **FAN; HEATING AND VENTILATION; MINE VENTILATION; TUNNEL VENTILATION; VENTILATION.**

**Air Compressor.**—The Rotary Blower as an Air Compressor. Frank Richards. An explanation of the loss of power inseparable from the rotary blower and seemingly fatal to its use as an air compressor. Ill. 1500 w. Am Mach—Dec. 29, 1898.

**Foundry.**—The Uses of the Blower in the Foundry. Walter B. Snow. Read before the New England Foundry Men's Assn. Gives the theoretical consideration which govern the design of fan blowers and their operation, the different types employed in the foundry and some of the uses. 4000 w. Ir Age—Feb. 10, 1898.

**Rating and Capacity.**—Rating and Capacity of Blowers. Alton D. Adams. Notes the disagreement in rated capacities between blowers of the same size and different makes, and compares the several ratings as to air pressure, delivery and power of the same blower with each other and the known laws governing the movement of air. Serial. Arch & Build—May 27, 1899.

## BLOWING ENGINES.

Blowing Engines. James Proctor. Read before the South Staffordshire Inst. of Iron and Steel Works Managers. Deals only with blowing engines as connected with blast furnaces. Ill. 2500 w. Engr, Lond—Aug. 5, 1898.

Notes on Blowing Engines. T. M. Grant. Abstract of paper read before the West of Scotland Iron and Steel Inst. Describes various types. 2300 w. Engr's Gaz—March, 1898.

**Compound.**—Compound Blowing Engines. Illustrates and describes a pair of vertical cross-compound blowing engines. 1400 w. Engng—Jan. 6, 1899.

**Compound Beam.**—Compound Beam Blowing Engine at the Pribram Silver and Lead Works (Die Balancier-Compound Gebläsemaschine bei der Silber-und Bleihütte in Pribram). A description of the new blowing engine at Pribram, Bohemia, with plate of drawings, indicator diagrams and account of test. 1 plate. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 5, 1897.

Compound Beam Blowing Engine in the Silver and Lead Works at Pribram (Ueber die Balancier-Compound Gebläsemaschine bei der Silber-und Bleihütte zu Pribram). A double beam engine of 75 horse power of good design, with Corliss valve gear. Two articles, 1 plate. 7500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 18, 25, 1897.

**Compound, Hungary.**—Blowing Engine at the Krompach Works. Illustrates and describes engines built for blast-furnace use, giving the leading dimensions. 500 w. Engr, Lond—April 21, 1899.

Compound Blowing Engine Built for the Hernadthaler Iron Works, Krompach, Hungary. Translated from the "Zeitschrift des Vereines Deutscher Ingenieure." Illustrates and describes an interesting horizontal blast furnace blowing engine built in Bohemia. 800 w. Eng News—Nov. 10, 1898.

Compound Blowing Engine (Verbund-Gebläsemaschine). A. v. Jhering. Illustrated description of powerful horizontal compound blowing engine for the Hernadthal Iron Works at Krompach, Hungary. Corliss valve gear is used on both steam and air cylinders. 2000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Oct. 15, 1898.

An Improved Blowing Engine (Eine Neuerung im Gebläsebau). Illustrated description of the improved blast furnace compound blowing engine with "ring" valves for the air cylinder, as built for the Vajdahunyad Steel and Iron Works in Hungary. Details of working parts are given. 6000 w. Stahl und Eisen—Nov. 15, 1897.

**Gas Driven.**—Recent Improvements in Power Plants, Especially in Blowing Engines (Neue Aufgaben des Kraftbetriebes in Hüttenwerken, insbesondere des Gebläsebaues). A. Riedler. Discussing especially the application of the gas engine to the driving of blast furnace blowing engines; and the modifications to produce the best results in such cases. 3000 w. Stahl und Eisen—Aug. 15, 1899.

See also **BLAST FURNACE GAS; GAS ENGINE.**

**Horizontal.**—Horizontal Blowing Engine for Blast Furnace (Liegende Gebläsemaschine für Hochöfen). Elevation, plan, and description of 700 horse-power double compound blowing engine. 1000 w. Zeitschr d Ver Deutscher Ing—July 31, 1897.

**National Steel Co., Ohio.**—Blowing Engines for the National Steel Company. Illustrated description of three interesting engines recently installed at the Ohio works. They are of the inverted marine type, with the air cylinders tandem to and above the steam cylinders. 600 w. Power—Jan., 1900.

**Rheinhausen Krupp Furnaces.**—Blowing Engines for Blast Furnaces (Hochofen-Gebläsemaschine). Fritz Lamey. An illustrated description of the powerful compound blowing engines built by the Elsass Machine Works at Mülhausen for the Krupp Works at Rheinhausen; with details, and sectional elevation. 2000 w. 1 plate. Zeitschr d Ver Deutscher Ing—April 15, 1899.

## BLUE PRINTING.

See also **DRAWING—Copying Processes.**

**Curved Glass Machine.**—A Curved Glass Blue-Print Machine. Paul Mellen Chamberlain. Describes and illustrates a convenient machine. 300 w. Trans Am Soc Mech Engs, No. 842—Dec., 1899.

Frames for Blue Printing. Useful practical hints. 800 w. Prac Eng—May 15, 1896.

**Gallery.**—A Novel and Convenient Blue Printing Gallery. Illustrates and describes the arrangements at the works of the Brown Hoisting and Conveying Machine Co., of Cleveland, Ohio. 600 w. Am Mach—March 29, 1900.

**Room.**—An Interesting Example of a Modern Blue Printing Room. Illustrates one of the most elaborate and expensive blue printing rooms, recently built at the works of the Brown Hoisting and Conveying Machine Co., at Cleveland, Ohio. 1000 w. Eng News—Feb. 22, 1900.

## BLUESTONE.

**New York.**—The Bluestone Industry of New York. James B. Gordon. Remarks on the changes in recent years, which led to the quarrying of thicker and larger stones, and necessary changes in methods, with an illustrated description of quarries and account of the deposits in New York State. 3400 w. Stone—July, 1899.

## BOAT.

See also **LAUNCH.**

**Alco-Vapor Motor.**—Motor Boat for Sea Service. Illustrates and describes a seagoing alco-vapor motor boat, designed for short cruises on the exposed coast of Maine and Massachusetts. 350 w. Marine Engng—May, 1899.

**Electric.**—See **ELECTRIC BOAT.**

**Gasoline Engines.**—See **GASOLINE ENGINE—Boats.**

**Launching from Ships.**—Suggestions as to Improved Appliances for Launching Ships' Boats. John Hyslop. Discusses davits and the means of operating them, also other appliances, and the need of improvement. Ill. 4200 w. Soc of Nav Archts & Marine Engs, No. 3—Nov., 1899.

**Roller.**—See **ROLLER BOAT.**

**Rubber.**—A Rubber Boat that Crossed the Sea, from "Harper's Weekly." Description of a novel boat, the invention of E. L. Perry, which carried three men across the Atlantic nearly 29 years ago. 500 w. Ind Rub Wld—Feb. 10, 1896.

**Submarine.**—See **SUBMARINE BOAT.**

**Torpedo.**—See **TORPEDO BOAT.**

**U. S. Navy.**—The Standard Navy Boats. Arthur B. Cassidy. A very fully illustrated account of the standard small boats for the United States Navy, including ships' boats, steam cutters, and dinghies. 3000 w. 38 plates. Trans Soc N A & M E—1898.

### BOATBUILDING.

**Model Tests.**—Boats and Sails. Walter Burnham. Part first illustrates and describes tools for testing boat models. Serial. Sci Am Sup—Oct. 14, 1899.

### BOGIE TRUCK.

See **CAR TRUCK; LOCOMOTIVE.**

### BOILER.

See also **LOCOMOTIVE BOILER; MARINE ENGINE; MARINE BOILER; STEAM GENERATION; STEAM PLANT; WATER-TUBE BOILER.**

A Study of Boiler Types. J. P. Johnston. Read at meeting of Civ. Engs'. Club, of Cleveland, O. Discusses types of boilers; selection of boilers; specifications; uses and abuses; and possibilities. 2500 w. Ir Trd Rev—Jan. 6, 1898.

Boilers and the Use of Steam. William H. Bryan. A lecture delivered before the Wage Earners Self-Culture Club, St. Louis. Discusses what steam is, principal uses, types of boilers and of engines, efficiency of boilers and engines. 4000 w. Age of St—May 8, 1897.

Steam Generators (Les Chaudières). C. Walckenaer. Discussing the circulation in water-tube boilers, with many illustrations of the various constructions, together with a description of the numerous forms of instantaneous steam generators, such as are used on steam motor carriages, etc. Three articles. 25000 w. Rev de Mécan—Feb., April, May, 1897.

The Horizontal Tubular Boiler. Some hints on the proper setting of this kind of boiler, with remarks on its construction and its durability and economy. Ill. 1500 w. Locomotive—April, 1898.

The Steam Boiler. Stephen Christie discusses the effect of location and cites some of the requirements looked for in the selection of boilers. 2000 w. Safety V—March, 1897.

Types of Land Boilers. Edward G. Hiller. Paper read before the Cleveland Inst. of Engs. The first part is chiefly historical, beginning with the development of steam boilers in the time of Savery. Serial. Prac Eng—Feb. 28, 1896.

**Ancient Pompeiian.**—Ancient Pompeiian Boilers. W. T. Bonne. Proof that the water-tube principle was understood and appreciated by the Greeks and Romans two thousand years ago. Ill. 2200 w. Am Soc Mech Engs—Dec., 1896.

**Belleville.**—See **MARINE BOILER.**

**Blow-Offs.**—Blow-Off Pipes. H. H. Kelley. Discusses the care necessary and often neglected, and the proper location of the blow-off pipe and construction of boiler settings. Ill. 2500 w. Engr, Cleveland, O—Aug. 1, 1899.

**Blow-Out Pipes.**—Blow-Out Pipes on Boilers. W. A. Carlile. Practical treatment of the subject. 1800 w. Mach—Feb., 1896.

**Blowing Out.**—The Blowing Out of Boilers. W. A. Carlile. Proper purpose and methods of blowing out boilers. 1200 w. Mach—Oct., 1896.
See also **Management.**

**Brace Tests.**—Boiler Brace Tests. A. F. Huston. Describes tests and gives points ascertained regarding the strength of rivets. Ill. 1000 w. Power—Aug., 1898.

**Bracing.**—See also **STAYBOLT.**

**Bracing Heads.**—Bracing Boiler Heads. An article prepared in compliance with a request for tables for calculating the number of braces required in staying boiler heads, when the braces are an inch and one-eighth in diameter. 1200 w. Locomotive—March, 1898.

**Brick Settings.**—Improvements in Steam Boilers, and the Brick Settings of Same. William Barnet Le Van. Illustrated detailed description of an improved boiler of the horizontal flue class, and the requisites of a proper boiler setting. Considers the production of smoke to be due often to improper setting. 6000 w. Trans Am Soc Mech Engs, No. 792—Nov., 1898.

**British Land.**—British Types of Land Boilers. History of land boilers from the time of Desagulier (1718) to date. An interesting and instructive paper read before the Cleveland Inst. of Engs. at Middleborough, Eng., with discussion. 4400 w. Engr, Lond—Feb. 21, 1896.

**Butt Joint.**—A Form of Quadruple-Riveted Butt Joint. Illustrated description, with consideration of advantage and calculation of strength. 3000 w. Sta Eng—Feb., 1897.

**Buttner Multitubular.**—The Buttner Multitubular Boiler (Chaudières Multitubulaires Système Buttner). A combined system of shell and water-tube boiler, intended to unite good steaming qualities with large reserve capacity. 1200 w. La Rev Tech—Sept. 10, 1897.

**Circulating Device.**—Boilers With Steam Circulating Device (Chaudières avec Emulseur à Vapeur). An illustrated description of the boilers at the Cambria sugar refinery; being boilers of the elephant type with circulating pipes connecting the steam space to the heaters. 2000 w. 1 plate. Génie Civil—Aug. 5, 1899.

**Circulation.**—A Contribution to the Study of the Circulation of Water in Steam Boilers (Contribution à l'Etude de la Circulation de l'Eau dans les Chaudières). Ch. Bellens. A review of the theory of M. Brillié, criticising the latter's application of principles of hydrostatics to problems in hydronamics, and offering a new theory to account for the phenomena described in his experiments. Serial. La Rev Tech—Jan. 10, 1898.

Circulation in Steam Boilers. Editorial discussion of statements made in a paper by George Halliday, on "The Influence of Velocity on Evaporation in Tubes." 2500 w. Eng News—Jan. 18, 1900.

The Circulation of Water in Steam Boilers (La Circulation de l'Eau dans les Chaudières). Ch. Bellens. Discussing and in some respects opposing the recent theories of M. Brillié upon the same subject. Serial. La Rev Tech—Jan. 25, 1898.

Value of Circulation in a Boiler. C. A. D. in "The Boiler Maker." Effects of increase of circulation upon evaporation, increase of economy secured thereby, and different means that have been employed to increase rapidity of circulation. 2000 w. Ir Trd Rev—Aug. 13, 1896.

See also **WATER-TUBE BOILER—Circulation.**

**Classification.**—The Production of Steam and Power. W. Stagg. Boilers of different types classified in order of efficiency, and the subjects of steam production and power production, with conditions of economy are discussed. 3000 w. Gas Wld—May 2, 1896.

**Cleaning.**—See **BOILER CLEANING.**

**Coal Mines.**—The Use of High-Pressure Steam at Collieries. Hugh Bramwell. From the "Jour. of the British Soc. of Min. Students." Notes, recording experience gained as to the care necessary in adopting a high boiler pressure at collieries. 1600 w. Col Guard—July 1, 1898.

**Coal Mine, Hazleton, Pa.**—Mine Boiler Plant at Hazleton Shaft Colliery of the Lehigh Valley Coal Co., Hazleton, Pa. An illustrated description of a thoroughly modern plant using forced and induced draft, economizer, and water for removing ashes from the boiler room. 2000 w. Mines & Min—Oct., 1898.

**Coal Mines, Saar.**—Fuel and Boiler Economy at the Saar Collieries. From a communication by Berginspektor Osterkamp to "Glückauf." Describes the manner of conducting the steam boilers and the experience gained. 1700 w. Col Guard—July 29, 1898.

**Conical Flues.**—Double Steam Boiler with Conical

Flues (Zwillings-Dampfkessel mit Conischem Stufenrohr). An illustrated description of an improved form of Lancashire boiler, exhibited at Paris. 800 w. Glaser's Annalen—Aug. 15, 1900.

**Comparison.**—Making Steam in Boilers. A comparison of the water-tube and tank systems. 1000 w. Bos Jour of Com—Aug. 20, 1898.

On the Comparative Efficiency of Water-Tube and Water-Tank Boilers. W. George Akhurst. Points out some erroneous opinions in regard to water-tube boilers, and gives the opinion that they will never surpass the water-tank boilers in point of number. 1600 w. Prac Engr—Dec. 2, 1898.

Sectional Water-Tube vs. Shell Boilers. L. G. Read. The pros and cons of this subject are summed up in this paper. 2400 w. Age of St—Feb. 1, 1896.

Water-Tube vs. Shell Boilers. W. Barnet Le Van. An account of comparative tests made between water-tube boilers and shell or horizontal flue boilers at the establishment of the Brush Electric Light Co., Philadelphia, in October, 1882. 8500 w. Mach—March, 1897.

**Corrosion.**—See **BOILER CORROSION.**

**Corrugated Furnace.**—Tests of a Corrugated Furnace "Gunboat Type" Boiler. Notes some of the features of the boiler and reports test, which gives results of more than usual interest. 1100 w. Eng News—March 3, 1898.

**Covering.**—The Protection of Steam-Heated Surfaces. Charles L. Norton. A partial report of investigations still in progress, with illustrated description of method of testing, apparatus used, etc. The relative efficiency of different coverings, the fire risks in certain methods and materials, and the gain in economy are studied. 4000 w. Tech Quar—Sept., 1898.

See also **LOCOMOTIVE BOILER.**

**Dean and Main.**—See **Vertical.**

**Defects.**—Defects in Steam Boilers. Abstract from the second report of the committee of the Austrian Soc. of Engs. and Archts., relating to stationary boilers. Ill. 8300 w. Eng News—Feb. 11, 1897.

**De Laval.**—The De Laval Steam Boiler. Illustrated description. K. Sosnowski, in "La Nature." The particular characteristics are high pressure and automatic operation and regulation. 1200 w. Sci Am Sup—Nov. 27, 1897.

**Design.**—Systematic Boiler Designing. H. M. Morris. An article intending to point out the line along which engineers think and work in this branch, indicating the mode of procedure from start to finish when considering the design of a complete boiler. Serial. Mach—Jan., 1897.

The Computation of Steam Boilers (Berechnung der Dampfkessel). E. Brauss. A discussion of the proper dimensions of a boiler for a steam-heating system, taking into account various fuels. Data concerning chimneys are also given. 2000 w. Gesunheits Ing—May 15, 1899.

The Design of Tubular Boilers. Charles L. Hubbard. Plain directions from the standpoint of engineers and architects. Serial. Mach, N. Y.—Oct, 1900.

**Dubiau.**—The Dubiau Improvements in Steam Boiler Construction (Die Neuen Dampfkessel mit Dubiauscher Emulsions-Einrichtung). Describing the Dubiau emulsion tubes as connected to boilers of various designs, for the improvement in the circulation and the prevention of foaming. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—July 30, 1897.

The Dubiau Emulseur (Note sur l'Emulseur Dubiau). M. Delbrouck. Giving data and results of tests made upon boilers provided with the Dubiau circulating device, showing the advantages of a vigorous circulation. 4000 w. 2 plates. Rev Univ des Mines—Dec., 1899.

**Dubiau Circulating Pump.**—See **PUMP—Dubiau Circulating.**

**Dutch Cruisers.**—See **CRUISER—Dutch.**

**Economy.**—Importance of the Boiler. Showing that boilers do not receive the attention they deserve, that they are greatly affected by the surroundings with which each is erected, and that improvements after location often improve the economy. 1300 w. Bos Jour Com—Oct. 2, 1897.

Steam Boiler Economy. William Kent. Considers especially the heating value of different coals, with three points bearing on economy. 5400 w. Sib Jour Engng—May, 1899.

Possible Economies in Steam Boiler Management. Walter B. Snow, in the "Boiler Maker." Discusses the losses and their causes. 2800 w. Prac Engr—Oct. 27, 1899.

**Efficiency.**—Boiler and Furnace Efficiency. R. S. Hale. Considers the means of determining boiler efficiency and its dependence on the efficiency of combustion and air supply. Tabulated results of tests are given. 6500 w. Trans Am Soc Mech Engs—May, 1899.

The Efficiencies of Steam Boilers and Furnaces. R. S. Hale. An examination of the conditions upon which boiler and furnace efficiency depend, based upon a comparative study of a large number of tests. 3500 w. Eng Mag—July, 1899.

Boiler Efficiency, Capacity and Smokelessness, with Low-Grade Fuels. William H. Bryan. Discusses the best method of expressing the economic performance of a boiler, the ways it may be measured, table with abstract of the results of a number of boiler trials, etc. 8500 w. Jour Assn Eng Soc—Nov., 1896.

Causes of the Variable Efficiency of Steam Boilers and Their Influence on Tests. F. G. Gasche. An account of experimental work with drawings and discussion. 6700 w. Jour W Soc Engs—Aug., 1897.

Efficiency and Management of Steam Boilers. E. J. Duff. Read at meeting of Manchester Assn. of Engs. Considers some of the causes which contribute to the loss of efficiency in boilers. 4500 w. Col Guard—Jan. 29, 1897.

Efficiencies of Boilers. John C. McMynn. In this paper the author strenuously urges distinction between efficiency of a boiler, efficiency of a furnace, and efficiency of boiler and furnace considered together, and holds that the separation of the efficiency of furnace, apart from that of the boiler, is a problem demanding solution. He makes, however, no attempt to solve it. 1300 w. Elec Engng—April, 1896.

Efficiency of Boilers and Engines. Thomas F. Scheffler, Jr. Regarding the time as not far distant when the efficiency of boilers will be calculated from the total number of British thermal units, the author proceeds to discuss a method of determining boiler efficiency on this basis. Serial. Mach—May, 1896.

Efficiency of Boilers with Varying Rates of Fuel Combustion. R. C. Carpenter. Experimental data on this subject given and deductions made. Theoretical considerations occupy much of the space devoted to the subject. 2500 w. Power—Dec., 1895.

Experimental Determination of the Efficiency of Steam Boilers with Varying Rates of Fuel Combustion. F. G. Gasche. Methods whereby the subject of boiler efficiency can be satisfactorily studied. Formulae constituting a rational basis for such study. 1800 w. Power—Feb., 1896.

Influence of Presence of Air upon the Efficiency of Boilers (Influence des Rentrées d'air sur le rendement des Chaudières). Abstract of a paper by M. Compère at the Congrès des Ingénieurs en chef, with discussion. 1000 w. Génie Civil—Oct. 15, 1898.

Limitations of the Efficiency of Steam Boilers. Editorial calling attention to claims made in boiler tests that cannot be correct. 1600 w. Eng News—March 18, 1897.

Steam Boiler Efficiency. Rules for designing steam boilers and checking experimental determinations of efficiency, enunciated by Prof. A. Houet, of Royal Polytechnic School of Delft, Holland, and communicated by M. Westerbaan Muserling. 300 w. Engng—Nov. 1, 1895.

The Commercial Efficiency of Steam Boilers. A. Hanssen. Read before the Civil and Mechanical Engs. Soc. The author utilizes material supplied during the past ten or fifteen years of experimental investigation, particularly that derived from experiments of Donkin, Kennedy, Unwin, Kestner and Déry,—for the determination of a form of boiler that will produce steam most cheaply, and to arrive at conclusions as to the extent to which cheap steam production must be sacrificed to other considerations. 8200 w. Engng—July 17, 1896.

The Efficiency of Steam Boilers. Brief editorial review of paper upon this subject read before the American Society of Mechanical Engineers, at three successive meetings, of discussions upon these papers by members, and articles, letters, and discussions in technical journals elicited by them. 1800 w. Eng News—June 11, 1896.

The Efficiency of a Steam Boiler. What is it?

William Kent. Read before the A. S. M. E. A defense of the desirability of still using the "pound of combustible" as a basis for the estimation of boiler efficiency, in comparison of different tests. 3800 w. Trans Am Inst of Mech Engs—Vol XVII., 1896.

Variation in Boiler Efficiency. William D. Ennis. Describes tests recently made by the writer at the electric station of the Consolidated Gas Company of New Jersey, Long Branch, making an attempt to divide the tests into periods for comparison. 1400 w. Power—Aug., 1898.

Effect of the Rate of Combustion Upon the Efficiency of Steam Boilers. Editorial review and critique of a paper read by Prof. W. F. M. Goss of Purdue University, before the New York Railroad Club. The paper is regarded as an important contribution to the literature of steam engineering, but exceptions are taken to some of the statements. 2800 w. Eng News—Sept. 24, 1896.

See also **Evaporation; GRATE.**

**Electric Power Stations.**—Boilers for Electric Power Plants. R. A. Douglass. Calls attention to things to be considered in deciding the question. 3400 w. Am Elect'n—June, 1900.

Designing Boilers for a Small Street Railway Plant. William Kent. Part first considers the preliminary studies peculiar to the service required. Serial. St Ry Rev—Feb. 15, 1899.

The Steam Boiler Question in Electric Power Plants (Die Kesselfrage der Elektricitätswerke). A discussion of various types of steam boilers with regard to their applicability to electric-power plants. 7500 w. Elektrotech Zeitschr—Sept. 30, 1897.

**Electric Stations.**—Current Boiler Prices for Large Electrical Plants. An account of the bids for boilers received by the United States Electric Lighting Co., of Washington, D. C. 600 w. Elec Eng—May 26, 1897.

**English Practice.**—Steam Boiler Practice in England. Gives the essential points of a paper by J. J. Steinitz, read before the Municipal Electrical Assn. (England). It gives the most advanced practice in England. 2500 w. Am Mach—Sept. 1, 1898.

**English vs. American.**—Comparative Cost of English and American Boilers. Data received from Mr. George I. Rockwood, who has recently returned from Europe, concerning the relative prices of steam boilers in England and in the United States, illustrating the wide difference in the practice of the two countries. 1300 w. Eng News—Dec. 31, 1896.

**Europe.**—Steam Boiler Practice in Europe. Extracts from the report of Mr. R. S. Hale, in Circular No. 5, of the Steam Users' Assn., on current European practice, based upon personal inspection. 3200 w. Eng News—Oct. 1, 1896.

European Boiler Practice. R. S. Hale. Discusses types of boilers, economisers, superheaters, grates, mechanical stokers, boiler fittings, pipe coverings, chimneys, boiler operation, testing, labor in boiler room, steam engines, etc. Discussion follows. Ill. 8000 w. Jour Assn of Engng Soc—April, 1897.

**Evaporation.**—Evaporation. W. N. Twelvetrees. Extract from a paper before the mechanical engineers of London, Eng., on the theory and practice. 800 w. Bos Jour of Com—April 23, 1898.

A Theoretical Study of Evaporation in Steam Boilers (Etude Théorique de la Vaporisation dans les Chaudières). H. Brillié. An analytical and graphical investigation by means of which the evaporation of a given boiler can be computed. Cables and curves are given showing a very close agreement between computed values and the results of actual tests. A valuable article. Three papers. 10000 w. Génie Civil—August 21, 28, Sept. 4, 1897.

**Evaporation Rate.**—The Relation of Rate of Evaporation to Efficiency of Steam Boilers. George R. Bale. Showing that boilers of all types give practically identical efficiency at any given rate of evaporation, when worked under conditions most suitable to the particular description of the fuel employed. 2500 w. Prac Eng—Sept. 23, 1898.

**Fallacies.**—Fallacies Concerning Boilers. Editorial discussing a few of these. 1800 w. Engr, Lond—Aug. 12, 1898.

**Fire Engine.**—A New Fire-Engine Boiler. Illustrated description of a new departure in the construction of this class of fire apparatus, the invention of Charles H. Fox, of Cincinnati. 1500 w. Fire & Water—Nov. 27, 1897.

**Flue Strength.**—Strength of Internal Flues. From the Annual Report of the Engine Boiler and Employers-Liability Insurance Company, Limited (England). Describes experiments on a Lancashire boiler, giving inferences drawn. 700 w. Mech Wld—Sept. 16, 1898.

The Strength of Boiler Flues. A summary of the results of tests made at the Imperial Docks at Danzig in the six years from 1887 to 1892. A very thorough and important study. 2000 w. R R Gaz—April 3, 1896.

**Frost Damage.**—Damage to Steam Boilers by Frost. Examples are given showing that even boilers built of heavy plate and tested at high pressure cannot be exposed to cold weather with impunity. Ill. 500 w. Power—Dec., 1897.

**Fusible Plugs.**—Fusible Plugs. An explanation of their mechanism and why they burn out. 1000 w. Bos Jour of Com—Jan. 14, 1899.

Fusible Plugs in Boilers. W. A. Carlile. Describes the principal types of fusible plugs and states their advantages and disadvantages. 2300 w. Safety V—Feb., 1897.

**Grooving.**—The Grooving of Tube Ends. The cause of this tube destruction, method of repairing and cure. Ill. 1800 w. Locomotive—Sept., 1898.

**Heat Conduction.**—Heat Conduction in Steam Boilers. Herbert G. Geer. A discussion of the conditions on which the amount of heat conducted from one point to another depends. 1800 w. Power—Feb., 1897.

**Heat Losses.**—Heat Losses in a Steam Boiler. W. F. Durant, in "The Boiler Maker." Discusses the losses in the furnace, due to incomplete combustion, and the loss in the boiler. 3000 w. Ir Trd Rev—July 27, 1899.

**Heating.**—See **HEATING—Hot Water; STEAM HEATING.**

**Heating Surface.**—Increasing the Heating Surface of Boilers. F. F. Hemenway. A criticism of a tendency, which is chiefly manifested by those who assume to design boilers, with insufficient knowledge of principles. It does not follow that the larger heating surface belongs to the more efficient boiler. 1100 w. Am Mach—Jan. 30, 1896.

Proportioning of Heating Surfaces in Return Tubular Boilers. General principles which underlie this feature of boiler design. Diversity of practice. The writer thinks the diameters of tubes should be kept down and that in no case is there need of exceeding an outside diameter of 8¼ inches. 2000 w. Eng Rec—Dec. 21, 1895.

What Is the Heating Surface of a Steam Boiler? Charles Whiting Baker. Demonstrates that the surface exposed to the fire is the real heating surface of a boiler and reviews facts which show the relative heat absorbing power of water and gases. 4200 w. Am Soc of Mech Engs, No. 783—June, 1898.

**House Heating.**—See **HEATING—Boiler; PLUMBING—Hot Water; STEAM HEATING—Boiler.**

**Hydraulic Tests.**—See **BOILER INSPECTION—Hydraulic Tests.**

**Idle Periods.**—See **Management.**

**Inspection.**—See **BOILER EXPLOSION; BOILER INSPECTION.**

**Installation.**—The Installation of Steam Boilers. Critical discussion of details of boilers and their surroundings, with a view to showing the causes of present practice. Serial. Elec Rev, Lond—June 16, 1899.

**Internally Fired.**—Test of Internally Fired Boiler at the Washington Mills. Gives the data of a test, noteworthy for the rapid combustion and high results obtained. 500 w. Eng Rec—March 5, 1898.

See also **Vertical.**

See **STOKING—Labor Cost.**

**Lancashire.**—Specifications for a Lancashire Boiler 30 ft. x 8 ft., for 200 lb. Working Pressure. Sam Boswell. Points out the main features and gives dimensions and details. 1300 w. Prac Eng—Dec. 17, 1897.

See also **Conical Tube.**

**Locomotive.**—See **LOCOMOTIVE BOILER.**

**Locomotive Type.**—Stationary Shop Boilers. F. W.

Dean. A plea for the locomotive type of boiler in stationary service, claiming economy and commenting on statements made concerning them. 7500 w. R R Gaz—June 15, 1900.

**Low Water.**—Low Water in a Steam Boiler (Manque d'Eau dans un Générateur de Vapeur). C. Walckenaer. A discussion of a boiler explosion at Montreuil-sous-Bois, with an account of experimental investigations into the causes of sudden fluctuations of water level and disappearance of water from the glass. 4000 w. 1 plate. Annales des Ponts et Chaussées—3 Trimestre, 1897.

The Low Water Scapegoat. Editorial on the injustice of always attributing boiler explosions to low water. 700 w. Loc Engng—Sept., 1899.

**Management.**—On the Management of Steam Boilers. F. G. Ansell. Considers how to ensure full efficiency and avoid all possible risk of danger, discussing firing and feed-water. 3200 w. Elec Eng, Lond—Dec. 10, 1897.

Preparing Boilers for Periods of Idleness. Suggestions and detailed description of operations necessary to leave a boiler in proper condition for starting when needed. 2500 w. Engr, Cleveland, O.—June 15, 1900.

Proper Construction and Care of Boilers. J. M. Allen. Read before the Southern Ice Exchange, at Charleston, S. C. Extracts dealing with how to prevent boiler explosions. Serial. Bos Jour of Com—April 17, 1897.

Steam Boilers: Their Equipment and Management. Albert A. Cary. Read before the National Electric Light Assn. Part first begins the discussion of what style of boiler is best adapted to the work. Serial. Elec Rev—May 20, 1896.

See also **Economy.**

**Man-Hole Frames.**—Man-Hole Frames. Discusses the necessity of providing man-holes, convenient of access, safe, etc., with points of importance to be observed in construction. Ill. 1800 w. Lord's Mag—Feb., 1897.

**Man-Hole Openings.**—Man-Hole Openings. From "The Locomotive." Rules for their proper reinforcement. 1500 w. Bos Jour of Com—Jan. 23, 1897.

**Manufacture.**—See **BOILER MANUFACTURE.**

**Marine.**—See **MARINE BOILER; MARINE ENGINE; WATER-TUBE BOILER.**

**Material.**—Recent Advances in the Manufacture of High-Grade Boiler and Pipe Material. On the continual and rapid progress in materials, made necessary by increase of pressures. Ill. 5500 w. Jour Am Soc of Nav Engs—Feb., 1899.

**Mills and Factories.**—Selecting Boilers for Mills and Factories. W. H. Wakeman. A contribution to practical knowledge designed for the information of manufacturers and steam users. 2000 w. Mach—Aug., 1896.

**Mining.**—Steam Boilers for Mining Purposes. William Kent. The principles governing their economical and efficient use. The influence of local conditions on the size and type of boilers, and an impartial study of best types for varying conditions at mines. Serial. 1st part. 4000 w. Col Eng—March, 1897.

Steam Boilers for Mining Purposes. William Kent. The principles governing their economical and efficient use. The influence of local conditions on the size and type of boilers, and an impartial study of best types of boilers for varying conditions at mines. Serial. Mines & Min—Sept., 1898.

Steam Boilers for Mining Purposes. William Kent. The principle governing their economical and efficient use. The influence of local conditions on the size and type of boilers, and an impartial study of best types for varying conditions. 1500 w. Mines & Min—Oct., 1898.

See also **Coal Mine.**

**Oblique Joints.**—Efficiency of Riveted Joints. Abstracted from "The Locomotive." Explains what is meant by efficiency, and discusses how to find the effective efficiency. Ill. 1300 w. Am Mach—Aug. 12, 1897.

**Paris Exposition.**—Boilers at the Paris Exposition. General review of the exhibits, noting the preponderance of the water-tube type. Serial. Engr, Lond—June 22, 1900.

The Boiler Plant on the Champ de Mars (Installation des Chaudières dans les Deux Grandes Usines du Champ-de-Mars). Emile Cayla. A well illustrated general description of the great plant for furnishing steam to the mechanical and electrical sections of the Paris Exposition. 4500 w. 1 plate. Génie Civil—April 7, 1900.

The Boilers of the Paris Exposition. Illustrated detailed description of interesting exhibits. 5500 w. Power—Sept., 1900.

**Pressure.**—Reducing Pressure on Shell Boilers. From "The Locomotive." An explanation of the rumors that shell boilers are liable to a speedy and gradually increasing reduction of allowable working pressure, with discussion of the change in methods and manufacture necessary to meet the tendency toward high pressures. 2400 w. Ir Trd Rev—July 8, 1897.

**Railway Shops.**—Boiler Plant, Chicago Shops, C. R. I. & P. Railway. Illustrated description. 800 w. Ry Rev—Feb. 6, 1897.

**Reform.**—Boiler Reform. John J. Hogan. An able review of the causes which have retarded progress in boiler construction, mostly embraced in the phrase "disregard of natural laws," and a clear and concise enunciation of the laws which must be observed in approximating toward the ideal construction. 2500 w. Mach—Jan., 1896.

**Regulator.**—The Sandillon Pressure Regulator (Detendeur Regulateur de Pression, Système Sandillon). J. Loubat. With reports of trials both of the pressure regulator and of an automatic boiler feeder of similar design. 2000 w. La Rev Tech—June 10, 1899.

**Reinforcing Openings.**—The Reinforcing Openings in Boilers. From "The Locomotive." The details of their safe design. 1700 w. Bos Jour of Com—May 29, 1897.

**Repairs.**—Boiler Patching. W. G. Ranton. Describes the two methods known as soft and hard patching. 1600 w. Power—Aug., 1899.

**Retarders.**—The Effect of Retarders in Fire Tubes of Steam Boilers. Jay M. Whitham. Read before the A. S. M. E. Data obtained from tests of a 100 horse-power tubular boiler, with conclusions favorable to the use of retarders, especially in tubular marine boilers. 1300 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

**Riveted Joint Test.**—Experiments in Bursting a Boiler by Hydraulic Pressure. The boiler tested was built by the John O'Brien Boiler Works Co., of St. Louis, the object being to determine the strength of two different styles of riveted joints. Ill. 350 w. Eng News—July 1, 1897.

**Riveted Seams.**—Defects in Riveted Seams of Boilers (Etude sur les Avaries de Certaines Chaudières dans la Region des Rivures Circulaires). Ch. Frémont. A discussion of the causes of cracks along longitudinal riveted seams, with photographic illustrations. 1500 w. Bull de la Société d'Encour—May, 1898.

**Rules.**—See **BOILER REGULATIONS.**

**Safety.**—The Steam Boiler and Its Safety. F. G. Mitchell. Read before the Hamilton Assn., C. A. S. E. Calls attention to some points affecting the safety of boilers. 1000 w. Can Elec News—Jan., 1899.

**Scale.**—See **BOILER SCALE.**

**Schoolhouse.**—The Condition of Schoolhouse Boilers. Editorial based upon the report of a Massachusetts District Police Inspector, discussing the manner in which boilers in school houses are neglected, and the consequent risk of explosion. 800 w. Eng Rec—Sept. 17, 1898.

**Selection.**—The Choice of a Boiler. Discusses some of the points of first importance to be considered. 1700 w. Engng Mech—Oct., 1898.

The Choice of a Boiler. Editorial showing the importance of taking local conditions into account in the selection of a steam boiler, and the minor influence of first cost as compared with cost of maintenance. 1500 w. Engr, Lond—Sept. 2, 1898.

The Economy of the Modern Engine Room. Charles E. Emery. Discussing the problem of boiler selection. Serial. 1st part. 5100 w. Eng Mag—Sept., 1896.

The Selection of a Boiler. Notes from a memorandum prepared by Charles E. Stromeyer, as to what are the most general demands on a boiler and what boilers are best suited for these purposes. 1200 w. Col Guard—Sept. 1, 1899.

**Serpollet.**—See **STEAM VEHICLE.**

**Solignac.**—The Solignac Mixed Boiler. Interesting illustrated detailed description. 2400 w. Am Eng & R R Jour—Feb., 1896.

The Solignac Circulating Boiler (Sur la

Chaudière Mixte, Système Solignac). A. Brüll. An illustrated description of a boiler in which the water circulates from a large upper reservoir through tubes in which it is converted into steam, which then returns to the upper part of the reservoir. 1200 w. Bull de la Soc d'Encour—May 31, 1900.

**Specifications.**—See **BOILER SPECIFICATIONS.**

**Staybolt.**—See **STAYBOLT.**

**Steam Vehicles.**—See **STEAM VEHICLE—Boilers.**

**Strength.**—Practical Experience on the Strength of Boilers. C. E. Stromeyer. Abstract of a paper read before the British Inst. of Naval Arch'ts. Analyses results obtained and considers general practice in land boilers as compared with Lloyds rules. 2500 w. Engs Gaz—April, 1899.

**Stresses.**—The Strength of Cylindrical Shells. F. Keelhoff. Very abstruse mathematical discussion. The conclusion is reached that it is useless to take any account of the action of the ends in modifying the stresses in the shell of an ordinary boiler, and that the effect of the ends is as likely to increase as to diminish these stresses. 1800 w. Engng—Jan. 17, 1896.

**Sugar Refinery.**—The Boiler Plant of Arbuckle Brothers' Sugar Refinery, Brooklyn, N. Y. Illustrated description of plant, noteworthy for the numerous devices for the saving of space, labor and fuel. 900 w. Eng News—June 2, 1898.

**Support.**—On the Support of Long Cylindrical Boilers. Practical treatment of proper and improper methods with diagrams. 1000 w. Age of St—Feb. 1, 1896.

**Supporting Hooks.**—On Hooks for Supporting Boilers. Discusses the hooks and their form, giving tabulated statements of safe dead loads for wrought-iron hooks of two forms. 2000 w. Locomotive—Jan., 1899.

**Tests.**—See **BOILER TESTS.**

**Tube-end Grooving.**

**Tube Retarders.**—See **Retarders.**

**Vertical.**—A Vertical Steam Boiler of Novel Design. Illustrated description of an internally fired vertical tubular boiler designed by Dean and Main. 600 w. Eng News—June 23, 1898.

**Water-Tube.**—See **MARINE BOILER; WATER-TUBE BOILER.**

**Wood-Burning.**—How to Set a Wood-Consuming Boiler. Considers the best methods for wood-consuming boilers. 1200 w. Min & Sci Pr—Dec. 24, 1898.

**BOILER ACCIDENT.**

See also **BOILER EXPLOSION.**

**France, 1897.**—Accidents to Steam Boilers (Accidents d'Apparreils à Vapeur). The official report for France for 1897, with numerous illustrations and data concerning boiler explosions and other disasters to steam apparatus. 7000 w. 4 plates. Ann des Ponts et Chaussées—1 Trimestre, 1899.

**France, 1898.**—Accidents with Steam Boilers in 1898 (Des Accidents d'Appareils à Vapeur Survenus pendant l'Année 1898). The official French tabulated report, with plates of details of explosions and other accidents. 5000 w. 3 plates. Ann des Ponts et Chaussées—2 Trimestre, 1900.

**Marine Furnaces.**—The Causes of Collapse in Marine Boiler Furnaces. William R. Austin. Read before the Inst. of Engs. and Shipbuilders, Scotland. States the known and assumed causes and gives a theory which the writer thinks may account for some unexplained cases. Ill. 3000 w. Prac Eng—March 4, 1898.

**Steamship "City of Everett."**—Collapse of a Pair of Corrugated Furnaces. From "The Locomotive." Illustrated description of an accident which took place in one of the four compound marine boilers of the whaleback steamer "City of Everett." 800 w. Ir Age—March 11, 1897.

**Steamship "Elderslie."**—A Peculiar Boiler Accident—Result of a Vacuum. From the British "Shipping Gazette." An accident on the British steamer "Elderslie" is described, which caused the death of the third engineer in a most unusual manner. 900 w. Am Mach—June 15, 1899.

**Tug-boat.**—A Remarkable Boiler Accident. W. F. Durand. Describes an accident to a boiler on a tug-boat in N. Y. Harbor, which caused the complete melting of a mass of wrought-iron boiler tubes, with no explosion. Also suggestions of a possible solution. Ill. 1400 w. Sib Jour of Engng—March, 1900.

**Vertical.**—Failure of an Upright Boiler. From "The Locomotive." Describes the conditions and the cause of failure. 800 w. Engr—Sept. 4, 1897.

**BOILER ATTENDANT LICENSE.**

See **STEAM ENGINEER.**

**BOILER CLEANING.**

See also **BOILER CORROSION; BOILER SCALE.**

Cleaning Boilers. A device, patented by John Stephenson, of Newark, N. J., which permits automatically cleaning the top surface of all tubes. 450 w. Bos Jour of Com—Oct. 1, 1898.

Method for Cleaning Boiler Tubes. Illustrates and explains the new method being introduced by the Union Boiler Tube Cleaner Co., of Pittsburg. 1200 w. Am Mfr & Ir Wld—Aug. 17, 1899.

The Use of Boiler Compounds. Albert A. Cary. Divides these compounds into three divisions, discussing each in detail. 3500 w. Am Mach—Dec. 7, 1899.

The Use of Boiler Compounds. W. H. Wakeman. Showing that some compounds injure valve seats and discs and cause other troubles. 1100 w. Am Mach—Oct. 26, 1899.

**BOILER CONSTRUCTION.**

**Materials and Tests.**—Materials and Tests for Boiler Construction in America. Condensed report of the committee of the American Boiler Manufacturers' Assn., presented at Philadelphia. 3000 w. Ir & St Trds Jour—Aug. 28, 1897.

**BOILER CORROSION.**

See also **BOILER CLEANING; BOILER SCALE.**

A Peculiar Case of Corrosion. An account of sudden and intense corrosive action in a boiler, with explanation. Ill. 1300 w. Locomotive—Aug., 1898.

Internal Corrosion in Boilers. Calls attention to the important influence of oxygen brought in with the water. 1600 w. Bos Jour of Com—April 24, 1897.

Internal Corrosion in Steam Boilers. Report of paper by Mr. Sinclair Couper, read before the Inst. of Engs. and Shipbuilders in Scotland. Deals with the many theories which have been adduced to account for corrosion. 3500 w. Engr, Lond—Dec. 4, 1896.

The Corrosion of Iron. S. W. Parr and A. E. Paul. Results of a series of experiments conducted for the purpose of determining the conditions favoring the corrosion of iron—or to reproduce as nearly as possible the conditions existing inside of steam boilers. 600 w. Technograph, No. 12—1897-8.

**U. S. Navy.**—Corrosion of Boiler Tubes in the United States Navy. Walter F. Worthington. Discusses the reasons usually assigned for the corrosion of boiler tubes, and gives results of experiments to determine the difference in corrodibility between the usual materials used, and general conclusions. Ill. 5400 w. Jour Am Soc of Nav Engs—Aug., 1900.

**BOILER COVERINGS.**

See **BOILER—Coverings; LOCOMOTIVE BOILER—Coverings.**

**BOILER EXPLOSION.**

See also **BOILER ACCIDENT.**

Boiler Explosions Discussed. T. R. Parker. Considers modern boilers less likely to burst, and discusses various types. 2000 w. Am Mfr & Ir Wld—Aug. 23, 1900.

Heat and Boiler Explosions. James Wright. Paper read before Montreal C. A. S. E. Briefly outlines the views held as to what heat is, considers the mechanical equivalent and the behavior of water when subjected to heat. 4500 w. Can Elec News—Feb., 1897.

Investigations of Boiler Explosions. Gus C. Henning. Discusses the fundamental causes of explosions, showing that careful testing and inspection will always be sufficient to demonstrate the cause of any boiler explosion. 2000 w. Trans Am Soc of Mach Engs—May, 1899.

Thoughts Suggested by Boiler Explosions. T. R. Parker. Read before the Pacific Coast Gas Assn. Discusses the medium employed; the agent; the character of the material; and forms and types of boilers, and means of avoiding conditions which cause explosions. Also general discussion. 6700 w. Am Gas Lgt Jour—Aug. 13, 1900.

**Barking, Eng.**—Barking Boiler Explosion. Reports important evidence given at the inquest. 4000 w. Engng—Jan. 20, 1899.

Boiler Explosion at Barking. An account of an extremely violent explosion, accompanied by loss of life. The first recorded instance of the accidental explosion of the shell of a "Scotch" boiler. Illustrations and editorial. 2800 w. Engr, Lond—Jan. 13, 1899.

**Birmingham, Ala.**—The Birmingham Boiler Explosion on the premises of the Birmingham, Ala., Ice Factory Co., with discussion of the possible causes. 1400 w. Ice & Refrig—Nov., 1898.

**Bradford, Eng.**—Boiler Explosions. A review of the Board of Trade inquiry into an accident to a Cornish boiler at Bradford. 1800 w. Eng Mech—Aug., 1898.

**Buffalo, N. Y.**—Boiler Explosion at Buffalo, N. Y. Account of an accident at the National Starch Mfg. Co.'s plant, with description of the battery and the conditions before and after the explosion. 1000 w. Min & Sci Pr—Sept. 10, 1898.

The Buffalo Boiler Explosion. E. E. Williams. Illustrated description of the explosion at the Niagara factory of the National Starch Mfg. Co., at Buffalo, N. Y., where 7 were killed and 21 injured. 1000 w. Sci Mach—Aug. 1, 1898.

**Bury, Eng.**—The Fatal Boiler Explosion at Bury. Gives the investigations by the Board of Trade into the causes and circumstances. The tramways company are severely blamed. Also editorial. 3000 w. Prac Eng—June 17, 1898.

**Centralia, Pa.**—Boiler Explosion of the Centralia Colliery, Centralia, Pa. Illustrated description. 700 w. Power—Dec., 1896.

**Deptford, Eng.**—Explosion of a Water-Tube Boiler at Deptford. Report of the British Board of Trade, of interest because of its special bearing on the management of water-tube boilers. 2200 w. Engr, Lond—June 29, 1900.

**Dynamite.**—A Dynamite Boiler Explosion. An account of an explosion where the results seem to indicate the use of dynamite or its equivalent. An illustrated description. 1200 w. Locomotive—Oct., 1898.

**Eccles, Eng.**—Boiler Explosion at Eccles. Gives briefly the construction and history of the boiler, with report of the investigation. 4000 w. Engng—Jan. 20, 1899.

**Electric Power Station.**—Boiler Explosion in a Tramway Power House. Describes an explosion apparently due to the gradual deterioration of the plate, at the point of initial fracture from exposure of the joint to the heat of the furnace. Ill. 800 w. Locomotive—Sept., 1899.

**Flues.**—Accidents Caused by the Rupture of Boiler Flues (Accidents Causés par des Ruptures de Tubes à Fumeé). M. C. Walckenaer. Report of the secretary of the central commission of steam machinery (France) with discussion of the failures of boiler flues from 1888 to 1896. 7500 w. 1 plate. Am des Ponts et Chaussées—Part III., 1897.

**France, 1896.**—Accidents to Steam Boilers during 1896 (Accidents d'Appareils à Vapeur en 1896). The official report of accidents to steam apparatus in tabulated form, with plates of illustrations showing the nature of the explosions. 6000 w. 3 plates. Ann des Ponts et Chaussées—1 trimestre, 1898.

**Germany.**—The Efficacy of Boiler Inspection in the German Empire (Ueber die Wirksamkeit der Dampfkesselüberwachung im Deutschen Reiche). C. Bach. A review of accident statistics, showing that accidents due to boiler explosions, etc., have diminished considerably in proportion to other accidents. With tables and curves. 1000 w. Zeitschr d Ver Deutscher Ing—June 23, 1900.

**Germany, 1896.**—Boiler Explosions in the Year 1896 (Die Dampfkessel Explosionen während des Jahres 1896). Tabulating the explosions which occurred in the German empire, with date, location, kind of boiler, and number of persons in-Colliery, Centralia, Pa. Illustrated Description. jured. 1000 w. Glückauf—Sept. 25, 1897.

**Germany, 1897.**—The Boiler Explosions in Germany in the Year 1897 (Die Dampfkesselexplosionen im Deutschen Reiche im Jahre 1897). A tabulated report with notes giving the ascertainable facts and details of the boiler explosions in the German empire for 1897, with notes and comments. Two articles. 7000 w. Zeitschr d Ver Deutscher Ing—Sept. 24, 1898.

**Gratweiner Paper Mill.**—Steam Boiler Explosion at the Gratweiner Paper Mill (Dampfkessel-Explosion in der Gratweiner Papier Fabrik). An illustrated account o. a destructive boiler explosion. The boiler was one of a battery of the Dupuis type, the rupture taking place along a newly riveted seam. 3000 w. and 1 plate. Oesterr Monatschr f d Oeffent Baudienst—March, 1897.

**Hidden Defects.**—Boiler Explosions and Failures from Hidden Defects. From "The Locomotive." Illustrated description of causes of failures. Fractured plates, hidden cracks, possible in all types of boilers that have riveted shells and lap joints. 2000 w. Age of St—Feb. 27, 1897.

**Hot Water.**—Boiler Explosions. R. C. Carpenter. A general illustrated discussion of the subject, with examples of explosions of steam, and hot-water boiler explosions in Canada and the United States, which, however, are stated to be very rare in proportion to the large number in use. 1800 w. Heat & Ven—Nov. 15, 1895.

**Iron Works.**—Boiler Explosion in an Iron Works. Illustrated description of the damage done by a water-tube boiler explosion, the path taken by the upper drum, etc. 1200 w. Locomotive—Feb., 1900.

**Landslide.**—A Landslide Explodes a Boiler. Illustrates and describes the circumstances under which an explosion occurs at Rosendale, N. Y. 1100 w. Locomotive—March, 1900.

**Locomotive.**—See **LOCOMOTIVE EXPLOSION.**

**Low Water.**—See **BOILER.**

**Marine.**—Explosion of a Marine Boiler (Explosion eines Schiffskessels). With very clear photographs showing the ruptured rear end of the cylinder. The metal was found to be crystallised. 1000 w. Zeitschr d Ver Deutscher Ing—Nov. 27, 1897.

See also **Steamboat; "Terrible;" Torpedo Boat.**

**Montreuil-sous-Bois, France.**—See **BOILER—Low Water.**

**New Bedford, Mass.**—Boilers at Acushnet Mill, New Bedford, Explode. An account of an explosion which killed two employees and destroyed much personal property. 1000 w. Bos Jour of Com—March 16, 1897.

The New Bedford Explosion. Calls attention to interesting features in connection with a recent explosion. 1600 w. Bos Jour of Com—March 20, 1897.

**Norwich, Eng.**—A Noteworthy Boiler Explosion. Gives in full the report of the Board of Trade relating to the explosion of a boiler at St. George's, Bridge Street, Norwich, Eng. 5500 w. Engr, Lond—Dec. 23, 1898.

Boiler Explosion at Norwich. Report of the Board of Trade investigation of the explosion at the new technical schools in course of building at Norwich, Eng., with editorial comment. 6500 w. Engng—Dec. 9, 1898.

**Oil Mill.**—Boiler Explosion in an Oil Mill. Illustrates and describes an explosion which shows that repairs were made on a wrong principle. 800 w. Locomotive—June, 1898.

**Paper Mill.**—Explosion of a Kier at a Paper Mill, Bolton. Report of an investigation with regard to the bursting of a revolving rag boiler or kier, which occurred at the Springfield Paper Works, Bolton. 5000 w. Engng—Nov. 20, 1896.

**Paterson, N. J.**—Boiler Explosion at Paterson, N. J. Describes the destruction of a plant of 14 large boilers in the Passaic Rolling Mills. 600 w. Eng Rec—May 7, 1898.

The Boiler Explosion at Paterson, N. J. An illustrated article on this terrible explosion at the works of the Passaic Rolling Mill Company. 700 w. Eng Rec—May 14, 1898.

**Prevention.**—Can Boiler Explosions Be Prevented? W. H. Wakeman. Discussion of the causes of explosions, and precautions that should be taken. 3600 w. Mod Mach—Oct., 1900.

**Rochester, N. Y.**—A Terrible Boiler Explosion and Its Lesson. An account of the explosion which occurred Nov. 22, at the Graves Elevator Works, Rochester, N. Y. The cause is supposed to have been a crack hidden in the joints by the overlap of the sheets. 1800 w. Am Mach—Dec. 16, 1897.

Boiler Explosion in a Brewery. Illustrates and describes a recent boiler explosion at the plant of the Standard Brewing Co., Rochester, N. Y. 1000 w. Locomotive—June, 1899.

**Sharlston Coal Mine, Yorkshire.**—The Sharlston Colliery Boiler Explosion. Illustrations and particulars of the explosion that took place at this colliery last July. 800 w. Ir & Coal Trds Rev—Nov. 4, 1898.

**Sheffield.**—Boiler Explosion at Sheffield. An account of the disastrous explosion on Nov. 1, at the Don Cutlery Works, and the investigation. 4500 w. Engng—Dec. 29, 1899.

**Steamboat "Francis Joseph I."**—A Remarkable Boiler Explosion. Illustrates and describes the explosion of the shell of a Scotch boiler on the steamer "Francis Joseph I.," at Prague, Austria, on the morning of May 19, 1898. 1100 w. Engr, Lond—Feb. 17, 1899.

**"Terrible."**—The Explosions of the Boilers of H. M. S. "Terrible." Editorial on the explosions of this vessel's boilers, suggesting that the ship be reboilered with some other type of water tube than the Belleville. 1400 w. Engr Gaz—May, 1899.

**Tilsit, Prussia.**—Steam Boiler Explosion at Splitter near Tilsit (Dampfkesselexplosion in Splitter bei Tilsit). The official report of a disastrous explosion, with photographs showing the nature and extent of the damage. 2000 w. Zeitschr d Ver Deutscher Ing—March 11, 1899.

**Torpedo Boat "Adler."**—Disastrous Boiler Explosion on the Austrian Torpedo Boat "Adler." J. Heins. An illustrated account of a disaster that occurred while the vessel was steaming in the Adriatic Sea, on July 22, 1899. 1200 w. Marine Engng—June, 1900.

**BOILER FEEDER.**

See also **BOILER—Regulator; PUMP—FEED-Water.**

A New Way to Feed Boilers. Illustrates an apparatus for supplying boilers with feed water with a much smaller expenditure of steam than is necessary with pumps. The Q. & C. Scott Boiler Feeder. 1200 w. Am Mach—June 17, 1897.

Selecting a Boiler Feeder. W. H. Wakeman. Presents the advantages and disadvantages of pumps and injectors. 2400 w. Mod Mach—March, 1900.

**BOILER INSPECTION.**

See also **BOILER PLATE—Testing Rules.**

A National Boiler-Inspection Law. E. D. Meier. Presents the need of such a law; all that has been done; other countries; and gives suggestions for early and complete accomplishment of the desired end. 4000 w. Jour Assn of Engng Soc—April, 1897.

Boilers as the Inspector Finds Them. George B. Hartley. Discusses the causes of explosions, the demand for high-pressure boilers, with consideration of various types of boilers, etc. Discussion follows. Ill. 5800 w. Pro Engs' Club of Phila—April, 1897.

Boiler Inspection. Proposed addition to existing rules, as they relate to shells and riveting. 2500 w. Ind Engng—June 20, 1896.

Inspection of Boilers by Engineers in Charge. W. J. Ranton. On the importance of a personal inspection by the engineer in charge. 1800 w. Power—Oct., 1899.

Testing Steam Boilers. C. A. Collett. A practical discussion of methods of ascertaining the safe or unsafe condition of steam boilers. 1700 w. Safety V—Feb., 1896.

**Great Britain.**—Government Boiler Inspection. Editorial comment on the effort to promote a bill in Parliament to provide for the compulsory inspection of steam boilers. Thinks such inspection might prove mischievous, and that it is very unlikely that it would be of service. 1500 w. Engr, Lond—Dec. 18, 1896.

**Hydraulic Tests.**—Seam Rips and Hydraulic Tests. The advisability and value of the hydraulic test of boilers in all cases of inspection is editorially questioned. Especially for the detection of seam rips in egg ended boilers it is considered worse than useless, though its value for determining tightness in new boilers, or in repairs of new boilers, is admitted. 1600 w. Prac Eng—Aug. 21, 1896.

**Massachusetts.**—State Inspection of Boilers in Massachusetts. From a paper by Thomas Hawley. A review of the Massachusetts law and how it is working. 2400 w. Bos Jour of Com—Sept. 26, 1896.

The Massachusetts Inspection and License Law. A critique. It is maintained that under this act, a man who in a plant of less than 150 h. p. would be unable to get up steam and start the engine, might yet, under this law, be granted a first class license. 2200 w. Lord's Mag—March, 1896.

**BOILER MANUFACTURE.**

Boiler Making. Henry J. Hartley. Old and new methods contrasted. 2200 w. Bos Jour of Com—Nov. 28, 1896.

Modern Boiler Making Contrasted with Old Methods. Henry J. Hartley. Paper read at the convention of the Am. Boiler Mfrs.' Assn. Past and present of boiler building. Treatment wholly practical. 2500 w. Ir Age—July 2, 1896.

Old and New Methods in Boiler Making. The methods of thirty years ago are contrasted with the improved methods of to-day, and some fine examples of marine boiler work are named and briefly described. 2500 w. Am Mach—Sept. 24, 1896.

Twenty-five Years' Progress in Boiler Making. W. H. Booth. The progress has been almost wholly in workmanship rather than in principles. 3000 w. Elec Rev, Lond—Nov. 12, 1897.

**BOILER PLATES.**

The Manipulation of Boiler Plates. Substance of replies in response to a circular, giving quite a complete account of the handling of plates. 1800 w. Ry Age—May 25, 1900.

**Open-Hearth Steel.**—Open-Hearth Steel Boiler Plates. T. L. Coudron. A comparison of the specifications proposed by the Am. Committee of the Inter. Assn. for Testing Materials with the Standard Specifications of the Am. Ry. Mas. Mechs.' Assn. and others. Also editorial. 3500 w. R R Gaz—June 22, 1900.

**Testing Rules.**—New Rules for Testing Boiler Plates. A sharp editorial criticism of the new rules of the Board of Inspectors of Steam Vessels so far as they relate to testing plates for use in steam boilers. 1100 w. Eng News—April 9, 1896.

**Thermal Condition.**—On the Thermal Condition of Iron, Steel and Copper When Acting on Boiler Plates. Ella Mary Bryant. Illustrates and describes investigations made to determine the temperature of boiler plates. The measurements were made by thermo-electric junctions embedded in the substance of the plate. Serial. Prac Eng—Sept. 23, 1898.

**BOILER REGULATIONS.**

**"Hamburg."**—Safety of Boiler Materials (Sicherheit der Kesselbaustoffe). John Trnovskej. A compilation of the so-called "Hamburg" regulations and specifications for securing safety in boiler construction. 3000 w. Oesterr Monatschr f d Oeffent Baudienst—April, 1900.

**Lloyd's.**—Lloyd's Register New Boiler Rules. A discussion of a recent concession made by Lloyd's Register and its appreciation by marine-engine builders, with other changes of rules. 2000 w. Engr, Lond—Nov. 5, 1897.

**Manchester.**—The Care of Steam Boilers. An abstract of the rules of the National Boiler and General Insurance Co., of Manchester, England. Serial. Eng Rec—Feb. 11, 1899.

**Prussia.**—Installation of Boilers (Aufstellung von Dampfkesseln). The official rules of the Prussian Government covering the details of steam boiler installation, as revised June 30, 1897. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 7, 1897.

**Saxony.**—The New Saxon Regulations for the Prevention of Accidents with Water Tube Boilers. Ch. Bellens. Translated from "La Revue Technique." The regulations promulgated by the Technical Commission appointed by Saxony, and put into effect Dec. 18, 1897. 2000 w. Power—Nov., 1898.

The New Law in Saxony for Multitubular Boilers (Le Nouveau Règlement Saxon pour les Chaudières Multitubulaires). Ch. Bellens. An examination of the recent Saxon regulations, with especial reference to water-tube boilers, giving a sketch of a boiler conforming fully with the official requirements. 1500 w. La Revue Technique—May 10, 1898.

**BOILER SCALE.**

See also **BOILER CLEANING; BOILER CORROSION.**

Cleaning Boilers. Suggests means of preventing the formation of scale. 2000 w. Engr, U. S. A.—Sept. 1, 1899.

Feed Water and Boiler Scale. Injurious effects of scale, and its removal. 1600 w. Bos Jour of Com—Jan. 23, 1897.

Incrustations in Boilers (Incrustants et Désincrustants). M. Dibos. An investigation into the causes and character of boiler incrustations, with analyses and suggestions for remedies. Especially referring to marine boilers. 6000 w. La Revue Technique—Jan. 25, 1897.

The Cure for Corrosion and Scale from Boiler Waters. Albert A. Cary. Describing the phenomena of pitting, grooving and general corrosion, the theories offered in explanation of them, and the means of their prevention. Ill. 6800 w. Eng Mag—March, 1897.

The Cure for Corrosion and Scale from Boiler Waters. Albert A. Cary. An examination of the devices employed in skimming and filtration. Ill. Serial. 4th part. 8600 w. Eng Mag—June, 1897.

The Cure for Corrosion and Scale from Boiler Waters. Albert A. Cary. Detailing the impurities that cause the formation of scale, and the methods of treating them. 7400 w. Second paper. Eng Mag—April, 1897.

The Prevention and Removal of Boiler Scale (Verhinderung und Beseitigung des Kesselsteines). R. Danilof. A discussion of the various chemical and mechanical methods of preventing and removing incrustations, calling especial attention to the use of cold water for loosening scale. 2000 w. Oesterr Zeitschr Berg u Hüttenwesen—Sept. 24, 1898.

**Bavarian Inspectors.**—Boiler Incrustation and Its Removal. Report of the Bavarian Society for Boiler Inspection. 1800 w. Am Mfr & Ir Wld—Nov. 13, 1896.

**Cold Loosening.**—Removal of Boiler Incrustations (Désincrustation des Chaudières). M. Schmidt. Describing the success obtained in loosening boiler scale by rapid cooling and washing out when cold. 6000 w. Bull de la Soc d'Encour—Jan., 1898.

**Conductivity.**—The Conductivity of Boiler Scale. Experimental determinations with different materials by Jos. P. Clark, Neil McEwen, and Frank J. Wood, of Columbus Assn., No. 31, N. A. S. E. of Brooklyn, N. Y., with illustrated description of apparatus and methods. 1500 w. Power—May, 1896.

**Locomotive.**—The Effect of Scale on the Evaporation of a Locomotive Boiler. L. B. Breckenridge. Gives details of a series of tests recently completed at the Univ. of Illinois. 1400 w. R R Gaz—Jan. 27, 1899.

**Oils, Clean Boilers.**—Treats of the practical use of kerosene as a material for cleaning and keeping boilers clean. 2000 w. Lord's Mag—Nov., 1895.

Mineral Oils as Scale Preventives. Information concerning the nature and action, and the best way of using, petroleum derivatives. 1900 w. Locomotive—July, 1898.

Physical and Chemical Properties of Volatile Oils in Boilers. W. H. Edgar. Address before the Northwestern Elec. Assn. at Milwaukee. Discusses the use of oils to counteract the evil effect of incrustation, especially of kerosene and petroleum and their different distillates. Discussion. 4400 w. W. Elect'n—Jan. 29, 1898.

**Soda.**—A Letter on Soda, in Answer to an Inquiry. W. H. Edgar. On the action of soda ash or caustic soda in steam boilers. 2200 w. Loc Engng—Aug., 1900.

**Soda Ash.**—Soda Ash as a Boiler Purge. Considers this the cheapest and least objectionable of the chemical compounds used for purification, and explains its action and how it should be used. 1000 w. Ry Mas Mech—Nov., 1897.

**Sodium Fluoride.**—The Action of Fluorides on Feed Water and Corrosion in Steam Boilers. A. Wangemann. A paper read before Robt. Fulton Assn. of Stationary Engineers. The use of sodium fluoride has hitherto been obstructed by its cost. The writer states that the price has now been reduced and that it is available. Its advantages and practical points in use for preventing scale in boilers, form a very useful paper. 4000 w. Sta Eng—May, 1896.

**Sodium Tannate.**—Steam Boiler Incrustation. Recommending the use of sodium tannate. 800 w. Power—March, 1898.

**Talmage Prevention.**—A Simple and Successful Scale Prevention Method. Illustrates and describes the system of J. G. Talmage, which is pronounced to be successful when properly operated. 1600 w. Am Engr & R R Jour—May, 1900.

### BOILER SETTING.

See also **BOILER Support.**

A Boiler Setting. G. W. Bissell. Method for supporting a horizontal return-tubular boiler is described. Ill. 250 w. Trans Am Soc of Mech Engs—Dec., 1897.

Boiler-Setting and Furnace-Construction. Edgar Kidwell. Showing the requirements of boiler-setting and how to obtain them. Ill. 5200 w. Eng Mag—July, 1897.

The Hanging and Setting of the .Horizontal Fire-Tube Boiler. Orosco C. Woolson. A criticism of the common method and the remedy. Ill. 4400 w. Am Soc of Mech Engs, No. 782—Jan., 1898.

The Setting of Horizontal Tubular Boilers. The paper is the result of conversations with designers of boilers, with masons making a specialty of boiler settings, and with operating engineers and firemen, together with observation. Ill. 4000 w. Power—Nov., 1897.

**Water-Gas Plants.**—The Importance of Proper Boiler Settings in Water-Gas Plants. Jno. R. Lynn. Read at meeting of the Michigan Gas Assn. Notes defects and discusses rules, and fuel tests. 2200 w. Pro Age—March 1, 1899.

### BOILER SHOPS.

The Arrangement of Boiler Shops. F. M. Whyte. A discussion of the general arrangement of a boiler shop forming a part of a locomotive repair plant. 2200 w. Am Engr & R R Jour—June, 1900.

**Grafenstaden, Alsace.**—The Boiler Shops of the Alsace Machine Works at Grafenstaden (Kesselschmiede der Elsässischen Maschinenbaugesellschaft in Grafenstaden). Illustrated description of a modern boiler works with especial reference to electrically operated tools and hydraulic riveting machinery. 3500 w. Zeitschr d Ver Deutscher Ing—Oct. 7, 1899.

### BOILER SPECIFICATIONS.

**American.**—Uniform American Boiler Specifications. E. D. Meier. Read at recent convention of American Boiler Manufacturers' Assn. A comparison of present regulations here and abroad, with general consideration of the subject. 4000 w. Ir Age—Aug. 26, 1897.

Report of Committee on Uniform American Boiler Specifications. The report as finally adopted at the convention of American Boiler Manufacturers' Assn. at St. Louis. 4500 w. Ir Age—Oct. 13, 1898.

### BOILER TESTS.

See also **BOILER INSPECTION; ECONOMIZER—Tests; STEAM ENGINE TESTS.**

Boiler Tests: Classification of Data and Plotted Results. William Wallace Christie. A large collection of tests have been tabulated and the results plotted in diagrams. Tables. Trans Am Soc of Mech Engs—Dec., 1897.

Boiler Testing With Various Fuels. David P. Jones. The writer has given this subject much attention and presents some of the results of his experience, with suggestions as to what may be the best methods to secure the best results. Ill. 7800 w. Jour Am Soc of Nav Engs—Feb., 1898.

Comparative Tests of Steam Boilers with Different Kinds of Coal. Charles E. Emery. Paper read at the N. Y. meeting of the A. S. M. E. A digest, with references to the information available in regard to a suggestion made at a previous meeting, by Mr. W. F. Dean, that boiler trials should be made on the basis of efficiency,—defined to be the ratio between the total which any given coal can generate by complete combustion, and part of it absorbed by the water heated and the steam generated. 10800 w. Trans Am Soc of Mech Eng—Dec., 1895.

Comparison of Boiler Tests. Explains facts that will assist in reducing different reports of tests to a common basis. 1300 w. Col Guard—Sept. 29, 1899.

Economic Tests of Boilers. Lavington E. Fletcher. Abstract of memorandum presented by the chief engineer at the annual meeting of the Manchester Steam Users' Assn. Description of boilers, and the character of the tests, with tabulated data from which it is concluded that they are not more economical than Lancashire boilers. 1000 w. Prac Eng—Dec. 20, 1895.

Notes on Testing Steam Boilers. Frederick Grover. The notes refer to such tests as are necessary to determine the economic performances. Serial. Mech Wld—Jan. 6, 1899.

Suggestions on Boiler Testing. C. E. Emery. Dealing largely with the need of ascertaining the calorific value of different fuels. 2500 w. Sib Jour of Engng—Dec., 1895.

Testing the Evaporation of Boilers. H. B. Budgett. From the "Journal of the British Society of Mining Students." Deals with means of testing the duty a boiler is doing, giving three methods. 2300 w. Col Guard—May 13, 1898.

The Need of Testing Boilers. Report by a committee of the Engineers' Society of Western Pennsylvania. 1000 w. Eng Rec—Oct. 21, 1899.

**A. S. M. E. Code.**—Draft of the Report of the Committee on the Revision of the Society Code of 1885, Relative to a Standard Method of Conducting Steam-Boiler Trials. 16000 w. Trans Am Soc of Mech Engs—Dec., 1897.

Report of the Committee on the Revision of the Society Code of 1885, Relative to a Standard Method of Conducting Steam-Boiler Trials. Submits a revised code. The changes are mainly in the line of amendments shown by experience to be desirable. 15000 w. Trans of Am Soc of Mech Engs, No. 805—Nov., 1898.

Report of the Committee on the Revision of the Society Code of 1885. Relative to a Standard Method of Conducting Steam-Boiler Trials. A copy of the revised code, the changes being chiefly in the line of amendments which experience has shown to be desirable. Ill. 36500 w. Trans Am Soc of Mech Engs—May, 1899.

Report of the Committee on the Revision of the Society Code of 1885, Relative to a Standard Method of Conducting Steam-Boiler Trials. Gives the code of 1899 with appendices. 2500 w. Trans Am Soc of Mech Engs, No. 827—Dec., 1899.

Discussions Upon the Provisional and Amended Drafts of the Report of the Committee on the Revision of the Code of 1885, Relative to a Standard Method for Conducting Steam-Boiler Trials. 10800 w. Trans Am Soc of Mech Engs, No. 828—Dec., 1899.

**B. & W. Marine.**—Test of a Babcock & Wilcox Boiler Built for the "Alert." Gives the general dimensions of the boilers, pointing out wherein the differ from others heretofore built for vessels of the U. S. Navy, and describes the tests made. 4800 w. Jour Am Soc of Nav Engs—May, 1899.

**Curved Water Legs.**—Test of an Experimental Boiler. Reports the results of a test made upon curved water legs. Ill. 1700 w. Locomotive—May, 1898.

**Drummond Coal Mine, Canada.**—Some Boiler Tests at Drummond Colliery. Charles Fergie. The boilers tested were two Stirlings and one Heine, having been in use three and five years, respectively. 1200 w. Can Min Rev—Oct., 1897.

**Eccentric Flue.**—Evaporation Test of a Boiler with Eccentric Internal Furnace Flue (Verdampfungsversuche an einem Kessel mit Seitlichem Wellrohre). A boiler of the Lancashire type, with corrugated furnace flue eccentrically placed. An evaporation of 9.98 lbs of water, and an efficiency of 75.5 per cent. was obtained. 1500 w. Zeitschr d Ver Deutscher Ing—May 15, 1897.

**Fuels.**—Boiler Testing with Various Fuels. David P. Jones. Abstract of paper read before the Am. Soc. of Naval Engs., at Washington, D. C. Discusses methods of testing with coal, oil, waste gases of blast furnaces, and bagasse. 3800 w. Eng News—Feb. 3, 1898.

**Horizontal Return Tubular.**—Tests of a Horizontal Return Tubular Boiler with Two Kinds of High Grade Bituminous Coal. H. Barrus. Describes tests, giving results. 700 w. Eng Rec—June 4, 1898.

**Rules.**—See **A. S. M. E. Code.—STEAM ENGINE TESTS.**

**Starting and Closing.**—Starting and Closing Boiler Tests. A discussion as to whether the test should be started with clean grates, with Prof. Carpenter's opinion. 1200 w. Bos Jour of Com—Nov. 28, 1896.

**Vertical.**—Test of a Vertical Boiler. George H. Barrus. Tested while running under ordinary service conditions. 600 w. Eng Rec—April 2, 1898.

**BOILER WORKS.**

See **BOILER SHOP.**

**Bolivia.**—Some of the Undeveloped Resources of Bolivia. Sir Martin Conway. Interesting description of the country and its products, containing information of the mineral wealth. Map, and discussion. 7000 w. Jour Soc of Arts—Feb. 2, 1900.

**BOLSTER.**

See **CAR BOLSTER.**

**BOLT.**

**Cover-Plate.**—The Strains on Cover-Plate Bolts. From the "Locomotive." Extracts from an article studying the tension to which the bolt is subjected when under steam. 1000 w. Bos Jour of Com—Dec. 25, 1897.

**Strength Chart.**—A Chart of Bolt Strengths. Lawford H. Fry. Gives a diagram illustrative of the great amount of engineering information that can be given by the use of charts. 1200 w. Am Mach—Dec. 8, 1898.

**BOLT HEADS.**

**Test.**—Report on Comparative Test of Bolt Heads. W. Kendrick Hatt. Explains the purpose of the tests, and their results, with discussion. Presented at the Convention of the Master Car Builders' Assn. 2700 w. R R Car Jour—July, 1899.

**BOOSTER.**

An Experiment with an Improvised Booster on Street Railway Feeders. Robert P. Brown. Account of the reasons leading to the adoption of the system, and description of the plant as installed, with map, plan and load curves. 1800 w. Elec Wld—Oct. 24, 1896.

Boosting with Alternating Currents. Alexander Russell. Boosting is briefly described, the theory considered and illustrations given. 1300 w. Elect'n—Nov. 13, 1896.

**Direct-Current.**—Direct-Current Boosters. Claude W. Hill. Illustrates and describes a track feeder booster with its motor. 700 w. Elec Rev, Lond—July 6, 1900.

**Electric Railways.**—Boosters for Street Railways. Describes installations on various roads. Ill. 3300 w. St Ry Rev—Feb. 15, 1898.

The Booster System as Applied to Electric Railways. J. Lester Woodbridge. Shows the arrangement of booster, explaining its aim, and operation and discussing the economy. 3000 w. Jour Fr Inst—May, 1898.

**Electric Tramway.**—Boosters in Street Railway Service. M. C. Canfield. Explains what a booster is and its use. 1600 w. Engr, U. S. A.—July 1, 1899.

**Railway Work.**—The Booster in Railway Work. J. B. Scott. Largely descriptive of its use in the City and Suburban Railway, of Baltimore, Md. 1600 w. St Ry Rev—Jan 15, 1896.

**BORAX.**

Old and New Methods of Production. Illustrated account of the deposits in the United States and the methods used. 1000 w. Sci Am—May 26, 1900.

**BOREHOLE.**

See **COAL MINING—Borehole.**

**BORING.**

See also **COAL MINING; COAL MINING MACHINERY; DIAMOND DRILLING; DRILLING; MACHINE TOOL; MINING; MINING MACHINERY; SHAFT SINKING; WELL BORING.**

**Cylinders.**—Boring and Finishing Cylinders in the Horwich Shops of the Lancashire and Yorkshire Railway. F. J. M. Illustrated description of special machine-shop operations carried on in these works. 1300 w. Am Mach—Sept. 8, 1898.

Boring an Engine Cylinder in the Sierra Nevada Mountains. H. H. Kelley. An account of difficulties in starting up a mine engine that had been stopped for more than a year and not left in a proper condition. Ill. 2000 w. Engr, U. S. A.—Sept. 1, 1899.

Boring Cylinders for Motor Vehicles. Robert I. Clegg. Considers tools, expedients and methods used. 1600 w. Horseless Age—April 12, 1899.

Method of Boring Large Cylinders in a 72-inch Lathe. Alfred Dunn. A brief illustrated description of the methods used for boring and facing a 64 seconds by 10 minutes 6 seconds cylinder at one setting. 400 w. Mach, N. Y.—Nov., 1897.

Reboring a Steam Cylinder. Charles A. Hague. An accident made it necessary to rebore a cylinder, and an account of the arrangements is given by which the work was accomplished in a single day. 1000 w. Am Mach—April 28, 1898.

**Fauck's Apparatus.**—See **MINING MACHINERY—Boring.**

**Fly Wheels.**—Boring 48-Inch Fly Wheels on a 20-Inch Lathe. C. O. Griffon. Illustrated description of means and method. 500 w. Am Mach—Aug. 20, 1896.

**Foundations.**—See also **FOUNDATION—Bridge Pier.**

**Hydraulic Feed.**—Boring Cranks with Hydraulic Feed. H. S. Brown. Illustrates and describes a device arranged by the writer, with remarks on its uses, and on improved tools. 1700 w. Am Mach—Aug. 24, 1899.

**Mining.**—See **COAL MINING; COAL MINING MACHINERY; MINING; MINING MACHINERY.**

**BORING BAR.**

A Convenient and Efficient Boring Bar. Illustrates and describes a boring bar and some of the uses to which it may be put. 900 w. Mach, N. Y.—Sept., 1900.

**BORING MACHINE.**

**Ancient.**—A Machine Tool of the Last Century. W. S. Durfee. Describes a mill for boring gun barrels, found in a work published in 1791. Ill. 1600 w. Am Mach—April 28, 1898.

**Beaman & Smith.**—The Beaman & Smith Boring Machines. An illustrated description of three different types of large boring machines. 500 w. Ir Age—Sept. 27, 1900.

**Cross Ties.**—See **ADZING MACHINE.**

**German.**—A Large Special Horizontal Boring and Milling Machine—"Made in Germany." Half-tone and drawing showing an interesting machine built by Droop & Rein. Bielefeld, Germany. 500 w. Am Mach—March 9, 1899.

**Horizontal.**—Horizontal Boring and Milling Machine (Horizontal Bohr und Fräsmaschine). Brief illustrated description of a powerful machine-tool, with plate giving working elevation drawing. 1000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Oct. 22, 1898.

**Mathematics.**—A Boring-Mill Job as a Trade Secret—Some "Practical" Mathematics. A question regarding the working of a steel casting is answered, showing it to be a matter of simple mathematics and not a "trade secret." 1100 w. Am Mach—Oct. 7, 1897.

**Oerlikon Works.**—Double Boring and Milling Machine (Doppelte Bohr-und Fräsmaschine). An illustrated description of a large boring machine, designed by the Oerlikon Machine Works, and especially adapted for electrical work. Zeitschr d Ver Deutscher Ing—Jan. 7, 1899.

**Profile Turning.**—Unusual Profile Turning on a Boring Mill. Illustrated description of a boring mill containing some unusual features, and particulars of an unusual job done on it. 900 w. Am Mach—Feb. 9, 1899.

**Thread-Cutting.**—The Universal Boring and Thread-Cutting Machine of Paul Langbein (Universalbohr-und Gewindeschneid-Machine von Paul Langbein in Saranno, Italien. D. R. P. 108990). A well illustrated account of a handy and serviceable tool which can be driven by belt or electric motor. 1300 w. Glaser's Ann f Gew u Bauw—March 15, 1900.

**Threading and Countersinking.**—Boring Threading and Countersinking Machine. From "Revue Industrielle." Illustrated detailed description. 1500 w. Sci Am Sup—Feb. 11, 1899.

**BORING TOOL.**

**Cam Analysis.**—Analysis of the Cams of the Geometric Boring Tool. J. B. Taylor. Explanatory notes. 1100 w. Am Mach—June 14, 1900.

**Geometric.**—A Geometric Boring Tool. Illustrated description of a recent device for boring other than round holes. 1700 w. Am Mach—May 3, 1900.

**BOTTLE-FILLING MACHINE.**

**Electrical.**—Electrical Bottle-Filling Machine. Illustrated description. 1100 w. W Elec—Aug. 22, 1896.

**BOTTLE-LABELING MACHINE.**

**Electric.**—Use of Static Electricity in a Bottle-Labeling Machine. Illustrated description. 1800 w. W Elec—Dec. 28, 1895.

**BOULEVARD.**

See also **PARK; ROAD.**

**American Cities.**—Parkways and Boulevards in American Cities. Sylvester Baxter. Introductory remarks upon the extensive improvements in this line in European cities, with a discussion of the drives of New York city are given in part first. Serial. Am Arch—Oct. 8, 1898.

**BRACKET.**

**Cast Iron Tests.**—See **COLUMN—Cast Iron Tests.**

**BRAKE.**

See also **AIR BRAKES; FENDERS.**

**Adhesive Rail.**—Adhesive Rail Brakes (Adhäsion Vermehrende Schienenbremsen.) Max Shiemann. Describing a form of tramway brake acting by the adhesion of magnetized brake shoes directly to the rails. 1000 w. Deutsche Zeitschr f Elektrotechnik—March 15, 1898.

**Beam.**—See **BRAKE BEAM.**

**Bicycle.**—A New Cycle Brake. Illustrated description of a brake that may be applied almost instantaneously without relaxing the grip. The invention of Horatio Phillips. 800 w. Engng—Nov. 26, 1897.

**Bridge.**—See **BRIDGE BRAKE.**

**Cable Car.**—Cable Car Brakes. Paul Synnestvedt. A letter to the editor criticising the form of brake commonly used. 1100 w. Ry Mas Mech—Nov., 1896.

**Creamer.**—Railway Safety Brakes. W. G. Creamer. An account of the circumstances that led to the invention of the Creamer safety brake, the difficulties encountered, etc. Ill. 2000 w. Ry Mag—June, 1897.

**Electric.**—An Independent Motor to Utilize the Brake Energy. Merrill E. Clark. Abstract of a lecture describing a system of independent motor and a means of utilizing the brake energy in connection with street railways and other traction. Ill. 700 w. Compressed Air—April, 1899.

A Novel Electric Brake. Frank M. Ashley. Illustrated description of a new system with a small storage battery in each car. 700 w. Elec Pow—Jan., 1896.

Eddy-Current Brake for Electric Tramways (Wirbelstrombremse für Strassenbahnwagen). Describing the improved device of the Helios Company, in which the electrical and mechanical brakes are united. 1200 w. Elektrotech Zeitschr—Dec. 7, 1899.

Electric Brakes for Alternating Currents (Elektrische Bremsen für Wechselströme). J. Fisher-Hinnen. With especial reference to electrically released mechanical brakes for hoisting machinery. Methods of designing brakes for one, two, and three-phase currents are given. 3500 w. Elektroch Zeitschr—Sept. 13, 1900.

Electric Brake for Trailers (Elektrische Betriebs-und Nothbremse für Anhängewagen Elektrischer Bahnen). Describing a form of brake for trailing cars on electric tramways; a magnet holds the brake out of contact unless the coupling breaks. 1000 w. Elektrotech Zeitschr—May 4, 1899.

An Electric Brake for Trailer Cars (Elektrische Bremse für Anhängewagen). Dr. A. Krebs. An illustrated description of an electric brake of simple mechanical construction, made by the Allgemeine Elektricitäts Gesellschaft. 500 w. Elektrotech Zeitschr—July 19, 1900.

The Use of Electric Brakes on Tramways (Ueber die Verwendung Elektrischer Bremsen beim Strassenbahn Betriebe). Especially illustrating and describing the Siemens & Halske magnetic brake. 800 w. Mitt d Ver f d Förd d Local u Strassenbahnwesens—Sept., 1898.

See also **Induction Motors; Magnetic.**

**Electric Cars.**—Brakes on Street Cars. An article arguing that with high speeds, mechanically operated brakes are necessary as the work is too severe for the motorman to perform satisfactorily. 1300 w. St Ry Jour—Dec., 1895.

Brake Rigging for Electric Cars. C. F. Uebelacker. Calls attention to some of the more prominent conditions which brake rigging in general must meet. Ill. 3500 w. St Ry Jour—March, 1897.

Electric Car Brake Adopted by Chicago City Railway. Description and illustration of the device. 700 w. St Ry Rev—Oct. 15, 1896.

Power Brakes Upon Electric Cars. A. K. Baylor. The author shows how the revolving armature on the car axle may generate the power requisite for braking the car, after the driving current is shut off. 3000 w. St Ry Jour—March, 1896.

See also **BRAKE TESTS; ELECTRIC CAR—Acceleration; FENDER—Electric Car.**

**Electric Car Motor.**—See also **Magnetic.**

**Electric Vehicles.**—The Value of Electric Brakes as Recuperating Devices for Automobiles. F. B. Booth. Considers that the value rests wholly with the conditions under which the vehicle is used, and that it is not likely to be used on vehicles built for city service. 1400 w. Elec Wld & Elec Engr—April 8, 1899.

**Electro-Pneumatic.**—The Chapsal Electro-Pneumatic Brake. George Leonard. Abstract of a paper before the Society of Civil Engineers of France. Also editorial. Description of the apparatus, principally in its application to the Westinghouse Automatic Air Brake. The editorial shows the futility of inventing apparatus for working the air brake, and discusses the advantages claimed. 3800 w. R R Gaz—Dec. 24, 1897.

**Gear.**—See **BRAKE GEAR.**

**Hand Tests.**—The Efficiency of Hand Brakes on Railway Cars (Ueber den Wirkungsgrad der Spindelbremsen an Eisenbahn-Fahrzeugen). C. Schlöss. An illustrated account of careful tests made on the Austro-Hungarian Railroads. 1600 w. Zeitschr d Oest Ing u Arch Ver—April 6, 1900.

**Induction Motors.**—The Braking Action of Induction Motors (Ueber die Bremsung von Induktions Motoren). Friedrich Eichberg. A mathematical discussion of the various methods by which the braking action of induction motors may be effected with especial reference to use for tramway service. 5000 w. Elektrotech Zeitschr—Nov. 24, 1898.

**Magnetic.**—Brake System for Electric Cars and Trains (Bremsung Elektrisch Betriebener Wagen und Züge). Max Schiemann. A paper before the Berlin Electrotechnical Society describing an improved form of magnetic brake acting at the same time upon the rails and the wheels. 6000 w. Elektrotech Zeitschr—July 27, 1899.

Motor and Magnetic Brakes for Electric Railways (Motorische und Magnetische Bahnbremsen). Max Schiemann. An examination of the use of reverse current braking and of the use of electro-magnetic brakes acting upon friction disks attached to the axles. 5 illustrations. 2500 w. Deutsche Zeitschrcrift für Elektrotechnik—Oct. 15, 1896.

Reversing Motors, with Magnetic Brake. William Baxter, Jr. Illustrated description of an application of the magnetic brake to a series-wound motor, and also the manner in which it is connected with the circuit wires. 1900 w. Am Mach—Oct. 15, 1896.

The Electromagnetic Brake of the Union Electric Company (Die Elektromagnetische Bremse der Union Elektricitäts-Gesellschaft). M. F. A. Kubierschky. Illustrated description of a brake used on the Dresden tramways. A disc on the axle is acted upon by stationary magnets. The current is taken from the motors. 2000 w. Elektrotechnische Zeitschr—April 7, 1898.

See also **Electric.**

**Momentum Friction.**—Momentum Friction Brake for Electric Cars. Illustrated description of a recent invention by W. G. Price, of Chicago, which has had six months successful operation in actual service. 350 w. Eng News—Oct. 22, 1896.

**Problems.**—Some of the Problems in Train Braking. G. L. Wilkinson. A general discussion of problems relating to the effective working of brakes. 3700 w. R R Gaz—Oct. 13, 1899.

**Shoe.**—See **BRAKE SHOE.**

**Street Car.**—See **Electric Car; BRAKE TESTS.**

**Vacuum.**—The Midland Railway Company's Automatic Steam and Vacuum Brake. A very clear diagram drawing of the locomotive vacuum brake in detail, to which is appended a description. 1500 w. Eng, Lond—Feb. 21, 1896.

**Water.**—Test of Water Brake. Frank F. Coggin. An account of a series of tests made to ascertain the retarding power of the water brake, made on the mountain division of the Maine Central R. R. 1000 w. Loc Engng—June, 1900.

Water Brake Cards, U. P. R. R. The indicator diagrams given with description and explanation illustrate the force exerted in the cylinder as braking power, the distribution of that power throughout the stroke, and the variation of power due to the location of the reverse lever. 400 w. Loc Engng—Dec., 1896.

What Is a Water Brake? T. A. Hedendahl. Reply to the query. 800 w. Loc Engng—Dec., 1896.

**BRAKE BEAMS.**

Break Beam Pressure. E. C. Schmidt. Describes experiments made by the Univ. of Illinois. Also an editorial. Ill. 2500 w. R R Gaz July 27, 1900.

**Hanging.**—The Hanging of Brake Beams. An equalizing device to prevent the tilting forward tendency of trucks. The device is in use on the D. & H. C. Co.'s lines. Ill. 700 w. Ry Age—Dec. 20, 1895.

The Effect of Brakebeam Hanging Upon Brake Efficiency. R. A. Parke. Extracts from a paper presented at meeting of the New York Railroad Club. A careful study of the subject concluding that high efficiency of brakes can only be attained by suspending the brakebeams from the truck frame and between the wheels. 6000 w. R R Gaz—Nov. 19, 1897.

**Solid.**—Solid Brake Beams. R. H. Angier. A discussion of metal brake beams, describing the practice of European railroads. Also editorial. Ill. 3200 w. R R Gaz—June 9, 1899.

**Stresses.**—Mechanics of the Cambered Brake Beam. Irving P. Church. The object of the paper is to determine the stresses induced in the various members of the brake beam when employed in pressing the brake shoes at its extremities against the car wheels; and also the deflection of the middle point at the same instance. 2500 w. Jour Fr Inst—Sept., 1898.

**BRAKE GEAR.**

**Driver.**—Improvements in Locomotive Driver Brakes. Illustrates the driving-wheel brake-rigging on the new locomotives built for the Lake Shore & Mich. So. Ry. and discusses present practice. 1400 w. Am Engr & R R Jour—Feb., 1900.

Rules for Calculating and Designing Driver-Brake Gear of the Push-Down Type. Gives general formula and examples of application to special cases. 500 w. Loc Engng—Aug., 1896.

Standardized Driver Brakes C. & N. W. Ry. Describes the new design made with adjustable links adopted on the Chicago & Northwestern Railway. Ill. 800 w. Am Eng & R R Jour—Jan., 1898.

**Efficiency.**—Efficiency of Foundation Brake Gear. R. A. Parke. Criticises the defective design of freight car trucks from the point of view of brake efficiency, and advocates a higher maximum braking force, and inside hanging of brakes. 1200 w. R R Car Jour—June, 1896.

**Inside.**—Inside Brakes for Passenger Cars. Gives the reason for adopting this plan of construction on the Canadian Pacific. 900 w. Ry Age—May 14, 1897.

Inside Hung Passenger Car Brakes. Report of discussion of this subject at the June convention of the Master Car Builders' Assn. 1800 w. R R Car Jour—Aug., 1897.

**BRAKE LEVERS.**

**Standard.**—Standard Brake Levers. Pulaski Leeds. Discusses the advantages of standards, and the unmechanical system now in use. 2200 w. R R Car Jour—Sept., 1897.

**BRAKE SHOES.**

A Contribution to the Theory of Brake Shoes. Letters called out by article published Aug. 27, with editorial discussion. 2500 w. R R Gaz—Sept. 24, 1897.

Mr. S. P. Bush on Brake Shoes. Abstract of remarks before the Western Railway Club, by the chairman of the M. C. B. Brake Shoe Committee, on the development of high power brake shoes. 500 w. R R Gaz—Sept. 28, 1900.

The Friction of Brake Shoes Under Various Conditions of Pressure, Speed and Temperature. R. A. Smart. Abstract of a paper before the Western Railway Club, giving the results of tests made at Purdue University. 1800 w. Eng News—Sept. 27, 1900.

Two Recent Improvements in Railway Train Brake Construction. The improvements discussed are the adaptation of the brakeshoe pressure to each truck, as described by R. A. Parke in a paper read before the N. Y. Railroad Club, and the improvement in construction as shown in the tests of the "Diamond S" brakeshoe. 1400 w. Eng News—Nov. 25, 1897.

**Allen-Morrison.**—A New Composition Brakeshoe. Describes the "Allen-Morrison Elastic" brakeshoe which has successfully withstood three months service tests on the South Elevated Railroad of Chicago. Also editorial. 1900 w. R R Gaz—Aug. 27, 1897.

**Corning.**—Tests of the Corning Brake Shoe. Report of laboratory tests recently made by Prof. Goss, at Purdue Univ., to determine the frictional qualities. 700 w. R R Gaz—March 24, 1899.

**Expanded Metal.**—A New Brake Shoe. Illustrated description of shoe called the "Diamond S" offered by the Sargent Company of Chicago. It consists of a bundle of expanded metal sheets of steel about which molten iron is cast. 1400 w. Ry Mas Mech—Oct., 1897.

**Friction.**—The Effect of Temperature on the Friction of Brake Shoes. From a paper by Prof. R. A. Smart before the Western Railway Club, giving the results of experiments, with curves. 1700 w. R R Gaz—Sept. 28, 1900.

**M. C. B. Tests.**—The Work of the Brake Shoe Test Committee. Editorial review of the committee reports, with diagrams and tables. 2200 w. R R Gaz—June 19, 1896.

Laboratory Tests of Brake Shoes. Reviews past work of M. C. B. Committee, describes apparatus and manner of testing, and gives diagram of results. 2800 w. R R Gaz—Aug. 21, 1896.

**Sargent Tests.**—The Sargent Brake Shoe Tests at Wilmerding. Report of extensive road and laboratory tests of the new "Diamond S" brake shoe. 2200 w. R R Gaz—Nov. 26, 1897.

**BRAKE TESTS.**

See also **CAR—Acceleration and Braking.**

**Street Car, New York.**—Tests of Street Car Brakes by the New York Railroad Commission. Descriptions of the brakes tested which met the requirements. 4800 w. Eng News—Aug. 2, 1900.

Tests of Street Car Brakes in New York. Editorial pointing out some of the defects of the tests and records made by the New York Railroad Commission. 1100 w. R R Gaz—Aug. 10, 1900.

**BRASS.**

**Alloys.**—Aluminum, Silicon and Phosprorus in the Brass Foundry for Special Work. F. J. Davis. General review of the uses of these metals for the purpose named. 900 w. Foundry—Dec., 1895.

Aluminum, Manganese and Silicon in the Brass Foundry. F. J. Davis. Read at the convention of the American Foundrymen's Assn., at Detroit. Discusses the advantages of each metal. 1400 w. Ir Trd Rev—June 24, 1897.

The Value and Use of Aluminum, Manganese and Silicon in the Brass Foundry. F. J. Davis. From "Proceedings of the American Foundrymen's Assn." Directions for the use of these metals in order to secure good results. 1300 w. Am Mach—Sept. 9, 1897.

**Antimony.**—The Influence of Antimony on the Cold Shortness of Brass. Erwin S. Sperry. An account of experiments made by varying the amount of antimony of a constant composition. Ill. 4500 w. Trans Am Inst of Min Engs—Feb., 1898.

**Bismuth.**—The Influence of Bismuth on Brass, and its Relation to Fire-Cracks. Erwin S. Sperry. Describes experiments made while investigating this subject giving results and conclusions. Ill. 1800 w. Trans Am Inst of Min Engs—Aug., 1898.

**Lead Influence.**—The Influence of Lead on Rolled and Drawn Brass. An account of the discovery that lead gives desirable cutting qualities to brass, with experimental study of its action. Ill. 7700 w. Trans Am Inst Min Engs—Sept., 1897.

**Oxygen Effect.**—The Properties of Brass Made from Copper Containing Sub-Oxide, with Observations of the Effect of Oxygen on Copper. Erwin S. Sperry. An account of experimental investigations, concluding that unless the amount of oxzyen is large it cannot be called an injurious impurity. 4000 w. Trans Am Inst of Min Engs—Aug., 1900.

**BRASS CASTINGS.**

Making Large Brass Castings. C. Vickers. Practical hints upon the subject. 900 w. Am Mach—March 12, 1896.

**Burning In.**—"Burning in" Brass Castings. C. Vickers. Directions and suggestions for "burning in" successfully. Ill. 1000 w. Mach, N. Y. —March, 1898.

**BRASSES.**

See also **BEARINGS.**

**Car.**—Some Points About Making Car Brasses. Views of Mr. James Swan on the subject of the making and care of journal brasses. 900 w. Ry Mas Mech—May, 1899.

**Molding.**—See **MOLDING—Brasses.**

**BRASS FOUNDING.**

See also **BRASS FURNACE.**

A Talk on Brass Founding. Charles Vickers. Read at Cincinnati meeting of Am. Foundrymen's Assn. Considers methods used in various classes of work to secure the best results. 1600 w. Ir Age—June 16, 1898.

A Talk on Brass Founding. Chas. Vickers. Read before American Foundrymen's Assn. Reviews the peculiarities of the metal, the special difficulties, and the means for overcoming them. 3000 w. Foundry—Sept., 1898.

Brass Foundry Practice. K. K. Gives illustrated description of methods used and found capable of producing good results. 1300 w. Foundry—June, 1898.

Melting, Mixing, and Casting Brass. John A. Macauley. Considers only mixtures in everyday use which are of practical value. 1600 w. Foundry—July, 1898.

Methods of the Brass Foundry. Extracts from a paper on "The History and Technics of Bronze Founding," read at the Pittsburg meeting by James Powell, indicating that in the making of statues and other cored work the processes of the Greeks and Etruscans were substantially those of to-day. 1000 w. Ir Trd Rev—Sept. 21, 1899.

Light Brass Founding. C. Vickers. Suggestions for this class of work. 1600 w. Am Mach —May 11, 1899.

**Gating.**—Brass Founding—Gates and Gating. C. Vickers. Illustrated description of a good method of grating a mold. 1400 w. Am Mech—June 28, 1900.

**Siemens-Halske.**—See **ELECTRIC CABLE WORKS.**

**BRASS FURNACE.**

See also **BRASS FOUNDING.**

Brass Foundries. Part first gives information of furnaces used. Serial. Mach—Jan., 1897.

Brass Furnaces. Paul Wever. Particulars concerning furnaces in use on the continent of Europe, but little known in the United States. Ill. 1800 w. Foundry—June, 1900.

Brass Melting Furnaces. Joseph Horner. Part first deals with the mixing metal, and methods of making brass. Serial. Mech Wld—April 22, 1898.

Improved Brass Furnaces. D. C. Thompson. Gives a description, with illustrations, of twin furnaces of the cylinder type. 1500 w. Foundry —Feb., 1898.

The Construction of Brass Melting Furnaces. From a paper by E. Millett, read before the Am. Foundrymen's Assn. Illustrated description. 800 w. Am Mach—Oct. 26, 1899.

**German.**—A German Brass Furnace. An illustrated description of a furnace near Chemnitz, which differs in construction and operation from American practice. 2000 w. Foundry—Dec., 1899.

**BRASS GOODS.**

**Plumbers.**—Making Plumbers' Brass Goods. Charles Vickers. Condensed from paper read at the Cincinnati meeting of the Am. Foundrymen's Assn. Suggestions for making machinery brass work. 1000 w. Dom Engng—Sept., 1898.

**BRASS INDUSTRY.**

**Naugatuck Valley, Conn.**—The Brass Industry in the Naugatuck Valley. Reviews the present condition of this industry and the causes. 1400 w. Ir Age—Feb. 15, 1900.

**BRAZIL.**

Brazil: Its Commerce and Resources. Thomas L. Thompson. Sets forth the resources, chief industries and commercial prospects of this country, and the rapid progress being made. 5700 w. Forum—March, 1898.

Resources of Brazil. An article on the economic condition of Brazil, written by L. Lipman, a well-informed local authority. Also a translation of the advertisement for coal for the Brazilian Central Railroad. 3300 w. U. S. Cons Repts—Nov., 1898.

**BRAZING.**

Electrical Shop Work. B. F. Fells. Brief illustrated description of the best methods of setting up and using a brazing outfit. 900 w. Elec Wld—Aug. 13, 1898.

**BREAKWATER.**

See also **HARBOR IMPROVEMENTS; RIVER REGULATION; SHORE PROTECTION.**

The Design of Breakwaters. J. Watt Sandeman. Read before the Engineering Conference of the Inst. of Civ. Engs., England. Considers the facts that determine the general character, position and principal proportions. 2200 w. Engr, Lond—June 16, 1899.

**Alderney.**—Difficult Repairs to the Alderney Breakwater. B. O. Townshend. Illustrated description from Proc. Inst. C. E. of the method of inserting large concrete blocks in the face of a wall exposed to heavy seas. 1400 w. Eng Rec—March 17, 1900.

Repairs of the Breakwater at Alderney. Bernard O'Driscoll Townshend. Presented to the British Inst. of Civ. Engs. Illustrates and describes repairs in which large concrete blocks were substituted for granite. 1200 w. Eng News—Aug. 10, 1899.

**American Coast.**—Breakwater Construction on the American Coast. Louis Y. Schermerhorn. Extracts from a paper presented before the Engineers' Club of Philadelphia. Data of American experience and practice. 1000 w. Ry Rev—Nov. 13, 1897.

Breakwater Construction on the American Coast. Louis Y. Schermerhorn. Confined to the construction on the ocean coast and considering the forces through wave-action, design, position and general principles; also discussion. Ill. 7500 w. Pro of Engs' Club of Phila—Jan., 1898.

**Bilbao.**—The Port of Bilbao (Puerto de Bilbao). A description of the breakwater, built under royal order of June 29, 1888. It is constructed of stone and cement and situated at the west of the outer harbor, and is 1450 metres long. Serial, Part I. 3000 w. Revista de Obras Publicas—Dec. 14, 1899.

**Cleveland, Ohio.**—The New Cleveland Breakwater. Illustrated description of its design and construction. 3500 w. Eng Rec—Aug. 20, 1898.

**Delaware.**—The Delaware Breakwater. Condensed from report of C. W. Raymond. Illustrated description of a random-stone breakwater which departs in many respects from the accepted practice based on the Cherbourg breakwater. 2200 w. Eng Rec—July 8, 1899.

**Greytown, Nicaragua.**—See **RAILWAY—Silico Lake, Nicaragua.**

**Marquette, Mich.**—Breakwater at Presque Isle Point, Marquette, Michigan. W. H. Hoyt. Illustrated description of somewhat novel construction. 1000 w. Eng News—April 7, 1898.

The Marquette Breakwater and Duluth Ship Canal Piers. Illustrated description of the method of making, supporting and placing enormous blocks of concrete. 5000 w. Eng Rec—Oct. 28, 1899.

**Mississippi Delta.**—The Reaction Breakwater as Proposed for the Opening of the Southwest Pass of the Mississippi River. Lewis M. Haupt. An explanation of the problem to be solved and the plans proposed. Ill. 5000 w. Jour Fr Inst—July, 1900.

**Reaction.**—The Reaction Breakwater as Applied to the Improvement of Ocean Bars. Lewis M. Haupt. Gives results of the curved breakwater at Aransas Pass, Texas, and the cause of the effective work; also considers the cost. The theory is explained. Ill. 5800 w. Pro Am Soc of Civ Engs—Sept., 1899.

The Reaction Breakwater as Applied to the Improvement of Ocean Bars. Discussion of the paper by Lewis M. Haupt. 2000 w. Pro Am Soc of Cil Engs—Nov., 1899.

The Reaction Breakwater as Applied to the Improvement of Ocean Bars. Continued discussion of paper by Lewis M. Haupt. 4200 w. Pro Am Soc of Civ Engs—Jan., 1900.

The Reaction Breakwater as Applied to the Improvement of Ocean Bars. Discussion of paper by Lewis M. Haupt. 2200 w. Pro Am Soc of Civ Engs—Feb., 1900.

**Wave Action.**—Notes on the Effects of Waves on Breakwaters in Different Depths of Water. William Shield. Read at the Engineering Conference of the Inst. of Civil Engs., England. A study of wave action, comparing facts and theories. 2000 w. Engr, Lond—June 16, 1899.

The effect of Waves on Breakwaters. Extracts from a paper by William Shedd, read before the British Inst. of Civ. Engs. A description of the movement of concrete and rubble by wave action on a number of breakwaters. 1400 w. Eng Rec—Sept. 16, 1899.

**BREECH MECHANISM.**

See **GUN—Breech Mechanism.**

**BREWERY.**

**Guatamala.** — The New Castillo Hermanos Brewery in Guatemala (Neue Brauerei von Castillo Hermanos in Guatemala). C. W. Schütz. Description and plans of large brewery plant designed in Germany for erection in Guatemala, and representing the latest German practice. 1800 w. Zeitschr d Ver Deutscher Ing—Oct. 29, 1898.

**BREWING MACHINERY.**

Progress in Brewing Machinery (Fortschritte auf dem Gebiete der Brautechnik). H. Hempel. A paper before the Hessian branch of the Verein Deutscher Ingenieure, giving an illustrated description of modern machinery and methods used in brewing. Serial. 2 parts. 5000 w. Zeitschr d Ver Deutscher Ing—July 21, 28, 1900.

**BRICK.**

**Architectural.**—Brick and Terra-Cotta at the League Exhibition. An illustrated review of the work exhibited at the annual exhibition of the Architectural League of New York. Serial. Br Build—April, 1897.

**Efflorescence.**—On the Saline Efflorescence of Bricks. Oscar Gerlach. Considers the causes leading to it, and the practical means of avoiding the same. Serial. Br Build—March, 1898.

**Fire.**—See **FIRE-BRICK.**

**Glazed.**—Glazed Bricks. Discusses the advantages and disadvantages of salt-glazed and enameled bricks; describes their manufacture and method of testing. 1500 w. Builder—Feb. 27, 1897.

Making Enameled Brick. A brief statement of the methods of working, moulding, dipping, and burning. 1000 w. Brick—Sept., 1898.

**BRICK.**

**Hollow.**—See **BUILDING MATERIAL; FIRE-PROOF CONSTRUCTION.**

**Interior Finishing.**—Bricks and Tiles for Interior Finishing. Russell Sturgis. The article sets forth the sanitary and artistic possibilities of these materials, giving many suggestions for their use. Ill. Serial. Br Build—Jan., 1899.

**Paving.**—See **BRICK PAVEMENT.**

**Slag.**—See **SLAG—Bricks.**

**Tests.**—See also **BRICK PAVEMENT.**

**Tests, Charlottenburg.**—Brick Testing in 1895-1897 (Ziegelprüfungen in den Betriebsjahren 1895-1897). M. Gary. A very full review and record of the tests made at the Royal Testing Laboratory at Charlottenburg, with tabulated details and curves of results. 15000 w. Mitt aus den Kgl Tech Versuchsanstalt—Part IV., 1899.

**Vitrified.**—Vitrified Brick—Their Manufacture and Advantages as a Paving Material. J. W. Sibley. Read before the annual meeting of the Alabama Industrial and Scientific Society. Considers only the vitrified brick made of shale. 1300 w. Brick —Aug., 1897.

See also **BRICK PAVEMENT.**

**BRICK BUILDING.**

Notes on Design of Brick Buildings. George F. Newton. The importance of the appreciation of opportunities and possibilities; choice of material; knowledge of theories formed from the study of successful buildings, etc. 2300 w. Br Builder—April, 1896.

The Economy of Brick Structures as Compared with Those of Wood. R. N. Buell. Read at the Pittsburg meeting of N. B. M. Assn. Considers the comparative cost of wood and brick structures, and other advantages, and how to demonstrate the superiority of brick to the builders of American homes. 3000 w. Brick—March, 1898.

**Holland.**—The Brick Architecture of Holland. R. Clipston Sturgis. The brick work of the public buildings, secular and ecclesiastical, is to be considered and illustrated. 1200 w. Br Build—March, 1896.

**BRICKLAYING.**

Practical Bricklaying. Owen B. Maginnis. Part first explains the tools and appliances used, and the attitudes and actions of the bricklayer. Arch & Build—Nov., 1899.

**BRICK MANUFACTURE.**

See also **BRICK PAVEMENT.**

Clays, Mixing, Preparing and Burning. Information intended as aid for men of limited experience. 3000 w. Brick—Jan., 1897.

**Australia.**—Brick Making in Australia. Frank W. N. King. Illustrated account of this industry, giving information of quality, wages, etc. 1500 w. Brick—Jan., 1897.

**Coal Measure Shale.**—Brick-Making from Coal Measure Shale. From a communication by M. Sylva Cottier to the Soc. of Hainaut Mining Engs.

Describes the work as carried on by the Marles Colliery Co. in the north of France. 1300 w. Col Guard—Sept. 30, 1898.

**England.**—Brickmaking in England—The Accrington Shale District. John A. Turner. Historical and descriptive account with illustrations of machinery employed and of the works. 4000 w. Brick—Jan., 1899.

**Roller-Pallet.**—The Roller-Pallet System for the Manufacture of Bricks. Clemens Catesby Jones. Gives a brief account of prevailing industrial conditions and practice, describing the best modern system of drying, and presenting a mechanical process and its advantages. 4200 w. Trans Am Inst of Min Engs—Feb., 1900.

**Tuskegee School.**—Brickmaking in Tuskegee, Ala., Industrial School. Victoria Earle Matthews. Illustrated description of the industry and some of the buildings erected with these bricks. 1200 w. Brick—April, 1896.

### BRICK PAVEMENT.

See also **MACADAM—Road Construction.**

Brick Pavements. L. M. Hastings. A statement before the convention of the A. S. M. I. of the results of an inspection of such work in a number of cities. 1100 w. Eng Rec—Oct. 14, 1899.

Brick Pavements. Read before the Massachusetts Highway Assn., by James A. Davis. A general review of the progress and present status of brick paving, from which the author concludes that pavements of good brick, properly laid in the manner he describes, are superior in all respects to any other known kind of pavements. 2000 w. Brick—Oct., 1896.

Brick Pavements and Paving Brick. A. D. Thompson. On the merits of brick as a paving material, the methods of construction, the testing of paving brick and the price. 2300 w. Brick—Feb., 1899.

Brick Pavements the Best. M. H. Underwood. In favor of vitrified brick, laid on a concrete foundation. 3300 w. Brick—March, 1896.

Brick Paving in Several Cities. L. M. Hastings. Read before the Am. Soc. of Munic. Imp. Information concerning the wearing qualities, etc. 2300 w. Munic Engng—Nov., 1899.

Brick Paving from Start to Finish. M. Nicholson. The author does not advocate brick in preference to all other material but aims to describe the best practice in brick paving, as he has learned it from experience and observation. 4200 w. Pav & Mun Eng—Dec., 1895.

Brick Paving Statistics. George W. Kummer. Answer to a circular of inquiry. First part contains answers from Akron, O., Albany, N. Y., and Altoona, Pa. 1500 w. Brick—June, 1896.

Brick Paving in the Middle West. H. Foster Bain. Discusses the suitability of the various paving materials for small towns in the locality named, especially noting the advantages from the introduction and wide use of brick paving. Ill. 2800 w. Am Rev of Revs—July, 1899.

Notes on Brick Pavements. An account of the practice in Buffalo, Cleveland, Cincinnati, Louisville, Kansas City, Omaha, St. Louis, Detroit, Philadelphia, and Providence. 1700 w. Eng Rec—Dec. 23, 1899.

Paving Brick and Brick Pavements. H. J. March. Gives the history and progress of brickmaking, and considers brick pavements, their cost, durability, etc. 10500 w. Jour Assn of Engng Socs—Aug., 1899.

Paving Bricks. T. C. Hopkins. Gives brief history of the use of bricks for this purpose, the materials and essential properties, the testing, and a comparison with other materials. 2000 w. Engng Jour—Feb., 1898.

**Bridge.**—See **BRIDGE FLOOR.**

**Chicago.**—The Future of Brick Pavements in Chicago. Frank W. Moulton. Reports the condition of the wood pavement, the menace to health, the advantages of good paving, etc., and urges the claims of brick as the best material to use. 3300 w. Brick—Feb., 1899.

**Columbus, O.**—Construction and Maintenance of Brick Pavements. E. A. Kemmler. Read before the Am. Soc. of Munic. Imp. Gives an outline of experience in Columbus, O., and discusses the present standard practice. Ill. 4500 w. Munic Engng—Sept., 1900.

**Comparative Methods.**—Comparative Value of Side Cut, End Cut and Repressed Brick for Street Paving. T. C. Tridell. Advantages and disadvantages of each class. A good, practical paper. 1300 w. Brick—Feb., 1896.

**Expansion.**—Expansion of Brick Pavements in Hot Weather. Reports from Niagara Falls, Cleveland, and other places regarding the upheaval of pavement, and the supposed causes. 500 w. Eng Rec—July 17, 1897.

**Jackson, Mich.**—Brick Street Paving in Jackson, Mich. Illustrated description of methods employed in repaving a street 68-ft. wide between curbs, and 99-ft. wide between property lines, in Jackson, Mich., and which had been previously paved with macadam thoroughly compacted by long use. 1300 w. Eng News—April 30, 1896.

**Laying.**—Brick Pavements from a Contractor's Point of View. George R. Grimes. Abstract of paper read at meeting of the National Brick Mfrs. Assn. Gives the most satisfactory methods of laying brick pavements. 2500 w. Eng Rec—Feb. 24, 1900.

Construction of Brick Pavements. George R. Grimes. Read at meeting of the Nat. Brick Mkrs. Assn. at Detroit. Considers the subject under seven heads. 3000 w. Brick—March 1, 1900.

Cost of Single-Course Brick Street Pavement. T. S. McClanahan. Abstract from paper read before the Ill. Soc. of Engs. The method of laying 4,878 square yards of brick paving, inclusive of preparation, and the detailed cost of the entire work is given. The pavement is shown to have cost $1.43 per square yard. 400 w. Munic Engng—Oct., 1896.

How to Lay Brick Pavements. J. R. Haldeman. A brief article giving directions. 1000 w. Clay Rec—July 14, 1897.

Random Notes on the Construction of Brick Pavements. E. A. Kemmler. Reviews the principles of street construction as laid down by the different specifications of a number of the larger cities, pointing out the good and bad features. 2400 w. Munic Engng—Feb., 1898.

**Manufacture.**—How to Make Further Improvement in the Manufacture of Paving Brick. A discussion suggesting the field for experiment. 800 w. Brick—Feb., 1899.

The Manufacture and Use of Brick for Street Paving. H. K. Landis. Showing the processes of making paving-brick, the qualities desirable in it under different conditions and the methods of testing it. 8300 w. Eng Mag—Sept., 1896.

**Marietta, O.**—Paving Streets with Brick. S. J. Hathaway. Account of brick paving as practiced in Marietta, O. 1900 w. Munic Engng—Nov., 1896.

**Minneapolis.**—Brick Paving. Irving E. Howe. Gives a brief description of the construction, and a statement of cost of the brick paving on Seventh street in the City of Minneapolis, laid during the season of 1897. 1300 w. Jour Assn of Engng Soc—March, 1898.

**Peoria, Ill.**—Brick Pavement Construction. A. D. Thompson. Defective foundation, or soft paving brick, or both, are considered as the chief causes of failure. This position confirmed by history of brick paving in Peoria, Ill. 8500 w. 10th An Rept of Ill Soc of Eng & Surv—1895.

**Road.**—A Country Road Paved with Brick. J. Ed. Miller. Describes a brick road made with crushed stone curbing. Discussion. 2000 w. An Rept of Ill Soc of Engs & Surv—1897.

Paving Brick for Country Roads. Thomas S. McClanahan. Discusses the need of good country roads, and the construction of brick roads. 1800 w. Brick—Feb., 1897.

Paving Country Highways. Captain Williams. Favoring the movement. 1100 w. Brick—March, 1896.

Paving Country Highways. William S. Williams. The author discusses the application of brick paving to public highways, and finds it good. 900 w. Clay Rec—Feb. 26, 1896.

See also **MACADAM.**

**St. Louis.**—See Tests; **PAVEMENT.**

**Small Towns.**—Brick Paving in Small Towns. A. W. Smith. Condensed from paper read before the Indiana Engng. Soc. Advocating the use of good vitrified brick. 1100 w. Munic Engng—Feb., 1897.

**Specifications.**—See **Tests.**

**Structure.**—An Investigation of the Benefit of Structure on the Wearing Power of Paving Brick. Edward Orton, Jr. Gives results of investigations authorized by the Nat. Brick Mfrs.' Assn. Discussion follows. 4000 w. Brick—Feb., 1897.

**Tests.**—A Method of Comparing Rattler Tests of Paving Brick. Daniel B. Luten. Illustrates and describes several rattlers, and discusses the value of the test. Also explains method of comparing. 2800 w. Munic Engng—April, 1900.

A New Method of Testing Paving Brick. Paper of Mr. Jones, read before the Nat. Brick Mfrs. Assn. Describes a new method of testing, aiming to reproduce the blow of the horse's foot and the rolling wear of the wagon. 2000 w. Clay Rec—March 27, 1899.

A New Testing Machine and the Cross-Breaking Test of Vitrified Paving Brick. F. F. Harrington. Describes the testing machine designed by M. L. Holman and gives the results of an investigation of the cross-breaking test of paving brick. Ill. 4000 w. Jour Assn of Engng Soc—Jan., 1897.

Effect of Moisture on the Results of the Rattler Test of Paving Brick. W. Kendrick Hatt. Reports the results of tests to show less loss when wet than when dry. 900 w. Brick—Sept. 1, 1899.

Experiments on Vitrified Paving Brick. F. F. Harrington. The testing laboratory of the St. Louis water, sewer and street commissioners is the place where the experiments described were conducted. Results of uniform tests of a variety of paving bricks are presented, with three plates of diagrams. 3000 w. Jour Assn of Engng Soc—Aug., 1896.

Impact and Abrasion Tests of Paving Brick. H. J. Burt. Method of carrying out tests of this kind in the Laboratory of Applied Mechanics, University of Illinois. 2300 w. Tech—May, 1896.

Methods of Testing Paving Brick. Illustrated review by W. K. Hatt, of many different tests, which he interprets as indicating the rattler test to be the only important one. 3200 w. Eng Rec—March 4, 1899.

Paving Brick and Brick Pavements. Arthur N. Talbot. A letter stating the relative advantages of different methods of testing paving brick. 1500 w. Eng Rec—March 24, 1900.

Paving Brick and Brick Pavements. Daniel B. Luten. Read before the Indiana Engng. Soc. Illustrated report of the results of a study of different brick pavements and of a large number of tests of paving brick. 5000 w. Eng Rec—March 3, 1900.

Paving Bricks. F. Paul Anderson. The results of a large number of tests made on fire clay brick and paving brick, giving deductions, precautions, method of testing and numerous half tone illustrations of crushed specimens. 3000 w. Digest of Phys Tests—April, 1896.

Paving Brick Tests. W. K. Hatt. Letter, with diagram, on the influence of moisture on the results of brick tests by the rattler method. 500 w. Eng Rec—April 7, 1900.

Report of the Commission on Paving Brick Tests. Edward Orton, Jr. Reports of tests by rattling, absorption, cross-breaking, crushing, hardness, and specific gravity. 6300 w. Brick—Feb., 1897.

Report of the Commission on Standard Specifications and Methods of Testing Paving Brick. Edward Orton, Jr. A brief résumé of report previously given, with additional tests and conclusions. 6000 w. Clay Rec—April 29, 1897.

Report of Committee on Paving Brick Specifications and Tests. The qualifications for durability are stated as toughness and hardness, imperviability to liquids, and strength. Report was followed by discussion. 5000 w. An Rept of Ill Soc of Engs & Surv—1897.

Standard Paving Brick Tests. A review of the work of the National Brick Manufacturers' Assn., with the official list of tests adopted Feb. 9, 1900. Also editorial note on progress in brick paving. 3000 w. Eng Rec—March 17, 1900.

Standard Specifications and Methods of Testing Paving Brick. Report of Edward Orton, Jr., secretary of the commission on standard specifications, appointed by the National Brick Mfr's Assn. 3800 w. Pav & Mun Eng—Jan., 1896.

Standard Specifications for Paving Brick Tests. Report submitted to the National Brick Mfrs.' Assn. by the committee appointed to investigate the question. 6000 w. Munic Engng—March, 1897.

Standard Tests for Paving Brick. Almon D. Thompson. Exceptions to conclusions reached by the committee of the Nat. Brick Mfr. Assn. 1700 w. Munic Engng—April, 1897.

Supplemental Specifications by the Paving Brick Commission. Supplemental to the report of the commission heretofore published. Specifications for tests with table. 1400 w. Munic Engng—April, 1897.

Testing Paving Brick. A. D. Thompson. Character of bricks suitable for paving, the necessity of testing to make sure of quality, and the essentials for satisfactory testing. 3600 w. Munic Engng—Nov., 1896.

Testing Paving Brick. Describes recent tests indicating defects in National Brick Manufacturers Assn. specifications. 900 w. Eng Rec—June 18, 1898.

What Should Be Expected of Paving Brick? Extract from a paper by F. P. Anderson, on an exhaustive series of paving brick tests, dealing also with the foundation, laying, etc. 3000 w. Clay Rec—Oct. 10, 1898.

**Tests, Illinois University.**—Standard Methods of Testing Paving Brick. Arthur N. Talbot. Describes a series of tests made in the Laboratory of Applied Mechanics, Univ. of Illinois, which show that the standard method of the Nat. Brick Mfrs. Assn. should not be adopted without further investigation. 2000 w. Technograph, No. 12—1897-8.

**Tests, Iowa.**—Brick Paving in Iowa. A statement of the elaborate tests being conducted in that State on the physical and chemical properties of paving brick, the methods of testing them and the actual resistance of the various brands of travel, in different cities of the State. 2500 w. Eng Rec—Feb. 3, 1900.

**Tests, Iowa College.**—Tests of Paving Brick at the Iowa State College. Illustrated account of experiments to determine the relative importance of different kinds of tests. 3500 w. Eng Rec—April 1, 1899.

**Tests, St. Louis.**—Testing of Brick and Cement. Description of the City Testing Works of St. Louis, Mo. They are said to be the most complete in the country, and test carefully all stone, brick and cement used in street paving. 1700 w. Clay Rec—June 15, 1896.

**Tests, Williamsport, Pa.**—Tests of Paving Brick at Williamsport. Results of abrasion and absorption tests on fifteen kinds of paving brick submitted with bids at Williamsport. Table. Eng News—April 9, 1896.

**United States.**—The Evolution of Paving Brick in the United States. H. A. Wheeler. Read before the Nat. Brick Mfrs. Assn. Relates early experiments with paving brick in various places, its improvement and growing use. 3000 w. Clay Rec—March 27, 1899.

**Washington, D. C.**—See **PAVEMENT.**

**BRICK PIER.**

**Tests**—See **BRICKWORK.**

**BRICK VENEER.**

Brick-Veneer Construction. Fred T. Hodgson. Discussion of this practice, showing that it is a loss both in economy and efficiency. 1200 w. Br Build—Jan., 1898.

**BRICKWORK.**

Architects' Troubles with Brickwork. F. E. Kidder. Discusses the more common troubles met with by architects in trying to obtain first-class work. 2000 w. Br Build—Sept., 1896.

Bricks and Brickwork in Engineering Construction. Review of a lecture by Dr. A. C. Elliott, delivered to the Brit. Assn. of Water Works Engs., on the "Strength of Brick and Brickwork." 1500 w. Jour Gas Lgt—July 31, 1900.

Notes on the Design of Brick Buildings. George F. Newton. The importance of training the imagination, with suggestions helpful to students. Illustrations of fine examples of foreign brickwork. 4000 w. Br Build—Sept., 1896.

**Bonding.**—The Bonding of Brickwork. Ernest Flagg. Discusses methods of bricklaying in the United States. Ill. 3300 w. Br Build—Dec., 1898.

**Bonding Steel Ties.**—Bonding of Brickwork. Illustrated description of a method of bonding with steel ties. 600 w. Br Build—Aug., 1896.

**Estimating.**—Estimating Brickwork. F. E. Kidder. Explains the system adopted by the Brick Contractors' Exchange of Denver, and illustrates its application. Serial. Br Build—Aug., 1898.

**Spanish.**—Spanish Brick and Tile Work. C. H. Blackall. Illustrated description of architectural work in this material, especially of the Moorish style. Serial. Br Builder—June, 1896.

**Strength.**—Strength of Brick Masonry. Ira O. Baker. Part first discusses the importance of not underestimating the strength and the extravagance of over estimating it, giving some results of experiments. Serial. Br Builder—March, 1898.

**Tests.**—Strength of Brick Work. A summary of tests of brick piers. Ill. 900 w. Brick—Nov. 1, 1899.

The Resistance of Brick Masonry (Die Tragfähigkeit von Ziegel-Mauerwerk). F. von Emperger. A review of recent English and American experiments, with illustrations of many tests. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 1, 1899.

**Tests, British.**—Brickwork Tests: Report on the First Series of Experiments. William C. Street and Max Clarke. Paper read at meeting of Royal Inst. of Brit. Archs., illustrated, and followed by notes, statistics and discussion. The tests were made for the purpose of ascertaining the amount of resistance possessed by brickwork under great crushing loads. 10000 w. Jour of Roy Inst of Brit Arch—April 2, 1896.

Brickwork and Masonry. Editorial comment called forth by the extensive series of tests on the strength of brick piers being made under the direction of the Inst. of Brit. Archts. 1600 w. Engng—Jan. 1, 1897.

Brickwork Tests of the Royal Institute of British Architects. Abstracts of papers by Messrs. William C. Street, Max Clarke, Matt Barbutt, and Prof. Unwin, with editorial. Account of experiments, etc. 6000 w. Builder—April 4, 1896.

The Resistance of Brickwork. C. H. Blackall. A review of the experiments recently made in England under the direction of the Royal Inst. of Archts., with the object of determining the resistance to crushing of brick piers. 2800 w. Brickbuilder—May, 1896.

A Further Note on the Brickwork Tests. H. H. Statham. Editorial suggestions of methods of bonding to determine strength. 1800 w. Builder—April 11, 1896.

Brickwork Tests. Reports on the second series of experiments, by William C. Street and Max Clarke, with appendices by Prof. Unwin. Ill. 7000 w. Jour Roy Inst of Brit Archt's—Dec. 17, 1896.

Brickwork Tests. Discussion of the report of the second series of experiments. 7500 w. Jour Roy Inst of Brit Arch'ts—Dec. 31, 1896.

Brickwork Tests. Report on the Third Series of Experiments by William C. Street and Max Clarke, with Appendices by Professor Unwin. Tabulated results are given with other information of interest. 6000 w. Jour Roy Inst of Brit Archs—Dec. 18, 1897.

**Tests, Cornell.**—Tests of Brick Masonry Piers. E. J. McCaustland. An account of tests made and results obtained. 2200 w. Trans of Assn of Civ Engs of Cornell Univ—1900.

**Tests, Toronto.**—Tests of Canadian and English Brickwork. Illustrations and some particlulars of tests of common brick conducted by C. H. C. Wright and his assistants at the School of Practical Science, Toronto. 1700 w. Can Arch & Builder—July, 1896.

**Turin.**—Mole Antonelliana. G. W. Percy. Illustrated detailed description of an example of light construction in brickwork, in the city of Turin, Italy. A brief history of the origin, progress and changing uses of the building. 4200 w. Jour Assn of Engng Soc—May, 1897.

### BRICKWORK DESIGN.

**School.**—See **EDUCATION—Brickwork Design.**

### BRIDGE.

See also **ARCH; CULVERT; VIADUCT.**

Artistic Design for a Movable Bridge. An illustration of the possibilities of artistic and monumental design for this type. 600 w. Ry & Engng Rev—May 12, 1900.

The Artistic Side of Bridge Design. A reply to an editorial in the N. Y. "Times." condemning the American engineer for his lack of artistic feeling. Ill. 900 w. Eng News—Dec. 21, 1899. See also **Architecture.**

**Æsthetic, European.**—Aesthetic Design in European Bridges. Robert Grimshaw. Illustrations and brief descriptions of some artistic work in this line. 1500 w. Eng News—June 17, 1897.

**Æsthetic, New York.**—The Esthetics of Bridge Design as Exemplified by Two Recent New York Bridges. Alfred P. Boller. An interesting article on this subject, with views of the Central Bridge and Harlem Ship Canal Bridge at Kingsbridge Road, New York. 2400 w. Eng News—Oct. 7, 1897.

**Aire River, Yorkshire.**—Bridges Over the River Aire. Illustrated detailed description. 2000 w. Engr, Lond—March 9, 1900.

The Great Northern Railway—Bridges Over the River Aire. Illustrated detailed description. 1800 w. Engr, Lond—April 20, 1900.

**Albany.**—New York Central Improvements at Albany. An illustrated account of the reconstruction of the Hudson River passenger bridge. 1000 w. R R Gaz—Nov. 10, 1899.

The Maiden Lane Bridge, Albany, N. Y. Illustrated description of a double-track bridge of one draw span 269 ft. long, four fixed spans of 181½ ft., and plate-girder approaches, designed to carry the heaviest trains of the New York Central line without checking speed. The type of construction differs in a number of respects from usual practice. 2700 w. Eng Rec—Oct. 28, 1899.

**Alexander III.**—Engineering at the Paris Exposition of 1900 (Das Ingenieurwesen auf der Pariser Weltausstellung des Jahres 1900). Fritz Eiselen. An illustrated description of this highly artistic highway bridge, and its construction. Serial. Deutsche Bauzeitung—July 14, 1900.

False Works and Traveling Bridge for construction of the Alexander III. bridge (Notes sur la Construction du pont Alexandre III. Exécution des Travaux Préparatoires. Pont Roulant de Montage). This very elaborate description of the traveling bridge false-work for the steel arch of the Alexander III. bridge is really an essay upon the continuous girder, and both the text and the 4 large plates of illustrations contain much valuable information. 11000 w. Ann des Ponts et Chaussées—3e. trimestre, 1898.

Notes on the Construction of the Alexander III. Bridge. (Notes sur la Construction du Pont Alexandre III). MM. Résal and Alby. A further contribution to the account of this great work; dealing principally with the construction of the hinged arches and with their erection. 16000 w. 5 plates. Ann des Ponts et Chaussées—4 Trimestre, 1898.

The Alexander III. Bridge. Brief illustrated description of the work and of the processes adopted in its erection. Serial. Engng—July 14, 1899.

The Alexander III. Bridge Across the Seine (Pont Alexandre III. sur la Seine). A fully illustrated description of the construction and launching of the temporary truss to be used in connection with the erection of the main arch of the bridge. 1 plate. Serial. Génie Civil—Feb. 4, 1889.

The Alexander III. Bridge at Paris (La Pont Alexandre III. sur la Seine). E. Rouyer. An elaborately illustrated article on the construction of the abutments for this bridge, including a description of the caissons, concrete work, and superstructures. A fine plate giving a general elevation of the finished bridge accompanies the paper. 5000 w. Génie Civil—Nov. 19, 1898.

The Bridge of Alexander III., at Paris. Illustrated description of a bridge being built across the Seine, and named for the Czar of Russia. 1000 w. Eng News—April 21, 1898.

The Alexander Bridge at Paris (Die Alexander Brücke in Paris). Carl Bernhard. A very full account of the construction of the bridge, with many illustrations of details and erection. 6000 w. 2 plates. Zeitschr d Ver Deutscher Ing—Sept. 2, 1899.

The Alexander III. Bridge Over the Seine (Pont Alexandre III. sur la Seine). E. Rouyer. Describes especially the methods of casting the false-work truss and the erection of the arch ribs. 2000 w. 1 plate. Génie Civil—July 8, 1899.

The Alexander III. Bridge Over the Seine (Pont Alexandre III. sur la Seine). E. Rouyer. Describing especially the methods of casting the steel voussoirs, and of assembling the arches prior to erection. 4000 w. 1 plate. Génie Civil—July 15, 1899.

The Alexander III. Bridge over the Seine at Paris (Die Brücke Alexander III. über die Seine in Paris). A very full description from a special correspondent, with plates of details. 5000 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1897.

The Alexander III. Bridge, Paris; Construction and Erection of Arch Ribs. Abstract of description from the "Annales des Ponts et Chaussées with two-page plate. 1800 w. Eng News—May 25, 1899.

The Alexander III. Bridge, Paris. J. Guenaire. Illustrated description of this handsome bridge and its construction. 1800 w. Sci Am—March 10, 1900.

The Alexander III. Bridge (Le Pont Alexandre III). Illustrated description of this fine new single arch over the Seine, with perspective drawing, photographs of the present condition of the work, and plate of elevation and details. 5000 w. 1 plate. Génie Civil—June 26, 1897.

The Bridge of the Exposition of 1900 (Note sur le Pont de l'Exposition de 1900). A discussion of the disadvantages which further obstruction of the Seine would produce upon the river traffic on the Seine at Paris. 2500 w. La Révue Technique—Nov. 10, 1896.

The Construction of the Alexandre III. Bridge at Paris (Construction du Pont Alexandre III.). MM. Résal and Alby. Description of the site, and an account of the progress of the work up to the present time, with especial reference to the sinking of the caissons and the construction of the foundations. 15000 w. 7 plates. Ann des Ponts et Chaussées—1 Trimestre, 1898.

The Construction of the Alexander III. Bridge, Paris. Jacques Boyer. A very fully illustrated account of the design, construction and erection of the latest and most remarkable bridge across the Seine; one of the conspicuous features of the coming exposition. 4500 w. Engineering Mag—1899.

See also **Budapest; Paris Exposition; PARIS EXPOSITION—Buildings; STEEL CASTING.**

**Algeria.**—Cantilever Bridge Over the Chéliff, Algeria (Pont à Jonction Centrale Partielle sur le Chéliff, Algére). A. Dumas. With views showing the method of erection without false works and data concerning the construction. The central span is 148 feet. 1800 w. Génie Civil—Feb. 3, 1900.

Partially Connected Cantilever Bridge over the Chéliff (Pont à Jonction Centrale Partielle sur le Chéliff, Algérie). Describing a peculiar form of cantilever in which a partially rigid connection is made in the middle of the central span. 2000 w. Génie Civil—Feb. 26, 1898.

The Construction of the Bridge of Oued Endja, Algeria (La Construction du Pont de L'Oued Endja). A. Daujon. The official report, with full description of the sinking of the pier caisson, and the construction and launching of the girders. An important work in the French-African Colony. 15000 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre, 1899.

**Aqueduct.**—A Steel Aqueduct Bridge. Illustrated explanation of the details of a bridge with an aqueduct 96-ft. long, 53-ft. wide, and 9¼ ft. deep, on the Erie Canal. 800 w. Eng Rec—July 9, 1898.

The Briare Canal Aqueduct (Pont-Canal de Briare). M. Masoyer.. A very complete account of the construction of this great canal aqueduct over the Loire, also includes smaller aqueducts along the line of the Loire Canal. 30000 w. 9 plates. Ann des Ponts et Chaussées—2 Trimestre, 1898.

The Briare Aqueduct Bridge over the Loire (Le Pont-Canal de Briare sur la Loire.) A very complete description of this important steel-tank canal-aqueduct bridge, with map, profiles and other illustrations. 3000 w. 1 plate. Génie Civil—March 11, 1899.

The Briare Canal Bridge. Illustrated description of an aqueduct bridge in France, noteworthy for the details of the large metal trough. 900 w. Eng Rec—July 7, 1900.

Steel Canal Aqueduct at Briare, France. Information from paper of Mr. Masoyer, in "Annales des Ponts et Chaussées." Illustrated description of interesting features of this engineering work, built to connect the Loire and Briare canals across the river Loire, near the town of Briare, France. 600 w. Eng News—Nov. 3, 1898.

The Oudan Aqueduct Bridge (Le Pont-Rivière d'Oudan). M. Masoyer. An illustrated description of the iron aqueduct by which the Oudan is carried across Roanne-Digoin canal. 2000 w. 1 plate. Ann des Ponts et Chaussées—1 Trimestre, 1899.

See also **AQUEDUCT.**

**Arch.**—See also **Müngsten; Niagara; Rhine; Viaur; ARCH.**

**Arched Steel Tube.**—See **Snodland.**

**Architecture.**—The Architectural Element in Engineering Works. H. Heathcote Statham. Discusses various types of bridge architecture showing the attention given to this branch of engineering, especially during the 19th century. 12200 w. Jour Roy Inst of Brit Archts—May 20, 1899.

The Architectural Element in Engineering Work. H. H. Statham. Abstract of paper read before the Royal Inst. of British Arch'ts. Thinks the viaduct is to the 19th century what the cathedral was to the 12th, 13th, and 14th centuries. Discusses various types of bridge architecture. 2000 w. Archt, Lond—May 19, 1899.

The Architecture of Bridge Building. E. C. Gardner. Urging that more emphasis be laid upon esthetics in the construction of bridges. Ill. 2800 w. Eng Mag—Aug., 1896.

The Architecture of Bridges. Illustrated review of forms of bridge construction and embellishment. Serial. Bridges—April, 1899.

See also **ARCHITECTURE—Bridges, Parapets and Balustrades, Engineering Work.**

**Argen, Bavaria.**—Highway Bridge Over the Argen at Langenargen (Strassenbrücke über die Argen bei Langenargen). Detailed description with numerous illustrations of a suspension road bridge of 220 feet span over the Argen in Bavaria. 1000 w. Zeitschr d Ver Deutscher Ing—Jan. 7, 1899.

**Assam-Bengal Railway.**—Assam-Bengal Railway Bridges. Sketch design of the steel trestles of a bridge on a 10 degree curve, radius 573 feet, on a grade of 1 in 43, with specifications. 1000 w. Ind Engng—July 9, 1898.

See **RAILWAY CONSTRUCTION—Assam-Bengal.**

**Atbara.**—An American Bridge in the Soudan (Eine Amerikanische Brücke im Sudan). F. C. Kunz. A general description of the Atbara bridge, by one of the engineers of the Pencoyd Iron Works, with numerous interesting photographs of the erection of the structure. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 23, 1900.

The Atbara Bridge (Die Atbara-Brücke). Inspector Frahm. An account of the circumstances attending the placing of the order for the Atbara bridge, together with a detailed description of the structure and its erection. Two articles. 4000 w. Stahl und Eisen—Aug. 1, Sept. 1, 1899.

The Atbara Bridge. Illustrated description of the bridge and its erection, the story of the foreman who had charge of its transportation and erection, and Lord Kitchener's speech at its dedication. 4500 w. Eng Rec—Nov. 4, 1899.

The Atbara River Bridge. Comment on the object lesson taught to British makers by the contract for this bridge, which was given to an American firm, discussing the causes and giving a brief history of the work. Serial. Engng—June 9, 1899.

The Atbara River Bridge. Interesting data concerning the erection of this bridge on the line of railroad now building in the Soudan, and the quick fulfillment of the order by an American company. Ill. 1200 w. R R Gaz—May 26, 1899.

The Atbara River Bridge. Richard Khuen, Jr. A brief account of the events that led to the construction, and of the negotiations, with illustrated description of the engineering features. 5500 w. Pro Engs' Club of Phila—Dec., 1899.

The Soudan Railroad and the Atbara Bridge. Extracts from the speech of Lord Kitchener at the opening of this bridge. 800 w. R R Gaz—Sept. 29, 1899.

See also **Niagara Arch.**

**Austria-Hungary.**—Iron Bridge Construction in Austria-Hungary (Eiserne Brückenbauten in der Oesterreichisch - Ungarischen Monarchie). M. Foerster. A discussion of the principles of bridge trusses, with diagrams of structures recently erected. 2500 w. Stahl und Eisen—Feb. 1, 1899.

**Austrian Trestle.**—The Iron Trestle Bridges on the Waidhofen-Gaming Railway (Die Eiserne Gerüstbrücke der Localbahn Waidhofen-Gaming). Oskar Meltzer. A description of some modern trestle railway bridges on an Austrian local road, with photographs and illustrations of details. 2500 w. Zeit d Oesterr Ing u Arch Ver—Feb. 24, 1899.

**Baltimore & Ohio R. R.**—Bridge Work on the Baltimore & Ohio Railroad. Illustrated description of recent heavy double-track, plate-girder and truss bridges. 1000 w. Eng Rec—March 24, 1900.

**Bangor & Aroostook R. R.**—Bridge Improvements on the Bangor and Aroostook R. R. Illustrations, with brief description. 800 w. Ry & Engng Rev—Aug. 11, 1900.

**Bellaire, Ohio.**—Proposed 850-Foot Span Highway Bridge. Plans and specifications for a bridge across the Ohio River at Bellaire, O., were prepared and bids or designs for a cantilever and also for a suspension span invited. A comparison is made of the essential features of the two types available, with diagrams. 1500 w. Eng Rec—Nov. 27, 1897.

**Belleville, Ill.**—See **ARCH—Concrete.**

**Bellows Falls, Vt.**—New Double 140-Ft. Span Stone Arch Bridge for the Fitchburg R. R. at Bellows Falls, Vt. Illustrated description of the construction of one of the most notable stone arch railway bridges in America. 1100 w. Eng News—June 21, 1900.

**Bern, Switzerland.**—Construction of the Kornhaus Bridge, Berne, Switzerland. Illustrated description of the details and methods of construction. This is a steel bridge of six arch spans, the largest of 377 feet. 2500 w. Eng Rec—June 17, 1899.

The Cornhouse Bridge at Berne, Switzerland. Elmer L. Corthell. The article is supplemental to one published in this paper in issue of Dec. 19, 1895, giving illustrated description of special features of this bridge now nearing completion. 2000 w. Eng News—Dec. 16, 1897.

The Cornhouse Bridge, Berne, Switzerland. Elmer L. Corthell. Description of location, method of securing plans, details of plan adopted, which is of the steel arch and pier type, and an examination into the possibility of American competition in such work. Ill. Eng News—Dec. 19, 1895.

The Ironwork of the Kornhaus Bridge at Berne (Die Eisenkonstruktion der Kornhausbrücke in Bern). A very complete account of the structural work of the great arch bridge over the Aar at Berne, of 377 feet span. Three articles, 6000 w. Schweizerische Bauzeitung—July 8, 15, 22, 1899.

The Kornhaus Bridge at Berne (Die Kornhaus-Brücke zu Bern). A very fully illustrated account of this fine new bridge across the valley of the Aar. The main arch has a span of 115 metres. 7500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Nov. 19, 1898.

The Kornhaus Bridge at Berne (Le Pont du Kornhaus, à Berne). Henry Martin. An elaborately illustrated detailed description of this important steel arch bridge. Two articles. 8000 w. Génie Civil—Nov. 26 and Dec. 3, 1898.

The Kornhaus Bridge at Berne (Die Kornhausbrücke in Bern). H. V. Linden. Four articles containing an account of the new iron arch bridge at 112.5 metres span to be built over the Aar. Detail drawings. 9000 w. Schw Bauz—Oct. 17, 24, 31, Nov. 7, 1896.

The Competition for a Bridge over the Aar between Berne and the Lorraine Suburb (Der Wettbewerb eines Aar Uebergangs von der Stadt Bern nach dem Lorraine-Quartier). With reproductions of the prize-winning designs for this important structure. Four articles. Four plates. 7000 w. Schweizerische Bauzeitung—Aug. 14, 21, 28, Sept. 4, 1897.

The Competition for the Lorraine Bridge at Berne (Concurrenz-Entwurf für die Lorraine-Brücke in Bern). Devoted especially to an examination of the design which contained a wide span arch of iron and concrete, and which although not finally adopted, received an award. 8000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1898.

See also **Bridge Pier; Rhine.**

**Boat.**—Boat Bridge Over the Indus at Khushalgarh. Brief account with illustration. 400 w. Ind Engng—Feb. 19, 1898.

**Bonn.**—The New Bonn Bridge Over the Rhine. A beautiful structure, costing about $1,000,000 is illustrated and described. 800 w. Sci Am Sup—March 11, 1899.

The New Bridge over the Rhine at Bonn (Die Neue Rheinbrücke bei Bonn). J. L. Algermissen. A very complete general description, with views of the completed structure, and sheets of details. 4500 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1899.

The New Bridge Over the Rhine between Bonn and Beuel (Die Neue Rhinebrücke zwischen Bonn und Beuel). An excellent illustrated description of this latest bridge over the Rhine. The central braced arch has a span of 614 feet. Three articles, 5000 w. Deutsche Bauzeitung—Dec. 24, 28, 31, 1898.

See also **Rhine.**

**Boston.**—An Elevated Railway Drawbridge in Boston. An illustrated description of a new street bridge, built at a cost of about $1,500,000. 1000 w. St Ry Jour—Jan. 6, 1900.

See also **Lift; BRIDGE MACHINERY—Electric.**

**Brazil.**—The Cachoeira Bridge, Brazil. Illustrated description of a steel cantilever bridge recently built, especially some of the features adapted to local conditions in which the English methods of work differ from the usual practice in the United States. 1800 w. Eng Rec—Jan. 1, 1898.

**Briare, France.**—See **Aqueduct.**

**Bridesburg, Delaware River.**—The Delaware River Bridge at Bridesburg. Illustrated description of the details of a structure with both plate-girder and large truss spans. 2800 w. Eng Rec—Nov. 25, 1899.

Superstructure of the Delaware River Bridge at Bridesburg, Philadelphia, for Pennsylvania and New Jersey R. R. Co. Paul L. Wolfel. Detailed description and account of erection, with illustration and short discussion. 4500 w. Pro Engs' Club of Phila—July-Sept., 1897.

**Brisbane, Australia.**—The Albert Railway Bridge at Indooroopilly, Queensland. The method of erection of this two-span bridge is described; each span is 340 feet long and 41½ feet deep at centre of curved top boom. Ill. 2000 w. Eng, Lond—Jan. 17, 1896.

The New Albert Bridge, near Brisbane, Australia. Descriptive account with illustrations. 1800 w. Ry Rev—Aug. 22, 1896.

The New Victoria Highway Bridge, Brisbane, Australia. Photographs and description of a new six-span, highway bridge, with account of its construction. 1500 w. Eng News—Oct. 7, 1897.

The Victoria Bridge, Brisbane. Description with photographs of the bridge completed and in course of construction. 1000 w. Engr, Lond—Sept. 17, 1897.

See also **BRIDGE ERECTION—Launching.**

**British Columbia.**—Trestle Bridge, Esquimalt and Nanaimo Railway, British Columbia. Sketch of trestle bridge, on a curve, with a grade, designed by J. A. L. Waddell. 700 w. Ind Engng—Feb. 4, 1899.

**Brooklyn.**—New York and Brooklyn Bridge. W. Hildenbrand. A letter commenting on the reports made concerning the strength of the bridge, and suggesting a means of so strengthening it as nearly to double its capacity. 1000 w. R R Gaz—Dec. 9, 1898.

New York and Brooklyn Bridge. Report of C. C. Martin, chief engineer and superintendent, on matters connected with the bridge. Considers the bridge as safe as it ever was. 1200 w. R R Gaz—Dec. 9, 1898.

Strength of the New York and Brooklyn Suspension Bridge. Brief discussion as to the increased loads being a cause of danger. 1000 w. Sci Am—Jan. 8, 1898.

The Safety of the Brooklyn Bridge. Editorial discussion of the condition of the bridge, urging such reconstruction as will secure absolute safety. 1800 w. R R Gaz—Dec. 16, 1898.

**Budapest.**—The Francis Joseph Bridge across the Danube at Budapest (Le Pont François Joseph sur le Danube à Budapest). An illustrated description of this fine cantilever, with photographic views of the partially completed work and a plate of details. 4500 w. Génie Civil—May 8, 1897.

The Francis-Joseph Bridge at Budapest (Die Franz-Josefs-Brücke in Budapest). Illustrated description of the new steel cantilever bridge over the Danube at Budapest. The main clear span is 674 feet, the side spans 260 feet each. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 26, 1897.

The Francis Joseph Highway Bridge over the Danube at Budapest (Le Pont Route François-Joseph sur le Danube à Budapest). A very complete account of this important cantilever, with details of the piers, structural work and erection. 4000 w. 1 plate. La Revue Technique—Sept. 25, 1898.

The New Francis-Joseph Bridge. The fundamental system of the structure is explained, with illustrations and description of the architectural features. The whole appearance of the structure is said to be striking and elegant and to add to the charms of Budapest. 2200 w. Eng, Lond—May 14, 1897.

The Schwurplatz Bridge over the Danube at Budapest (Die Schwurplatz-Donaubrücke in Budapest). A. Meissner. Description of this new chain-suspension bridge over the Danube with plate of details and map of approaches. 2000 w. 1 plate. Oesterr Monatschr f d Oeffend Baudienst—April, 1899.

Three Noteworthy Foreign Bridges (Drei Bemerkenswerthe Brückenbauten des Auslandes). M. Foerster. A descriptive comparison between the Franz-Josephs Bridge at Budapest, the Alexander III. Bridge at Paris, and the new arch bridge at Niagara. 4500 w. Stahl und Eisen—Feb. 1, 1898.

**Budapest Chain.**—The Manufacture of the Chain Links for the Schwurplatz Bridge Over the Danube at Buda-Pesth (Die Herstellung der Kettenglieder für die Schwurplatz-Brücke über die Donau bei Budapest). Julius Seefehlner. An illustrated general account of this chain highway bridge, with details of the manufacture of the links. Serial. Zeitschr d Ver Deutscher Ing—May 5, 1900.

**Buffalo, N. Y.**—Street Bridges Over Railroad Tracks in Buffalo. Illustrated description of the important features of the largest bridges erected on the grade-crossing improvements of Buffalo. 2000 w. Eng Rec—May 13, 1899.

See also **Lift.**

**Burlington Channel, Canada.**—Burlington Channel Swing Bridge. Illustrated description of a bridge working under difficult conditions. The motive power is electricity. 1000 w. Can Eng—Dec., 1896.

**California.**—Bridge Evolution as Relating to Southern California. C. E. Fowler. Part first is an introductory general review of progress in bridge design, especially of metal construction. Ill. Serial. Bridges—May, 1899.

**Calumet River, Chicago.**—Double-Track Bridge Across the Calumet River—Chicago, Lake Shore and Eastern Railway. Illustrated description. 600 w. R R Gaz—May 7, 1897.

The Design of a Modern Drawbridge. Andrews Allen. Presents the design of the Calumet River Draw, for the Calumet & Blue Island Ry. Co. Ill. 2800 w. Wis Engr—Jan., 1898.

**Cantilever.**—Cantilever Bridges. A brief abstract of Prof. Edgar Marburg's paper before the Engineers' Club, of Philadelphia, the general conclusion being rather adverse to the economy of the cantilever type, except for long spans and situations where falsework is extraordinarily expensive. 900 w. Ry Rev—April 25, 1896.

Cantilevers in Bridge and Building Construction (Freitäger im Brücken-und Hochbau). A paper read before the German Railway Society by Prof. Reuleaux, with many illustrations of European and American practice. 8000 w. Glaser's Annalen—Feb. 1, 1897.

On Cantilever Bridges. Edgar Marburg. Historical and technical with diagrams, formulae and practical remarks. Brief discussion. 5000 w. Pro Eng's Club of Philadephia—July, 1896.

**Cast Iron, England.**—Cast Iron Railroad Bridges in England. The article gives statistics, taken from a recent Blue Book, and is an interesting exhibit of the extensive use of cast iron in English bridges. 1000 w. R R Gaz—May 8, 1896.

**Cernavoda, Danube River.**—A Bridge Over the Danube at Cernavoda. A five span bridge 2460 feet long, costing $1,567,456 for the main bridge. Ill. 1000 w. R R Gaz—Nov. 29, 1895.

The Cernavoda Bridge Over the Danube River. Illustrated description of cantilever bridge. 800 w. Eng News—Aug. 27, 1896.

**Cherbourg.**—The Hydraulic Rolling Bridge of the Port of Cherbourg (Pont Roulant Hydraulique du Port de Cherbourg). This is a bridge spanning the passage between two of the basins of the Cherbourg docks and is arranged to be lifted and drawn back by hydraulic power; span 98 feet. 2500 w. 1 Plate. La Rev Tech—Feb. 25, 1897.

The Rolling Bridge at Cherbourg (Le Pont Roulant de Cherbourg). Describing and illustrating the new bridge at the Cherbourg docks. The bridge is drawn back by hydraulic power. 2000 w. Génie Moderne—October 1, 1897.

**Chicago.**—Proposed Design for Campbell Avenue Bridge Over Chicago Drainage Canal. A general description of the design of the superstructure, with illustrations showing the principal details of plans prepared by the Sanitary District engineers. The plans were finally rejected, but of interest because of the completeness and magnitude of the scheme. 900 w. Ry & Engng Rev—April 23, 1898.

See also **Chicago Drainage Canal; Lift; Plate Girder Draw; BRIDGE CONSTRUCTION.**

**Chicago & Northwestern Ry.**—Some Short Span Railway Bridges. Illustrates two bridges on the Chicago & Northwestern Railway having unusually shallow floors and special details in connections. Serial. Eng Rec—June 3, 1899.

Rock River and Merrimac Bridges, Chicago & Northwestern Ry. Illustrations and description of the essential features of interest to engineers of the two bridges recently completed by this road to replace old bridges. 1600 w. Eng News—July 9, 1896.

**Chicago Double Deck.**—Double-Deck Bridge at Wells St., Chicago. Illustrated detailed description of a bridge carrying the Northwestern Elevated Ry. over the tracks of the Chicago & Northwestern Ry. 1200 w. Eng News—Aug. 24, 1899.

**Chicago Drainage Canal.**—Chicago, Madison & Northern Swing Bridge Over Drainage Canal. Brief illustrated description of the longest and one of the largest bridges which will span this canal. 700 w. Ry & Engng Rev—March 4, 1899.

Proposed Bridges Across the Chicago Drainage Channel. Extracts from the specifications, with drawings and general information. 4200 w. R R Gaz—Dec. 3, 1897.

Railway Drawbridges Over the Chicago Drainage Canal. Describes four of the five railway bridges crossing this channel, giving specifications and illustrations. 5000 w. Eng News—Dec. 2, 1897.

Swing Bridges on the Chicago Drainage Canal. Specifications and conditions for some of the bridges for which bids are now invited. Diagrams are given showing the truss outlines, and a few typical maximum strains and sections. 800 w. Eng Rec—Oct. 2, 1897.

See also **Chicago; Lemont, Ill.; Lift.**

**Chicago, Madison & Northern Ry.**—Chicago, Madison & Northern Railroad Company's Bridge. Details of superstructure of a double-track 474-ft. swing-bridge, with illustrations. 1000 w. Eng Rec—March 19, 1898.

**Cincinnati.**—The Covington and Cincinnati Suspension Bridge. A description of the reconstructed bridge, with details of the towers, anchorages and truss work. Serial. Eng Rec—Sept. 10, 1898.

The Covington and Cincinnati Suspension Bridge. Illustrated description of the construction of the new cables. Serial. Eng Rec—Nov. 26, 1898.

The Newport and Cincinnati Bridge. Illustrated description of this 3,375-ft. structure, with 510-ft. channel span, which presents some unusual details owing to unsymmetrical loading. 400 w. Eng Rec—April 23, 1898.

See also **BRIDGE ERECTION.**

**Cleveland.**—See also **Lift.**

**Colombo.**—The Victoria Bridge, Colombo. Charles Vincent Bellamy. Reasons for removing the Bridge of Boats and for the building of a new structure, with description and information. Ill. 9400 w. Ind & East Eng—June 26, 1897.

**Columbia, Pa.**—Rebuilding of the Pennsylvania Railroad Bridge at Columbia, Pa. Brief historical account of the various bridges built at this point and the disasters to the structures. 700 w. Ry Rev—July 17, 1897.

**Combination Truss.**—Combination Bridges. A. D. Ottewell. A discussion of the advantages of using iron, steel, and wood, in combination, for bridge trusses, with illustrations and details of several such structures. 1200 w. Engng—Sept. 9, 1898.

**Concrete—Expanded Metal.**—Concrete and Expanded Metal Highway Bridge Construction in Allegheny County, Pa. Illustrates two methods of employing this material. Both bridges described are near Pittsburg. 600 w. Eng News—Jan. 26, 1899.

**Concrete—Reinforced.**—An Early Design for a Long-Span Concrete-Steel Arch Bridge. Thomas C. Clarke. Brief illustrated description of a design once accepted for the Washington Bridge over the Harlem River, in New York City. 400 w. Eng News—Sept. 28, 1899.

Comparative Estimates of the Cost of Combination and All-Steel Highway Bridges. H. G. Tyrell. Shows that in the bridge in question the combination bridge cost one-third less than the steel one. 300 w. Eng News—Aug. 23, 1900.

Concrete Steel Bridge Construction. Edwin Thacher. Considers in detail the construction of concrete steel arches and other structures, the materials, workmanship, etc., giving specifications for concrete steel bridges. Ill. 11700 w. Eng News—Sept. 21, 1899.

The Concrete Iron Bridge at Schloss Eichhorn in Moravia (Beton-Eisenbrücke auf Schloss Eichhorn in Mähren). J. Melan. A handsome concrete iron arch bridge on the Melan principle, of about 58 feet span. 1200 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1899.

**See also Draulitten; Mans; Oconomowoc; Patterson; Steyr; Topeka; Washington; Zürich.**

**Congo.**—The Inkissi Bridge, Congo Railway. Illustrates and describes the erection of this bridge, which was attended with great difficulty. 1100 w. Engr, Lond—March 3, 1899.

**Constance.**—See **BRIDGE DESIGNS—Continuous Girder.**

**Cornerstone Laying.**—Origin of Ceremonies Connected with the Laying of the Cornerstone of a Structure. From "Le Génie Civil." Investigation of such observances, especially in the laying of the cornerstone of bridges. 1100 w. Eng News—Jan. 21, 1897.

**Courcelles, France.**—New Railway Bridge Over the Seine. Brief illustrated description. 700 w. Engr, Lond—Aug. 19, 1898.

**Damaged but Strong.**—See **RAILWAY BRIDGE.**

**Danube.**—Hinged Concrete Bridge Across the Danube. O. J. Marstrand. Abstracted from "Zeitschrift fuer Bauwesen." Describes a bridge connecting the village of Inzigkofen with the opposite side of the Danube. The greatest economy was necessary, and the conditions somewhat unusual. Ill. 1100 w. Eng News—Sept. 17, 1896.

**Davenport.**—The Latest of the Large Mississippi Bridges. Illustrated description of a bridge of seven fixed spans and a draw span, having a total length of 2310 feet. 700 w. Sci Am—March 17, 1900.

**Dee River.**—See **Queensferry, Wales.**

**De Kalb, Ill.**—See **BRIDGE FLOOR—Brick and Concrete.**

**Delaware River.**—See **Bridesburg.**

**Denmark.**—See **ARCH—Concrete Reinforced.**

**Detroit.**—See **BRIDGE ERECTION—Belle Isle.**

**Dirschau, Germany.**—New Railway Bridge Over the Weichsel at Dirschau. Description of German bridges, built side by side, as illustrated by "Le Génie Civil." 2400 w. Engr, Lond—Dec. 6, 1895.

**Don River.**—Bridge Over the River Don. Drawings of the principal members, etc., with description, of a popular type of bridge. 900 w. Engr, Lond—May 21, 1897.

**Draulitten, Germany.**—The Monier Arch Bridge at Draulitten, Germany. Description abstracted from the "Centralblatt der Bauverwaltung." The arch has a span of 88 feet and a rise of 21 feet, and bore a test load of 164 pounds per sq. foot satisfactorily. 1000 w. Eng Rec—March 7, 1896.

**Drawbridge.**—Some Features of Draw or Rotating Bridges. Editorial explanation of recent failures of turntables. 700 w. Eng Rec—April 2, 1898.

Some Interesting Types of Modern Drawbridges. Frank W. Skinner. Brief illustrated description of various types of drawbridges and their manner of operation. 2000 w. Harper's Wk—Jan. 28, 1899.

**See also Plate Girder Draw and under geographical locations.**

**Drawbridge Machinery.**—See **BRIDGE MACHINERY.**

**Düsseldorf.**—The New Bridge Across the Rhine at Düsseldorf (Die Neue Rheinbrücke bei Düsseldorf). A general description of the work, with data as to cost, and some account of the electric tramway over the bridge from Düsseldorf to Krefeld. 2000 w. 2 plates. Oesterr Monatschr f d Oeff Baut—Dec., 1898.

The New Bridge Over the Rhine at Düsseldorf (Die Neue Rheinbrücke be Düsseldorf). A brief account of the completion of this fine new braced arch bridge, with illustrations showing the method of erection. 1000 w. 1 plate. Zeitschr d Ver Deutschr Ing—Nov. 19, 1898.

The New Düsseldorf Bridge Over the Rhine. From "Ueber Land und Meer." Brief illustrated description. 500 w. Sci Am Sup—Feb. 11, 1899. **See also Rhine.**

**Düsseldorf-Duisburg.**—See **ELECTRIC RAILWAY—Düsseldorf-Duisburg.**

**Duluth and Superior.**—The Duluth and Superior Bridge. Illustrated description of the truss and turning details of a very heavy swing span. 2500 w. Eng Rec—June 23, 1900.

Duluth-Superior Bridge. Illustrated description of this bridge, which was built under special act of the American Congress. 2200 w. Ry Rev—Sept. 4, 1897.

The Duluth-Superior Bridge. Elevation, plan, cross-section, and general description of an important bridge nearly completed, connecting Rice's Point, Duluth, with Connor's Point, Superior. 800 w. R R Gaz—March 12, 1897.

**See also BRIDGE MACHINERY—Electric.**

**Earthquake Countries.**—See also **BUILDING CONSTRUCTION—Earthquake Countries.**

**East Liverpool, Ohio.**—Suspension Bridge Over the Ohio River at East Liverpool, O. Hermann Laub. Illustrated description of bridge for highway and electric railway traffic, of the stiffened suspension type. 1500 w. Eng News—April 1, 1897.

**Easton, Pa.**—The Lehigh Valley Railroad Bridge at Easton, Pa. Illustrated description of a structure consisting of 8 trusses and a 630-foot viaduct approach. The truss spans are very much skewed at both ends, and the difficulties of alignment and centrifugal strains due to rapidly moving heavy trains, developed special features of construction which are explained in detail. 2600 w. Eng Rec—Feb. 10, 1900.

**East River, N. Y.**—Long-Span Bridges for Great Cities. O. F. Nichols. A paper presented at the meeting of the Dept. of Engng. of the Brooklyn Inst. of Arts and Sciences, having special reference to projects for crossing the East River, N. Y. 5000 w. Eng Rec—March 13, 1897.

The Adopted Plans for the New East River Bridge. Drawings showing plan, elevation, and sections of what will be the longest suspension bridge in the world; and will have the longest span of any bridge save the Forth Bridge. 400 w. Eng News—July 30, 1896.

The New East River Bridge. States the changed conditions which make a bridge connecting New York and Brooklyn farther north a necessity, its location and a brief illustrated description. 1700 w. Sci Am—Sept. 12, 1896.

Bridges Over the East River. O. F. Nichols. Read before the Municipal Club of Brooklyn, Jan. 18, 1898. Considers the old bridge, the new bridge, and the next bridge, pointing out what is needed to insure the greatest benefits. 2700 w. Eng Rec—Jan. 22, 1898.

Falsework for Erecting the Manhattan Towers and End Spans, New East River Bridge. C. E. Fowler. Illustrated description with two-page plate of details. 3000 w. Eng News—March 8, 1900.

New East River Bridge. Important details and portions of the specifications for the bridge to be built between Delancey Slip, New York, and South Fifth Street, Brooklyn. 1500 w. R R Gaz—Feb. 11, 1898.

Proposed Plans for Bridges and Tunnels Across the East River at New York City. Discusses the plans for improving the transit facilities. Also editorial discussion. 3000 w. Eng News—Dec. 28, 1899.

Temporary Foot Bridge for Placing the Cables of the New East River Bridge. Illustrated description of a temporary suspension bridge for erecting four cables 18¾ inches in diameter and about 3000 feet long from anchorage to anchorage. 1600 w. Eng Rec—Oct. 27, 1900.

The Bridge Problems of the Greater New York. Editorial presenting the advisability of bridge construction between New York and Brooklyn in order to hasten, with facilities for communication, the real union which is to take effect Jan. 1, 1898. 900 w. Eng Rec—May 23, 1896.

The Cables and Suspenders for the New East River Bridge, New York City. Illustrates and describes the general details for the center suspension span. 2700 w. Eng News—Nov. 23, 1899.

The New East River Bridge. An illustrated account of the new bridge to be built from near the foot of Broadway, Brooklyn, to a point near the foot of Grand St., New York. 3500 w. Ir Age—Sept. 24, 1896.

The New East River Bridge. Illustrated description of the progress of the work on this bridge at New York, with information concerning the plan and construction. 1800 w. Sci Am—Jan. 7, 1899.

The New East River Bridge. Extracts from the address of O. F. Nichols before the Broadway Merchants' Association of Brooklyn. Ill. 1800 w. R R Gaz—Dec. 15, 1899.

The New East River Bridge. Gives specifications for steel cables, suspenders, coverings, sheaves, bands, and their appurtenances. Ill. 2500 w. Ir Age—Nov. 16, 1899.

The New East River Bridge. Illustrated description of some details of the parts to be contracted for. 700 w. R R Gaz—Nov. 24, 1899.

The Towers and End Spans for the New East River Bridge. Illustrations reproduced from the engravings accompanying the specifications from which selected information is given of interest in connection with the drawings. 3500 w. Eng News—Feb. 17, 1898.

The Third East River Bridge. Illustrated description of the plans for the third suspension bridge to be built between Manhattan and Brooklyn, New York. 700 w. Eng Rec—May 12, 1900.

The New York and Long Island Bridge, New York City. Illustrated description of the great steel cantilever bridge by which the Long Is. R. R. Co. expects in due time to run its trains into New York City. 1600 w. Sci Am—May 8, 1897.

The Relative Advantages of Bridges and Tunnels. Discusses the advisability of driving tunnels for communication between two large communities for which long-span bridges offer the only alternative connection. Also report on the use of tunnels between Brooklyn and Manhattan, New York, by W. B. Parsons. 2800 w. Eng Rec—Dec. 16, 1899.

See also **BRIDGE ANCHORAGE; BRIDGE APPROACH; BRIDGE FOUNDATION; BRIDGE TOWER.**

**Electric Railway.**—Bridges for Electric Railroads. Charles F. Stowell. A review of accidents occurring under the new heavier requirements and an arraignment of inadequate specifications and defective tests. 1500 w. R R Gaz—July 10, 1896.

**Electric Tramway.**—See **ELECTRIC TRAMWAY—Drawbridge.**

**Electric Trolley Construction.**—See **ELECTRIC TRAMWAY—Drawbridge.**

**English Practice.**—Recent English Practice in Bridges and Framed Structures. Alfred D. Ottewell. Illustrations with explanatory remarks. 2000 w. Bridges—May, 1899.

**Essex-Merrimac.**—The Essex-Merrimac Bridge. Horace C. Hovey. Describes what is known as the Essex-Merrimac bridge, crossing at Deer Island from Newburyport to Salisbury. It has existed in two different forms, each having a bearing on the general interests of bridge building. 1600 w. Sci Am—Oct. 17, 1896.

**Fairmount Park, Philadelphia.**—The Design and Specifications for the Fairmount Park Bridge. John Sterling Deans. Letters setting forth the facts relating to this structure. A protest was presented to the commissioners of Fairmount Park against the award of the contract. 5300 w. Eng News—Aug. 13, 1896.

Erection of a Fairmount Park Bridge. This bridge has three 200-feet arch spans, erected by falsework and traveler of unusual form. Ill. 800 w. Eng Rec—June 4, 1898.

The Fairmount Park Arch Bridge, Philadelphia. Illustrated and briefly describes the principal constructional features. 900 w. Eng News—Aug. 4, 1898.

Bridge Over Wissahickon Creek, Fairmount Park, Philadelphia. Joseph Wood Wagner. Description, with illustration, of a bridge of excellent design, and well suited to the location. 1200 w. Eng News—Sept. 9, 1897.

**Feldkirch, Vorarlberg.**—Rebuilding the Bridge of the Holy Cross over the Ill at Feldkirch in Vorarlberg (Neubau der Gewölbten Heiligkreuzbrücke über den Illfluss bei Feldkirch in Vorarlberg). Theodor Pawlik. A valuable paper describing the replacement of an old semi-circular arch by a flatter segmental structure, with all details of the computation, and erection. 10000 w. 8 plates. Oesterr Monatschr f d Oeffent Baudienst—April, 1898.

**Ferry.**—See **FERRY BRIDGE.**

**Floating.**—A Floating Bridge in the Philippines. B. F. Cheatham. A letter giving a short description of a bridge constructed by the American army. Ill. 800 w. Eng News—Sept. 14, 1899.

The Floating Bridge at Lynn. C. J. H. Woodbury. An account of a unique wood bridge, built in 1803, which is still in use. It is essentially a very thick raft. 2000 w. Eng Rec—March 11, 1899.

See also **Northwich; Pontoon; FLOATING BRIDGE.**

**Fort Perry, Pa.**—Special Bridge and Viaduct Construction in Western Pennsylvania. Illustrated description of a 1,340-ft. bridge at Fort Perry carrying two tracks, but with one of the trusses proportioned to carry one-half the weight of a third track when a third truss is built alongside. The main 400-ft. span has very heavy details. 2000 w. Eng Rec—June 2, 1900.

**Foundations.**—See **BRIDGE FOUNDATIONS.**

**France.**—Notes on Recent French Bridge Construction. Notes and illustrations explaining details of interesting structures of recent date. 1500 w. Eng News—July 6, 1899.

Some Recent French Bridges (Einige Neuere Französische Brückenbauten). Herr von Frahm. A general review of recent structures, describing the Mirabeau and the Alexander bridges in Paris, the Viaur viaduct, and various railway bridges. Two articles. 6000 w. Stahl und Eisen—Dec. 1, 15, 1899.

**Francis Joseph.**—See **Budapest.**

**Galicia.**—See **Wooden Lattice.**

**Gas Protection.**—The Protection of Overhead Bridges from Locomotive Gases. Editorial discussion of this subject, and the need of reform in engineering practice, with suggestions for remedying the trouble. 1500 w. Eng News—July 20, 1899.

**Geneva.**—The Coulouvrennière. Concrete Arch Bridge, Geneva, Switzerland. Illustrated description of a concrete bridge of non-skeleton construction recently completed at Geneva, Switzerland. 1000 w. Eng News—Aug. 6, 1896.

**German Arch.**—Some Notable German Arch Bridges. Illustrated description of some of the longest and, architecturally, most beautiful bridges. 1100 w. Sci Am—March 25, 1899.

**Germany.**—Recent German Bridges (Neuere Deutsche Brückenbauten). With photographs of bridges now in course of erection and elevation of the large bridges and viaducts of recent design. A valuable article by Prof. Foerster, of Dresden. 6000 w. Stahl und Eisen—Sept. 15, 1897.

See also **BRIDGE BUILDING; BRIDGE EXHIBIT.**

**Girder.**—See also **GIRDER.**

**Glasgow.**—The New Glasgow Bridge. From the "Scotsman." General description of the work of rebuilding a bridge over the Clyde. 1100 w. Archt, Lond—April 14, 1899.

**Gogra River, India.**—Gogra Bridge, Bohramghat. W. J. Turnbull. Illustrated description of a bridge over a river with badly defined banks. 400 w. Ind Engng—July 23, 1898.

**Grand River, Mich.**—See **Lansing; BRIDGE CONSTRUCTION.**

**Greenpoint Avenue, Brooklyn.**—The Greenpoint Avenue Bridge. Illustrated description of a low-level highway swing bridge for heavy city traffic. It is about 200 feet in length, with a 20.5-ft. roadway and two 5.75-ft. sidewalks. 900 w. Eng Rec—May 27, 1899.

**Harlem River, New York.**—Harlem River Drawbridge. General description, elevation, plans and diagrams, strain sheet, and truss details. Serial. Eng Rec—Jan. 25, 1896.

Bridge Over the Harlem River. An illustrated description of the bridge which carries the N. Y. C. & H. R. R. R. over the Harlem River, at New York. 1500 w. Engng—Dec. 9, 1898.

Four-Track Swing Bridge over Harlem River, New York Central & Hudson River R. R. Illustrated description of the general features only of the operating machinery. Drawings giving dimensions, material and details of construction. 1000 w. Eng News—April 30, 1896.

Opening of the N. Y. C. Four-Track Drawbridge and Viaduct in New York City. Illustrated description of this interesting work. 2000 w. Sci Am—Feb. 27, 1897.

The New York Central Four-Track Drawbridge Over the Harlem River. Illustrated description of probably the heaviest railroad drawbridge in the world; it is 400 ft. long, with a depth at center of 64 ft., and weighs 2500 tons. A detail is given of the track-locking apparatus. 2700 w. R R Gaz—Feb. 21, 1896.

The Third Avenue Drawbridge Across the Harlem River, New York City. Illustrated description of one of the largest and heaviest drawbridges ever built. 1000 w. Eng News—Nov. 5, 1896.

Third Avenue Drawbridge Across the Harlem River, New York City. Illustrated description of this massive drawbridge. 1500 w. Sci Am—July 17, 1897.

The Willis Avenue Bridge Over the Harlem River, New York City. Elevation with brief description of bridge to be constructed. 700 w. Eng News—Sept. 23, 1897.

See also **BRIDGE ERECTION.**

**Highway.**—Highway Bridges. Carl Gayler. Discusses a few points for improvement in the building of highway bridges, which may account for the limited success, and deals at some length with the present practice of structural engineers who have made highway bridges a specialty. 2800 w. Jour Assn of Engng Soc—June, 1896.

Highway Bridges. Editorial on methods of securing safe county bridges. 1600 w. Eng Rec—Oct. 15, 1898.

Highway Bridge Building. Albert W. Buel. A discussion of the character of highway bridges and of the methods to improve this work. 4200 w. Eng Rec—Dec. 24, 1898.

See also **Argen, Bavaria; Bellaire, O.; Brisbane; Budapest; Concrete-Expanded Metal; Lansing; Newark, N. J.; Nogent-sur-Marne; Paris; Park; Rails; Railway Branch Lines; Suspension; Verdun; Vienna; Wellsville; HIGHWAY BRIDGE.**

**History.**—The Birth-Place of Modern Bridging. The history of the first successful building of iron bridges by the Coalbrookdale ironmasters, in 1779. Ill. 1300 w. Engr, Lond—Sept. 23, 1898.

**Hudson River.**—Large Span Railway Bridges. E. W. Young. A letter discussing the proposed long span railway suspension bridge across the Hudson River, and a short editorial reply. 1500 w. Engng—Dec. 11, 1896.

The New Bridge Over the Hudson River at New York. Illustrated description of the proposed New York and New Jersey Railroad bridge across the Hudson River. 1300 w. Sci Am—May 2, 1896.

The North River Bridge. G. Lindenthal. Illustrated description of the general technical features of the undertaking. The characteristics of the superstructure, foundations, peculiarities of end spans, method of erection, and comparison with other large bridges. 4000 w. Trans Assn of Civ Engs of Cornell Univ—June, 1896.

**Hudson River.**—See also **Suspension; TUNNEL—Hudson River.**

**Illinois University.**—A Concrete Foot Bridge. Arthur N. Talbot. Description of construction of a small foot bridge in the grounds of the University of Illinois, with discussion. 3500 w. Ill Soc of Engs & Surv—11th An Rept, 1896.

**India.**—Bridges in India. Information relating to the work of F. E. Robertson and the recent bridge structures in India. Ill. 2700 w. Bridges—June, 1899.

**Indo-China.**—Bridge 1680 Metres Long Over the Red River (China) (Pont de 1680 Mètres d'Ouverture sur le Fleuve Rouge). M. Bricka. This cantilever bridge is to be built on the railway line between Hanoi and the frontiers of China. It will have 19 spans, the longest of 348 feet. Description illustrated with one plate. 1600 w. Ann des Ponts et Chaussées—3e. Trimestre, 1898.

**Indus.**—Bridge Over the Indus. Fine illustration, with brief description of the bridge across the Indus, on the Kotri Rohri section of the Indian State Railway. 500 w. Engng—July 28, 1899. See **Boat.**

**Inverness.**—The New Waterloo Bridge Over the River Ness at Inverness. The piers are of cast iron cylinders and the spans steel lattice girder. It replaces the "old black bridge" built 90 years ago. The construction is fully described and illustrated by a view of the structure. 2400 w. Engr, Lond—April 10, 1896.

**Iowa.**—Some Examples of Bridge Engineering. Illustrated description of a number of engineering crimes in Iowa, with an editorial introduction on the subject. 3500 w. Eng Rec—May 6, 1899.

**Iowa City.**—A Bridge that Ought to be Better. Illustration and criticism of bridge recently erected across the Cedar River, near Iowa City, Ia. Gives criticisms of J. A. L. Waddell with further explanations. 1400 w. Eng News—June 30, 1898.

**Italian Drawbridge.**—An Italian Drawbridge. The central span is a lifting leaf 41 feet 7 inches long and 30 feet 5 inches wide, operated by hydraulic mechanism. 450 w. Eng News—Feb. 20, 1896.

**Ithaca, N. Y.**—Steel Arch Highway Bridge Over Fall Creek, Ithaca, N. Y. Illustrates and describes a bridge consisting of two plate-girder arch ribs braced together by cross-frames and a triangular lateral system, and carrying vertical latticed ports which uphold the floor system. 500 w. Eng News—April 28, 1898.

**Japan.**—American Bridges in Japan. Illustrated description of two bridges containing a number of special features made necessary by the requirements of the transportation facilities. 1000 w. Eng Rec—Dec. 23, 1899.

**Japanese Wooden.**—A Japanese Bridge. Drawing and brief description of a quaint, strong and handsome wooden bridge at Iwakuni, Japan. 250 w. R R Gaz—Nov. 11, 1898.

See also **BRIDGE CONSTRUCTION—Japan.**

**Kansas City, Pittsburg & Gulf Ry.**—Bridge Work on the Kansas City, Pittsburg & Gulf R. R. Illustrates and describes the Waddell patented form of 100-ft. through truss, the concrete piers of the Arkansas River bridge and the construction of these piers, with the engineering difficulties encountered and overcome. 6800 w. Eng News—Aug. 25, 1898.

**Kentucky River.**—A Historic Bridge. Illustrated description of the first large cantilever trussed bridge, and the manner of erecting it across the Kentucky River. 1200 w. Eng Rec—July 9, 1898.

**Kirchheim, Würtemberg.**—Hinged Concrete Arch Bridge Over the Neckar River at Kirchheim, Würtemberg. General view, with brief description of a notable highway bridge of this type. 250 w. Eng News—March 29, 1900.

**Kistna, India.**—The Kistna Bridge, East Coast Railway, India. F. J. E. Spring. Illustrated description. Serial. Engng—July 3, 1896.

**Knoxville, Tenn.**—The New Tennessee River Bridge at Knoxville, Tenn. An illustration of the aesthetic element determining the choice of a bridge. The structure is of steel, arched cantilever design, for roadway and sidewalks. 400 w. Eng News—May 7, 1896.

**Korea.**—A Korean Bridge. Illustrated description of the first steel bridge in Korea, a railway structure having a footway outside one truss. The bridge is 2000 ft. long and has ten spans. 700 w. Eng Rec—April 15, 1899.

**Kornhaus.**—See **Bern.**

**Langenargen.**—See **Argen, Bavaria.**

**Lansing.**—Steel Arch Highway Bridge, Lansing, Mich. An illustrated description of a bridge carrying Michigan Avenue over the Grand River, composed of two 110-ft. arched girder spans, supporting a roadway 115½-ft. in width over all. The ends of the 4 ft. girder arches are pin connected; the bridge is noteworthy by reason of its unusual width. 300 w. Eng News—Nov. 14, 1895.

See also **BRIDGE CONSTRUCTION—Grand River.**

**Lausanne, Switzerland.**—Competition for Three Highway Bridges Over the Flonthal at Lausanne (Der Wettbewerb für drei Strassenbrücken über das Flonthal in Lausanne). With illustrations of the premiated designs, and the report of the judges. Serial. Schweizer Bauzeit—Feb. 25, 1899.

**Lemont, Ill.**—"Bobtail" Swing Bridge, Santa Fé Ry., Lemont, Ill. Illustrates and describes a double-track bridge about to be erected by the Sanitary District of Chicago, over the main channel of the drainage canal. 1200 w. Ry & Engng Rev—Aug. 6, 1898.

**Lewiston, Idaho.**—See **Snake River.**

**Lewiston, N. Y.**—See **Niagara Suspension.**

**Life.**—The Life of Iron Railway Bridges. An editorial discussion. 2200 w. Engr, Lond—Feb. 14, 1896.

What Is the Life of an Iron Railroad Bridge? J. E. Greiner. Read before the Am. Soc. of Civ. Engs., with discussion and correspondence. An interesting discussion on the factors necessary to consider in bridge design, and the effect of increased weight and speed of railroad equipment on bridges already up; a table of safe allowable unit stresses proposed for use in new designs. Considerable information is brought out in the discussion. 20500 w. Trans Am Soc Civ Engs—Oct., 1895.

**Lift.**—Proposed Bascule Bridge. A counterbalanced bridge having a clear opening of 150 ft. and fitted with a novel counterbalance. A subway is provided for pedestrians when the bridge is up. Ill. 200 w. Eng Rec—Feb. 22, 1896.

The Lift or Bascule Type of Movable Bridges. A statement of the relative merits of swing and lift bridges. 1000 w. Eng Rec—July 28, 1900.
See also **Tower, London.**

**Lift, Boston.**—Rolling Lift Bridge of the Boston Terminal (N. Y., N. H. & H. R. R.). Illustrated description of the six-track drawbridge over Fort Point Channel. 3000 w. Eng News—March 15, 1900.

The Fort Point Channel Bridge, Boston. Illustrated description of a rolling lift bridge with three double track spans 85 to 118 ft. long. 1200 w. Eng Rec—Aug. 19, 1899.

The Scherzer Rolling Lift Bridge Over the Fort Point Channel, Boston. Describes some of the details peculiar to this particular bridge, giving illustrations. 1500 w. R R Gaz—Sept. 8, 1899.

The Scherzer Rolling Lift Bridge Over the Fort Point Channel, Boston. Illustrated description of an engineering work of interest. 800 w. R R Gaz—Aug. 4, 1899.

**Lift, Buffalo.**—Michigan Street Drawbridge, Buffalo, N. Y. Illustrated description of a double hinged lift bridge presenting novel engineering features. 1500 w. Eng News—Aug. 19, 1897.

The Michigan Avenue Bascule Bridge, Buffalo. Illustrated description of bascule bridge with a differential rolling counterpoise, and its operation. 1800 w. Eng Rec—Aug. 21, 1897.

**Lift, Chicago.**—Eight-Track Rolling-Lift Drawbridge Over the Chicago Drainage Canal. Illustrated description of the accepted design, with statement of the usually complicated conditions. 1600 w. Eng News—May 24, 1900.

The Eight-Track Scherzer Rolling Lift Bridge at Chicago. Illustrated description of an eight-track span of 150 ft. on a 68-degree skew, designed as a fixed span for early service and subsequent modification into a bascule bridge, when the waterway below is open for boats. 1900 w. Eng Rec—May 26, 1900.

New Scherzer Lift Bridge Over the Chicago River. Illustrates and describes the two new rolling lift bridges now building. 500 w. R R Gaz—Sept. 22, 1899.

Scherzer Rolling Lift Bridges Over the Chicago River. States the conditions on this river and gives illustrations of bridges to be constructed. 1200 w. Eng Rec—Sept. 23, 1899.

The Chicago Type of Bascule Bridge. Illustrated description of the general design and special details of a trunnion-type bascule with special brakes, buffers, locking gear and piers. 2300 w. Eng Rec—July 21, 1900.

The Morison Lift Bridge Over the Chicago River. Illustrates and describes a special design of bascule bridge, differing from other bascule bridges mainly in the driving machinery and the method of counter weighting. 600 w. R R Gaz—June 2, 1899.

Van Buren Street Rolling Lift Bridge, Chicago, Ill. Warren R. Roberts. A thorough description, with full structural details. Ill. 11500 w. Jour Assn of Eng Soc—Dec., 1895.

**Lift, Cleveland.**—A Rolling Lift Bridge at Cleveland. Illustrates and describes a Scherzer rolling lift bridge, of the single arm type, being built by C., C., C. & I. Ry. to replace an old wooden swing span. 900 w. Ry Age—June 8, 1900.

The Cuyahoga River Rolling Lift Bridge. Illustrated description of a single-track rolling bridge of 110-ft. clear span; the strains in the main and cantilever spans are given in detail. 800 w. Eng Rec—March 3, 1900.

**Lift, Electric.**—An Electrically Operated Bridge. Describes the method of operating a lift bridge of 34 ft. span and 66 ft. width. 500 w. Eng Rec—April 7, 1900.

**Lift, Milwaukee.**—Lift Bridge at Milwaukee. Illustrated description of the Huron Street bridge. 1800 w. Ry Rev—May 15, 1897.

The New Huron Street Lift Bridge, Milwaukee, Wis. M. G. Schinke. Detailed description with illustrations. 1800 w. Eng News—April 22, 1897.

**Lift, Newtown Creek, N. Y.**—A Bascule Three-Hinged Arch. Description and figure of bridge designed by W. H. Breithaupt, to be built over Newtown Creek. 600 w. Eng Rec—Aug. 8, 1896.

The Newtown Creek Hydraulic Bascule Bridge. Description of accepted design for a bascule bridge operated by hydraulic rams and counterweights for the crossing from Vernon to Manhattan Avenues. Illustrated by diagrams. 450 w. Eng Rec—Oct. 31, 1896.

**Lift, Rutherford, N. J.**—A Novel Lift Bridge on the Erie. Illustrated detailed description of the bridge over Berry's Creek, about seven miles from Jersey City. 2500 w. R R Gaz—Nov. 27, 1896.

Counterweighted Lift Bridge on the Erie Railroad. Description with perspective view of bridge across Berry's Creek, near Rutherford, N. J. 600 w. Sci Am—Nov. 28, 1896.

**Light Railway.**—Light Railway Bridges. The Lössintz bridge on the Eppendorf-Hetzdorf state railway line, in Saxony, is illustrated and described as a noteworthy type. 1500 w. Engr, Lond—July 22, 1898.

Notes on Light Railway Bridges. Illustrated description of a bridge built under rather difficult conditions—the Gerüstpfeiler Viaduct, designed and carried out by the government engineers of the Saxon States Railways. It is built of trestle piers or lattice-work columns, on a curve of 125 m. radius and with a gradient of 1:40. Calculations of strains and details of construction are given. 4000 w. Engr, Lond—Dec. 24, 1897.

**Little Calumet.**—Coustruction of Little Calumet River Bridge. Benjamin Douglas. Description with elevation of abutments and pier. 3000 w. Technic—1897.

**Lobositz, Bohemia.**—The New Railway Bridge Over the Elbe at Lobositz (Die Neue Eisenbahnbrücke über die Elbe bei Lobositz). H. Rosche. With view of the completed bridge, and plan of railway connections. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 28, 1898.

**London.**—London Bridge. A. J. Glasspool. Historical review, mostly relating to the old London Bridge. 2200 w. Arch, Lond—Oct. 23, 1896.
See also **Tower; Vauxhall.**

**London Railway.**—See **RAILWAY STATION—London.**

**London Tower.**—The Tower Bridge at London (Le Pont de la Tour, à Londres). A very good account of the Tower Bridge over the Thames, discussed from a French point of view. With plate of details of the bascules and hydraulic machinery for operating them. 3500 w. 1 plate. Génie Civil—Sept. 25, 1897.

**Long Island.**—See **East River.**

**Long-Span.**—Long-Span Bridges. William H. Burr. An illustrated discussion of the design of such bridges. Also brief general discussion. 6500 w. Pro of Engs' Club of Phila—Dec., 1899.

**Loschwitz, Saxony.**—The Rigid Suspension Bridge at Loschwitz, Saxony. Robert Grimshaw. Bridge over the Elbe, just above Dresden, is described and illustrated. The principal innovations introduced are named and described. 3300 w. Sci Am—Sept. 26, 1896.

**Low Level, Queensland.**—Low Level Bridges in Queensland. A. B. Brady. Abstract of paper read before the Inst. of Civ. Eng. Illustrated description, with statement of conditions that led to the use of these bridges. 2200 w. Eng News—July 16, 1896.

**Lübeck.**—See **BRIDGE MACHINERY—Hydraulic.**

**Maintenance.**—Care of Bridges. Extracts from the committee report on this topic to the Assn. of Supts. of Bridges and Buildings. 900 w. R R Gaz—Oct. 28, 1898.

**Mans, France.**—The X Bridge at Mans (Le Pont en X au Mans). A description of this peculiar double intersecting bridge, giving an excellent discussion of the principles of reinforced concrete construction, of which it is an excellent example. 10000 w. 1 plate. Rev Tech—Feb. 10, 1899.

The X Bridge at Mans. F. E. R. From "La Revue Technique." Describes a bridge of originality of construction and pleasing appearance. Ill. 2800 w. Ind Engng—March 25, 1899.

**Marseilles, France.**—Swing Bridges in the Port of Marseilles. A summary of an essay of an Italian government engineer, E. C. Cagli, which is a valuable investigation on the more important of the numerous swing bridges that have been constructed in the port of Marseilles for the accommodation of the road and railway traffic in and about the docks of that city. 1200 w. Engng—May 29, 1896.

**Masonry.**—See **ARCH—Hinged; Masonry; Stone.**

**Maumee River.**—The Maumee River Drawbridge. Illustrated description of a bridge having a center pivot of unusual design and special end lifting devices. 1000 w. Eng Rec—Sept. 8, 1900.

**Mediæval.**—Some Curious Bridges. An interesting article describing some mediaeval bridges of note and of historical interest. 2800 w. Ill Car & Build—May 15, 1896.

**Miampimi, Mexico.**—A 1030-Foot Suspension Bridge Span. Illustrated description of a bridge for transporting ore at Miampimi, Mexico. 600 w. Eng Rec—Oct. 20, 1900.

**Military.**—Military Bridges. Illustrated extracts from U. S. War Dept. manuals. 2000 w. Eng Rec—July 16, 1898.

Military Bridge Over the Oder River (Kriegsbrückenschlag über die Oder). A short, well illustrated description of a trestlework wooden bridge, 632 meters long, built in 20 days by 50 officers and 1500 men. 1 plate. 200 w. Wiener Bauind Zeit—May 24, 1900.

See also **Floating; Pontoon.**

**Milwaukee.**—Rebuilding of the Kinnickinnic River Swing Bridge on the Chicago & Northwestern Railway, at Milwaukee, Wis. Francis H. Bainbridge. Illustrated detailed description of the work, with discussion. 6000 w. Jour W Soc of Engs—April, 1900.

See also **Lift.**

**Minneapolis Arch.**—The Minneapolis Arch Bridge. General elevation, and sections, details of viaduct, approach spans, arch trusses and tower. 700 w. Eng Rec—Dec. 7, 1895.

See also **BRIDGE ERECTION.**

**Minnesota River.**—Bridge Over Minnesota River—Minneapolis and St. Louis Railroad. General view and principal details of a three-span Pratt combination bridge. 400 w. Ry Rev—Aug. 15, 1896.

**Mirabeau, Paris.**—New Cantilever Bridge at Paris. Description of the Pont de Mirabeau, which was opened for traffic on April 20, 1896. It is composed of a river span of 100 m. and two half-spans of 36 m. each. 900 w. Engr, Lond—May 15, 1896.

The New Bridge Over the Seine. A somewhat minute description of the Mirabeau Bridge. It possesses many features of originality in its details. Serial. Engng—June 12, 1896.

**Montreal.**—Reconstruction of the Victoria Tubular Bridge. An account of the work of rebuilding the tubular bridge at Montreal, giving facts of interest relating to the old bridge and some idea of the cost. Ill. 1200 w. Ry & Engng Rev—Oct. 1, 1898.

The Victoria Bridge, Montreal. Illustrated description of the old and new bridges. Part first is on the conditions governing the work and the construction of the piers. Serial. Eng Rec—Oct. 22, 1898.

The Victoria Jubilee Bridge. A brief but clear account of the method of replacing the tubular bridge by a new double-track truss bridge without suspending traffic. 1300 w. Ill. Can Engr—Sept., 1898.

The Victoria Jubilee Bridge at Montreal; Grand Trunk Railway. Illustrated description of the tubular bridge across the St. Lawrence at Montreal, and also of the truss bridge that is to replace it. 3000 w. Eng News—Aug. 26, 1897.

The New St. Lawrence Bridge at Montreal. An account of a bridge to be built for railway, street railway and highway traffic, by the Montreal Bridge Co. 800 w. Eng News—Sept. 24, 1896.

The St. Lawrence Bridge Competition. Plans, with brief description, submitted by engineers from the United States, Canada, England and Belgium. Special features are given, with aggregate weights and cost. 4200 w. Eng News—Jan. 7, 1897.

**Moselle River.**—The Bridge Over the Moselle Between Trarbach and Traben (Die Moselbrücke bei Trarbach-Traben). A very completely illustrated account of the new highway bridge over the Moselle. Five braced bowstring trusses of 54 to 64 metres span. Two articles. 3500 w. Glaser's Annalen—Sept. 1, 15, 1900.

**Movable.**—Movable Bridges in European and American Cities. A report by George W. Rafter to the N. Y. state engineer on lift bridges, with a view to their application to the Erie Canal and city of Rochester. The article is well illustrated and is a valuable contribution. 1800 w. Pav & Mun Eng—Feb., 1896.

Opening Bridges. George Wilson. A classification after Rankine of the different ways in which a movable bridge is capable of motion, and a historical account of drawbridges are given in the first part. Also a table of the drawbridges in the United Kingdom, with dates of their erection, rivers, etc., crossed, dimensions, how carried, and methods of moving them is appended. 2200 w. Prac Eng—May 1, 1896.

The Design of Movable Bridges. Editorial discussion of interesting questions in connection with this subject. 2500 w. Eng News—Nov. 5, 1896.

See also **Aesthetic; Drawbridge; Lift.**

**Müngsten, Germany.**—Double-Track Steel-Arch Railway Bridge, Müngsten, Germany. Abstract of article by A. Rieppel, in "Zeitschrift des Vereines Deutscher Ingenieure." Information relating to the design and erection of the bridge, with illustrations of the principal features. 1400 w. Eng News—Sept. 1, 1898.

The Kaiser Wilhelm Bridge. Illustrated description of the design and method of erection. Span, 525 ft.; total height, 350 ft. 4000 w. Eng Rec—June 10, 1899.

The Müngsten High-Level Arch Bridge. Illustrated description of interesting features. The floor of the bridge is about 354 ft. above the surface of the river Wupper, which flows beneath. 1300 w. Sci Am—Sept. 9, 1899.

The Müngsten Viaduct (Die Thalbrücke bei Müngsten). A fully illustrated account of this fine viaduct at Müngsten, near Düsseldorf; the great arch is 525 feet span, and the total length 1640 feet. Three articles. Four plates. 12000 w. Zeitschr d Ver Deutscher Ing—Nov. 20, Dec. 4, 11, 1897.

The Müngsten Viaduct (Le Viaduc de Müngsten). An illustrated account of this great steel arch, with views of the structure both in course of erection and when completed. 4000 w. 1 plate. Génie Civil—July 2, 1898.

The Viaduct of Müngsten. From "Le Génie Civil." Describes and illustrates an arched railway bridge, recently erected in Germany, having a span of 560 ft. 2500 w. Engr, Lond—Jan. 20, 1899.

See also **German.**

**Murray River, Australia.**—Lifting Bridge Over the Murray River at Swan Hill. This river is the natural boundary between New South Wales and Victoria, and bridges over it are erected at the joint expense of the two colonies. Illustrated detailed description. 1000 w. Engr, Lond—Nov. 19, 1897.

**Newark, N. J.**—The Fourth-Street Bridge, Newark. Illustrated description of a heavy solid-floor steel highway drawbridge and approaches to be constructed across the Passaic River. 2000 w. Eng Rec—May 1, 1897.

See also **BRIDGE ERECTION; BRIDGE MACHINERY—Electric.**

**Newburyport, Mass.**—An Old Chain Suspension

Bridge. Malverd A. Howe. Data relating to the old chain bridge crossing the Merrimac River near Newburyport, Mass. Ill. 700 w. R R Gaz—Jan. 5, 1900.

See also **BRIDGE CONSTRUCTION.**

**New Orleans.**—The Proposed Mississippi River Bridge at New Orleans. Brief description of design, the special features of which are a span of 1000 ft. and the character of the foundation material. 700 w. Eng News—April 1, 1897.

See also **RAILWAY TERMINAL.**

**New South Wales.**—Public Works in New South Wales. Brief illustrated description of a suspension bridge across Kangaroo Valley. 500 w. Arch, Lond—Aug. 19, 1898.

**Newtown Creek.**—The Newtown Creek Bridge Competition. Facts in connection with this much discussed piece of engineering work, with illustrated description of designs submitted. 5500 w. Eng News—Nov. 5, 1896.

See also **Greenpoint Avenue, Brooklyn; Lift.**

**New York.**—See also **East River; Harlem River; Hudson River.**

**Niagara.**—Bridges Across the Niagara. Brief account with illustrations. 500 w. St Ry Rev—Oct. 15, 1897.

The Bridges of Niagara Gorge. Description, with illustrations of picturesque bridges which span the gorge, connecting the American and Canadian shores. 2200 w. Ill Car & Build—July 21, 1899.

See also **Budapest; BRIDGE CONSTRUCTION.**

**Niagara Arch.**—The Arch Bridge over the Niagara Rapids (Die Bogenbrücke über die Niagara-Stromschnellen). G. Barkhausen. Illustrated description of the new Niagara railway arch based upon the paper of the engineer, Mr. R. S. Buck. 6000 w. Zeitschr d Ver Deutscher Ing—Oct. 1, 1897.

The New Metal Arch Bridge at Niagara (Le Nouveau Pont Metallique en Arc sur le Niagara). Raymond Godfernaux. A very excellent description of the new railway arch across the Niagara gorge, with comparisons with numerous arches on the continent, and especial reference to the Viaur Viaduct. 3500 w. 1 plate. Génie Civil—Sept. 24, 1898.

The New Railroad Bridge at Niagara. Short description of steel arch to replace the old suspension railroad bridge. Contains brief general specification of material, erection and loading. 2000 w. R R Gaz—April 24, 1896.

A New Steel Arch Bridge Over the Niagara Gorge. Orrin E. Dunlap. Bridge over the Niagara, replacing a suspension bridge. It will be the longest span steel arch bridge ever built. Ill. 1600 w. Eng News—Jan. 2, 1896.

The New Steel Arch Over the Niagara Gorge. Orrin E. Dunlap. Brief history of the present railway supension bridge, followed by description of the new steel arch which is to take its place. 1700 w. Eng News—Aug. 6, 1896.

The Niagara Arch. From data and prints furnished by Fred. W. Cohen. Treats of the novel points and method of erection. Ill. 3000 w. Stevens Ind—Jan., 1898.

The Niagara Railway Arch. R. S. Buck. Gives a historical review of former bridges on the site, and description of the present bridge with fine illustrations. 6300 w. Pro of Am Soc of Civ Engs—April, 1898.

The Niagara Arch Bridge Swung. Describes also the predecessors of this arch. 700 w. Eng Rec—April 23, 1898.

New Steel Arch Bridge for Trolley Line Across the Niagara Gorge. Orrin E. Dunlap. Describes bridge in course of construction which will afford the first trolley car connection between the Dominion of Canada and the United States. 700 w. W Elec—April 3, 1897.

The 840-ft. Steel Arch Bridge at Niagara. A description with detailed drawings of the abutments for a bridge to be built over the Niagara gorge, after the designs of Mr. L. L. Buck, with a general account and foundation details, and an ideal view. 2000 w. R R Gaz—Feb. 28, 1896.

The New Bridge Over the Niagara River. General facts relating to the Atbara bridge so rapidly constructed, with detailed description of the Niagara bridge recently completed by the same company—the Pencoyd Iron Works, of Philadelphia. Ill. Serial. Engng—April 28, 1899.

The New Highway Bridge Over the Niagara River (Die Neue Strassenbrücke über den Niagara-Fluss). F. C. Kuns. A very fully illustrated account of the construction of the great Clifton arch of 840 feet span, over the Niagara river. Two articles. 1 plate. 10000 w. Zeitschr d Oesterr Ing au Arch Ver—July 28, Aug. 4, 1899.

See also **BRIDGE TEST.**

**Niagara Cantilever.**—Reinforcing the Niagara Cantilever. Illustrates and describes the method of reinforcing the Michigan Central Railroad's cantilever by means of a new third truss and strengthening the old trusses to have the same deflection as the new one. Part I. describes the old bridge and the method of reconstructing the towers. Serial. Eng Rec—Oct. 13, 1900.

Strengthening the Cantilever Bridge at Niagara. Brief illustrated description of very difficult work. 1200 w. Sci Am—Oct. 20, 1900.

**Niagara Suspension.**—A New Suspension Bridge at Niagara. Illustrates work and describes a new bridge in process of erection from near Lewiston, N. Y., to a point on the Canadian side, just above the village of Queenston, Ont. 1100 w. Ry Age—Dec. 30, 1898.

The Lewiston and Queenston Suspension Bridge. Illustrated description of a supension bridge of 1040 feet span, supported by the cables of an old demolished bridge, pieced out with eye-bars and stiffened by a truss of unusual design. 5000 w. Eng Rec—Aug. 26, 1899.

The Old and New Suspension Bridges Over the Niagara River at Lewiston, N. Y. Interesting accounts of these bridges, with illustrations. 2000 w. Eng News—Jan. 12, 1899.

**Nogent-sur-Marne.**—Highway Bridge at Nogent-sur-Marne (Pont Route de Nogent-sur-Marne). A Dumas. Illustrated description of a handsome cast-iron arch bridge across the Marne, with details of the piers and abutments. 2500 w. 1 plate. Génie Civil—Dec. 9, 1899.

**Northern Pacific Ry.**—Standard Plans for 130-ft. Through Truss Bridges; Northern Pacific Ry. Full-page plate with description of one of the bridges adopted by this road to replace the old wooden bridges. 450 w. Eng News—Feb. 2, 1899.

See **Plate-Lattice Girder.**

**Northfield, Mass.**—See **BRIDGE ERECTION.**

**North Wales & Liverpool Ry.**—See **RAILWAY.**

**Northwich, Eng.**—Pontoon Swing Bridges Over the River Weaver, at Northwich, England. John A. Saner. Abstract of a paper read before the Institution of Civil Engineers, describing a swing span supported upon a circular steel pontoon, with various interesting details. 1 plate. 5000 w. Eng News—Sept. 20, 1900.

Swing-Bridges Over the River Weaver, at Northwich. John Arthur Saner. Read at meeting of Inst. of Civ. Engs., London. Brief description of the two bridges and the motive power used. 1100 w. Builder—Feb. 3, 1900.

**Nova Scotia, Mira River.**—The Mira River Bridge, Nova Scotia. M. Murphy. Brief account of bridge remarkable for the cheapness with which it was constructed. 400 w. Eng News—Dec. 31, 1896.

**Oberschönweide.**—See **Spree River, Germany.**

**Oconomowoc, Wis.**—A Concrete and Iron Bridge at Oconomowoc, Wis. Illustrates and describes a small, but interesting, arch bridge of this type. 700 w. Eng News—Oct. 19, 1899.

**Opening.**—See **Movable.**

**Ottawa, Can.**—The Inter-Provincial Bridge, Ottawa, Canada. Illustrated description of the methods of putting down the foundations of piers in 20 to 60 feet of water-logged saw-dust and timber; with general details of the cantilever superstructure. 2200 w. Eng Rec—March 10, 1900.

**Ottawa, Ill.**—See **Plate-Girder Draw.**

**Otterthal.**—The Iron Bridge Over the Otterthal (Die Eiserne Thalbrücke über das Otterthal). Ernst Biedermann, of Berlin, gives detailed description of this bridge, which is built on the American type of scaffolding bridges, a method especially applicable in this particular instance. 4900 w. Zeitschrift für Bauwesen. No. X-XII.

**Painting.**—See **PAINTING—Metal Bridges.**

**Papaghni, Madras Railway.**—The New Papaghni Bridge on the Madras Railway. Harry James

Thompson. Paper read before the Inst. of Civ. Engs. The piers consist of two 12-ft. cast-iron cylinders, sunk through 60 feet of sand, clay, silt and boulders to rock bottom, and filled with concrete and masonry. The principal cost items are included. 1600 w. Ind & East Eng—Feb. 1, 1896.

**Paris.**—A Novel French Highway Bridge. From "Le Génie Civil." General elevation and several details of a highway bridge of French design located in Paris. It carries an important street over the Orleans Ry. 450 w. Eng News—Dec. 10, 1896.

New Railway Bridges in Paris. Illustrated description. 1800 w. Engr, Lond—Jan. 5, 1900.

See also **Alexander III.; Mirabeau; Tolbiac; BRIDGE ERECTION—Launching.**

**Paris Exposition.**—A Cantilever-Arch Bridge at the Paris Exposition. Illustrated description of a foot-bridge over the Seine, erected as a cantilever, but acting as an arch when completed, with the roadway as a horizontal tie between the ends. 1200 w. Eng Rec—July 14, 1900.

Foot-Bridge Over the Seine Between the Pont de l'Alma and the Pont de Jena (Passerelle sur la Seine entre le Pont de l'Alma et le Pont d'Jena). Ch. Dantin. A well illustrated description of this steel bridge, of which the main span is a parabolic arch, and its construction and design. 4500 w. 1 plate. Génie Civil—May 26, 1900.

Foot-Bridges which Connect Different Parts of the Exposition at Paris (Exposition de 1900. Passerelles Réunissant entre elles les Différentes Partie de l'Exposition). An illustrated general description of iron and wooden bridges across the Seine and roadways. 1400 w. Génie Civil—July 17, 1900.

Iron Concrete Foot-Bridge at the Paris Exposition (Passerelle en Béton Armé Reliant le Pavilion de Madagascar au Trocadéro). Ch. Dantin. A short illustrated description of this bridge, constructed on the Hennebique system. 400 w. Génie Civil—May 12, 1900.

Steel Arch Foot-Bridge Over the Seine at Paris. Illustrated description. 500 w. Eng News—Aug. 30, 1900.

**Park.**—Park Bridges. Oscar Sanne. Illustrated description of designs erected in the Milwaukee Lake Park, the aim being to fulfill the engineering requirements and also make the structure of high artistic value. Discussion. 4000 w. Jour of W Soc of Engs—Aug., 1898.

**Park.**—See also **Fairmount Park; ARCH—Concrete Reinforced.**

**Park, Cleveland, O.**—Cleveland Park Bridges. Illustrates and describes the new bridges which were designed with a special view to aesthetics. 1200 w. Eng Rec—Feb. 26, 1898.

**Park, New York.**—A Park Bridge. Illustrated description of a masonry arch in Central Park, New York, built under supervision of architects and an engineer. 400 w. Eng Rec—Jan. 21, 1899.

**Passaic River.**—The Passaic River Drawbridge. Illustrated description of the reconstruction and enlargement of the turntable of a plate-girder swing span. 700 w. Eng Rec—June 30, 1900.

**Paterson, N. J.**—Three-Span Melan Arch Bridge Across the Passaic River, Paterson, N. J. Brief illustrated description. 600 w. Eng News—March 16, 1899.

**Pennsylvania Railroad.**—Bridge 69, New York Division, Pennsylvania Railroad. Illustrated description of a double-track deck structure of 235 feet span, built for heavy express traffic. Gives details of connections and supports. 1000 w. Eng Rec—March 4, 1899.

**Pennsylvania Western.**—See **BRIDGE CONSTRUCTION.**

**Philadelphia.**—The New Bridge Over Frankford Creek, Philadelphia. Inset. An electrically operated bridge illustrated by detailed drawings. 1500 w. R R Gaz—Feb. 7, 1896.

**Philadelphia, Eighteenth Street.**—The Eighteenth Street Bridge, Philadelphia. Illustrated description of the details of a heavy plate-girder bridge over a railway subway. 1000 w. Eng Rec—Oct. 14, 1899.

**Pin vs. Rivet.**—American and English Bridges. Editorial discussion of why the pin system is used in America and the rivet connections in England. 1600 w. Engr, Lond—Aug. 13, 1897.

**Pittsburg.**—The Bellefield Arch Bridge in Schenley Park, Pittsburg, Pa. Illustrated description of the construction of a handsome stone arch of 150 ft. span. 2000 w. Eng News—June 22, 1899.

The Bellefield Stone Arch Bridge, Pittsburg. Illustrated description of a masonry arch bridge of 150 ft. span and 85½ ft. width. 1300 w. Eng Rec—June 9, 1900.

The Forbes Street Bridge, Pittsburg, Pa. Illustrated description of an old and a new arch bridge of about 150 ft. span, showing the development of structural work of this type in the last 25 years. 2500 w. Eng Rec—July 15, 1899.

The Panther Hollow Bridge, Pittsburg, Pa. An illustrated description of the design, construction, and erection of a 3-hinged arch of 360-ft. span. 1300 w. Eng Rec—June 4, 1898.

See also **BRIDGE DESIGN.**

**Pittsburg, Bessemer & Lake Erie and Union Rys.**—The Bridge Work of the Pittsburg, Bessemer & Lake Erie and Union Railways. Illustrated descriptions of details and features of novelty. 4300 w. Eng News—Aug. 16, 1900.

**Plate Girder.**—See **GIRDER.**

**Plate Girder Draw.**—Construction of 175 ft. Counter Balanced Plate Girder Swing Bridge. W. A. Rogers. Illustrated description of the construction. 3800 w. Jour W Soc of Engs—Dec., 1899.

Design of a 175-ft. Counter Balanced Plate Girder Swing Bridge. Albert Reichmann. Illustrates and describes the novel features of probably the largest plate girder counter-balanced swing bridge ever built—on the C., M. & St. P. Ry. at Chicago. Operated by a 25 horse-power electric crane motor. 2000 w. Jour W Soc of Engs—Dec., 1899.

New Form of Plate Girder Swing Bridge, C., M. & St. P. Ry. Illustrated description of a bridge of somewhat novel design, made to take the place of a wooden span 161 ft. long, swinging upon a center pier. The conditions were unusual, owing to a proposed improvement of the river channel. 1000 w. Ry & Engng Rev—Oct. 28, 1899.

Plate Girder Swing Bridge at Ottawa, Ill. Illustrated description of a bridge on the C., B. & Q. Railroad, crossing the Illinois and Michigan Canal, the special features of construction necessary to adapt it to its low position being of interest. 700 w. Ry Rev—Oct. 16, 1897.

**Plate-Lattice Girder.**—Plate-Lattice Girder Bridge Over Little Missouri River, Northern Pacific Railway. Illustrates standard designs prepared by Mr. K. E. Hilgard, for 100-ft. deck plate girders and 85-ft. through plate-lattice girders, with details. Also describes the most recently built bridge of this type. 1300 w. Eng News—July 15, 1897.

Standard Plans for 100-ft. Through Plate-Lattice Girder Bridges; Northern Pacific Ry. Considerations that led to the adoption of this type, and the advantages in its favor. Illustrated description. 1000 w. Eng News—July 8, 1897.

**Pony-Truss.**—Standard Plans for 120-ft. Pony-Truss Bridges, Northern Pacific Ry. Illustrates and describes the novel features of the pony trusses used. 900 w. Eng News—Jan. 5, 1899.

**Pontoon.**—Old Methods of Crossing Rivers by Pontoons. Gives illustrated description of boats and methods used. 900 w. Sci Am Sup—Oct. 22, 1898.

**Pontoon Swing.**—See **Northwich, Eng.**

**Quebec.**—Proposed Bridge Across the St. Lawrence River at Quebec. Information of site and plans for the construction of a railway bridge, with estimate of cost, general dimensions, and other particulars. 1200 w. Eng News—Oct. 14, 1897.

**Queensland.**—Burdekin River Bridge—Queensland Government Railways. H. C. Stanley. Illustrates and describes a high-level bridge in Australia. 900 w. Ry & Engng Rev—March 19, 1898.

See also **Low Level.**

**Queensferry, Wales.**—The Victoria Bridge Over the Dee at Queensferry. Thomas Walter Barber. Read before the Inst. of Civ. Engs., England. Describes a telescopic or rolling girder bridge. 2000 w. Ir & St Trds Jour—Dec. 30, 1899.

The Victoria Bridge Over the River Dee. Detailed illustrations and views of this bridge at Queensferry, with description. 1700 w. Engng—June 11, 1897.

**Rails.**—Use of Old Rails in Overhead Bridges, N. S. W. Govt. Rys. Detailed drawings and description of these bridges, showing the practicability of utilizing old rails for this purpose. 1000 w. Ry & Engng Rev—July 7, 1900.

Standard Highway Bridge of Steel Rails, Baltimore & Ohio R. R. The cost of these bridges is less than for wooden structures. They are otherwise perfectly satisfactory. Drawings of side and end elevation are given. 800 w. Eng News—Nov. 28, 1895.

**Railway.**—A Modern Railway Span. Drawings and description of a typical span, with comment on the gradual assimilation of English and American types. 1200 w. Ry Rev—Sept. 12, 1896.

See also **RAILWAY BRIDGE; RAILWAY BUILDINGS—Bridges and Buildings.**

**Railway Branch Lines.**—Railway Bridges for Branch Lines. M. A. Pollard-Urquhart. Read at meeting of Soc. of Engs., London. Deals with public road bridges over the railway, public road bridges under the railway, bridges for occupation roads, and bridges over water courses. 2500 w. Arch, Lond—June 5, 1896.

**Rance River, France.**—Proposed Bridge Across the Rance, France. Information concerning this bridge, stating the conditions to be satisfied. 1000 w. U. S. Cons Repts, No. 568—Nov. 1, 1899.

**Redheugh.**—The Redheugh Bridge. Illustrated description of the characteristics of a bridge soon to be rebuilt. The remarkable feature is that the upper and lower members of the girders are respectively gas and water mains. 2200 w. Engr, Lond—July 9, 1897.

**Religious Edifice.**—The Bridge as a Religious Edifice. Extracts from records of the fourteenth to sixteenth centuries concerning a bridge in Barnstaple, England. 1200 w. Eng Rec—Sept. 16, 1899.

**Rhine.**—Arched Bridges Over the Rhine. Illustrated accounts of two remarkable bridges. Part first describes the Bonn Bridge. Serial. Engng—Feb. 9, 1900.

The Bridges Across the Rhine, Near Bonn and Düsseldorf, Germany. Frits Mueller von der Werra. Illustrates and describes the important features of two imposing structures opened to traffic in 1898. 4300 w. Eng News—April 20, 1899.

The New Bridge Over the Rhine (Les Nouveaux Ponts sur le Rhin). H. Martin. A very fully illustrated account of the new bridges across the Rhine at Bonn and at Düsseldorf. Two articles. 1 plate. 5000 w. Génie Civil—May 20, 27, 1899.

The New Rhine Bridges at Bonn and Düsseldorf (Die Neuen Rheinbrücken zu Bonn and Düsseldorf). A comparative study of these latest bridges across the Rhine, with numerous details of the construction. 7500 w. 1 plate. Zeitschr d Ver Deutscher Ing—March 25, 1899.

Recent Bridge Competitions (Neue Brückenwettbewerbe). R. Krohn. A discussion by the engineer of the Gutehoffnungshütte, of recent designs for steel arch bridges of spans of 400 to 640 feet, including the bridges for Bonn, Bern, and Düsseldorf. 6000 w. Zeitschr d Ver Deutscher Ing—Feb. 13, 1897.

See also **Bonn; Düsseldorf.**

**Richmond, Ind.**—Bridges Over the Whitewater River at Richmond, Ind. Illustrates and describes a number of interesting structures. 600 w. Eng News—June 22, 1899.

The Old National Bridge. Describes the bridge over the White-Water River, at Richmond, Indiana, which is soon to be replaced by a modern construction. Ill. 900 w. Pro of Purdue Soc of Civ Engs—1897.

**Riesa, Elbe River.**—Counterweighted Arch Bridge at Riesa. Illustrated description of bridge over the River Elbe having peculiarities in design and construction. 1000 w. R R Gaz—July 24, 1896.

**Rochester, Pa.**—The Suspension Bridge Over the Ohio River at Rochester, Pa. E. K. Morse. Illustrated description of a bridge with a channel span of 800 ft., with some opinions of the writer on the construction of suspension bridges. 3000 w. Eng News—April 1, 1897.

**Rocker Expansion Bearing.**—See **BRIDGE BEARING.**

**Rock Island.**—Double Deck Highway and Railway Bridge, Rock Island, Ill. Illustrated description of one of the most important bridge structures constructed in the United States during the past year. 5000 w. Eng News—Dec. 17, 1896.

The Davenport and Rock Island Bridge Over the Mississippi River. Illustrates and describes the general details of the latest bridge to be constructed across the Mississippi River, giving also its history. 3800 w. Eng News—Jan. 11, 1900.

The New United States Rock Island Bridge. Illustrates particularly the details of swing span. 2600 w. Eng Rec—April 2, 1898.

The United States Rock Island Bridge. Part first gives history and description, general data, requirements, manufacture and erection. Ill. Serial. Eng Rec—Jan. 30, 1897.

See also **BRIDGE ERECTION; BRIDGE MACHINERY.**

**Rockville, Pa.**—The 3820-ft. Stone Arch Bridge for the Pennsylvania R. R. at Rockville, Pa. Illustrated description of the general details of the longest stone arch railway bridge in the world. 700 w. Eng News—May 10, 1900.

**Rolling.**—See **Cherbourg.**

**Roman.**—The Bridges Over the Tiber in Ancient Rome. From "La Nature." Description and views, given for the purpose of showing the characteristic differences from present types. 1400 w. Sci Am Sup—Feb. 18, 1899.

**Rutherford, N. J.**—See **Lift.**

**St. Lawrence.**—Bridges over the St. Lawrence for the New York and Ottawa. Brief illustrated description of two bridges being constructed from Cornwall, Ont., to a point near Hogansburg, N. Y. The channel is divided by an island which is also crossed on an embankment about three-quarters of a mile long. 700 w. R R Gaz—Oct. 1, 1897.

See also **Montreal; Quebec.**

**Saint-Vallier, France.**—Acceptance Tests of the Suspension Bridge at Saint-Vallier (Les Epreuves de Réception du Pont Suspender de Saint Vallier). Report showing deflections for various positions of concentrated moving loads. The bridge is double-span, with tower in center. 7500 w. 4 plates. Ann des Ponts et Chaussées—1 Trimestre, 1898.

**Sarajevo, Bosnia.**—The Kaiser Bridge at Sarajevo. (Die Kaiserbrücke in Sarajevo). Josef Schuster. Description and photograph of a combined steel and concrete arch of 83 feet span over the Miljacka river, at Sarajevo, Bosnia. 2000 w Zeitschr d Oesterr Ing u Arch Ver—Sept. 9, 1898.

**Senegal.**—The New "Faidherbe" Bridge at Saint-Louis (Le Nouveau Pont Faidherbe à Saint-Louis). A fully illustrated account of the new truss bridge across the Senegal, replacing the pontoon bridge connecting the island of the city of Saint-Louis with the mainland of Africa. 3500 w. 1 plate. Génie Civil—Oct. 23, 1897.

**Short Span.**—See **RAILWAY BRIDGE.**

**Skew.**—Track Elevation, N. Y., N. H. & H. R. R. in Boston. Data, drawings, diagrams, and general specifications of four-track skew bridge. 1200 w. Ry Rev—April 11, 1896.

**Skunk River, Iowa.**—New Skunk River Bridge, C. B. & Q. Ry. Illustrated description of a double-track deck structure composed of three main spans of 146-ft. length, of the Pratt type, the trusses being 36 ft. 6 in. deep, bringing the track about 68 ft. above low water. 900 w. Ry & Engng Rev—June 9, 1900.

**Snake River, Idaho-Washington.**—Cantilever Bridge at Lewiston, Idaho. Illustrates and describes a recently completed bridge of considerable interest from an engineering standpoint. 1100 w. Ry & Eng Rev—July 8, 1899.

The Snake River Bridge. Illustrated description of a cantilever highway bridge having rocker bents under the cantilevers and inclined anchor arms. 2500 w. Eng Rec—Nov. 18, 1899.

**Snodland, Eng.**—The Snodland Bridge Over the River Medway. Illustrations and brief description of a bridge of unique design, with arched steel tubes. 400 w. Engr, Lond—Oct. 9, 1896.

**South Africa.**—An American Bridge for South Africa. Illustrates a bridge recently shipped by an American firm, for the Orange Free State railways. 400 w. R R Gaz—July 29, 1898.

**South Rocky River.**—The South Rocky River Bridge. Illustrated description of a high level viaduct built near Cleveland, O., which shows quite a departure from the usual style. Special pains were taken to secure an improvement from an architectural standpoint. 1500 w. Eng Rec—June 13, 1896.

**Spree River, Germany.**—A Handsome Viaduct Over the Spree. Brief illustrated description of a very ornamental German viaduct. 400 w. Ry Age—June 1, 1900.

Steel Footbridge Over the River Spree, Near Berlin, Germany. Illustrated description of the interesting features of an unusual design. 600 w. Eng News—June 14, 1900.

The Kaisersteg Bridge. H. Müller-Breslau, in "Zeitschrift für Bauwesen." Illustrated description of a 573-ft. cantilever bridge with center hinge and a stiffening arch, in which the curves of the chords were determined by a unique method, described in detail. 800 w. Eng Rec—Feb. 17, 1900.

The Metal Footbridge at Oberschönweide (La Passerelle Métallique d'Oberschönweide). An illustrated description of the new bridge over the Spree at Oberschönweide near Berlin. 1800 w. 1 plate. Génie Civil—March 3, 1900.

**Spuyten Duyvil, New York.**—The Spuyten Duyvil Swing Bridge; New York Central & Hudson River R. R. Illustrated detailed description. 1100 w. Eng News—June 14, 1900.

**Steyr, Austria.**—The New Bridge at Steyr (Die Neue Schwimmschulbrücke in Steyr). Describing a recently constructed bridge of 138 feet span, on the Melan principle of iron beams imbedded in concrete. The arch is hinged at the crown and springings. 3500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Dec. 23, 1898.

**Stone.**—Building a Small Stone Highway Bridge. Bridge designed by J. F. Fisher, of Chicago. Data of design and construction, with elevation. 1300 w. Eng Rec—Oct. 24, 1896.

Stone Masonry Bridges. Extracts from a paper by Mr. Owen Morris. Brief notes both historical and descriptive. 1400 w. Stone—July, 1899.

The Historical Development of Stone Bridges. George F. Swain. Lecture delivered before the Assn. of Engng. Soc. Traces the history from the earliest times and the progress by different nations. Ill. 5700 w. Stone—Feb., 1897.

See also **Rockville, Pa.**; **ARCH—Stone.**

**Street Railway.**—Some Street Railway Bridges. Illustrations and descriptions of some designs for street railway traffic. 1500 w. St Ry Rev—July 15, 1897.

**Surprise Creek, Canada.**—The Surprise Creek Arch. Illustrated description of the design and erection of a 290-ft. pin-connected arch bridge on the Canadian Pacific railway. 1000 w. Eng Rec—July 16, 1898.

**Suspension.**—Modern Suspension Bridges (Hängebrücke der Neuzeit). A paper by Prof. Mehrtens, with numerous illustrations, and a discussion of the possibilities of the method with modern materials and construction. 10000 w. Stahl und Eisen—June 15, 1897.

Old and New Forms of the Suspension Bridge. Gustav Lindenthal. A well-illustrated history of the suspension bridge with description of the most notable examples. The difficulties of construction and engineering problems solved in former bridges are discussed, and a full description of the proposed Hudson River bridge at New York is given. 4000 w. Eng Mag—Dec., 1898.

Suspension Bridges—A study. George S. Morison. The paper is submitted with a view to opening the way for improvement and to show that a great suspension bridge, which would be well adapted to railroad service, would involve no insurmountable difficulties of construction. A suspension bridge of unusual dimensions and capacity is illustrated and the design explained. 16500 w. Am Soc of Civ Engs—Sept., 1896.

See also **Argen, Bavaria**; **Brooklyn**; **Budapest**; **Cincinnati**; **East Liverpool, O.**; **East River**; **Hudson River**; **Miampimi, Mex.**; **Newburyport**; **New South Wales**; **Niagara**; **Rochester, Pa.**; **St. Vallier**; **Tegga River, India.**

**Suspension Chain.**—See **Budapest**; **Newburyport.**

**Suspension Highway.**—Some Light Highway Suspension Bridges. Illustrated description of two structures of a type now used considerably in sparsely peopled regions. 1100 w. Eng Rec—Feb. 3, 1900.

**Suspension Stiffened.**—New Type of a Rigid Suspension Bridge (Nouveau Type de Pont Suspendu Rigide). Com. Gisclard. A general description, with diagrams, of a suspension bridge stiffened by two trusses hinged at the center. 3500 w. Génie Civil—May 5, 1900.

Note on a New Type of a Rigid Suspension Bridge (Note sur un Nouveau Type de Pont Suspendu Rigide). M. Gisclard. A description, with diagrams, of a suspension bridge, stiffened by two trusses hinged at the center. Serial. Ann d Ponts et Chaussées—4th quarter, 1899.

Suspension Bridges. Comments on the probable revival of the suspension bridge with a stiffening truss, and discusses the bending moments in a two-hinged and three-hinged girder. Serial. Engng—Aug. 14, 1896.

The Stiffened Bridge. An editorial discussion of the field of usefulness of this type and of the methods of designing the stiffening truss. 1100 w. Eng Rec—Nov. 18, 1899.

Truss Work of Rigid Suspension Bridges (Garde Corps des Ponts Suspendus Rigides). M. Métour. A mathematical discussion of the stresses in the framed truss-work of a rigid supension bridge, with tables of bending and shearing moments. 5000 w. Ann d Ponts et Chaussées—1 Trimestre. 1898.

See also **Loschwitz, Saxony.**

**Sutton Bridge, Eng.**—Railway Swing Bridge Over the River Nene. Illustrated detailed description of a bridge recently opened for traffic at Sutton Bridge, on the Midland Great Northern Railway, England. 2000 w. Engr, Lond—July 23, 1897.

**Sweden.**—Swedish Railway Bridges Near the Arctic Circle. Illustrated description of bridges on a Swedish railway which is the most northerly in the world. 500 w. Eng News—June 3, 1897.

**Swingbridge.**—See **Drawbridge.**

**Sydney, N. S. W.**—Proposed Bridge at Sydney. A copy of terms and conditions for the construction of a bridge connecting Sydney with North Sydney. 1100 w. U. S. Cons Repts, No. 726—May 10, 1900.

See also **VIADUCT—Subaqueous.**

**Tallahatchie River, Miss.**—Drawbridge Over Tallahatchie River—Yazoo & Mississippi Valley R. R. Illustrated description of a pivot drawbridge. 1600 w. Ry Rev—Aug. 28, 1897.

**Tegga River, India.**—Proposed Suspension Bridge of 200 Feet Span Over the Tegga River, near Demagiri, South Lushai Hills. H. C. Banerji. Description with drawings. 1200 w. Ind Engng—Nov. 14, 1896.

**Temperanceville, Pa.**—The Temperanceville Bridge. Illustrated description of a three-truss, double-track deck bridge with interesting details. 1000 w. Eng Rec—March 4, 1899.

**Thomson Run, Pa.**—The Thomson Run Bridge. Brief description, with engravings, of a fine trestle bridge on the line of the Monongahela St. Ry. Co. 200 w. R R Gaz—Oct. 6, 1899.

**Tokay, Hungary.**—Cantilever Bridge Over the Theiss River at Tokaj, Hungary. Abstract translation of description by the designer, O. J. Marstrand, as published in the "Zeitschrift des Oesterr, Ingenieur und Architekten Vereines." Ill. 600 w. Eng News—May 26, 1898.

The New Bridge Over the Theiss at Tokay (Die neue Theissbrücke bei Tokaj). Illustrated description of a suspended truss bridge on the cantilever principle recently completed at Tokay, in Hungary. The central span is 350 feet, and two side spans of 170 feet. 4500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Oct. 29, 1897.

**Tolbiac, Paris.**—The Rue de Tolbiac Bridge, Paris A brief review of the novel and peculiar features, with interior perspective of one of the main spans. 900 w. Engr, Lond—Dec. 25, 1896.

The Tolbiac Bridge in Paris. Illustrated description of a bridge which has recently been constructed under special conditions, and presents many novel and interesting features in its design. 2700 w. Engng—Aug. 28, 1896.

**Topeka, Kan.**—Construction of the Topeka Melan Bridge. Illustrates design and construction of a concrete steel bridge with one span of 125 ft., two of 110 and two of 97.5. 2500 w. Eng Rec—April 16, 1898.

Melan Concrete and Steel Arch Bridge, Topeka, Kan. A five span concrete bridge, stiffened by longitudinal lattice arches, spaced 8 ft. apart. The method of construction is explained fully, and special attention is given to the examination of concrete. An inset plate illustrates the details. 2800 w. Eng News—April 2, 1896.

**Toronto.**—The New York Street Bridge, Toronto, Canada. Illustrated description of deck bridge. 300 w. Can Arch—Nov., 1897.

**Towy River.**—Concrete Bridge Over the Towy. Illustrates and describes a design offered by G. A. Lundie, but not accepted by the council, giving specification. 1000 w. Engr, Lond—July 22, 1898.

**Travancore, India.**—Steel Road Bridge, 150 Feet Clear Span. Illustration of the general design and some details of a steel road bridge lately supplied to the Travancore Government. 450 w. Ind Engng—Jan. 9, 1897.

**Trent Canal, Canada.**—Some Novelties in Swing Bridge Construction on the Trent Valley Canal. R. B. Woodworth. Illustrates and describes peculiarities of construction in two bridges crossing the Trent Valley Canal, Canada. 900 w. Eng News—June 30, 1898.

**Trestle.**—See **Austrian Trestle; British Columbia; Thomson Run, Pa.; BRIDGE CONSTRUCTION—Japan; TRESTLE; VIADUCT.**

**Troy, N. Y.**—The Spring Avenue Bridge, Troy, N. Y. Detailed illustrated description. 2000 w. Eng Rec—Nov. 30, 1895.

**Tugela River, Natal.**—The Frere and Tugela Bridges. Engravings giving an excellent idea of the wreckage of these bridges by the Boers, and information concerning the new bridges to replace them. 1000 w. Engng—Jan. 26, 1900.

The New Colenso and Frere Bridges. Illustrated descriptions of bridges over the Tugela River in South Africa, being made in England to replace those destroyed by the Boers. Also account of the rapid work. 800 w. Engr, Lond—Jan. 19, 1900.

**Tyne, Eng.**—Proposed Bridge Over the Tyne. Illustrates and describes a cantilever type with span of 500 ft. in length. 1000 w. Engr, Lond—Sept. 15, 1899.

**United States.**—See **RAILWAY—United States.**

**Vauxhall, London.**—The New Vauxhall Bridge. A letter, signed by men of prominence, protesting against the design of this structure and urging the coöperation of competent architects; also the answer of the chairman of the Bridges Committee, and editorial. 3000 w. Builder—March 11, 1899.

New Vauxhall Bridge. A short description of the structure now being demolished, and an illustrated description of the new concrete arch bridge. 1200 w. Builder—Jan. 7, 1899.

The Temporary Vauxhall Bridge. Photographic views, plan and elevation of central girders, with brief notes. 500 w. Engr, Lond—May 13, 1898.

**Verdun, France**—The Construction of a Road Bridge Over the Doubs at Verdun (La Construction d'un Pont Route sur le Doubs à Verdun). Detailed description of this handsome stone arch bridge, of three spans, 135 feet each. Diagrams of the masonry and the centerings are given, and photographs of the completed structure. 3000 w. 2 plates. Ann des Ponts et Chaussées—4 Trimestre, 1897.

**Versam.**—The Versam Bridge. S. Berg. Illustrated description of construction of a three hinged arch bridge crossing a wild gorge. 900 w. Engr, Lond—Aug. 27, 1897.

**Viaur, France.**—The Construction of the Viaur Viaduct (Construction du Viaduct du Viaur). MM. de Volontat and Théry. An account of the progress of the construction of the piers and scaffolding for this great railway arch over the Viaur valley, in the south of France. 2500 w. 1 plate. Ann des Ponts et Chaussées—1 Trimestre, 1898.

The Construction of the Viaur Viaduct (Construction du Viaduct du Viaur). M. Théry. A general description of the great steel arch over the Viaur valley, span 220 metres; with plates of the proposed and executed work. 8000 w. 4 plates. Ann des Ponts et Chaussées—1 Trimestre, 1899.

The 721-ft. Three-Hinged Steel Arch Railway Bridge Across the River Viaur, France. Illustrated detailed description of one of the most notable metal arch bridges of recent years. 4000 w. Eng News—Sept. 6, 1900.

**Vibrations.**—A Study of the Vibrations of Bridges (Etude des Mouvements Vibratoires dans les Ponts). E. Lebert. A mathematical analysis of the vibratory actions in single-span girder bridges and in suspension bridges in which the floor simply rests upon the piers. 15000 w. Ann des Ponts et Chaussées—3 Trimestre, 1899.

On the Vibrations Caused by Trains Passing Over Iron Bridges. C. A. W. Pownall and John Milne. A series of experiments, illustrated by sketches of apparatus used and the curves recorded, to determine the transverse, longitudinal and vertical amplitude of vibration of bridges under moving loads. 4500 w. Engng—Jan. 24, 1896.

**Victoria.**—See **Montreal; Queensferry.**

**Vienna.**—The Franzens Bridge at Vienna. Illustrated translation of article, by F. Pfeuffer, on an arch highway bridge, giving his views on the aesthetic considerations governing bridge design. 2600 w. Eng Rec—Aug. 18, 1900.

The New Franzens Bridge Over the Danube Canal in Vienna (Die Neue Franzensbrücke über den Donaucanal in Wien). Franz Pfeuffer. A very fully illustrated description of this ornamental highway bridge and its construction. 3 plates. 6000 w. Zeitschr d Oest Ing u Arch Ver—May 4, 1900.

The Iron Arch Over the Döblinger Hauptstrasse (Die Eiserne Bogenbrücke über die Döblinger Hauptstrasse). Carl Stöckl. Description and full analytical investigation of 110 ft. span wrought iron arch on the belt line of the Vienna elevated railway. Two articles, plates of details. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—June 25, July 2, 1897.

The Iron Girder Bridges of the Vienna City Railway (Die Eisernen Balkenbrücken der Wiener Stadtbahn). Sigmund Kulka. With details and photographic view of these fine girders of spans from 50 to 80 feet. 3500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—May 20, 1898.

**Washington Memorial.**—Concrete Steel Construction in the Proposed Memorial Bridge. Illustrated description of the design of a 192-ft. arch, with practically all the tensile stresses taken by steel members hidden by concrete and cut-stone masonry. 1000 w. Eng Rec—May 26, 1900.

The Memorial Bridge Across the Potomac. Illustrated description of the design submitted in the limited competition for a bridge of about 3500 ft. length, between Washington and Arlington, as a monument to American patriotism. The prize design employs concrete steel construction very largely. All designs were prepared by engineers and architects working together. Also an editorial on the importance of the competition. 11200 w. Eng Rec—April 21, 1900.

The Modified Design for the Memorial Bridge Over the Potomac River at Washington. An illustrated account of the modified design for the concrete steel arch bridge between Washington and Arlington to commemorate American patriotism. 600 w. Eng Rec—Oct. 13, 1900.

The Prize Designs for the Proposed Memorial Bridge Across the Potomac River at Washington, D. C. Reviews the report submitted by the board appointed to examine the designs. 1500 w. Eng News—June 21, 1900.

**Watertown, N. Y.**—Mill Street Bridge, Watertown, N. Y. Illustrates and describes a short-arch bridge of unique design erected by an unusual form of false work. 1800 w. Eng Rec—March 5, 1898.

**Wellsville, N. Y.**—The Wellsville Over-Grade Bridge. Illustrated description of a light highway bridge, affording a clearance of 22 ft. over the rail base, with the floor surface only 23 ft. above the base. 600 w. Eng Rec—Aug. 4, 1900.

**Wooden.**—The Life of Wooden Piles and Bridges. William Gammons. Abstract of an address before the bridge and building department of the C., M. & St. P. Ry., 1000 w. Eng Rec—March 12, 1898.

See also **Japanese; Military; Zanesville, O.; BRIDGE CONSTRUCTION—Japan; Timber; TRESTLE.**

**Wooden Lattice.**—Wooden Lattice Bridges in Galicia (Hölzerne Gitterbrücken in Galizien). Mainly descriptive, showing some recent structures with spans from 80 to 145 feet. 1 plate. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—June 4, 1897.

**Worms.**—Proposed Bridge Over the Rhine at Worms (Der Wettbewerb um den Entwurf einer festen Strassenbrücke über den Rhein bei Worms). A description, with details, of a three-span stiffened suspension truss bridge, with spans of 850 feet. Two articles. 12000 w. Zeitschr d Vereines Deutscher Ing—Jan. 16 and 23, 1897.

**X, Mans, France.**—See **Mans, France.**

**Y.**—See **Zanesville, O.**

**Yenisei, Siberia.**—Building the Bridge Across the Yenisei. Illustrates and describes the method of using the local wood for the caissons of the bridge pillars. 1200 w. Engr, Lond—July 6, 1900.

**Youngstown, O.**—South Market Street Bridge, Youngstown, O. Illustrates and describes the design and erection of a bridge with a main span of 210½ feet, formed of a plate girder arch, and approaches of special design. 1400 w. Eng Rec—Feb. 4, 1899.

**Zanesville, O.**—The Zanesville, O., Timber Howe Truss Y-Bridge, Built in 1831-32. Illustrates and describes an interesting wooden bridge crossing the Muskingum and Licking rivers at their junction. 1000 w. Eng News—Jan. 25, 1900.

**Zürich.**—The New Stauffacher Bridge at Zürich (Die Neue Stauffacher-Brücke in Zürich). The Engineer's specification, with details and elevation of this handsome béton arch of 130 feet span. 2000 w. Schweizer Bauzeit—March 4, 1899.

### BRIDGE ABUTMENT.

See also **BRIDGE ACCIDENT; BRIDGE FOUNDATION; BRIDGE PIER.**

The Best Substructure for Small Highway Steel Bridges. John H. Burnham. Advocating stone that will withstand frost, but as this is scarce in Illinois, steel I-beam posts on mud sills with plank or iron backing are sometimes used, but are not as good as stone for abutments, though cheaper. 600 w. 10th An Rept of Ill Soc of Eng & Surv., 1895.

**Concrete.**—Concrete Abutments for a Railroad Bridge at Buffalo, N. Y. Describes the interesting features in the rebuilding of the abutments of a bridge of the N. Y. C. R. R. made necessary by the deepening of the Erie Canal. Ill. 1100 w. Eng News—July 21, 1898.

**Harlem Ship Canal.**—Piers and Abutments of the Harlem Ship Canal Bridge. An interesting illustrated description of masonry and caisson construction. 1200 w. Eng Rec—July 24, 1897.

**Wing Wall Angle.**—To Ascertain the Best Angle for Wing Wall of Bridge Abutment. John H. Serviss. Concludes that the best angle for the wing is that which requires in construction the least amount of material consistent with stability. 500 w. Ill Soc of Engs & Surv—11 An Rept., 1896.

### BRIDGE ACCIDENT.

**Adour River, France.**—The Accident of the Adour Bridge (L'Accident du Pont de l'Adour). P. Crépy. A discussion of the failure of a plate girder bridge under a test load of two locomotives, just after completion. 2000 w. La Rev Tech—Aug. 10, 1897.

**Brooklyn Bridge.**—See **BUCKLING.**

**Chicago.**—Accident to the Van Buren Street Bridge, Chicago. Description of an accident to the Scherzer bascule bridge over the Chicago River. The accident is supposed to have been caused by a defective casting. 800 w. Eng News—May 10, 1900.

**Cleveland, O.**—The Wilson Avenue Bridge Disaster, Cleveland, O. An illustrated explanation of the cause and nature of the wreck of this bridge. 900 w. Eng News—Jan. 26, 1899.

**Cornwall, Ont.**—Bridge Disaster at Cornwall, Ont. With photographs showing the condition of the work at and after the time of the fall of the pier. 1800 w. Eng News—Sept. 15, 1898.

The Bridge Failure at Cornwall, Ont. An account of the failure of this nearly completed bridge, giving such information as is at present available, together with illustrations showing the condition of the structure immediately before and after the failure. 1200 w. Eng Rec—Sept. 17, 1898.

The Cornwall Bridge Accident. A description of conditions before and after the accident, and an explanation of the cause. Ill. 1500 w. Eng News—Dec. 29, 1898.

The Fall of a Bridge at Cornwall, Ontario. Illustrated account of a disaster in which a river pier and two adjacent spans fell, with such facts as have been learned as to the cause. 1200 w. Sci Am—Oct. 1, 1898.

**New York.**—Failure of Falsework of New York Bridge. Illustrated description of bridge falsework which fell April 11, killing five men and injuring over twenty. 600 w. Eng Rec—April 15, 1899.

**Paris Exposition.**—Collapse of the Foot-Bridge Leading to the "Celestial Globe" at the Paris Exposition (Effrondrement de la Passerelle du "Globe Céleste"). A short general description of the bridge, with plans; and photographs taken after the accident. 500 w. Génie Civil—May 5, 1900.

The Bridge Collapse in Paris. Comment on the collapse of the foot-bridge at the Paris Exhibition, and the strength of armored concrete. 1400 w. Engr, Lond—May 4, 1900.

**Pottsville, Pa.**—An Instructive Failure of a Highway Bridge-Abutment. W. L. Cowles. The failure of the Washington street bridge in Pottsville, Pa., is described and illustrated. 1000 w. Eng News—Oct. 14, 1897.

**Rochester, England.**—Accident to Rochester Bridge. This accident to a cast-iron girder bridge is interesting in many details. The fine half-tone illustrations show the location and character of the fractures very plainly. 1200 w. Engng—March 20, 1896.

**St. Paul, Minn.**—Destruction of a City Bridge by a Train. Illustrated description of the destruction of a highway bridge in St. Paul, Minn., by a train passing below it. 700 w. Eng Rec—Dec. 24, 1898.

**Shelby, O.**—Fatal Collapse of a Highway Bridge. Illustrated description of an accident at Shelby, O., on July 4, 1898. 700 w. Eng Rec—July 23, 1898.

**Superior, Wis.**—A Curious Railway Trestle Bridge Failure. Brief illustrated description of the collapse of a timber trestle under an ore train on the Belt Line branch of the Great Northern Railway, near Superior, Wis. 600 w. Eng News—June 15, 1899.

**Tarbes, France.**—Fall of a Bridge at Tarbes. Editorial criticism of the construction and the cause of the failure in France. 2300 w. Engr, Lond—Sept. 24, 1897.

The Failure of the Adour Bridge at Tarbes (La Rupture du Pont sur l'Adour à Tarbes). A very full account, with numerous illustrations, of the failure of the steel girder bridge at Tarbes, France, while undergoing test just after completion. 4500 w. Génie Civil—July 31, 1897.

The Tarbes Bridge Failure. Particulars and illustration, from "Génie Civil," making it appear that the cause of failure was due to the design. 700 w. Eng Rec—Aug. 21, 1897.

**United States and Canada, 1896.**—Bridge Accidents in the United States and Canada in 1896. Charles F. Stowell. Tabular statements are presented, with explanatory remarks. 1400 w. Eng News—Feb. 11, 1897.

**Utica, N. Y.**—Bridge Failure at Utica, N. Y. An account of a bridge breaking down under a street car, with hypothesis explaining a possible cause. 1200 w. R R Gaz—Aug. 19, 1898.

**Victoria, B. C.**—The Bridge Disaster at Victoria, B. C. A review of the accident and the causes as deduced from expert investigation; with views of the wreck and rotten bridge members, and strain sheet. 3000 w. Eng News—June 18, 1896.

**Washington, D. C.**—The Failure and Repair of the Piers of the Aqueduct Bridge, Washington, D. C. L. R. Grabill. Illustrated description of the damage and methods adopted in making repairs. 3800 w. Eng News—July 26, 1900.

### BRIDGE ANCHORAGE.

**East River.**—Mason Work on the New East River Bridge Anchorage. Illustrated description of the design, and contractors' methods. 1900 w. Eng Rec—April 7, 1900.

The Anchorages for the New East River Bridge. Drawings of the general details of the Brooklyn anchorage, with description. The New York anchorage will be mostly the same; the exceptions are noted. 2200 w. Eng News—Sept. 9, 1897.

The Brooklyn Anchorage of the New East River Bridge. Illustrated description of the plant and methods of construction of an anchorage 114 feet high, resting on a platform 158x177 feet. 2800 w. Eng Rec—May 14, 1898.

The New York Anchorage of the New East River Bridge. Illustrated description of an unusual plant for concrete work. 2700 w. Eng Rec—June 18, 1898.

### BRIDGE APPROACH.

**East River.**—The New East River Bridge Approaches. Illustrated description of the viaducts for the pedestrians, surface and elevated cars, carriages and bicyclists on the second suspension bridge between Manhattan and Brooklyn. 2500 w. Eng Rec—May 12, 1900.

Viaduct Approaches for the New East River Bridge at New York City. Illustrated description of typical structural details. 3000 w. Eng News—May 10, 1900.

**Edinburgh.**—A Building Problem in Edinburgh. Extracts from report of Mr. M'Crae. The completion of the North Bridge makes it necessary to decide what shall be done with the sites for building along the new approach. The writer advocates the completion of the improvement, by the Council. 2700 w. Arch, Lond—Oct. 1, 1897.

**BRIDGE BEARING.**

**Rocker.**—The Simple Rocker as a Substitute for the Roller Bearing (Das Einfache Pendel als Ersatz für das Rollen Kipplager). H. Kübler. A discussion of the use of a single rocker instead of a series of rollers as an expansion bearing for bridge trusses; with computations applied to a practical example. 1000 w. Zeitschr d Ver Deutscher Ing—Feb. 17, 1900.

**BRIDGE BRAKE.**

The Bridge Brake. Robert Grimshaw. Illustrated description of a device for preventing oscillations or undulations, applicable to almost any form of bridge construction. 1800 w. Eng News—Aug. 6, 1896.

**BRIDGE BUILDING.**

See also **BRIDGE CONSTRUCTION; BRIDGE ERECTION.**

**Germany, 19th Century.**—German Bridge Building in the 19th Century (Der Deutsche Brückenbau im XIX. Jahrhundert). Prof. Georg Mehrtens. The first part of a very well illustrated history of iron and steel bridge construction, in theory and practice, written on the occasion of the German bridge exhibit at Paris. Serial. Zeitschr d Ver Deutscher Ing—April 21, 1900.

**Review.**—Bridge Building, Past and Present (Der Brückenbau, Sonst und Jetzt). Prof. Mehrtens. A very interesting address delivered before the Technical Society of Frankfurt am Main, with many illustrations of famous bridges. Two papers, 4000 w. Schweizer Bauzeit—Sept. 3, 10, 1898.

**BRIDGE CONSTRUCTION.**

See also **BRIDGE BUILDING; BRIDGE DESIGN; BRIDGE ERECTION.**

**Chicago.**—Change of Approach Span, Van Buren St. Bridge, Chicago. An account of changes made necessary in the construction of the drainage canal, and the exacting conditions imposed upon the engineers. 900 w. Ry & Engng Rev—Feb. 18, 1899.

Lifting a Chicago Swing Bridge. Explains how the repairs of the Randolph street bridge, in Chicago, were carried out. 600 w. Eng Rec—Dec. 11, 1897.

Rebuilding of the Kinzie Street Drawbridge of the Chicago & Northwestern Ry. William H. Finley. Brief history of the old structure and illustrated description of the new. Discussion. 8000 w. Jour W Soc of Engs—Feb., 1899.

**Economical.**—Economies in Railway Bridge Design and Manufacture. J. Graham. Considers the subject in relation to bridges for export, in order that England may meet outside competition. 2200 w. Engr, Lond—Jan. 26, 1900.

**1898.**—Notable Bridge Construction in 1898. A review of modern work of interest, the removal of historic bridges to make room for structures of greater strength and capacity, characteristics of the most typical examples of recent work, etc. 2800 w. Eng News—Feb. 2, 1899.

**European and American.**—European and American Bridge Construction. Gustav Lindenthal. A fully illustrated paper, showing the rise of metallic bridge construction and the development and extension of modern methods to wide spans. 3500 w. Eng Mag—Sept., 1898.

**Flexible Joints.**—Flexible Joints (Joints Flexibles). A discussion of the methods of M. Mesnager for providing flexibility in members of trussed structures in order to avoid non-axial stresses. 1500 w. Rev Tech—Dec. 10, 1899.

**Grand River.**—See Lansing; **BRIDGE**—Lansing.

**Inn River.**—The Reconstruction of the Bridge Over the Inn Between Branau and Simbach (Der Umbau der Branau-Simbacher Innbrücke). Leopold Petri. Consists principally of a description of the construction of the masonry piers and their pneumatic foundations. Two plates of details of the caissons and air locks. 5000 w. Oesterr Monat O B—Dec., 1896.

**Japan.**—Construction on the Kyoto Ry., Japan. Willard C. Tyler. A short illustrated description, showing construction of wooden false work lashed together with grass rope. 400 w. Ry & Engng Rev—Sept. 15, 1900.

**Lansing, Mich.**—The Reconstruction of Grand River Bridge. W. A. Rogers. Illustrated description with statement of cost for the different kinds of work. 5500 w. Trans Am Soc of Civ Engs—Aug., 1896.

**Lausanne.**—Widening a Swiss Arch Bridge. The Prichard Viaduct, near Lausanne. Sidewalks of 5½ ft. are increased to 10½ ft. each, by the addition of a pair of iron corbels or brackets at the top of each pier, which support at their outer ends a longitudinal girder upon which the outer ends of the sidewalk transverse joist are carried. Illustration of structure, elevation, etc. 150 w. Eng Rec—May 23, 1896.

**London.**—Extension of Skinner Street Bridge. Description and illustration of work made necessary by the extension of the terminal station of the Great Eastern Railway. 2000 w. Eng, Lond—Feb. 26, 1897.

**Minneapolis.**—Widening an Iron Truss Bridge. Illustrated description of the changes to be made in the Washington Ave. Bridge, Minneapolis, Minn. 800 w. Eng Rec—July 25, 1896.

**Newburyport, Mass.**—Reinforcing the Newburyport Suspension Bridge. Illustrated description of methods adopted in strengthening for street railway traffic a 244-ft. suspension span built in 1810. 1300 w. Eng Rec—Oct. 6, 1900.

**Niagara Reservation.**—Rebuilding Niagara's Reservation Bridges. A general account of the new concrete bridges between the mainland, Green Island and Goat Island, with illustrations of preliminary construction. 700 w. Sci Am—Sept. 22, 1900.

**Norval's Pont.**—The Reconstruction of Norval's Pont Bridge. Some good illustrations of the bridge before and after reconstruction. 250 w. Engng—Sept. 7, 1900.

**Orange River.**—Hopetown Bridge. Brief account with illustrations, of the rebuilding of the channel span of the road bridge over the Orange River, in Cape Colony, in 18 days after the receipt of the order. 500 w. Engng—March 23, 1900.

**Pennsylvania, Western.**—Special Bridge and Viaduct Construction in Western Pennsylvania. Illustrated description of the details and construction of 22,000 tons of viaducts and bridges on the Carnegie railways. Part first describes mainly the viaducts, including one which carries two tracks at different elevations. Serial. Eng Rec—April 28, 1900.

**Philadelphia.**—Reconstruction of the Penrose Ferry Bridge, Philadelphia. Illustrated description of some novel foundation methods for bridge piers and of heavy timber approaches. 2800 w. Eng Rec—April 8, 1899.

**Pin Repacking.**—Repacking a Main Truss Chord Pin. E. F. Terry. Letter giving illustrated description of method of changing bars in the bottom chord of a bridge. 600 w. Eng Rec—Jan. 30, 1897.

**Plate Girder Draw.**—See **BRIDGE.**

**Timber.**—Timber Bridge Construction in New South Wales. Percy Allan. Read before the Engng. Soc. of the Royal Soc. of N. S. W. Illustrated description of improved construction. 4500 w. Eng, Lond—May 22, 1896.

**Washington.**—Widening a Washington Highway Bridge. Describes the addition of cantilever brackets for sidewalks, to a plate-girder skew bridge. 700 w. Eng Rec—Nov. 11, 1899.

**York, Eng.**—Strengthening Lendal Bridge. York. Illustrated description of the method employed in strengthening a cast iron arch bridge to accomodate heavier traffic. 1300 w. Eng, Lond—Dec. 27, 1895.

**BRIDGE DEFLECTION.**

**Measuring Instrument.**—See **BRIDGE STRESSES.**

**BRIDGE DEFORMATION.**

See **BRIDGE STRESSES; MATERIALS' STRENGTH**—Fatigue.

**BRIDGE DESIGN.**

See also **BEAM; BRIDGE STRESSES; FRAMEWORK.**

Bridge Practice. Discusses whether it is permissible in good practice to erect structures in which it is impossible to estimate, after a year's working, the maximum strains in the different bars. 1300 w. Engng—Nov. 20, 1896.

Notes on the Statics of Double-Braced Trusses (Beitrag zum Statisch Bestimmten Gegliederten Balkenträger mit Zweifachem Ausfüllsystem). W. Dietz. An examination of various forms of framed structures, using the graphical treatment, including cantilevers, swing bridges, and arches. 2500 w. Zeit d Ver Deutscher Ing—March 4, 1899.

Some Hints on Bridge Designing. Oscar Sanne. On the working out of details in a manner that will make a pleasing impression. 4000 w. Jour W Soc of Engs—April, 1899.

**Arched Trusses.**—Trusses with Suspended Horizontal Thrust (Bogenträger mit Aufgehobenem Horizontalschub). A design for arched trusses, whereby the horizontal thrust may be converted into a vertical pull sustained by a tension member anchored in the pier. 2000 w. Zeitschr d Ver Deutscher Ing—March 20, 1897.

**Bending Moment.**—See **BEAM.**

**Braked Trains.**—The Influence of Braked Trains on the Superstructure of Metallic Bridges. F. Jasinski. Abstract of an article in the "Revue Generale des Chemins de Fer," July, 1895, expressing the belief that strain from this cause is frequently overlooked, showing by example its importance, and suggesting a simple plan of resisting bracing. 900 w. Ry Rev—April 11, 1896.

**Continuous Girder.**—Graphical Determination of the Pier Reactions of Continuous Girders of Constant Moment of Inertia (Zeichnerische Bestimmung der Stutzmomente Continuirlicher Träger von Constantem Trägeitsmomente). L. Guesen. With numerous diagrams, adapted for a variety of cases occurring in practice. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 2, 1900.

The Continuous Arched Girder with Two Joints. (Der Continuirliche Bogenträger mit Zwei Gelenken). A very full mathematical discussion, with the practical example of the bridge over the Rhine at Constance fully computed. 8000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1898.

**Counterbracing.**—Framed Girders with Diagonal Counterbracing (Fachwerkträger mit Gegendiagonalen). Karl Haberkalt. A discussion of the action of counterbraces in bridge trusses, maintaining that the desired stiffness can better be obtained by strengthening the main members. 3000 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1900.

**Counter Stresses.**—Insufficient Provision for Counter-Stresses in Railroad Bridges. Discussion of paper by Henry S. Pritchard. 1700 w. Pro Am Soc of Civ Engs—Nov., 1899.

Insufficient Provision for Counter-Stresses in Railroad Bridges. Henry S. Pritchard. Presents considerations showing that provision should be made for counterstresses from some increase in the live loads, and such provision should be clearly stated in the specifications. 1500 w. Pro Am Soc of Civ Engs—Aug., 1899.

**Distortion.**—The Sectional Distortion of Iron Bridges (Die Querschnittsverzerrungen Eiserner Brüken). O. C. Reymann. A mathematical discussion, showing the effect which a distortion of a cross-section has upon the vertical and longitudinal members. Serial Glaser's Annalen—Oct. 1, 1898.

**Drawbridge.**—Draw Span Stresses — Assumptions Made to Determine Them. Malverd A. Howe. A discussion of the question of making proper assumptions for the determination of stresses, and the methods in use at the present time. Ill. 3000 w. Bridges—April, 1899.

The Accuracy of the Ordinary Formulas for Swing Bridges. F. E. Turneaure. The discussion considers truss bridges only, and examines the formulas for continuous girder with constant moment of inertia, pointing out an easy method for determining the degree of approximation in any given case, and of correcting the computations if desired. 2300 w. Eng News—Dec. 3, 1896.

**Drawbridge Bracing.**—Diagonal Bracing Over the Turntable in Swing Bridges. Malverd A. Howe. Mathematical discussion of the stresses in a case of balanced loading. 1000 w. R R Gaz—Aug. 31, 1900.

**Drawbridge Detail.**—The Design of Drawbridge Details. Abstract from book by Charles H. Wright. The article is a clear presentation of the subject of plate-girder draw-spans and their machinery, and is well illustrated. Serial. Eng Rec—Oct. 17, 1896.

**Drawbridge Reactions.**—Experimental Determination of Drawbridge Reactions. Malverd A. Howe. An account of investigations made to determine a reliable method for computing these reactions. 2000 w. Eng News—Nov. 30, 1899.

Reactions in Swing-Bridge Trusses. Willis Whited. Discusses the pier and abutment reactions in trussed drawbridges of both the center-bearing and rim-bearing types. 4000 w. Pro of Engs' Soc of W Penn—Feb., 1900.

**Drawbridge, Sampson.**—A New Way of Constructing Drawbridges. Brief illustrated description of designs of William L. Sampson, which consists of movable cantilever spans having inclines, and aprons adapted to be engaged by the inclines and swung into an angular position. 600 w. Sci Am—Feb. 4, 1899.

**English.**—Economy in Bridge Work. Editorial discussion of the need of radical changes in the English method of bridge design. 2400 w. Engng—Aug. 3, 1900.

**Estimating.**—The Bridge Works' Estimating Department. E. M. Scofield. Suggests methods which have proved valuable in actual use. Ill. 2800 w. Bridges—April, 1899.

**Graphic.**—A Graphic Solution of Trusses. Fred Morley. A convenient method for determining the stress in any particular member of a roof or bridge truss. 2300 w. Pro of Purdue Soc of Civ Engs—1897.

**La Rue Formula.**—A New Formula for the Curvature of Chords in Truss Bridges. Benjamin F. La Rue. The formula is deduced and it is believed to be of practical value in facilitating calculations. 1500 w. Eng News—March 19, 1896.

La Rue's Formula for Curvature of Chords in Bridge Trusses. Letters from R. C. Berkeley, Jr., and Henry Szlapka, with reply from Benj. F. La Rue. Criticism and modification of Mr. La Rue's statements regarding tension in a vertical post under full load. 900 w. Eng News—April 30, 1896.

**Lattice Girders.**—The Location of Diagonal Members in Parallel Lattice Girders (Ueber das Centrieren der Diaganalen in Parallel-Gitterträgern). L. Nicolay. A mathematical examination of the conditions obtaining in lattice girders which show the most economical positions for diagonal members. 1000 w. Schweizerische Bauzeitung—Oct. 28, 1899.

**Launhardt Formula.**—The Launhardt Formula and Railroad Bridge Specifications. Henry B. Seaman. Reviews Wöhler's experiments on the fatigue of metals and the deductions which were made in 1889, placing the matter in a form for practical application to bridge construction, presenting a general specification for steel railroad bridges. 8000 w. Pro Am Soc of Civ Engs—Oct., 1898.

**Load Equivalents.**—A Study of Load Equivalents (Beitrag zur Lehre von den Belastungs-Aequivalenzen). Franz Podhajsky. A graphical and analytical investigation into the manner in which the distribution of loads upon beams and girders takes place with various combinations of locomotives and cars. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—June 11, & 18, 1897.

**Maximum Stress.**—General Criterion for Position of Loads Causing Maximum Stress in any Member of a Bridge Truss. F. C. Kunz. Discussion of paper by L. M. Hoskins. 500 w. Pro Am Soc of Civ Engs—Aug., 1899.

General Criterion for Position of Loads Causing Maximum Stress in Any Member of a Bridge Truss. F. H. Cilley. Contribution to the discussion of the paper by L. M. Hoskins. 400 w. Pro Am Soc Civ Engs—April, 1899.

General Criterion for Position of Loads Causing Maximum Stress in Any Member of a Bridge Truss. L. M. Hoskins. A contribution toward the unification of the theory of maximum stresses due to moving loads. 6500 w. Pro Am Soc of Civ Engs—March, 1899.

Graphical Determination of Maximum Stresses in a Truss (Graphische Ermittelung der Grössten Stabkäfte in einen Fachwerksbalkenträger). Prof. J. Melan. Describing a simple graphical method, with diagrams showing the application. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—April, 1899.

Maximum Stresses in Bridge Members. L. N. Hoskins. Considers in as general a manner as possible the problem of determining what position of a given series of moving loads will produce the greatest stress in any member of a bridge truss. Mathematical discussion. 4700 w. Trans of Wis Acad—Vol. X.

The Position of Wheel Loads Causing Maximum Stresses in Web Members. M. A. Howe. Considers only simple trusses which have one set of web members vertical. Ill. 1200 w. R R Gaz—April 20, 1900.

**Moment Table.**—An Improved Moment Table. W. C. Armstrong. A table for computing moments and shears in bridge trusses from concentrated loads, presenting new features aiming to reduce the arithmetical work to the least possible limit consistent wtih the desired accuracy. 1200 w. Eng News—March 11, 1897.

**Parabolic Truss.**—Stresses in Lattice Members in a Parabolic Truss (Einflusslinien für die Spannungen der Gitterstäbe beim Parabelträger). Emil Bittner. An analytical investigation for various loads. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—July 16, 1897.

**Pittsburg.**—A New Truss Design and Its Analysis. C. L. Strobel. Design, including strain sheet, worked out so as to show the proportioning of parts and the weights and cost, prepared by the writer in connection with the competition for the Sixth St. bridge, Pittsburg, Pa. 1800 w. Eng News—July 22, 1897.

**Plate Girder.**—See **GIRDER.**

**Pratt Truss.**—The Strain Sheet and Estimate of Cost for a Pratt Truss Highway Bridge. A. B. Loomis. Assumed data are given for the case under consideration, with determination of weight or dead load, calculation of stresses, estimate of material and estimate of cost. 1700 w. Tech—May, 1896.

**Railway.**—Designs for Railway Bridges. Onward Bates. The subject is considered in a general manner. 13800 w. Pro of Purdue Soc of Civ Engs—1897.

**Roofs.**—See **ROOF.**

**Secondary Stresses.**—Secondary Stresses in Trusses and Girders. Editorial discussion of views advanced concerning the advantages of the pin system. 1300 w. Engr, Lond—March 16, 1900.

**Skew.**—A Graphic Method of Setting Out the Face-Angles of Skew Bridge Voussoirs. H. H. Humphreys. Gives an explanation of the method devised by Mr. D. Connery for solving the problem. Ill. 1000 w. Builder—June 18, 1898.

**Skew Details.**—The Designing of Skew Connection Details for Roof and Bridge Work. C. A. P. Turner. An illustrated discussion of methods used in determining dimensions. 4000 w. Eng News—Feb. 15, 1900.

**Train Loads.**—American Train Loads in the Calculation of Bridges (Ueber Amerikanische Belastungszüge für die Berechnung von Brücken). F. C. Kuns. An article with a table and diagrams comparing the bridge loads on various American and foreign railways. 1000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—April, 1900.

**Wheel Concentrations and Fatigue Formulas.**—Wheel Concentration and Fatigue Formulas in Bridge Design. Continned discussion. 4400 w. Pro Am Soc of Civ Engs—Oct., 1899.

Wheel Concentrations and Fatigue Formulas in Bridge Design. Informal discussion at the annual convention, June 27, 1899. 12500 w. Pro Am Soc of Civ Engs—Aug., 1899.

**Working Stresses.**—Safe Working Stresses. R. H. Thurston. Discussion of Mr. Stone's paper read at the July meeting of A. S. C. E. Reviews the knowledge that has been gained by experience and experiments, and discusses many points bearing on this subject. 3700 w. Sib Jour of Engng—Nov., 1898.

The Determination of the Safe Working Stress for Railway Bridges of Wrought Iron and Steel. E. Herbert Stone. Compares and discusses six systems for giving approximately the safe working stress for wrought iron, with discussion of results for steel and related matters of interest. 11500 w. Pro Am Soc of Civ Engs—May, 1898.

**BRIDGE DETAILS.**

**Tests.**—Tests of Bridge Details. D. Y. Dimon. Abstracted from a thesis prepared for the degree of C. E. in 1896. The details tested were sleeve nuts, loop floor beam hangers or stirrups, welded loop eyes such as are used on light counter rods, bent eyes as used for lateral connections. Results are given. 800 w. Trans of Assn of Civ Engs of Cornell Univ—June, 1897.

**BRIDGE ENGINEERING.**

**Address.**—The Profession of Bridge Engineering. A lecture by J. S. Deans on the proper training of an engineer to become a specialist in structural work. 3000 w. Eng Rec—May 6, 1899.

**BRIDGE ERECTION.**—See also **BRIDGE CONSTRUCTION.**

Bridge Erection. Frank H. Constant. Discusses some of the most common methods. 3800 w. Year Bk of Soc of Engs, Univ of Minn—1898.

Erecting Three Notable Bridges. Brief description of the Clifton, Atbara, and Delaware River bridge-erection methods. 1400 w. Eng Rec—Oct. 27, 1900.

The Erection of Metallic Bridges. Frank P. McKibben. Considers the various methods of erecting different forms of metallic bridges. Illustrations and discussion. 9000 w. Jour Assn of Engng Soc's—March, 1898.

The Removal of an Iron Bridge (Verschiebung einer Eisernen Brücke). Describes the manner in which an iron truss bridge of 107 feet span and over 70 tons weight was shifted bodily to a new location about 100 feet distant in 30 minutes. Photographs of various stages of the work are given. 1000 w. Glaser's Annalen—July 15, 1898.

**American.**—The Erection of Iron Bridges in America (Die Aufstellung Eiserner Brücken in Amerika). Carl Bernhard. A description of the rapid methods of erection used by the American builders of iron bridges. Two articles, 7000 w. Zeitschr d Ver Deutscher Ing—July 8, 15, 1899.

**Arch Centering.**—See **ARCH CENTERING.**

**Attok, India.**—The Erection of the Attok Bridge, India. Illustrated account of the erection of three spans of 250 feet, and two of 300 feet, by means of lofty timber corbels. 800 w. Eng Rec—Jan. 28, 1899.

**Belle Isle, Detroit.**—The Erection of the Belle Isle Bridge. Illustrated description of bridge over the Detroit River, constructed to meet unusual conditions of soil and water. 700 w. Eng Rec—Nov. 7, 1896.

**"Big Four" R. R.**—Emergency Bridge Construction on the "Big Four" R. R. Account of very rapid work in the temporary and permanent replacement of a wrecked bridge. 1500 w. Ry Rev—July 11, 1896.

**"Burlington" Ry.**—Bridge Renewing on the C., B. & Q. Illustrated description of the method of replacing iron through truss bridges with plate girders. 1000 w. Ry Rev—July 31, 1897.

**Ceylon.**—Bridge Erection in Ceylon. Describes methods of renewing a bridge without employing falsework. 600 w. Eng Rec—Nov. 11, 1899.

**Chicago.**—Removing a Bridge. Illustrates and describes the removal of the Chicago Terminal Transfer Bridge. 700 w. Ry Age—Aug. 18, 1899.

Renewing a Bridge. Describes an interesting engineering feat performed by the Chicago & Northwestern Railway, in the removal of the old drawbridge near Kinsie street, Chicago, and the substitution of a new span. Ill. 700 w. Ry Age—March 18, 1898.

**Cincinnati.**—Erection of the Newport and Cincinnati Bridge. Illustrated description of the construction and removal of two sets of false work over nearly 1500 ft. of waterway, the removal of old spans, the erection of two sets of new spans, and the corresponding work on the long approaches of an unusually wide, heavy bridge. 2400 w. Eng Rec—July 23, 1898.

**Cincinnati Suspension.**—Enlarging the Covington and Cincinnati Suspension Bridge. H. L. Bridwell. Illustrated description of a difficult piece of engineering work, which has had to be carried on without interrupting traffic. 1200 w. R R Gaz—Sept. 17, 1897.

**Clinton, Iowa.**—Reconstruction of the Chicago & Northwestern Bridge, Clinton, Iowa. Engravings showing the main features of the reconstruction of four fixed spans of the single-track bridge over the Mississippi, with account of the work. 900 w. R R Gaz—May 20, 1898.

**Cutter, Ely.**—Rapid Bridge Building. An account of the rebuilding of the Cutter bridge which passed over the river Ouse at Ely in about eleven hours actual working time. 400 w. Ill Car & Build—Dec. 6, 1895.

Reconstruction of the Cutter Bridge, Ely; Great Eastern Railway. A descriptive illustrated article telling how an old cast iron bridge was replaced by a wrought iron structure without interfering with the railway traffic. 3000 w. Engng—Dec. 6, 1895.

**Ely, Eng.**—See **Cutter.**

**France.**—The Erection of Bridges and Framed Structures (Montages des Ponts et Charpentes). M. Michel-Schmidt. Especially devoted to the methods of erecting recent bridges in France and structures at the Exposition. 4500 w. 5 plates. Mem Soc Ing Civ de France—Sept., 1900.

The Erection of the Metallic Superstructures of the Bridges over the Ciron and the Dropt (Mise en Place des Nouveaux Tabliers Métalliques des Ponts sur le Ciron et le Dropt). With a plate of details showing the construction of the false works and the manner of removing the old bridges simultaneously with the erection of the new. 1500 w. 1 plate. Rev Gen de Chem de Fer—July 1, 1899.

**Grahamstown, N. B.**—Renewal of the Swing Bridge at Grahamstown, N. B. An illustrated account of the removal of a hand-power single-line swing bridge, and replacing it by a double-line swing bridge worked by hydraulic machinery. 1800 w. Transport—May 26, 1899.

**Harlem River.**—Erection of a Long Four-Track Drawbridge. Explains some of the striking features of the erection of the trusses and special appliances used in the construction of the bridge over the Harlem River. Ill. 1500 w. Eng Rec—Sept. 12, 1896.

**Launching.**—Bridge Erection by Projection. Describes the erection of a number of bridges in this manner. 1000 w. Eng Rec—Nov. 19, 1898.

Bridge Erection by Projection in France. An explanation of the work. 600 w. Eng Rec—July 16, 1898.

Erection of the Albert Bridge by Launching. Describes the interesting features and the methods used in the erection of this railway structure across the river Brisbane, in Queensland, Australia. 1800 w. Eng Rec—Sept. 24, 1898.

The J. F. Lépine Bridge (La Pont J. F. Lépine). L. Biette. Giving a full description of the manner in which the bridge was constructed and launched over a cutting 142 feet wide, containing 11 railway tracks, without interrupting trains. 7500 w. 2 plates. Ann des Ponts et Chaussées—1 Trimestre, 1899.

The J. F. Lépine Bridge over the Northern Railway of France (Pont J. F. Lépine sur la Tranchée du Chemin de Fer du Nord). Describing the placing of the trusses of a street viaduct over a wide railway cutting in Paris. The completed bridge was pushed bodily over a span covering 10 tracks without interrupting travel. 5000 w. 1 plate. Génie Civil—Sept. 4, 1897.

The Saint Bernard Bridge (Le Pont Saint Bernard). An illustrated account of the erection of a truss bridge at rue Lépine over a cutting of the Northern Railway of France at Paris. A pair of bowstring trusses were pushed over a cutting 132 feet wide without interrupting traffic beneath. 2500 w. La Revue Technique—Oct. 10, 1897.

The Stephenson Bridge in Paris. Brief illustrated description of a single-span bridge which was thrown bodily across the line of the Northern Railway Co. 450 w. Engr, Lond—Sept. 3, 1897.

**Milwaukee.**—Rapid Bridge Moving. Presents further information concerning the bridge removal at Milwaukee. A 130-ton draw span was moved 219 ft. down the river to a new site, and located there ready for use in less than 3 hours. 700 w. Eng Rec—Jan. 21, 1899.

Removing a Bridge. Illustrates and describes the removal of a draw span over the Kinnickinnic river at Milwaukee, Wis., to a new site. 1000 w. Ry Age—Jan. 13, 1899.

**Minneapolis.**—Erection of the Lake Street Arch Bridge, Minneapolis. Illustrated description of the erection of a bridge, 1271 ft. long, and 120 ft. above the bed of a shallow part of the upper Mississippi River. 900 w. Eng Rec—Sept. 24, 1898.

**Neunkirchen, Germany.**—Moving a Bridge. From "La Nature." Illustrations and particulars of a difficult piece of engineering work. 500 w. Sci Am Sup—May 26, 1900.

**Newark, N. J.**—Replacing the Newark Draw. Illustrated description of the method employed to replace a 400-ton draw span with one of 600 tons, with a minimum interference with river and rail traffic. 1700 w. Eng Rec—July 29, 1899.

**New Brunswick, Canada.**—American Bridge Erection. Brief illustrated description of the erection of a cantilever bridge over the St. John river, New Brunswick. 400 w. Engr, Lond—Sept. 15, 1899.

**Northfield, Mass.**—A Novel Method of Bridge Erection; Connecticut River Bridge, Northfield, Mass. Illustrated description of a curious method of erection without false works which was recently adopted in constructing a highway bridge. 1700 w. Eng News—Sept. 7, 1899.

The Northfield Bridge. Illustrated description of a cantilever structure with a main span of 360 ft., which was erected by a unique method which is explained. 4000 w. Eng Rec—Sept. 2, 1899.

**Omaha, Neb.**—The Erection of the Omaha Bridge. Illustrated description of the methods and plant used to remove the old and erect the new Union Pacific Bridge. 1500 w. Eng Rec—Aug. 27, 1898.

**Paris.**—See **Launching.**

**Pennsylvania R. R.**—Erection of Bridge 69, Pennsylvania Railroad. Illustrated description of the methods employed in erecting a bridge of 236 ft. span on one of the busiest trunk lines in the country without the interruption of traffic. The new span was erected on falsework on one side of the line and when it was completed the old span was moved to the other side and the new one substituted, the time occupied in moving being less than 14 minutes. 3600 w. Eng Rec—April 22, 1899.

**Philadelphia.**—Replacement of the Old Metal-Span of the Pennsylvania Railroad Bridge Over the Schuylkill River at Philadelphia, October 17, 1897. Joseph T. Richards. Description showing the preparations and conditions under which a transfer was made in 2 minutes and 28 seconds. Ill. 3000 w. Pro Engs' Club of Phila—Jan., 1898.

Replacing Bridge No. 69, Pennsylvania R. R., near Girard Ave., Philadelphia. Jos. Wood Wagner. Description, with illustration, of the replacing of a Whipple-truss bridge, with a Pratt truss, the work consisting of the bodily removal of the old and substitution of the new span, so as not to interrupt the traffic between Philadelphia and New York. 2000 w. Eng News—Oct. 21, 1897.

**Pittsburg.**—Some Recent Work of the Keystone Bridge Co., near Pittsburg. Illustrates and describes the interesting engineering features and methods of construction. 2700 w. R R Gaz—May 18, 1900.

**Plate Girder.**—Best Method of Erecting Plate Girder Bridges. Discussion of committee report at convention of the Assn. of Ry. Supts. of Bridges and Buildings. Ill. 1800 w. Pro of Assn of Ry Supts—Oct., 1896.

Erection of a Long Plate-Girder Railroad Bridge. The requirements of this specification cover all necessary considerations. 400 w. Eng Rec—March 28, 1896.

Erection of a Plate Girder Span by Displacement. Illustrated account of the erection of a plate girder span by sliding it sidewise into the old position of a pony truss span, which was moved away at the same time. The new structure was used for train service while in transit. 900 w. Eng Rec—April 29, 1899.

The Erection of Large Plate Girder Spans. Charles H. Wright. Illustrates and describes the manner of handling and the transportation of these huge masses of steel. 1500 w. Bridges—July, 1899.

The Transportation and Erection of a Plate Girder Highway Bridge. Description of the transportation of the material and the erection of a plate girder bridge, built by the Wabash Bridge & Iron Works. An interesting study of simple and effective methods of overcoming difficulties. Ill. 1800 w. Eng News—April 15, 1897.

**Peterborough, England.**—Replacing a Main Line Railway Bridge in 150 Minutes. Illustrated description of a remarkable piece of bridge-building and removal on the Great Northern Railway at Peterborough. 1800 w. Eng, Lond—Nov. 27, 1896.

**Rock Island.**—Building the Draw Span of the New Rock Island Bridge. An account of the accident by which this bridge was wrecked by the ice when in process of building, and of its rapid reconstruction. 3400 w. R R Gas—May 28, 1897.

Erection of the Draw Span of the New Rock Island Bridge. Ralph Modjeski. An interesting illustrated description going into details, and followed by short discussion. 9200 w. Jour W Soc of Engs—April, 1897.

Erection of the Rock Island Bridge. Illustrated description of method used for an 1830 ft. bridge over the Mississippi, where an old bridge had to be replaced without interrupting trains. 1800 w. Eng Rec—May 28, 1898.

**St. Paul, Minn.** Temporary Bridge Across the Mississippi River, at St. Paul, Minnesota. Moving of Three 140-Foot Spans. A. W. Munster. Illustrations and brief explanation of this work. 400 w. Jour Assn of Engng Soc—Jan., 1900.

**Sohan, India.**—The Erection of Sohan Bridge. Brief illustrated description of the construction of a bridge by means of fan-shaped falsework built out from the base of each pier. 450 w. Eng Rec—Feb. 4, 1899.

**Squirrel Creek, Colo.**—Rapid Bridge Renewing on the Rock Island. Illustrates the progress and describes the method followed in replacing the bridge across Squirrel Creek, Colorado. 1000 w. Ry & Engng Rev—Nov. 19, 1898.

**Temporary.**—The Temporary Restoration of Railway Bridges. An account, with illustrations, of the type of structure and methods of operation for rapid construction. Part first considers wooden bridges. Serial. Engng—Nov. 24, 1899.

**Traveler.**—An Adjustable Steel Traveler. Illustrated description of a traveler capable of adjustment for bridges of various sizes and of ready shipment. 1000 w. Eng Rec—July 30, 1898.

**BRIDGE EXHIBITION.**

**Paris.**—The Exhibit of Typical American Bridges at the Paris Exposition. George L. Fowler. Engravings of ten drawings illustrating typical designs of some of the notable railway bridges, with descriptions. 4000 w. Eng News—July 5, 1900.

German Bridge Building. Exhibits at the Paris Exhibition. An account of the exhibits of the six leading German firms devoted to the design and construction of metallic bridges. Serial. 1st part. 3200 w. Engng—Aug. 10, 1900.

Railways and Bridges at the Paris Exhibition. Brief descriptions of interesting engineering construction. 4000 w. Builder—Aug. 25, 1900.

**BRIDGE FAILURE.**

See **BRIDGE ACCIDENT.**

**BRIDGE FLOORS.**

Bridge Floors. Report of committee on open floors for railway bridges. Illustrations of different types are given. 3200 w. American Assn of Ry Supts of Bridges and Buildings.

**Barker's.**—Barker's Bridge Flooring. It consists of troughs riveted together. The method of construction is described and illustrated. 3000 w. Eng, Lond—Jan. 24, 1896.

**Brick and Concrete.**—A Highway Bridge with Concrete and Brick Floor. L. B. Merriam. A bridge lately erected in DeKalb, Ill., of interest because of the unusually heavy dead load caused by the use of concrete and brick for driveway floor, and concrete sidewalks. 1200 w. Eng News—March 10, 1898.

A New Brick and Concrete Bridge Floor and Roadway. Illustrates and describes a brick and concrete roadway and sidewalk bridge under construction at DeKalb. Ill. 700 w. Clay Rec—Sept. 26, 1896.

**Rails.**—Solid Bridge Floors of Old Rails. Girder bridge construction on the Chesapeake and Ohio. Sections and detail drawings accompany the article. 600 w. R R Gaz—Nov. 22, 1895.

**Redecking.**—Redecking a Viaduct. Illustrated description of the method of renewing a highway bridge floor. 400 w. Eng Rec—Nov. 11, 1899.

**Solid.**—Solid Floor Bridges for Railroads and Highways. Frank C. Osborn. Read before the Civ. Eng's Club of Cleveland. The author describes and illustrates all the principal forms of this construction that have been used; it is an interesting record of what has been done. 11000 w. Jour of Assn of Eng Soc—Dec., 1895.

**BRIDGE FOUNDATION.**

See also **BRIDGE ABUTMENT; BRIDGE PIER; CAISSON; FOUNDATION.**

Bridge Foundations. A statement of the precautions which should be taken. 900 w. Eng Rec—Oct. 1, 1898.

Foundations for Masonry. Deals principally with the setting out of foundations for bridges and the care necessary. Ill. 1400 w. Ill Car & Build—Feb. 26, 1897.

**Atchafalaya River.**—Deep Bridge Foundations, Atchafalaya River. C. H. Chamberlain. Facts regarding this work in an alluvial section, where unusual depth of the piers was made necessary by reason of the instability of the soil when acted upon by river current. Diagrams. 3200 w. Jour Assn of Engng Soc's—Sept., 1898.

Experiences in an Engineer's Practice. Walter V. Rice. Providing against settling in insecure foundations at the Petrie St. bridge, Cleveland, Ohio. 2000 w. Jour Assn of Eng Soc—March, 1896.

**East River.**—Diamond Drill Borings for the New East River Bridge Pier Foundations. A description of the plan of work adopted to determine the depth of bed rock, preliminary to founding the towers of the new East River bridge. 700 w. Eng News—Sept. 24, 1896.

Foundations for the Brooklyn Tower of the New East River Bridge. Gives drawings and descriptions of this work, taken from the official plans and specifications. 2800 w. Eng News—May 27, 1897.

The New East River Bridge Foundations. Describes the work on the New York side of this structure, especially the points that differ from the Brooklyn side. 2500 w. Eng Rec—Nov. 6, 1897.

The New East River Bridge Foundations. Illustrates plant and methods of work. 2000 w. Eng Rec—Feb. 5, 1898.

The New York Tower Foundations, New East River Bridge. Illustrated account of the method of constructing these piers, especially the means for working under compressed air. Several new forms of air locks are explained. 2000 w. Eng Rec—April 1, 1899.

See also **FOUNDATION.**

**BRIDGE INSPECTION.**

**Erie Railway.**—Bridge Inspection on the Erie Railroad. A statement of the organisation for bridge inspection, the blanks used for the reports, and the directions to the inspectors. 1500 w. Eng Rec—June 2, 1900.

**BRIDGE MACHINERY.**

**Automatic.**—A Recent Example of Automatic, Interlocking Machinery for Operating a Swing Bridge. Charles H. Wright. Illustrated description of devices used on a long span constructed by the Edge Moor Bridge Works, and their action. 800 w. Eng News—July 7, 1898.

**Brake.**—See **BRIDGE BRAKE.**

**Chicago.**—Operating Machinery for the North Halsted Street Drawbridge, Chicago, Ill. Illustrated description of such details of this bridge as are deserving of especial mention. 1600 w. Eng News—Sept. 9, 1897.

**Electric.**—Working Swing-Bridges by Electricity. Describes various examples in the United States, where electrically operated machinery has been applied to these bridges. Ill. 4700 w. Engr, Lond—June 8, 1900.

See also **BRIDGE—Burlington Channel, Canada; Philadelphia.**

**Electric, Boston.**—An Electric Draw Bridge at Boston. W. S. Key. Illustrated description of a new bridge across the Charles River, the draw being operated by means of two G. E. "58" railway motors of 28 h. p. capacity each. 1600 w. Elec Wld & Engr—Dec. 23, 1899.

**Electric, Duluth.**—An Electrically Operated Bridge. J. E. Woodbridge. Describes and illustrates the interesting electrical features of the drawbridge connecting Duluth, Minn., and Superior, Wis. 700 w. Elec Wld—July 3, 1897.

Operating Mechanism, Duluth and Superior Swing Bridge. Illustrated description of the electrical apparatus used in moving and locking a 2000-ton swing span. 2200 w. Eng Rec—Feb. 24, 1900.

**Electric, Newark, N. J.**—An Electrically-Operated Drawbridge. Walter Kidde. An illustrated description of the motive power used in operating a 450-ton draw bridge over the Passaic River, at Newark, N. J., with statement of the requirements so successfully met. 1000 w. Stevens' Ind—July, 1898.

**Equalizing Gear.**—Equalizing Gear for Operating Machinery of a 246½-Ft. Swing Bridge, Chicago, Ill. Describes and illustrates a novel and effective departure in applying the power for the operation of a swing bridge. 500 w. Eng News—July 8, 1897.

**Hydraulic, Lübeck.**—The Hydraulic Installation of the Swing Bridge at the New Harbor at Lübeck (Die Hydraulische Einrichtung für die Drehbrücke im Neuen Hafen zu Lübeck). Giving a full description of the very complete hydraulic machinery for turning the swing bridge, with plate of detail drawings of accumulators. 2500 w. Zeitschr Ver Deutscher Ing—Sept. 4, 1897.

**Locking.**—Methods of Locking Drawbridge Ends, and Under This Head Include Locking of Turn-Tables. Reports to Convention of Ry. Supts. of Bridges and Buildings, with diagrams and discussion. 3300 w. Pro of Assn of Ry Supts—Oct., 1896.

**Pinion Brackets.**—Improved Drawbridge Pinion Brackets. Illustrations of a steel pinion bracket recently designed by Mr. Roemheld, engineer of bridges, Chicago. 250 w. Eng Rec—Sept. 25, 1897.

**Rock Island.**—The Operating Mechanism of the New Rock Island Bridges. Describes the swinging machinery proper, rail locks, the end jacks, interlocking and controlling systems and controlling device. 1300 w. Am Eng & R R Jour—Dec., 1896.

Turning Machinery for the Rock Island Bridge Swing Span. Illustrated description of the turning machinery of a bridge across the Mississippi. 3600 w. Engng—Sept. 16, 1898.

### BRIDGE MATERIAL.

See also **ANNEALING—Steel; BRIDGE SPECIFICATIONS; STEEL; STEEL SPECIFICATIONS.**

**Thomas Steel.**—Discussion on the Report of the Bridge Material Committee of the Oesterr. Ingenieur und Architekten Verein (Zur Debatte über den Bericht des Eisenbrückenmaterial-Ausschusses). Franz Kupelweiser. A contribution to the discussion on the report mentioned above. 3000 w. Zeitschr d Oest Ing u Arch Verein—April 13, 1900.

Report of Bridge Material Committee of the Oesterr. Ingenieur und Architekten Verein, on the Admissibility of the Use of Thomas Steel in Bridge Construction (Bericht des Eisenbrücken-Material-Ausschusses über die Zulässigkeit der Verwendung des Thomasflusseisens zu Brückenconstructionen). The full report, illustrated, recommending the use of Thomas steel when certain conditions are fulfilled. 20000 w. Zeitschr d Oest Ing u Arch Ver—April 27, 1900.

The Steel Question in Austria (Die Flusseisenfrage in Oesterreich). Prof. Mehrtens. A review of the production of Bessemer, Thomas and Martin steel in Austria, and a discussion of the report of the bridge-material committee of the Oesterr. Ingenieur und Architekten Verein on the admissibility of Thomas steel in bridge construction. 2500 w. Zeitschr d Ver Deutscher Ing—July 7, 1900.

### BRIDGE MOVING.

See **BRIDGE ERECTION; BRIDGE PIER—Moving.**

### BRIDGE PIER.

See also **BRIDGE ACCIDENT; BRIDGE ABUTMENT; BRIDGE FOUNDATION.**

The Distribution of the Pressure of Piers Upon Their Foundations (Ueber die Vertheilung des Pfeilerdruckes in den Fundamenten). Rudolf Mayer. A valuable contribution, with diagrams, to the important subject of the distribution of pressure in masonry piers. 200 w. Z. Oesterr, I. u A V—Dec. 11, 1896.

**Arkansas River.**—See **BRIDGES—Kansas City, Pittsburg and Gulf Ry.**

**Bern.**—Pier Foundations of the Kornhaus Bridge at Bern (Kornhausbrücke in Bern Fundierung des Schüttehaldepfeilers). An account of the sinking of the foundations for the great arch over the Aar. The foundations had to be carried through sloping banks of earth and loam to deep gravel below. 2500 w. 1 plate. Schweizerische Bauzeitung—Feb. 6, 1897.

The Foundation of the Right Pier of the Kornhaus Bridge at Berne (Kornhausbrücke in Bern. Baugeschichte des Rechtufrigen Hauptpfeilers). P. Simons. An account of the successful manner in which the pier for the great arch has been constructed in difficult ground on a steep slope. Two articles. 4500 w. Schweizerische Bauzeitung—March 26, April 2, 1898.

**Concrete.**—Concrete Piers, Sangamon River Bridge. Illustrates and describes the method of building some massive concrete piers, the method of doing the work being prescribed by the engineer and not left to the contractor. 600 w. Eng Rec—Nov. 4, 1899.

Stone Filled Concrete Pier. Details of method for hastening the work of construction of the Cascade Bridge of Burlington, Iowa. 500 w. Eng News—Dec. 17, 1896.

See also **CONCRETE STRUCTURE—Railway.**

**Concrete Laying.**—Depositing Concrete under Water at Charlestown Bridge, Boston, Mass. Describes some difficult work in making the foundations for two of the piers of this bridge. Ill. 1400 w. Eng News—March 17, 1898.

Submerged Concrete Laying. Slightly condensed from the report of William Jackson. Describes methods used on a bridge at Boston, Mass. 1500 w. Eng Rec—March 5, 1898.

**Cornwall, Ontaria.**—The New Cornwall Bridge Piers. Illustrated description of the difficult work of tearing down and rebuilding large concrete and limestone piers which were originally founded on unstable bottom. 5000 w. Eng Rec—Dec. 9, 1899.

**Ice Displacement.**—Masonry Pier Moved by Ice and Replaced. R. W. Leonard. From a paper read before the Canadian Soc. of Civ. Engs. Describes the replacing of an unfinished pier, moved out of position by the ice. 800 w. Can Eng—Dec., 1898.

**Manhasset, Long Island.**—Difficult Pier Construction, Manhasset Viaduct, Long Island R. R. William A. Cattell. Illustrates and describes an unusual piece of work which caused much anxiety and expense. 900 w. Eng News—Jan. 12, 1899.

**Moving.**—Moving a Pier of the Bismarck Bridge; Northern Pacific R. R. An account of an important and difficult piece of work recently carried out under the direction of the engineering department of the Northern Pacific R. R. 800 w. Eng News—April 28, 1898.

**Scour.**—See **WATER CURRENTS—Engineering Works.**

### BRIDGE PINS.

**Tests.**—The Condition of Steel in Bridge Pins. A. C. Cunningham. An account of the making of bridge pins and the necessity for special testing, with four tables of tests, with specifications submitted as being likely to procure as good bridge pins as can be had in common practice. 2000 w. Am Soc of Civ Engs—May, 1896.

### BRIDGE RAISING.

**Highway.**—Raising a Highway Bridge. Description of the raising of a viaduct bridge whose pedestals had settled, and query as to the action under load of a clay stratum, overlying soft soils. 900 w. Ry Rev—May 9, 1896.

### BRIDGE REMOVAL.

See **BRIDGE ERECTION; BRIDGE CONSTRUCTION.**

### BRIDGE RENEWAL.

See **BRIDGE ERECTION; BRIDGE CONSTUCTION.**

### BRIDGE REPAIRING.

See **BRIDGE ERECTION; BRIDGE CONSTRUCTION.**

### BRIDGE SHOP.

See **BRIDGE WORKS.**

### BRIDGE SPAN.

**Shipping Complete.**—Shipping and Erecting a Complete 130-Foot Railroad Span. Illustrated description of the method of shipping a single track lattice girder span with trusses 14 ft. 9 in. deep and 10 ft. apart. 1000 w. Eng Rec—Sept. 1, 1900.

### BRIDGE SPECIFICATIONS.

See also **BRIDGE MATERIAL.**

**Boston and Maine R. R.**—Standard Specifications for Metal Bridges, Boston and Maine R. R. An abstract of some of the more novel features of these specifications. 1100 w. Eng News—March 18, 1897.

**Fatigue Formulas.**—Fatigue Formulas in Bridge Specifications. Editorial review of new bridge specifications, recognising the fatigue of metals with full abstract of paper by H. B. Seaman. 4000 w. Eng Rec—Nov. 5, 1898.

**Launhardt Formula.**—See **BRIDGE DESIGN.**

**Loading.**—Typical Loading for Railway Bridge Specifications. Extract from paper by W. H. Schuerman, read at meeting of the Engng. Assn. of the South. Treats of loading which gives stresses which need only to be multiplied by a factor to give stresses agreeing closely enough for all practical purposes with the stresses produced by any of the specified loadings in general use. 2000 w. Ry & Engng Rev—June 18, 1898.

**Suspension Cable.**—Comparison of Suspension Cable Specifications of Brooklyn and New East River Bridges. Editorial comparison of the leading features of the two structures. 2200 w. Eng News—Nov. 30, 1899.

**Working Stresses.**—Working Stresses for Railroad Bridges. Brief abstract of a paper on railroad bridge specifications, by H. B. Seaman, with editorial discussion. 2500 w. R R Gaz—Nov. 4, 1898.

### BRIDGE STRESSES.

See also **BRIDGE DESIGN; BRIDGE TEST; MATERIALS' STRENGTH—Fatigue.**

**Measuring Instrument.**—An Instrument for Measuring and Recording Bridge Deflections. Illustrates and describes an apparatus devised by B. F. Pickering. 700 w. Ry & Engng Rev—Nov. 11, 1899.

Apparatus for Maxima and Minima Measurement of Deflections (Mesure des Flèches, Appareil à Maxima et Minima). Illustrating the standard apparatus for measuring and recording girder deflections as used by the department of Ponts et Chaussées. 2500 w. Le Génie Moderne—May 15, 1897.

A Proposed Device for Weighing Stresses Caused by Moving Trains. The device described for the determination of the unknown quantities in bridge stresses consists of a series of hydraulic track supports, recording pressures automatically in connection with multiple instantaneous photographs showing the wheel positions of the passing trains. 600 w. Eng News—April 30, 1896.

Measures the Bridge Strain. An account of an instrument so sensitive as to accurately measure the strain caused by the footfall of a pedestrian crossing Brooklyn Bridge. 1100 w. Sci Am Sup—March 20, 1897.

The Actual Stresses in Bridge Members. A brief account of the instruments used and methods of procedure followed by M. Rabut, in his interesting investigations of actual stresses in the various types of bridges in use on the Western Railway of France. 1200 w. Engng—Aug. 13, 1897.

Two Instruments for Measuring Deformation and Stresses in Bridges (Zwei Instrumente für Messungen von Formänderung und Spannungen an Brücken). G. Mantel. Describing an adjustable clinometer and an extensometer for use in quantitative measurements of flexure and tension in framed structures. Three articles. 4000 w. Schweizerische Bauzeitung—Feb. 8, 10, 17, 1900.

**Moving Loads.**—Moving Load Stresses in Bridge Structures. Points out the necessity of experiments on the deformation of bridges under live loads for further advance in the application of the theory of fatigue in metals to practical design. 900 w. Eng Rec—Dec. 3, 1898.

**Sudden Loads.**—Suddenly Imposed Loads. Editorial discussion of what constitutes suddenly imposed load, and the action of live loads. 1600 w. Engr, Lond—Nov. 26, 1897.

### BRIDGE TESTING.

See also **BRIDGE STRESSES.**

**Brussels.**—Test of a Bridge to Destruction. An account of the test to destruction on a Vierendeel bridge in the Turvueren Park, on the occasion of the Brussels International Exhibition, held in 1897, and the conclusions drawn. The bridge was a type between a plate and lattice girder. Ill. 3300 w. Ry & Engng Rev—Jan. 7, 1899.

**Erlenbach, Black Forest.**—Destruction Test of the Erlenbach Bridge on the Black Forest Railway (Belastungsprobe bis zum Bruch der Erlenbachbrücke der Schwarzwaldbahn). F. Schüle. This lattice girder bridge had been in use for 30 years, and being superseded, was made the subject of an experimental test. 1200 w. Schweizerische Bauzeitung—Jan. 13, 1900.

**Niagara Arch.**—Test of the New Niagara Bridge. Brief report of the test and its success. Ill. 400 w. Ry Age—Aug. 20, 1897.

Test of the New Steel Bridge at Niagara. Diagrams of deflection under test load of 2300 tons are given, with information of test. 700 w. R R Gaz—Sept. 3, 1897.

**Moving-Load.**—Some Experiments on Bridges under Moving Train-Loads. F. E. Turneaure. Description of a series of experiments on bridges of varying span and design, giving results of tests, with description of apparatus used, and a discussion of the points involved. Ill. Pro of Am Soc of Civ Engs—Nov., 1898.

**Loads.**—On the Uselessness of the Testing of Iron Bridges by the Method of Loads. From the "Organ für die Fortschritte des Eisenbahnwesens." Shows the tests to be defective and not a warranty of safety. 900 w. Ind Engng—Nov. 26, 1898.

### BRIDGE TOWERS.

**East River.**—Erection of Towers of New East River Bridge. Illustrated description of the various methods employed in assembling the parts of these skeleton towers, which rise nearly 335 ft. above high water. 2900 w. Eng Rec—May 5, 1900.

### BRIDGE WARNINGS.

Bridge Warnings for Low Overhead Structures. Committee report on the systems in use, mentioning the important characteristics and practical features, and an appendix containing descriptions and illustrations of a large variety of bridge warnings. 4000 w. American Assn of Ry Supts of Bridges & Buildings.

### BRIDGE WIDENING.

See **BRIDGE CONSTRUCTION.**

### BRIDGE WORKS.

**American.**—American Bridge Shop Practice. Editorial on the progress and the credit due the manufacturers, with a summary of prevailing practice and tendencies. 2700 w. Eng News—April 21, 1898.

Notes from American Bridge Shops. Part first presents information of the Elmira Bridge Co., of Elmira, N. Y., and the Union Bridge Co., of Athens, Pa. Ill. 2200 w. Eng News—March 3, 1898.

**Arrol, Glasgow.**—The Works of Sir William Arrol & Co., Limited. Illustrated detailed description of one of the most notable bridge-building establishments of Glasgow. Serial. Engr, Lond—May 18, 1900.

### BRIQUETTE.

See also **COAL DUST FUEL; COKE—Domestic; COKE MANUFACTURE—Briquetting.**

Briquettes and Briquette Machinery. Philip R. Björling. Describes the making of briquettes and the various binding materials used, naming the qualities they should possess, and the mechanical processes through which the material must pass. Ill. Serial. Col Guard—Sept. 24, 1897.

**Coal.**—Coal Briquettes. N. G. Neare. One of the many ways of utilizing waste product. 2000 w. Tradesman—July 1, 1896.

The Employment of Compressed Coal for Heating Purposes. Translated from "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." A description with statement of advantages and disadvantages of coal briquettes. Forty samples of brown coal gave a heating value of 4600 units, while briquettes gave 5300, or 15 per cent. higher. The evaporative value is, however, less. 1000 w. Col Guard—Dec. 6, 1895.

**Dust Explosions.**—See **Senftenberg Works.**

**Pitch Testing.**—Apparatus for Testing Pitch for Briquette Making. O. Binder, in "Oesterreichische Zeitschrift fur Berg und Huttenwessen." Describes apparatus and method of working by means of which the suitability of pitch for briquettes may be ascertained. 1100 w. Col Guard—June 16, 1899.

**Senftenberg Works.**—The Briquette Works of the Senftenberg Soft Coal District (Die Brikettfabriken des Senftenberger Braunkohlenreviers). Report of a trip of investigation made by Prof. Scheele, and dealing mainly with the question of dust explosions in the course of the manufacture of coal briquettes. Two articles. 3500 w. Glückauf—March 13, 20, 1897.

Dust Explosions in Briquette Works and Means for Their Prevention. A. Scheele. From notes of a visit to the briquette factories of the Senftenberg lignite district. Concludes that collecting chambers are not necessary, discusses means of getting rid of the dust, etc. 4000 w. Col Guard—April 15, 1897.

**Stocking Plant.**—Plant for Stocking, Etc. Patent Fuel at a French Colliery. M. Castellan. Communicated to the Société de l'Industrie Minérale. Illustrates and describes the arrangements for stocking boulets, a fuel made of fine slack from anchracite. 1200 w. Col Guard—Oct. 7, 1898.

**Velna Process.**—The Velna Process for the Manufacture of Briquettes from Waste Coal and Mineral Tar. "L'Industrie" describes a process devised by the chemist Velna, who uses petroleum or mineral tar only for enriching culm and other inferior combustibles, and produces briquettes from this material, the heating power of which is 30 per cent. higher than that of good coal. 1100 w. Am Mfr & Ir Wld—Nov. 13, 1896.

**Wales.**—Coal Briquettes in Wales. An account of this industry which is conducted on an extensive scale. 2000 w. U. S. Cons Repts, No. 327—Jan. 18, 1899.

The Manufacture of Patent Fuel in Wales. Describes the agglomite process of manufacturing patent fuel from both the anthracite and bituminous mineral. 1500 w. U. S. Cons Repts, No. 852—Oct. 6, 1900.

### BRITISH ASSOCIATION.

See SCIENTIFIC SOCIETY.

### BRITISH COLONIES.

The Colonies: Their Arts, Manufactures and Commerce. Owen Tudor Burne. Gives general facts and figures relating to the condition of the colonies, and shows that their commerce holds a good position in the world. 6500 w. Jour Soc of Arts—Nov. 19, 1897.

### BRITISH COLUMBIA.

The Trade and Industry of British Columbia. Information from the annual report of the British Columbia Board of Trade, about mining, fisheries, sealing, lumber, agriculture, etc. 1200 w. Bd of Tr Jour—Jan., 1897.

### BRITISH COMMERCE.

Exports and Imports. A résumé and editorial discussion of a paper by Sir Robert Giffen read at a meeting of the Royal Statistical Society. A clear and complete contribution to the problem of national economics, showing that international trade means more than the buying and selling of goods, and that the subject in its entirety presents a different aspect. 2800 w. Engng—Jan. 20, 1899.

### BRITISH EMPIRE.

The British Empire: Its Resources and Its Future. John Lowles. A survey of the British Empire, showing the progress of the colonies, and containing interesting information of the products, resources and future prospects. Discussion. 18300 w. Jour Soc of Arts—April 22, 1898.

### BRONZE.

**Aluminum.**—See ALUMINUM BRONZE.

**Atlas.**—See ATLAS BRONZE.

**Casting.**—See CASTING—Bronze.

**Durana Metal.**—See COPPER ALLOY.

**Microstructure.**—A Study of the Microstructure of Bronzes. A. E. Outerbridge, Jr. Investigations and conclusions are given, with photo-micrographs of specimens examined. Discussion. 5000 w. Jour Fr Inst—Jan., 1899.

A Study of the Micro-Structure of Bronzes. E. Heyn. A contribution to the subject of metallography, with a criticism of A. E. Outerbridge's paper. Ill. 5000 w. Jour Fr Inst—June, 1899.

**Phosphor.**—Phosphor Bronze. A Description of Its Characteristics and Methods of Manufacture. L. L. Smith. Deals with the composition and specifications, action of phosphorus, foundry treatment, etc. 1900 w. Am Eng & R R Jour—May, 1899.

Phosphor Bronze. Max H. Wickhorst. Read before the Western Foundrymen's Assn. Gives the process of manufacture used by the C., B. & Q. R. R. brass foundry at Aurora, Ill. 2000 w. Ir Age—March 25, 1897.

**Strength.**—Strength of Bronze in Compression. S. Bent Russell. These original tests are quite valuable. The results are shown in diagrams and tables, and fully discussed. 1200 w. Jour of Assn of Eng Soc—Dec., 1896.

### BROWN-COAL.

Brown-Coal Mining in Bohemia. Part first gives the history of the development. Serial. Col Guard—Sept. 22, 1899.

Mining in the Brown Coal District of North-West Bohemia and the Pilsen (Hard) Coal Fields, Remy: "Zeitschrift für Berg, Hutten-und Salinenwesen." Describes the beds, character of coal, development of the industry, workings, etc. 3000 w. Col Guard—May 22, 1896.

The Grottau Brown Coal Deposit, North Bohemia. Fried. Katzer, in "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Describes the deposit and working. 900 w. Col Guard—Nov. 5, 1897.

The Lignite Beds at Grottau in Northern Bohemia (Die Grottauer Braunkohlenablagerung in Nordböhmen). Describing these important deposits of soft brown-coal, with map and geological sections. Two articles, 1 plate. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 9, 16, 1897.

**Calorific Value.**—The Calorific Value and Moisture of Lignite (Heizwert und Wassergehalt der Braunkohlen). L. C. Wolff. A comparative study of the various German lignites or "brown coals," with computations of the calorific values and tables of the percentages of contained moisture. 5000 w. Zeitschr d Ver Deutscher Ing—July 9, 1898.

**Cologne District.**—The Lignite Deposits in the Cologne District (Das Braunkohlenvorkommen in der Kölner Bucht). H. Dobbelstein. A very complete description of these extensive workings, with map and several sections. 4500 w. 2 plates. Glückauf—Sept. 9, 1899.

The Lignite Industry of the Cologne District (Die Braunkohlenindustrie des Kölner Bezirkes). H. Schott. A paper before the Society of German Engineers, giving a review of the production of lignite and the extent to which it has been used in Germany and elsewhere. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 1, 1900.

See also Rhineland.

**Rhineland.**—Brown Coal Mining in the Rhineland. Information concerning the character of the deposits and methods of working. 1000 w. Jour Soc of Arts—June 22, 1900.

Brown Coal Mining in the Rhineland. From a report by Dr. Niessen, British Vice-Consul at Cologne, describing the deposits and working of the mines. 900 w. Col Guard—March 10, 1899.

The Mining and Utilisation of the Rhenish Lignites (Die Gewinnung und Verwertung der Braunkohle im Rheinlande). Giving several designs of successful furnaces for burning these low grade fuels without previous preparation. 1200 w. Zeitschr d Ver Deutscher Ing—April 3, 1897.

See also Cologne District.

**South America.**—The Coal Trade and Lignite Deposits of Northern South America. Francis C. Nicholas. Statements showing what these lignite deposits are and their future possibilities, with brief reference to the future needs of the country and the opportunity for trade. 1800 w. Eng & Min Jour—Aug. 20, 1898.

### BROWNSTONES.

Brownstones. T. C. Hopkins. From Appendix to the Annual Report of Pennsylvania State College. Part first treats of their texture and microscopic features, and the causes of decay in the cities. Ill. Serial. Stone—Aug., 1897.

General Features of Brownstones. T. C. Hopkins, in Appendix to the annual report of Pennsylvania State College. Part first gives the chemical composition, structural features, and analysis. 3500 w. Stone—July, 1897.

### BRUSH.

See also COMMUTATOR; DYNAMO.

Commutator Brushes for Dynamo-Electric Machines. Their Selection; Their Proper Contact Area and Their Best Tension. Alfred E. Wiener. Complete consideration from the practical standpoint of the subjects treated. Gives formulas by means of which the cross-sections of brushes and commutator pressure may be simply calculated for any of which the cross-sections of brushes and commutator pressure may be simply calculated for any given condition, the results being expressed in square inches and pounds. 2500 w. Am Elect'n—Sept., 1896.

The Best Proportions for Brushes with Collector Rings and Commutators Die Günstigste Dimensionirung der Stromabnehmer bei Schleifringen und Kollektoren). G. Dettmar. A record of a very complete series of experiments on the contact resistance, pressure, dimensions, etc., of copper and carbon brushes, with curves and tables. 4000 w. Elektrotech Zeitschr—May 31, 1900.

**Boudreaux Laminated.**—The Boudreaux Laminated Brushes at Low Voltages (Die Boudreaux-Blatter-buerste bei Niederer Spannung). Dr. G.

Langbein. An article showing the disadvantage of using brushes made of anti-friction metal on low voltage dynamos, on account of their high resistance. 700 w. Elektrotech Zeitschr—March 22, 1900.

**Carbon.**—Standarizing Carbon Brushes. E. Kilburn Scott. Gives tabulated sizes, suggesting that they be generally adopted, and also information concerning the quality and use. 1000 w. Elec Rev Lond—Nov. 24, 1899.

The Behavior of the Carbon Brush on the Commutators of Direct Current Power Generators. Harris J. Ryan. Descriptive of the manner the carbon brush takes the current off the commutator so that it is unnecessary to have the brushes moved from point to point with every variation of load in order to avoid sparking. 1100 w. Sib Jour of Engng—Oct., 1895.

**Holder.**—Some Modern Brush Holders. Illustrated descriptions of various designs. 2400 w. Elec Wld—July 23, 1898.

**Holder, Carbon.**—Carbon Brush Holders. Ernest Kilburn Scott. Gives a few of the rules which govern the application of carbon brushes, and also describes some of the leading types. Ill. Serial. Elec Rev, Lond—April 22, 1898.

**Multiple.**—On the Multiplicity of Brushes in Large Generators. William Baxter, Jr. Favors the employment of the two-brush machine, as a substitute for multiple brush machines, with reasons for the preference. 1700 w. Elec Wld—Aug. 29, 1896.

**Resistance.**—The Contact Resistance of Carbon and Copper Brushes (Der Kontaktwiderstand von Kohlen und Kupferbürsten). E. Arnold. A very complete account of comparative tests made upon brushes of various materials, with diagrams showing the resistance, wear temperature, and other data; the results being discussed mathematically. 3000 w. Elektrotech Zeitschr—Jan. 5, 1899.

The Contact Resistance of Carbon and Copper Brushes. A short digest of an article by E. Arnold, in "Elektrotechnische Zeitschrift," discussing this subject. 700 W. Elec Eng, Lond—Jan. 27, 1899.

The Electrical and Mechanical Resistance of Dynamo Brushes. Gives an account of an experimental investigation undertaken in the electrical laboratory of Columbia Univ., by Messrs. Tibbals, Lowenberg, and Burns. The apparatus used is also described. 2800 w. Elec Wld & Engr—Sept. 16, 1899.

See also **COMMUTATOR—Resistance.**

**Rockers.**—Brush Rocker Details and Bearings. E. K. Scott. Illustrated description of various arrangements. 1200 w. Elec Rev, Lond—Oct. 27, 1899.

**BUCKLING.**

Eccentric and Axial Resistance to Buckling (Exzentrische und Zentrische Knickfestigkeit). A. Ostenfeld. An analytical investigation, taking into account the formulae of Euler, Johnson and Rankine, and comparing these with the experiments of Tetmaier. 7500 w. Zeitschr d Ver Deutscher Ing—Dec. 31, 1898.

Resistance to Buckling, in Theory, Experiment and Practice (Die Knickfestigkeit in Theorie, Versuch und Praxis). F. von Emperger. A mathematical investigation, comparing the various theories, and plotting the corresponding curves. Serial. Zeitschr d Oesterr Ing u Arch Ver—Dec. 3, 1897.

**Brooklyn Bridge.**—The Buckling of the Trusses of the New York and Brooklyn Bridge. F. Collingwood. An illustrated account of the circumstances which caused the buckling of the lower chords of the trusses in July last, with editorial comment. 3000 w. R R Gaz—Nov. 18, 1898.

The Management of the Brooklyn Bridge. Review of article by F. Collingwood on the stresses in the Brooklyn Bridge and the buckling of chord members of the stiffening trusses. 1700 w. Eng Rec—Nov. 26, 1898.

**Columns.**—Graphical Investigation of the Buckling of Straight Columns (Graphische Untersuchung der Knickfestigkeit Gerader Stäbe). Luigi Vianello. With numerous diagrams showing the method of computing graphically the bending moments under various conditions. 7500 w. Zeitschr d Ver Deutscher Ing—Dec. 24, 1898.

See also **COLUMN.**

**Formula.**—A New Formula for Buckling (Eine Neue Knickformel). F. von Emperger. A comparison of curves deduced from a number of existing formulas with the new formula of Ostenfeld. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 1, 1899.

The Correct Formula for Buckling (Die Richtige Knickformel). Correspondence between Messrs. Prandtl, Kriemler, and Kübler, discussing the new buckling formula of the latter engineer. 2000 w. Zeitschr d Ver Deutscher Ing—Aug. 26, 1900.

The Correct Formula for Buckling (Die Richtige Knickungsformel). J. Kübler. An analytical and graphical comparison of the formulas of Euler, Rankine, and Tetmaier, and the derivation of a new formula claimed to represent the relation of the forces correctly. Serial. Zeitschr d Ver Deutscher Ing—Jan. 20, 1900.

The Elementary Derivation of the Formula for Buckling (Die Elementare Ableitung der Knickformel). W. Schüle. A discussion of the formula for the resistance of columns to buckling, showing how the formula may be derived without the use of the calculus. 1000 w. Zeitschr d Ver Deutscher Ing—July 1, 1899.

The Laws of Buckling for the Most Important Materials of Construction (Die Gesetze der Knickungsfestigkeit der Technisch Wichtigsten Baustoffe). Ingenieur Paul. Formulae for the resistance of long and short pillars of various materials, based upon the recent experiments of Prof. L. v. Tetmaier, at the Zurich Polytechnic. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 27, 1896.

**Truss.**—The Resistance to Buckling in the Vertical Members of a Truss Subjected to Unequal Loading (Der Knickungs-Widderstand der Wandstabe eines Gitterträgers bei Ungleichmässiger Beanspruchung). C. J. Kriemler. A graphical and analytical solution of this important problem in statics. 2000 w. Schweizerische Bauzeitung—Feb. 26, 1898.

**BUILDING.**

See also **ARCHITECTURE; BUILDING CONSTRUCTION.**

**Brick.**—See **BRICK BUILDING.**

**Calcutta "Standard."**—The "Standard" Buildings, Calcutta. A short description of a beautiful piece of architectural engineering, with illustrations. 1300 w. Ind & East Eng—Nov. 14, 1896.

**Chemistry.**—See **CHEMISTRY—Building Aid.**

**Contract**—See **CONTRACT—Building.**

**Corner-Stone Laying.**—See **BRIDGE.**

**Giesshübl Springs.**—Competitive Designs for Buildings for the Giesshübl Springs (Entwurf für einen "Quellentempel" in Giesshübl). Description and phototype illustrations of competitive drawings for ornate buildings over the medicinal springs at Giesshübl. 3 plates. 1200 w. Wiener Bauindustrie Zeitung—July 1, 1897.

**Municipal Control.**—The Municipal Control of Buildings. G. B. Longstaff. The necessity discussed, and the buildings considered from the points of view of stability, fire, health, position and mutual relations, convenience, and beauty. Paper read before the Arch. Assn, London, with discussion. 11000 w. Builder—Nov. 30, 1895.

**Portable.**—See **PORTABLE BUILDING.**

**Pueblo.**—See **ARCHITECTURE.**

**Rotary.**—See **ROTARY BUILDING.**

**Scientific Alliance, N. Y.**—A Proposed Building for the Scientific Alliance of New York. Report of the Building Committee. Gives history of the efforts to obtain a building for use of the Alliance, and the designs submitted for the new building. Ill. 2800 w. Science—March 25, 1898.

**Specifications.**—See **SPECIFICATION—Building.**

**Stone.**—Notable Stone Buildings in New York. Barr Ferree. The first part is a finely illustrated description of the Metropolitan Club. Serial. Stone—Jan., 1896.

**Timber.**—See also **TIMBER.**

**BUILDING ACCIDENT.**

A Lesson from a Building Accident. Describes the partial collapse of a building through the failure of a brick pier. Ill. 1000 w. Br Build—Sept., 1899.

Failure of Buildings. Roger Smith. A lecture delivered in Carpenter's Hall, England. Considering why buildings fail and, to some extent how they fail. Serial. Arch, Lond—March 27, 1896.

**Govan, Scotland.**—The Govan Building Disaster. Report of the official investigation with regard to an accident to an uncompleted building in Scotland, which killed five men and injured three. 2800 w. Arch, Lond—Oct. 14, 1898.

**London, Ont.**—The London Building Disaster. An effort to determine as nearly as possible the cause of the disaster at London, Ont., by which many lives were lost. 2700 w. Arch—Feb., 1898.

**Newburg Armory.**—An Erection Accident. Describes failure of roof trusses of the State Armory building at Newberg, N. Y. 600 w. Eng Rec—April 30, 1898.

**New York.**—Fatal Collapse of Part of a Cast-Iron Column Building in New York. Description, with illustrations, of the collapse of a five-story factory building, corner of 51st street and 12th ave., with editorial. 3900 w. Eng Rec—June 12, 1897.

The Failure of the Brown Soap Factory Building in New York City. Discusses the collapse of a portion of the building at 12th Ave. and 51st street, with illustrated description of the structure, and the possible causes of the failure. 3500 w. Eng News—June 17, 1897.

**Owner's Liability.**—The Owner's Liability for Building Accidents. A statement of the law as interpreted in New York, where the owner of a building which collapsed with fatal results has been held liable for damages. 600 w. Eng Rec—March 10, 1900.

**BUILDING CODE.**

See **BUILDING INSPECTION; BUILDING LAW.**

**BUILDING CONSTRUCTION.**

See also **FIREPROOF CONSTRUCTION; FRAMED STRUCTURES; SKELETON CONSTRUCTION; STEEL CONSTRUCTION; STRUCTURAL DESIGN; TALL BUILDINGS.**

General Principles of Construction. Part first deals with materials and stability. Serial. Nat Build—Sept., 1897.

Important Problems in Construction. William W. Crehore. Considers wooden construction and load distribution. Ill. 1600 w. Br Build—Dec., 1897.

Principles of Construction for Architectural Students. E. Wyndham Tarn. Part first discusses foundations, concrete, and piling. Serial. Archt, Lond—July 6, 1900.

Some Important Problems in Construction. William W. Crehore. Discussing what should not be done; with reasons. Part first treats of the respective merits of cast iron and of built-steel columns in skeleton fire-proof construction. Ill. 1800 w. Br Build—Oct., 1897.

**Alterations.**—Alteration Work in Occupied Buildings. Illustrates the reconstruction of a front wall of sixth story of a Chicago building. 1000 w. Eng Rec—April 2, 1898.

**American.**—American Building. An extended review of a recent work by F. E. Kidder, descriptive of American practice. 3400 w. Arch, Lond—Oct. 23, 1896.

**Argentina.**—Building in the Argentine Republic. A review of the local peculiarities of design, materials, and construction, legal requirements, and customs as to building contracts. 2800 w. Builder—Sept. 3, 1898.

Released Ashlar—A Problem in Ornamentation and Building Construction. John Cotter Pelton. The paper is intended to call attention to the subject of released ashlar construction in its broad application to modern structures. The idea in the perfection of this method of construction is the minimum use of the more costly and beautiful materials, stone and marble. Ill. 6000 w. Jour Assn of Engng Soc—Jan., 1896.

**Brick and Steel Factory.**—The Advantages Claimed for Brick and Steel Factory Buildings. Describes the style of construction called "composite," and states its advantages. Examples, recently erected in Providence, R. I., by the Berlin Iron Bridge Company, meet with great favor. 1500 w. Ir Age—Dec. 19, 1895.

**Cantilever.**—The Cantilever as Applied to Building Construction. John Beverly Robinson. Pointing out the lines along which a new style of architecture may develop. Ill. 4000 w. Eng Mag—Nov., 1896.

**Classification.**—A Proposal for Classifying Builder's Work. S. Flint Clarkson. Read before the London Architectural Assn. Considers why this is desirable and suggests classes to be made. Short discussion. 2100 w. Arch, Lond—Nov. 12, 1897.

**Damp Prevention.**—Damp in Buildings: Its Prevention and Cure. John McIntosh. Calling attention to some of the necessary precautions against damp to be observed in the erection of buildings, and the remedies applicable in dealing with structures in which damp has made its appearance. Serial. Ill Car & Build—Sept. 18, 1896.

**Defects.**—Some Defects in Buildings. William O. Ludlow. Discusses some of the defects appearing in buildings and their causes, with suggestions as to what not to do. 1400 w. Stevens' Ind—Oct., 1900.

**Dome.**—See **DOME.**

**Earthquake Countries.**—Construction in Earthquake Countries. John Milne. The series is based upon building regulations and experiences from nearly every earthquake shaken country in the world, and the study of thousands of ruined buildings in Japan. Serial. Engng—July 3, 1896.

Earthquakes and Building Construction. Review of a work by John Milne, which contains chapters on buildings and materials in earthquake countries which are of much value. 2500 w. Builder—March 4, 1899.

Buildings in Earthquake Districts. Note on the proceedings of a committee to inquire into the question of the most suitable types of buildings in districts liable to earthquakes. 1800 w. Ind Engng—July 28, 1898.

Buildings in Earthquake Districts. On the contradictions of practice and anomalous conclusions drawn, due to the variety of shock which at different times and places may constitute an earthquake. 1200 w. Ind Engng—Nov. 26, 1898.

Construction in Earthquake Countries. C. A. W. Pownall. An article intended to supplement a late contribution of John Milne, in further explanation of the destruction of the bridge over the Nagara River in Japan. 2000 w. Engng—Sept. 25, 1896.

The Construction of Earthquake-Proof Modern Buildings. Report of Earthquake Investigation Committee, Japan. Ill. 1400 w. Am Arch—Sept. 1, 1900.

Lescasse on Building in Regard to Earthquakes. Part first gives a description of the Japanese building system, with criticisms. Serial. Ind Engng—Jan. 28, 1899.

**Estimating.**—Estimating. John Lyman Faxon. Gives illustrations of estimating and discusses the proper basis. 2000 w. Br Build—Oct., 1899.

**French Civil Engineers' House.**—New Methods of Building Construction at Paris. From the "Building News." Detailed description of the system employed in the construction of the building for the Society of Civil Engineers of France. 1600 w. Sci Am Sup—Sept. 26, 1896.

**Greek vs. Roman.**—Extract from a pamphlet entitled "Prologmenos on the Function of Masonry in Modern Architectural Structures," by R. Guastavino, architect, New York. 1600 w. Arch, Lond—June 12, 1896.

**Home Insurance, N. Y.**—Reconstruction of the Home Insurance Building, N. Y. Illustrated description of the methods employed in reconstructing portions of a high office building damaged by fire. 2000 w. Eng Rec—Feb. 11, 1899.

**House.**—In the Cause of Intelligent House-Building. Suggestions for the improvement of building construction, the securing of better ventilation, and other details. 2000 w. Jour Gas Lgt—Feb. 20, 1900.

**Hygienic House.**—A Remarkable House. Illustrated description of a dwelling devised by Dr. W. Van der Heyden, and built in Yokohama. It is constructed to shield the inmates from extremes of temperature, for economy in the use of fuel, protection against earthquakes and perfect sanitation. 2500 w. Engng—Oct. 16, 1896.

**Iron.**—A Topical Discussion—Durability of Iron in Modern Building Construction Processes. Investigations, experiences and suggestions. 9500 w. Pro Eng's Club of Phila—July, Oct., 1895.

Iron Construction and Erection of Tremont Temple. C. H. Blackall. Detailed illustrated description. 3200 w. Eng Rec—Dec. 28, 1895.

See also **STEEL CONSTRUCTION—Durability.**

**Iron and Steel.**—Iron and Steel for Building Structures. The use of iron and steel in building is exemplified by brief and general illustrated descriptions of numerous tall buildings in American cities. 2300 w. Ir & Coal Tr Rev—Dec. 13, 1895.

**Iron and Wood Framing.**—Combined Iron and Wood Framing of a Dwelling. A drawing showing a method sometimes employed in France. 500 w. Eng Rec—Jan. 11, 1896.

**Joints.**—Joints and Joinery. Fred T. Hodson. Illustrates and describes various kinds of joints. Serial. Arch & Builds' Mag—Aug., 1900.

**Joists, Spans.**—Safe Spans for Wooden Floor Joists, Ceiling Joists, and Rafters in Buildings. F. E. Kidder. Tables showing the size of wooden joist to be used with the ordinary method of framing, with remarks. 800 w. Arch & Build—Oct. 17, 1896.

**Kansas City.**—Rebuilding the Kansas City Convention Hall. Illustrated description of the methods adopted in erecting with unusual rapidity the 187-ft. arch trusses of this building. 800 w. Eng Rec—June 23, 1900.

**Lifting Girder.**—See **GIRDER—Lifting Four Stories.**

**Manhattan Bank.**—Reconstruction of the Manhattan Bank Building. Illustrated description of the repairs and strengthening of an office building seriously damaged by fire. Describes the strengthening of the foundations, re-enforcement of columns, and construction of fireproof floors. 1000 w. Eng Rec—Feb. 3, 1900.

**Oxford.**—The Buildings at Oxford, From an Engineer's Point of View. J. W. Parry. An exceedingly interesting illustrated description of the ancient buildings of the various colleges of Oxford, with many curious details of construction methods, showing the expedients of architects and engineers before the invention of many of the present building methods and materials. 5000 w. Eng Mag—Dec., 1898.

The Buildings at Oxford from an Engineer's Point of View. J. W. Parry. A very interesting description of some of the ancient buildings at Oxford, giving many details of construction and showing numerous engineering expedients resorted to by their builders before the day of steam or jacks. The structural details of the Radcliffe Library are especially interesting. 4400 w. Eng Mag—Jan., 1899.

**Paris Exposition.**—See **BRIDGE ERECTION—France; PARIS EXPOSITION—Building Construction.**

**Permanence.**—Ephemeral Construction Editorial on the evidence of real permanence in construction being sought in architectural work, and of great activity in this field. 1200 w. Br Build—April, 1898.

**Repairs.**—Repairing Buildings. Illustrated description of the repairs of a 3-story building, leaning seriously, and of the removal of iron columns and reconstruction of trusses in a 4-story building 68 ft. wide and 100 ft. long. 1000 w. Eng Rec—Oct. 22, 1898.

**Roman.**—Roman Construction. G. W. Percy. Describes and illustrates methods employed by Roman builders in constructing vaults and arches. Discussion. 4500 w. Jour Assn of Engng Soc's—Oct., 1898.

**See also Greek vs. Roman.**

**Sanitary.**—Abstract of the third lecture of a series being given by Banister Fletcher, at Carpenter's Hall to students and clerks of works. 2500 w. Arch, Lond—Nov. 22, 1895.

Building Construction and Public Health. Peter Fyfe. Extract from an address under the auspices of the Glasgow Master Wrights' Assn. 1400 w. Arch, Lond—Nov. 5, 1897.

Building Construction in Relation to the Public Health. Peter Fyfe. Principally confined to the work of the carpenter and joiner, discussing how the leading principles and sanitation should be applied. Also editorial. 7000 w. San Rec—Dec. 10, 1897.

House Building from a Surgeon's Standpoint. H. C. Wyman. Describes some things in badly constructed houses that interfere with the health of the inmates. 3700 w. Dom Engng—Oct. 15, 1900.

See also **PLUMBING; SANITARY ENGINEERING.**

**Schneider Pavilion.**—See **PARIS EXPOSITION.**

**Schuchof System.**—See **EXPOSITION—Nijni Novgorod.**

**Statics.**—Statics of Structures—Theoretical and Applied. O. F. Semsch. An investigation of the conditions under which the forces acting upon any body will be in equilibrium. Part first treats of the simple beam with uniform load. 2000 w. Am Arch—Dec. 5, 1896.

**Steel.**—Probable Increase of Steel Construction. Showing the advantages in fire protection, reduction in cost and improvement in materials which make probable the adoption of steel in residence building. 2000 w. Arch & Build—Sept. 17, 1898.

**Tower Derrick.**—A Traveling Building Erection Tower. Illustrates a tower derrick with special features, used on many high buildings in New York. 800 w. Eng Rec—April 23, 1898.

**Waldorf Hotel.**—See **TRUSS—Waldorf Hotel.**

### BUILDING EXHIBIT.

**Berlin Exposition, 1896.**—Notes on the Building Exhibits at the Berlin Technical Exposition of 1896 (Der Hochbau auf der Berliner Gewerbe-Austellung, 1896). Heinrich Koechlin. A brief notice of the exposition, followed by a review of the building trades exhibits, mainly of interior details. An account of the compressed air apparatus for removing the sewage from the exhibition is also given. 12000 w. Oesterr Monat f d Oeffent Baudienst—Dec., 1896.

### BUILDING INSPECTION.

How Can Better Building Inspection be Secured? Editorial suggested by a recent collapse of a building under construction in New York City. Outlines a plan for the improvement of the character of buildings. 1400 w. Eng News—Oct. 1, 1896.

The Inspection of Buildings. Benjamin Franklin. Enumerates some points causing embarrassment in the application of the Building Inspection Law of 1893, and some of the instructive and interesting results from different methods and materials, with other information. Ill. 6000 w. Pro of Engs Club of Phila—March, 1898.

**Boston.**—The Building Department of Boston, Mass. A statement of the results of an investigation by a special committee representing the local master builders, fire underwriters, architects and real estate dealers, into the manner in which the building laws of Boston are enforced. 2300 w. Eng Rec—July 8, 1899.

**New York.**—Building Inspection in New York City. An instance of a building showing designs of weakness is given, that having been strengthened by experienced contractors, proved on inspection, to be worse than at first. Cited as a proof of the necessity of inspection work. 500 w. Eng Rec—July 24, 1897.

### BUILDING INSPECTORS.

**Examination.**—Civil Service Examination for Building Inspectors. The questions of technical character used at the late examinations for building inspectors, both for iron and steel work and for the general inspection of buildings. 1800 w. Arch & Build—April 4, 1896.

### BUILDING LAW.

**See also BUILDING—Municipal Control.**

The Enforcement of Building Laws. Osborne Howes. Read before the Detroit convention of Building Commissioners and Inspectors. Suggests that the board of underwriters of a city impose a penal charge of double rates upon buildings put up in defiance of a building law. 900 w. Arch & Build—Jan. 15, 1898.

**Breslau.**—Construction of Streets and Buildings in Breslau. Concerning the strictly enforced law regulating the construction of houses and streets, giving some of the requirements. 1000 w. U. S. Cons Repts, No. 530—Sept. 16, 1899.

**British.**—Building By-Laws and Their Administration. W. Henman. Read at meeting of the Royal Inst. of British Archts. A discussion of affairs outside of London, and the annoyances and irritations to architects in consequence of existing evils. Discussion. 2600 w. Builder—Dec. 17, 1898.

**Buffalo.**—The Buffalo, N. Y., Building Ordinance. Extracts from the new building law of named city with adverse editorial criticism. 3500 w. Eng Rec—July 11, 1896.

**Edinburgh.**—Building Rules of Edinburgh. A copy of the regulations governing the erection of buildings in this city. 1200 w. Arch, Lond—Feb. 3, 1899.

The Supervision and Regulation of Building Operations, as exercised by the Edinburgh Dean of Guild Court. David Lyon. A brief account of the origin and nature of this Court, its present form, its jurisdiction and functions. Serial. Arch, Lond—Feb. 3, 1899.

**London.**—The London Building Act and the Official Supervision of Buildings. W. Weaver. Read at meeting of the Surveyors' Inst., London. Discusses the act and the manner in which it is enforced, also the desirability of adopting the system prevailing under the Public Health Act in the provincial towns of England. 6000 w. Builder—Dec. 17, 1898.

**New York.**—Structural Regulations of the New York Building Law. Extracts from the new law modifying the previous requirements concerning the quality of materials, foundation, fire-proofing, iron and steel construction, floor loads, and the calculation of the strength of materials. 5800 w. Eng Rec—Sept. 16, 1899.

The Proposed New Building Code for New York City. Extracts from the sections which are of most interest to engineers, with other information bearing on the ordinance. 5500 w. Eng News Sept. 14, 1899.

### BUILDING MATERIAL.

See also **BRICK; BROWNSTONE; FIREPROOF CONSTRUCTION; IRON; SANDSTONE; STEEL; STONE; TERRA-COTTA; WOOD.**

**Architecture.**—See **ARCHITECTURE—Material.**

**Asbestic and Petrifite.**—Some New Building Materials. H. D. Searles Wood. Read at meeting of the Architectural Assn., London. Deals with asbestic and petrifite. 2400 w. Arch, Lond—Nov. 12, 1897.

**Austrian Country.**—Materials of Construction for Farm and Country Buildings (Bedeutung und Entwickelung des Landwirthschaftlichen Bauwesens). Prof. August Prokop. Various tables containing a large number of data concerning materials ordinarily met with in country districts in Austria. Serial. Wiener Bauind Zeit—April 5, 1900.

**Brick vs. Wood.**—Brick versus Wood. R. Clipston Sturgis. The writer proposes to treat briefly, first, the advantages of brick over wood; second, the adaptability of brick to all circumstances of climate and all classes of buildings; and third, a consideration of the means for promoting the more general use of brick. Serial. Br Build—July, 1897.

**Ceramic.**—See **CERAMIC INDUSTRY.**

**Clay.**—See **CLAY.**

**Durability.**—The Durability of Buildings and their Parts (Bestanddauer von Objecten und Objectstheilen). Prof. J. Röttinger. A long continued article on the age of buildings and the causes which affect their endurance. Partly theoretical, partly giving results of experience. Serial. 1st part. 1400 w. Wiener Bauindustrie Zeitung—June 28, 1900.

**Gesso.**—Gesso. Matthew Webb. Read before the Applied Art Section, Society of Arts. Explains the distinction between gesso and stucco and touches also on stucco works, the composition of gesso and treatment. Serial. Arch, Lond—March 5, 1897.

**Hollow Blocks.**—Hollow Blocks. A. T. Griffin. Setting forth the advantages of hollow terra-cotta building blocks. 1800 w. Brick—Feb., 1896.

Hollow Block Building vs. Frame. M. W. Lauer. The writer believes a hollow-block house far ahead of frame from all points of argument; but regrets the limit of the material as now manufactured, the range of molds making it impossible to carry out the architect's designs. 1700 w. Brick—Feb., 1899.

Hollow Building Blocks. Ed. F. Darnell. The author recommends hollow blocks throughout the building, outside walls included and gives an example. Compression tests are also given. 2700 w. Clay Rec—Feb. 26, 1896.

See also **FIREPROOF CONSTRUCTION.**

**Hollow Bricks.**—Walls and Ceilings of Hollow Bricks of Cement and Plaster (Wände und Decken aus Cement und Gyps-Hohltafeln). A review of Continental practice, with data concerning loads and sustaining power. Two articles. 5000 w. Wiener Bauindustrie Zeitung—April 15 & 22, 1897.

Use and Advantages of Hollow Brick. J. M. Mamer. Sets forth many advantages, and discusses means of introducing; gives results of tests and brief discussion. 2500 w. Brick—Feb., 1897.

**Iron.**—See also **IRON; IRONWORK.**

**Ironmongery.**—Builders' Ironmongery. Part first considers the branches into which the trade may be divided. The first of a series of articles aiming to help builders who feel the need of assistance. Serial. Ill Car & Build—Oct. 2, 1896.

**Metal Corrosion.**—See **METAL CORROSION.**

**Ornamental Blocks.**—Ornamented Building Blocks. E. G. Durant. Describes the making of these blocks, and tells how they came to be introduced. 1100 w. Brick—Jan., 1897.

**Paris Exposition.**—The Paris Exposition. Notes on Materials of Construction. Accounts of a great variety of exhibits of building materials. 3000 w. Builder—Sept. 8, 1900.

**Sandstone.**—See **SANDSTONE.**

**Stone.**—See also **STONE.**

**Stone, Cement, etc.**—Notes on Bedford Stone, Louisville Cement and Other Things. A symposium of information gathered on an excursion to these industries, followed by discussion. 1650 w. Jour of W Soc of Engs—Oct., 1896.

**Testing Apparatus.**—The Nivet Apparatus for Testing Building Materials. From "La Nature." Illustrated description of an apparatus for testing building materials (other than metals) that seems to be destined to render valuable service. 2000 w. Sci Am—Aug. 15, 1896.

**U. S. Government Tests.**—Government Tests of Building Materials. Report of important tests of building materials made at the Watertown Arsenal, Mass., with the two principal objects of ascertaining the strength and acquiring a knowledge of the durability. Serial. So Arch—Aug., 1896.

**Victorian Age.**—Building and Building Material During the Reign of Queen Victoria. A review of the transformations in building material which have marked the reign. 4300 w. Ill Car & Build—June 18, 1897.

Raising and Moving Large Buildings. Illustrates and describes two pieces of difficult work. The first, the removal of the town hall at Washington, Pa.; the second, the reconstruction of the lower portion of the Mandel Building, Chicago. 1000 w. Eng News—June 1, 1899.

### BUILDING MOVING.

**Brick.**—Moving a Railroad Building at Frodsham. England. Describes the moving of a brick structure at a cost of five cents per cu. ft. 1200 w. Eng Rec—June 11, 1898.

**Brick Block.**—Moving a Five Story Brick Block. Illustrated description of the moving of a 5-story 100 x 65 ft. brick block, weighing 3000 tons, a distance of 110 ft. 1100 w. Eng Rec—Dec. 17, 1898.

**Church.**—A Notable Church Moving Operation. Illustrated description from "Carpenter and Building." The moving of a large stone church with a high tower, all of the most massive construction, in Chicago. 1200 w. Ir Age—Jan. 9, 1896.

Moving a Stone Church Building in Chicago. The building weighed 6652 tons, and was 225 ft. high to top of spire. It was removed 510 ft. successfully. 1200 w. Eng News—Feb. 6, 1896.

**Paris.**—Moving an Iron Building in Paris. Describes the method employed in moving the framework of a 98 x 492 ft. building a distance of about 850 ft. Eng Rec—April 8, 1899.

**Paris Exposition.**—Moving the 30-Metre Gallery of the Champ-de-Mars (Déplacement de la Gallerie de 30 mètres au Champ-de-Mars). Ch. Dantin. Illustrated description of the method used in moving the large steel framework of one of the old exposition building to a new site. 3000 w. Génie Civil—Dec. 17, 1898.

### BULKHEAD.

See also **BREAKWATER; HARBOR IMPROVEMENT; PIER; RIVER REGULATION; SHORE PROTECTION.**

Beam Formula Applied to a Vertically Stiffened Bulkhead, with Some Results. H. F. Norton. A mathematical analysis. Plate. 3500 w. Soc of Nav Archts & Marine Engs, No. 6—Nov., 1899.

Marine Registry Rules for Watertight Bulkheads in Mail and Passenger Steamers (Vorschriften der Seeberufsgenossenschaft über Wasserdichte Schotte für Post- und Passagierdampfer). A paper by Herr Middendorf, discussing the method of determining the number and location of watertight bulkheads, with many illustrations and working diagrams. The official method of the German Lloyds. Two articles. 1 plate. 12000 w. Zeitschr d Ver Deutscher Ing—May 29, June 5, 1897.

Watertight Bulkheads for Vessels (Ueber die Wichtigkeit der Wasserdichten Schattwände auf den Schiffen). An abstract of Middendorf's paper giving the theory and proper practice for the location of bulkheads in vessels. 7000 w. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1897.

**Battleship.**—Test of the Bulkhead Separating the Engine Rooms of the Battleship "Illinois." J. J. Woodward. Abstract of a paper read at meeting of the Soc. of Naval Archts. and Marine Engs. Describes the three tests made, giving results. Ill. 3300 w. Eng News—Nov. 17, 1898.

Test of the Strength of a Longitudinal Bulkhead Separating two Engine Rooms. J. J. Woodward. With description of the bulkhead construction of the U. S. S. "Kearsarge," "Kentucky" and "Illinois," and an account of the tests. 4500 w. 4 plates. Trans Soc N A & M E—1898.

**New York.**—The Bulkhead Walls of New York. Standard sections of bulkhead retaining walls built on mud and on rock bottoms. The Board of Construction Engineers think it an excellent and satisfactory solution of a very difficult problem. 400 w. R R Gaz—Feb. 21, 1896.

**Philadelphia.**—Delaware Avenue Bulkhead, Philadelphia. Description, with illustrations of the general features of the standard sections of timber and concrete work. 1600 w. Eng Rec—Aug. 21, 1897.

The New Delaware River Bulkhead at Philadelphia, Pa. Describes the method of work contemplated, giving illustrations. 900 w. Eng News—Dec. 9, 1897.

**BULKHEAD DOOR.**

Water-Tight Doors and Their Danger to Modern Fighting Ships. Lord Charles Beresford. Paper read before the Institution of Naval Architects. Points out dangers attending present practice, and proposes remedies. These relate to the abolition of some of the water-tight doors, and the modification of others in respect to their size and their position in bulkheads. 3000 w. Engng—March 27, 1896.

Water-Tight Doors. N. Soliani. Paper read before the Institution of Naval Architects. Deals with dangers resulting from their use and suggests improvements in present methods. The danger is that such doors will be left open, and the reason they are so left is the difficulty in opening and shutting them. A method is proposed for the instantaneous opening or shutting of such doors by simply reversing an electric contact. Illustrated description of details is presented. 3000 w. Engng—March 27, 1896.

**Cowles.**—The Cowles System of Water-Tight Bulkhead Doors for the U. S. Cruiser "Chicago." The two methods of central control, known as the "double line" and the "single line" systems, are described; the latter being the one employed on the "Chicago." Ill. 1200 w. Eng News—Aug. 18, 1898.

See also **CRUISER—"Chicago."**

**BULLETS.**

**Explosive Effects.**—The Causes of the Explosive Effect of Modern Small Calibre Bullets. Charles E. Woodruff. Part first explains vibrations and their effects, and attributes the explosive effect to the capability or incapability of the tissues to transmit these wave motions. 3800 w. Sci Am Sup—July 2, 1898.

**BULLION.**

See also **ASSAYING; MINT.**

**Separation.**—Separation of Gold and Silver from Low-Grade Bullion. F. Gutzkow. Describes the writer's process of parting doré silver as adapted to the treatment of coppery silver bullion. 1700 w. Eng & Min Jour—April 17, 1897.

The Separation of Gold and Silver in the Mint. Howard Lee Davis. Describes the nitric-acid, and the sulphuric-acid methods. 2300 w. Yale Sci M—Dec., 1897.

**BUMPING POSTS.**

**Concrete.**—Concrete Bumping Posts, C. R. I. & P. Ry. Describes and illustrates a superior post consisting of a concrete pier 10 ft. long, 4½ ft. wide, and 9 ft. deep, reaching 4 ft. below the surface. 500 w. Ry & Engng Rev—Sept. 9, 1899.

**BUNGALOWS.**

Indian Bungalows. Plans of typical bungalows, describing and pointing out defects in arrangement, insanitary conditions, etc. 3800 w. Ind & East Engr—Oct., 1898.

**BUNSEN BURNER.**

**Lecomte.**—The Lecomte System of Bunsen Burner Construction. On the work of M. A. Lecomte in this field. His low-pressure economical Bunsen burner received recently a prize of 500 frs. 2000 w. Jour Gas Lgt—Dec. 27, 1898.

**BUOY.**

**Electric.**—See also **BUOY—Wave Power.**

**Electric Bell.**—New Electric Bell Buoy in Boston Harbor. Illustrated description of three buoys placed along the deep-water channel in Boston harbor. They are connected with and generated from Castle Island. The principles are explained. 1400 w. Elec Eng—Dec. 30, 1896.

Electric Gong Buoys—Audible versus Visual Signals. F. A. Hamilton. Read at convention of the Maritime Electrical Assn. Illustrated description of a system for utilizing electricity for facilitating navigation, explaining the details of the proposed method. 2400 w. Can Elec News—Oct., 1898.

**Electric Light.**—Inaccessible Maritime Lights. Elmer Laurence Corthell. Abstract of a paper promised in an early issue of "Sci. Am. Sup." Gives a well illustrated account of the system of electric light buoys used in the entrance to N. Y. harbor. 1500 w. Sci Am—March 14, 1896.

**Gas Light and Bell.**—Combined Gas Light and Bell Buoy. Robert M. Dixon. Illustrates and describes a device invented by the writer. 700 w. Stevens Ind—Jan., 1900.

**Life.**—See **LIFE BUOY.**

**Wave-Power.**—Morley Fletcher's Wave-Power Electric Buoy. Describes and illustrates a beacon light, and launch-changing buoy. Terminals are provided at the side of the buoy, so that an electrical launch may be moored and receive its charge of electrical energy when desired. 1600 w. Ind & Ir—Feb. 4, 1898.

**BURNER.**

**Argand.**—See **GAS BURNER.**

**Bunsen.**—See **BUNSEN BURNER.**

**Gas.**—See **GAS BURNER; GAS LIGHTING.**

**Incandescent Gas.**—See **INCANDESCENT GAS LIGHTING.**

**BURNISHING.**

Burnished Finish for Journals and Plain Surfaces. On the advantages of the roller finish and the practice of various roads. Ill. 1800 w. Am Eng and R R Jour—May, 1899.

**BUSHES.**

**Fitting.**—Fitting Brass Bushes. F. H. Directions for the turning and insertion of bushes, and the care necessary with the larger sizes. Ill. 1500 w. Mech Wld—Dec. 23, 1898.

**Stripping.**—The Stripping of Bushes. Customary practice, with suggestions for special cases. 900 w. Prac Eng—Nov. 27, 1896.

**Locomotive Cylinder.**—Bushing a Locomotive Cylinder. General description of the work, with illustrations. 1500 w. Mach, N. Y.—Feb., 1900.

**BY-PRODUCTS.**

The Recovery of By-Products. Editorial on the changed conditions which make it doubtful whether the recovery of many of these waste products will pay. 1600 w. Engng—Jan. 6, 1898.

See also under specific heads.

**BYTHIUM.**

See **ELECTRO-CHEMISTRY—Sulphur.**

## C

### CABLE.

See also **WIRE ROPE.**

Improvements in the Application of Cables for Power Transmission and Hoisting (Neueres auf dem Gebiete der Herstellung und Anwendung von Seilen für Kraftübertragungen und Hebezeuge). Dr. K. Keller. Mainly devoted to the most efficient forms of grooves for sheaves, and methods of twisting cables. 4000 w. Zeitschr d Ver Deutscher Ing—April 2, 1898.

**East River Bridge Specifications.**—The Last Suspension Cable Specifications. The requirements for the steel wire and workmanship for the four cables of the new East River bridge, New York. 2000 w. Eng Rec—Nov. 18, 1899.

**Electric.**—See **ELECTRIC CABLE.**

**Steel Wire.**—Notes on the Life of Steel Wire Cables. Frank Soulé. An account of tests to be made by E. H. Benjamin, to determine the effects of rust, age, wear and tear, shocks, etc. 700 w. Trans Am Inst of Min Engs—Sept., 1899.

**Submarine.**—See **SUBMARINE CABLE.**

**Telephone.**—See **ELECTRIC CABLE—Telephone.**

**Test.**—Tension Test of a Wire Cable of 90 mm. Diameter (Prüfung eines Drahtseiles von 90 mm. Durchmesser auf Zugfestigkeit). Prof. A. Martens. An interesting account of the test of this heavy cable, with photographic views of the machine and arrangements. 1800 w. Mitt aus d Kgl Tech Versuchsanstalt—Part 2, 1898.

**Transportation.**—Novel Method of Cable Carrying. An illustrated account, from the "Journal" of Telluride, Colo., of 12000 feet of tramway cable packed on mules. 350 w. Min & Sci Pr—Aug. 7, 1897.

**Venesuela.**—Contract for Cables in Venesuela. Copy of a contract for the construction of steel cables between Valencia and other towns for the transportation of merchandise. 700 w. Cons Repts—March 23, 1898.

### CABLE GRIP.

**Decauville Cars.**—Cable Grip for Decauville Cars (Grip à Machoires sur Waggonets Decauville). Showing details of cable grip for small tipping cars used on the Decauville system of narrow gauge industrial railways. 1 plate. 1200 w. Génie Civil—July 10, 1897.

### CABLE RAILWAY.

See also **MOUNTAIN RAILWAY.**

**Brixton.**—Brixton Cable Tramway. The largest cable road in Great Britain. The plant and equipment are fully described and illustrated. 400 w. Ry Wld—Jan. 6, 1896.

**Brooklyn Bridge.**—The Bridge Transportation System Between New York and Brooklyn. Full illustrated description, including engineering features, conditions of traffic, operation of cable railway, adoption of electricity, terminal facilities, and financial results. 4700 w. St Ry Jour—Feb., 1897.

**Construction, Chicago.**—A Problem in Street Railway Construction. The problem was connected with the change of cable road location (due to an extension of the stock yards) without interfering with regular traffic on the old line at any change point. 1600 w. St Ry Rev—May 15, 1896.

**Counterweight System.**—Counterweight System in St. Paul. Illustrates and describes the system invented by M. H. Bronsdon, which is being installed to replace that part of the cable railway known as Selby Hill. 1500 w. St Ry Rev—May 15, 1898.

Counterweight System at Providence, R. I. M. H. Bronsdon. The application of the system to a difficult case is illustrated by plans, photographs, and explanatory text. 700 w. St Ry Rev—April 15, 1896.

The Morgan Park Counterweight System. Illustrated description of various applications of this system. 2700 w. Ry Rev—May 22, 1897.

**"Dead Man's Curve," New York.**—"Dead Man's Curve." A discussion of means to overcome the danger at the corner of Fourteenth Street and Broadway, New York. Recommends the changing of motive power from cable to electricity. 1000 w. Elec Wld—March 6, 1897.

**Edinburgh.**—Conversion of the Edinburgh Horse Tramway System into Cable Traction. W. N. Colam. States the conditions under which these lines have been compelled to operate, and shows that though they are unfavorable the results have been very satisfactory. Gives reasons for adopting the cable system, and description. 5300 w. St Ry Jour—Sept., 1898.

The Cable Tramway System of Edinburgh. A comprehensive illustrated description of an installation having many improvements and interesting features. 10000 w. Tram & Ry Wld—March 8, 1900.

The Cabling of Edinburgh Tramways. Information as to the extent and nature of the scheme for changing most of the horse tramways to the cable system. Serial. Ry Wld—Jan., 1897.

The Progress of Cable Construction in Edinburgh. Points brought into view during the conversion of the tramways to the cable system. Ill. 3300 w. Ry Wld—Nov., 1897.

**Electric.**—Cable Line Operated by Electric Motor. Charles Grover. Describes and illustrates the motor-driven cable plant at Kansas City, Mo., and shows the economy resulting from change of power from steam to electricity. 1200 w. St Ry Wld—Oct. 15, 1897.

System of Cable Traction, Mollard & Dulac (Systeme de Remorguage Funiculaire, Mollard et Dulac). A combined cable and electric trolley system, by means of which electric cars carry a grip and are hauled up steep inclines by continuous running cable. 7000 w. La Rev Tech—Feb. 25, 1897.

**Electric Compared.**—Mechanical Haulage. J. Sturgeon. Read before the Tramway Inst. of Great Britain and Ireland. A discussion of traction by adhesion and by haulage, strongly favoring cable as against electric traction. Serial. Eng, Lond—Aug. 14, 1896.

See also **ELECTRIC RAILWAY—Cable Railway.**

**Finance, United States.**—See **ELECTRIC TRAMWAY.**

**Glasgow.**—See **UNDERGROUND RAILWAY.**

**Inclined.**—Inclined Plane Railways and Ropes. Samuel Diescher. Read at meeting of Engs. Soc. of W. Penn. Describes these railways and their operation and discusses the deterioration of the wire ropes used. The history of a set of ropes is given. 5500 w. St Ry Jour—Feb., 1897.

**Isle of Man.**—Cable Traction in the Isle of Man. Illustrated description of the installation equipment and operation of the Upper Douglas Tramway, with many details. 2400 w. Ry Wld—Oct., 1896.

**Mont Dore, France.**—Mont Dore Electrically Driven Cable Railway (Funiculaire du Mont Dore. Transport de Force par Courant Triphasé). Illustrated detailed description of an interesting mountain railway in France. The cars are operated by an electric motor, power being derived from a neighboring waterfall. A large plate of detail drawings accompanies the article. 4000 w. La Rev Tech—Nov. 10, 1898.

The Electrically-Driven Mountain Rope Railway at Mont Dore. Translation of an article in "Elektrotechnische Zeitschrift." Describes a railway said to be the only example of its kind in Europe. 1500 w. Elec Eng, Lond—March 31, 1899.

The Electric Cable Road at Mont Dore (Die Elektrisch Betriebene Seilbergbahn in Mont Dore). A three-phase current operates a motor which hauls the cars to the top of the incline by a cable. The power is derived from a hydraulic station in the valley 1¼ miles distant. 2000 w. Elektrotech Zeitschr—Feb. 23, 1899.

The Tri-Phase Electric Cable Road on Mont Dore, France (Die mit Dreiphasen Strom Elektrisch Betriebene Seilbahn auf den Mont Dore in Frankreich). E. A. Ziffer. A paper describing this cable road, said to be the only one in Europe worked by tri-phase currents. 2500 w. Mitt d Ver f d Förd d Local u Strassenbahnwesens—July, 1900.

**Montmartre, Paris.**—The Funicular Railway of Montmartre at Paris (Le Funiculaire de Montmartre à Paris). J. Laverchière. An illustrated account of the inclined cable railway up Montmartre, in Paris. 2000 w. Génie Civil—Aug. 11, 1900.

**Morgan Park.**—See **Counterweight System.**

**New York.**—The Lexington Avenue System of the

Metropolitan Street Railway Company, New York. This line was put in operation on Oct. 13. Its present length is about four and three-fourths miles, though it will be extended later to about six miles. The road, which is now run by cable, will ultimately be equipped with the underground electric conduit system. Ill. 3000 w. St Ry Jour—Dec., 1895.

See also **ELECTRIC CONDUIT TRAMWAY—New York.**

**Polyphase Electric.**—See **Mont Dore, France.**

**Power Station.**—The Equipment of the Broadway Power Station of the New York City Cable Railroad System. Stuart Thomson. General description. 2400 w. Safety V—Nov., 1895.

**Providence, R. I.**—See **Counterweight System.**

**St. Paul.**—See **Counterweight System.**

**Swansea, Wales.**—Swansea Constitution Hill Tramway. Illustrates and describes an interesting little cable tramway, where the cable is not continuous, but is attached at either end to a car. 1000 w. Tram & Ry Wld—Nov. 2, 1899.

**Swiss Mountain.**—Note on the Swiss Funicular Railways (Note sur les Chemins der Fer Funiculaires Suisses). General description, with very complete table of the Swiss cable roads for ascending steep mountain inclines. 1800 w. La Rev Tech—July 25, 1898.

**United States.**—See also **ELECTRIC TRAMWAY—United States.**

**Working Expenses.**—See **ELECTRIC TRAMWAY.**

## CABLE SHIP.

See also **SUBMARINE CABLE; SUBMARINE TELEGRAPH.**

Cable Repair Ships of the World and Their Work. Gustav Heinsohn. An illustrated historical account of what has been accomplished in this field, the difficulties overcome, and many points of interest. 2800 w. Ind Rub Wld—Jan. 10, 1896.

**"Hooker."**—The United States Cable Ship "Hooker." Brief description, with illustration, of the ship that will lay cables between the Philippine Islands. 700 w. Elec Rev, N. Y.—April 26, 1899.

**Japanese.**—Gear for Japanese Submarine Cable Steamer. Illustrated description of a combined picking-up and paying-out gear for the new submarine cable laying vessel of the Japanese Government. 900 w. Elec Rev, Lond—April 17, 1896.

**"Mackay-Bennett."**—Repair steamer "Mackay-Bennett." Illustrated description of a fine steamer owned by the Commercial Cable Co. 1500 w. Sci Am—Dec. 28, 1895.

**New Zealand.**—The Cable Ship "Tutanekai." Illustrated detailed description of a vessel designed for use in repairing the New Zealand Government cables. 800 w. Elec Rev, Lond—Aug. 21, 1896.

**"Podbielski."**—Germany's First Cable-Laying Steamer. Illustrated detailed description of the "Von Podbielski." 2200 w. Sci Am Sup—Sept. 8, 1900.

The Cable-Laying Ship "Von Podbielski" (Le "Von Podbielski" Navire Poseur de Câbles). A brief general description of this German cable ship, built at Port Glasgow, with illustrations. 800 w. Génie Civil—April 28, 1900.

The Cable-Laying Steamer "Von Podbielski." Illustrated description of Germany's first cable-laying steamer, and its equipment. 3000 w. Engng—June 22, 1900.

The First German Cable Steamer, "Von Podbielski" (Der Erste Deutsche Kabeldampfer "Von Podbielski"). Joh. Schütte. An illustrated description of this new cable-laying steamer and her engines. 1800 w. Zeitschr d Ver Deutscher Ing—June 9, 1900.

The New Cable-Ship "Von Podbielski." Describes a ship owned by Germany, recently launched at Port Glasgow. 2000 w. Elect'n, Lond—Nov. 17, 1899.

See also **SUBMARINE CABLE—Commerce.**

**"Portena."**—The French Cable Steamer "Portena." Description of the third cable steamer built by Messrs. Johnson & Phillips for the Compagnie Française des Cables Télégraphiques. 1800 w. Elect'n—April 2, 1897.

## CABLE TRAMWAY.

See **CABLE RAILWAY.**

## CABLEWAY.

See also **COAL HANDLING; CONVEYER; MECHANICAL HANDLING.**

Aerial Tramways. W. R. Shaw. General considerations relating to rope conveyers, and a list of some of the most interesting lines. 2200 w. Ind & East Eng—July 11, 1896.

Cableway Transportation and its Applications to Agriculture, Industry and Construction (Transports par Cables Aeriens et leurs Applications à l'Agriculture, à l'Industrie, et aux Constructions). A paper read before the society of civil engineers of France by M. Thiéry showing the economical advantages of cableways, with reference to successful installations in France and in the United States. 2000 w. Moniteur Industriel—March 12, 1898.

Wire-Rope Transportation. Illustrated brief description of the two general classes of these aerial ropeways, and their advantages. 700 w. Ir & Coal Trds Rev—July 2, 1897.

Wire Tramways. W. R. Shaw. States some of the advantages, the cost of construction, uses, etc., and gives details of tramways now working in various parts of the world. Serial. Ind & East Engr—Sept., 1899.

**Barzy.**—Cableway for Transportation of Millstone (Chemin de Fer Aérien pour le Transport de Pierres Meulières). An account of the overhead cableway at Barzy. The distance is 3550 feet, with a difference in level of 456 feet; 3000 tons of stone are transported in 10 hours. 2500 w. La Rev Tech—May 25, 1897.

**Blast Furnace Supply.**—"Otto" Wire Rope Tramway at a German Steel Works. Illustrated description of a rope tramway at the Hoesch Iron and Steel Works, Dortmund, for conveying coke to the blast furnaces. 800 w. Col Guard—Oct. 12, 1900.

**British Columbia.**—Aerial Tramways in British Columbia. B. C. Riblet. An account of the building and operation of aerial tramways in West Kootenay. 1500 w. Can Min Rev—Sept., 1899.

**Chilkoot Pass, Alaska.**—A Cableway Over Chilkoot Pass. Details of this work furnished by the Trenton Iron Co., of Trenton, N. J. 700 w. R R Gaz—Dec. 24, 1897.

Building the Tramway Over Chilkoot Pass. W. A. Burkholder. States the conditions under which this aerial tramway was constructed, giving illustrated description of the D.-K. T. Co.'s tramway. 1500 w. Jour of Elec—Sept., 1898.

Overhead Tramways. Henry Wysham Lanier. An interesting illustrated account of the wire ropeway construction for getting into the gold regions of the Yukon basin. 2500 w. Chau—Aug., 1898.

**Coaling at Sea.**—See **COALING AT SEA.**

**Colombia.**—Aërial Railway in Colombia. Translated copy of the contract for the construction of an aërial railway between the city of Honda and Argualarga or its suburbs. 1600 w. Cons Repts—Jan., 1898.

**Electric.**—The Development of Electric Cableways. Richard Lamb. Describes its application to logging in swamps, canal practice, quarry purposes, etc. Ill. 2500 w. Elec Eng, N Y—Nov. 4, 1897.

See also **CANAL HAULAGE—Electric, Lamb; TELPHERAGE.**

**Hallidie.**—Hallidie Ropeway at Halls Mines, Nelson, B. C. Illustrated description of a steel cable ropeway, carrying ore four and one-half miles, carrying 900 traveling buckets, holding 100 lbs. each. The system is automatic. 700 w. Min & Sci Pr—Feb. 1, 1896.

**Ice Quarry.**—See **ICE QUARRY.**

**Idaho Mines.**—Wire Rope Tramway at the Bunker Hill and Sullivan Mines, Idaho. General description illustrated by profiles and two excellent views. It has been operated since 1890, with a great saving in transportation expenses. There is one span of 1100 ft. over a town, at a height of 125 ft. above the houses. 600 w. Eng & Min Jour—April 18, 1896.

**Lime Rock Quarries.**—See **LIME ROCK—Maine Quarries.**

**Log, Switzerland.**—The Log Cableway at Richtersweiler, Switzerland (Die Richtersweiler Holzriese). Prof. W. Ritter. An illustrated description of an aerial wire cableway 2100 yards long, for transporting logs weighing 2 tons. Serial. Schweiz Bauzeitung—May 12, 1900.

**Miller.**—See **COALING AT SEA.**

**Mine.**—An Interesting Example of Ropeway Practice. This ropeway conveyor handles 200 tons daily, at about 2½ cts. per ton, using 8 h. p., conveying the tailings about a mile. The special features are a 60 degree turn mechanism, and an automatic loader, both illustrated. 900 w. Min & Sci Pr—Feb. 22, 1896.

Various Types of Ropeways. W. Carrington. Read at meeting of the Federated Institution of Mining Engs. Describes types and makes remarks as to their proper selection. 2500 w. Co Guard—March 19, 1897.

**Mississippi Improvement.**—Cableway at Lock and Dam No. 2. Mississippi River Improvement. R. D. Seymour. Illustrates and describes a cableway showing decided improvement in construction and manner of operation. Also discussion. 5000 w. Jour W Soc of Engs—Oct., 1898.

**Quarry.**—The Britts Landing Cable Hoist and Quarry. R. D. Seymour. A successful illustration of one of the uses to which a cableway can be applied, with illustrated description of quarry and means of working it. Discussion follows. 4200 w. Jour W Soc of Engs—June, 1897.

**St. Paul, Minn.**—The St. Paul Cable Hoist. Illustrates and describes the conveyor plant recently built for the U. S. Government at St. Paul, Minn. It solves the problem of dispensing with fall-rope carriers, which have heretofore been necessary for supporting the hoisting rope. 1000 w. Stone—Dec., 1898.

**Suwanee Canal, Ga.**—A Combined Cable Excavator and Conveyor. A simple form of cableway employed in excavating the Suwanee Canal, Ga.; it is fully described and illustrated. 2400 w. Eng News—Feb. 20, 1896.

**Table Mountain.**—Table Mountain Wire Ropeway. Illustrated description. 700 w. Engng—Sept. 4, 1896.

## CADMIUM.

On the Estimation of Cadmium as the Oxide. Philip E. Browning and Louis C. Jones. Contribution from the Kent Chemical Laboratory of Yale Univ. The work described shows that when the carbonate is filtered upon an asbestos felt previously ignited the dangers of reduction are obviated and the carbonate process is simplified. The results are tabulated. 700 w. Am Jour of Sci—Oct., 1896.

**Electro-Metallurgy.**—Some Notes on the Electro-Deposition of Cadmium and Its Alloys. Sherard Cowper-Coles. Explains why cadmium is used for the manufacture of fusible wires for electric cut-outs, and gives information concerning the deposition and the various alloys. 3500 w. Elec Rev, Lond—Oct. 21, 1898.

## CAGE.

**Mine Shafts.**—See **MINE CAGE.**

## CAISSON.

See also **BRIDGE FOUNDATION; COMPRESSED AIR; FOUNDATION; TALL BUILDING.**

Caisson Foundations. Illustrated description. Serial. Eng Rec—July 30, 1898.

Pneumatic Work. D. E. Moran. Address before the Central States Water-Works Assn. On the development of pneumatic foundation work. 2500 w. Comp Air—Feb., 1900.

**Air Lock.**—A New Air Lock and Cylindrical Wooden Pneumatic Caisson for Foundations. Illustrates and describes the use of the caissons, with improvements designed by John F. O'Rourke, in laying the foundations of a residence for Mrs. Elliott F. Shepard, on 62d St., near Madison Ave., New York. Also notes other interesting features of the construction. 1800 w. Eng News—Dec. 8, 1898.

**Air Locks and Shafts.**—Improvements in Pneumatic Caissons, Air Locks and Shafts. Illustrates and describes improvements made by John F. O'Rourke in the caisson shaft and the air lock. 1000 w. R R Gaz—Dec. 9, 1898.

**Alexander III. Bridge.**—Pneumatic Caisson, Alexander III. Bridge. Condensed from the Paris "Génie Civil." Describes the erecting and sinking of probably the largest caisson ever used. 900 w. Eng Rec—Feb. 26, 1898.

The Foundation Caissons for the Bridge Alexander III. (Caissons de Fondation du Pont Alexandre III.). Illustrated description of the construction and launching of the great caissons for the shore foundations of the new bridge over the Seine, at Paris. 5000 w. 1 plate. Génie Civil—September 11, 1897.

See also **BRIDGE—Alexander III.**

**Bridge Foundations.**—Historical Discussion of Pneumatic Foundations (Beitrag zur Geschichte der Druckluftgründung). A. Schmall v. Eisenwerth. An account of the early applications of the pneumatic methods of sinking foundations for bridge piers with especial reference to the construction of the railway bridge over the Rhine at Kehl, 1859. Two articles, 10000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 2, 9, 1898.

Pneumatic Caissons for Ordinary Foundations. A. W. Jones. Illustrates and describes the pneumatic work in connection with foundations of bridges. 5800 w. Bridgez—April, 1899.

**Building Foundations.**—Pneumatic Caisson Foundations for a Residence. Illustrated description of the eight wooden pneumatic caissons necessary to support a house 80-ft. high on made land over an old water course; also describes a new air lock. 3800 w. Eng Rec—Dec. 10, 1898.

Pneumatic Caisson Foundations for the Mercantile Building, New York City. Illustrations and description of features of particular interest. There were nine timber and five steel caissons, and the success and rapidity with which the work was accomplished without disturbing the neighboring structure is worthy, of note. 1100 w. Eng News—July 15, 1897.

Rapid Pneumatic Foundation Work. Illustrated description of wood caissons used in sinking piers for a New York building. 2200 w. Eng Rec—Oct. 28, 1899.

**Cincinnati Water-Works.**—Caisson for the Intake Pier for the Cincinnati Water-Works. Illustrated description of the 58x30 ft. caisson for a heavy masonry pier considerably over 100 ft. high. 500 w. Eng Rec—Dec. 9, 1899.

**East River Bridge.**—Brooklyn Caissons, New East River Bridge. Illustrated description of the design, construction and use of two wooden caissons, 63x79 ft. in plan, and 53 and 39 ft. high. Serial. Eng Rec—Dec. 17, 1898.

The East River Bridge Caissons. Information of the construction of these caissons, one of which is ready to launch. 700 w. Eng Rec—May 15, 1897.

**Inn Bridge.**—See **BRIDGE CONSTRUCTION—Inn.**

**Liverpool Docks.**—Caissons for the New North Docks, Liverpool. Illustrated description. 700 w. Engng—Sept. 4, 1896.

**Madras.**—Caisson, North Pier Head, Madras Harbor. Robert W. Thompson. A paper read before the Inst. of Civ. Engs. Describes caisson building and sinkiug, and construction in the dry of monolithic pier heads of concrete. 2500 w. Ry Rev—Aug. 8, 1896.

The Caisson at North Pier Head, Madras Harbor. Robert William Thompson. Description, with illustration, of a difficult piece of work. 2400 w. Ind & East Eng—Jan. 30, 1897.

**Movable.**—Movable Caissons for Repairing Dock Walls (Caisson Mobile pour la Réparation des Murs de Quais). Describing the appliances used for repairing the walls of the docks at Calais, under water. 8500 w. 1 plate. Ann des Ponts et Chaussées—Part I., 1897.

Movable Pneumatic Caisson for Submarine Rock Excavation. From "Revue Technique." Description of an apparatus installed by the Prussian Government, near Bingen, for the removal of the rocks in the river Rhine. 600 w. Eng Rec—March 6, 1897.

**Valparaiso.**—Sinking Cylinder Foundations in Valparaiso. An illustrated account of the pneumatic foundation work for the new pier now under construction at Valparaiso. 1200 w. Engr, Lond—Sept. 9, 1898.

**Wooden Cylindrical.**—See **FOUNDATIONS—Pneumatic.**

## CALCINER.

**Mechanical.**—The Latest Type of Mechanicad Calciner. W. Blackmore. Describes the Godfrey mechanical calciner, giving a vertical section, and a report of cost as compared with other methods. 1800 w. Col Guard—June 30, 1899.

The Latest Type of Mechanical Calciner. W. Blackmore. Read before the Institution of Mining and Metallurgy. Describes the Godfrey Mechanical Calciner, designed to calcine zinc and leady-zinc ores. 1900 w. Ir & St Trds Jour—Sept. 9, 1899.

### CALCIUM CARBIDE.

See also **ACETYLENE.**

Calcium Carbide and Acetylene. Additional information about the substances, and the industrial results likely to proceed from the discovery of the Wilson process of making calcium carbide. 2500 w. Can Eng—Jan., 1896.

Calcium Carbide and Acetylene. Editorial, commenting on the commercial methods by which these products are sought to be introduced, and upon views of experts regarding them. 2200 w. Eng News—Jan. 30, 1896.

Calcium Carbide and Acetylene. Part first reviews the history of the manufacture of calcium carbide. Serial. Ind & Ir—April 14, 1899.

Carbide of Calcium and Acetylene, and Their Applications. Ed. Hospitalier. Abstract of a paper read before the Société Internationale des Electriciens. The properties of calcium carbide and of acetylene occupy a considerable part of the paper, which concludes with a review of the present and probable applications of acetylene. 1200 w. Pro Age—May 1, 1896.

Carbide of Calcium and Acetylene. C. de Perrodil. The first of a series of articles constituting a complete translation from a work in French. Foot notes will be given bringing the subject matter up to date, and including special developments in the United States. Part first gives historical facts, and properties of the substance. Serial. Pro Age—April 15, 1898.

Development of the Carbide of Calcium Industry. Gives facts of scientific interest in connection with this product, its history, and the commercial importance of the industry. 4000 w. Sci Am Sup—Aug. 13, 1898.

The Calcium Carbide Industry. Editorial view of the remarkable activity displayed. 1800 w. Engng—July 15, 1898.

The Calcium Carbide Industry. Report of recent progress dealing with the production, utilisation, properties and tests. 3000 w. Engng—Dec. 9, 1898.

Will There Be a "Carbide" Industry? Dr. W. H. Birchmore. Opinions of a well known expert. The history of the chemistry of calcium carbide and acetylene is given and the five different methods of producing carbide of calcium are reviewed, two only of which are patented. 5000 w. Eng News—Jan. 30, 1896.

**Analyses.**—Analyses of Commercial Samples of Calcium Carbide (Analyse de quelques Échantillons Industriels de Carbure de Calcium). Henri Moissan. A communication to the French Academy showing the character and extent of the impurities in calcium carbide based upon the analyses of a number of samples from various sources. 2000 w. Comptes Rendus—Oct. 3, 1898.

**Blast Furnace Gas Engines.**—The Manufacture of Calcium Carbide and Its Relation to the Iron Industry (Die Calciumcarbidfabrication und deren Zusammenhang mit der Eisenindustrie). H. Liebetanz. A review of the carbide industry, showing that the use of furnace gas as a source of power may render its production advantageous in connection with iron works. Serial. Stahl und Eisen—March 1, 1900.

**Chemistry.**—Electro-Thermal Chemistry of Calcium Carbide. A description of recent investigations. 2200 w. W Elect'n—Nov. 16, 1895.

**Congress, Paris.**—Calcium Carbide at the Congress of Applied Chemistry. Reviews papers on this subject read at Paris. 1600 w. Sci Am—Oct. 20, 1900.

**Cost.**—Carbide of Calcium—Acetylene Gas. The present status of the manufacture, patents and literature on the subject. This is a most thorough and valuable report of a commission of able experts sent by "Progressive Age" to Spray, N. C., for the purpose of making full, accurate, and impartial tests of the cost of carbide of calcium. The descriptive part is illustrated with engravings. 12500 w. Pro Age—April 15, 1896.

Reply of "Progressive Age" Commissioners to Criticisms on the Cost of the Carbide of Calcium. In this reply the various criticisms and allegations which have appeared in different papers and which tend to throw doubt upon the validity of the conclusions arrived at by the commissioners, are met seriatim, and supplemented by press comments upon the work of the commissioners. 3000 w. Pro Age—July 15, 1896.

The Cost of Calcium Carbide. A discussion showing the advance that has taken place in this business and especially considering conditions in England. 4300 w. Engr, Lond—Dec. 22, 1899.

The Cost of Producing Carbide by Different Agencies. Abstract translation of a paper by F. Liebetans, read before the Acetylene Congress at Buda Pesth. Shows the effect of the cost of power on the cost of production. 3000 w. Jour Gas Lgt—Dec. 26 1899.

The Cost of the Production of Calcium Carbide (Kosten der Calciumcarbid-Darstellung). A computation, based upon the thermochemical and dynamical equivalents, and including costs of plants of various sizes and kinds. 2000 w. Der Electro-Techniker—April 30, 1898.

The Reply of Houston, Kennelly and Kinnicutt, to Criticisms on the "Progressive Age" Report Concerning the Cost of the Carbide of Calcium. Editorial comment. 700 w. Pro Age—July 15, 1896.

**Cost of Power.**—The Cost of a Ton of Calcium Carbide for Different Sources of Power (Herstellungskosten von 1000 kg. Calcium Carbid bei Verschiedenen Betriebskräften). F. Liebetanz. A paper read before the Acetylene Congress at Budapest, showing the influence of the cost of power upon the cost of carbide. 3000 w. Zeitschr f Elektrochemie—Aug. 10, 1899.

**Crushing Materials**—On the Crushing of Raw Materials for the Manufacture of Calcium Carbide. Abstract from the "Zeitschrift für Elektrochemie." Practice has shown that comparatively coarse crushing is better than pulverizing, and this has caused a change in the machinery used, and the manner shown to be most advantageous is given. 1500 w. Elect'n, Lond—May 19, 1899.

**Electric Furnace.**—Calcium Carbide as a Means of Conversion of Work (Das Calcium Carbid als Mittel zur Arbeitsübertragung). E. Neuberg. An analysis of the thermochemical efficiency of the electric furnace in the production of carbide. 2500 w. Elektrotech Zeitschr—March 1, 1900.

Electric Furnaces with Especial Reference to the Production of Calcium Carbide (Ueber Elektrische Oefen, besonders mit Rücksicht auf die Darstellung von Calcium Carbid). Birger Carlson. An examination of the electrical, thermal, and chemical conditions entering into the production of carbide and the best design of furnace for the purpose. Serial. Zeitschr f Elektrochemie—Feb. 8, 1900.

On Discontinuous and Continuous Carbide Furnaces (Ueber Diskontinuirliche und Kontinuirliche Carbidöfen). Dr. O. Fröhlich. A comparison and illustrated description of various forms of electric furnaces for producing calcium carbide. 4500 w. Zeitschr f Elektrochemie—July 5, 1900.

Three-Phase Currents in the Manufacture of Calcium Carbide in Italy. Cesare Pio. Gives data relating to the construction and operation of the furnaces in which three-phase currents are used, the production and cost. Ill. 3000 w. Elec Wld & Elec Engr—Aug. 5, 1899.

See also **ELECTRIC FURNACE—110-Volt Circuits.**

**Ingleton Works.**—The Calcium Carbide Works at Ingleton. F. J. A. Mathews. A description of the first plant erected in England according to the patents of M. Raoul Pictet. The charge is given a preliminary heating by the discharge gases, and the work is completed by the heat of the electric arc. 1800 w. Elect'n, Lond—Sept. 9, 1898.

**Invention.**—Priority in the Discovery of a Commercial Method of Making Calcium Carbide. Arthur C. Fraser. Evidence in support of the statement that the discovery belongs to the United States. 3800 w. Pro Age—Feb. 1, 1898.

**Manufacture.**—Is Fine or Coarse Material to be Preferred in the Production of Calcium Carbide (1st Fein Pulverisiertes oder Grob Gekörntes Rohmaterial bei der Herstellung von Calciumcarbid Vorzuziehen)? Birger Carlson. Showing the advantages of using coarsely ground material over that reduced to a fine powder. 1800 w. Zeitschr f Elektrochemie—Dec. 7, 1899.

The Manufacture of Calcium Carbide. Abstract of a paper by M. Nicolai, read before the Polytechnical Society at Berlin, reviewing the best methods of manufacture and formulating the important points. Reviews also an American consular report summarizing the condition of the industry in Europe. 1500 w. Gas Wld—Sept. 10, 1898.

The Manufacture of Calcium Carbide. Abstract of a paper read by M. Nicolai, at a meeting of the Polytechnical Society, at Berlin. Discusses the raw materials, important points in the manufacture, transportation, etc. 1600 w. Am Mfr & Ir Wld—Aug. 26, 1898.

The Manufacture of Calcium Carbide. J. T. Morehead and G. de Chalmot. A full exposition of the processes used, with cuts of furnaces. Numerous experimental results are given. 5800 w. Jour Am Chem Soc—April, 1896.

**Niagara Plant.**—Calcic Carbide Plant at Niagara Falls. Orrin E. Dunlap. The product of this initial plant will be sent to Philadelphia in barrels and there manufactured into acetylene gas to supply southern Pennsylvania. Ill. 1200 w. W Elect'n—Jan. 18, 1896.

The First Calcic Carbide Plant. Orrin E. Dunlap. Illustrated description of the works recently erected at Niagara Falls for the manufacture of calcic carbide. 1300 w. Min & Sci Pr—Feb. 1, 1896.

Manufacture of Calcium Carbide. Orrin E. Dunlap. Illustrated description of the plant at Niagara Falls. 2000 w. W Elec—May 16, 1896.

**North Carolina.**—An Account of the First Production of Calcium Carbide and Acetylene in the United States. F. P. Venable. Relates the beginning of the production of this substance at Spray, N. C. 900 w. Am Mfr & Ir Wld—Dec. 16, 1898.

**Ontario.**—Calcium Carbide in Ontario. From the annual report of A. Blue, Mineral Commissioner of Ontario. Information of progress made, and of apparatus of various types for its generation and control. 1800 w. Ir Age—April 7, 1898.

**Patents.**—See also **Invention.**

**Patents, British.**—The Carbide-Acetylene Patents. Interview with Prof. Lewes. Notwithstanding the action of the British House of Lords in rejecting the Willson bill, Prof. Lewes thinks the electrical furnace patents, and not the Bullier or Willson patents, will be the governing factor in the production of calcium carbide, and that this manufacture will not be open to the public till the electrical furnace patents lapse. He also has much to say with reference to practical points regarding the safe and efficient use of acetylene in illumination, and this is the most valuable feature of the reported interview. 2500 w. Gas Wld—April 11, 1896.

**Patents, Germany.**—The Nullification of the Bullier Carbide Patent in Germany (Zur Nichtigkeitserklärung des D. R. P. Nr. 77168 Bullier Verfahren zur Darstellung von Erdalkalicarbiden). Dr. W. Borchers. A review of the decision, with the text of the patent and references to anticipations of the recent carbide patents. Two articles. 7500 w. Zeitchr f Elektrochemie—April 20, May 18, 1899.

**Quality.**—The Quality of Calcium Carbide. Gives details of one or two of the most approved methods of analysis of calcium carbide. 1800 w. Jour Gas Lgt—May 17, 1898.

**Regulations.**—See **ACETYLENE.**

**Sault Ste. Marie.**—The New Plant of the Union Carbide Company at Sault Ste. Marie, Mich. Illustrated description of the new equipment whose initial output is to be ten times that of Niagara, with capacity for extension as the demand increases. 1800 w. Elec Wld—Aug. 1898.

**Supply.**—The Present and Prospective Supply of Calcium Carbide. Brief report of the situation in Europe, the conditions of supply and price, which are likely to be greatly modified by the increased production. 900 w. Cons Repts—Sept., 1898.

**Switzerland.**—The Manufacture of Calcium Carbide in Switzerland. Edward A. Schneider. Reports a great advance in the manufacture, due to cheap water power, the improved methods and favorable conditions. 700 w. Ind & Ir—Sept. 30, 1898.

**Virginia.**—A New Plant for the Manufacture of Calcium Carbide. John C. Temple. Illustrations and description of the new works of the Willson Ammonium Co., located on the James River, at Holcomb Rock, Virginia. 2500 w. Eng News—April 14, 1898.

**CALCIUM CHLORIDE.**

**Electrolysis.**—Notes on the Electrolysis of Chloride of Calcium Solutions (Beitrag zur Kenntnis der Elektrolyse von Chlorcalcium-Lösungen). H. Bischoff and F. Foerster. A full account of experimental investigations, using different currents and solutions. 4000 w. Zeitschr f Elektrochemie—April 20, 1898.

**CALCULAGRAPH.**

See also **TELEPHONE EXCHANGE—Timing Calls.**

**Telephone Service.**—The Calculagraph in Telephone Service. Illustrated description of an instrument for recording the time a telephone is in use. 1200 w. W Elect'n—Dec. 21, 1895.

**CALCULATING MACHINE.**

See also **COMPUTER.**

**Comptometer.**—The Comptometer. Fred. Morley. Describes and explains the method of operating a practical calculating machine. Ill. 2000 w. Pro of Purdue Soc of Civ Engs—1897.

**Numerical Equations.**—Machine for Solving Numerical Equations. George B. Grant. Illustrated description which gives rough approximations to roots of numerical equations, and competent to give the integral figures of roots of the general equation of the fourth degree. 1100 w. Am Mach—Sept. 3, 1896.

**CALCULATIONS.**

**Approximate.**—A. H. Barker. Short methods for simple operations to obtain closely approximate results. 1500 w. Prac Eng—Nov. 29, 1895.

**Checking.**—Checking Engineering Calculations. A. Hanssen. A method applicable to tables where the index column differs by constant differences. 2700 w. Engng—Jan. 31, 1896.

**CALIPER.**

**Contour.**—A New Form of Contour Caliper. W. F. Durand. An instrument devised to determine whether or not the contour or cross section of a pin, axle or spindle is circular, and if not, the finding where it departs from the true or circular outline. Illustrated description. 1700 w. Sib Jour of Engng—Jan., 1899.

**Vernier.**—Divider Points for Vernier Calipers. Describes an attachment designed by the writer, which will not interfere with other uses of the caliper, and will give the added advantages of an accurately graduated scale and fine screw or vernier adjustment. Ill. 2300 w. Am Mach—Dec. 30, 1897.

**CALORIFIC VALUE.**

See also **CALORIMETER; CALORIMETRY; COAL ANALYSIS; COAL TESTS; COMBUSTION; HEAT UTILIZATION.**

Calculating the Calorific Power of Coal from Analytical Data. D. De Paepe. "Bulletin Assn. Belge des Chemistes." Explains the writer's method of determining the calorific power, and the conclusions reached. 700 w. Col Guard—Jan. 27, 1899.

Coal Testing and Analysis. Camille Matignon. From a communication to the Second International Congress of Applied Chemistry. Reviews the factors which intervene in the examination of a coal, showing the advantage of introducing the calorific value into the clauses of a coal contract, and the utility of the Mahler bomb. 3000 w. Col Guard—Nov. 25, 1898.

Determination of the Heating Power and Steam-Producing Value of Coals from a Preliminary Examination. William Thompson. Read before the Can. Elec. Assn. Discusses a method whereby the heating power, and consequently the value of any fuel, can readily be determined. 2500 w. Can Elec News—June, 1897.

Experiments with a Boiler Arranged to Serve as a Calorimeter for Determining the Heating Value of Fuel. Charles J. Slipper, Mortimer Harrison, Jr. and Edward C. Schmidt. Graduation thesis. Tests made at Stevens Inst. to determine the heating value of coal under the conditions of its use with a boiler. Ill. 6500 w. Stevens Ind—July, 1900.

Methods for Fuel Testing. Arthur V. Abbott and Franz J. Dommerque. Describes the methods in vogue for the determination of calorific power, and shows the importance of the work in relation to power production. 3400 w. Elec Engng—Nov., 1896.

The Valuation of Coals. N. W. Lord. Presented before the Am. Assn. for the Adv. of Science. Discusses a number of unpublished tests and analytical results, which have been collected from various sources. 3500 w. Eng News—Feb. 16, 1899.

The Calorific Value of Certain Coals as Determined by the Mahler Calorimeter. N. W. Lord and F. Haas. Results of experiments conducted in the metallurgical laboratory of the Ohio State University to determine the calorific powers of coals in general use in Ohio, and how far ordinary analytical methods could be used as a basis for computing their values. 4500 w. Trans Am Inst of Min Engs—March, 1897.

The Calorific Value of American Coals. William Kent. A discussion of the paper of H. W. Lord and F. Haas, read at the Chicago meeting, Feb., 1897. 4400 w. Trans Am Inst of Min Engs—Nov., 1897.

Determination of the Calorific Value of Coal with the Mahler Calorimeter and by Jüptner's Formula (Die Bestimmung des Brennwerthes von Kohlen mittels des Mahler'schen Calorimeters und nach Jüptner's Empirischer Formel). A review by Baron von Jüptner of the American tests of Messrs. Lord and Haas. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—August 14, 1897.

The Calorific Value of Coals. E. Goutal. From the "Revue de Chimie Industrielle." A method for determining the calorific value of coal thought to be of sufficient accuracy, but which does not involve the use of a calorimeter. 700 w. Prac Eng—June 26, 1896.

The Determination of the Calorific Power of Coal. W. Nayes, M. Tuggart and W. Craver. Comparison of results obtained by the Hempel Calorimeter with those obtained from analysis and by the Berthier method. 1300 w. Pro Age—Jan. 15, 1897.

The Relative Value of Different Coals. H. M. Chance. Showing the qualities that give coal thermal value, and the methods and importance of testing them. 3300 w. Eng Mag—April, 1896.

**Anthracite.**—See **COMBUSTION.**

**Bituminous.**—Comparative Tests of Bituminous Steam Coals. William H. Bryan and R. C. Carpenter. Discussion of paper by John W. Hill. 2500 w. Pro Am Soc of Civ Engs—Aug., 1899.

Comparative Tests of Bituminous Steam Coals. Discussion of paper by John W. Hill. 3000 w. Pro Am Soc of Civ Engs—Sept., 1899.

Comparative Tests of Bituminous Steam Coals. John W. Hill. A full account of experimental investigations carried on at Cincinnati, in 1897-98, with results. Ill. 14000 w. Pro Am Soc of Civ Engs—April, 1899.

**Brown Coal.**—See **BROWN COAL.**

**Gas.**—The Calorific Power of Illuminating Gas. Harold G. Colman. Read before the Inst. of Gas Engs. Illustrates and describes Junker's calorimeter, and the manner of making tests. General discussion. 7000 w. Gas Wld—May 5, 1900.

The Heating and Lighting Power of Coal Gas. T. Fairley. Paper read before the British Asociation, showing the relation between the heating and lighting powers of coal gas. 900 w. Jour Gas Lgt—Sept. 18, 1900.

**Gas, Coal.**—The Balance Sheet of Heat Units in Coal Distillation. Herman Poole. An outline of what may be ascertained regarding the heat energy of coal and its products in gas-making. 3400 w. Am Gas Lgt Jour—Jan. 24, 1898.

**Semi-Bituminous.**—The Heating Value of Semi-Bituminous Coals. Editorial discussing the possible errors which are apt to cause the apparent heating value of the coal to be less than the true value, and so make the reported "efficiency" of a steam boiler erroneous. 1600 w. Eng News—March 24, 1898.

**Volatile Matter.**—Heating Value of the Volatile Portion of Bituminous Coal. William Kent. Suggestions to any one who may be disposed to undertake a research of this kind. The research will involve much labor but will supply answers to the following questions: (a) What is the character of the volatile matter of the more highly bituminous coals? (b) May it not be commercially possible to get rid of the least valuable products at the mines by some kind of coking process? 1600 w. Stevens Ind—April, 1896.

**Water Gas.**—Comparative Test of the Calorific Powers of Wilkinson Carburetted Water Gas and Lowe Carburetted Water Gas with the Junker Calorimeter. Martin Shepard, Rudolph E. Bruckner and John Schimmel, Jr. Graduating thesis of students of Stevens Inst. Methods of analysis are given and the plan of tests made, with results. Serial. Pro Age—Nov. 16, 1896.

**Weathered Coal.**—The Calorific Power of Weathered Coals. R. S. Hale and Henry J. Williams. Tabulated results of analysis with statement of the conditions. The results show a slight diminution of calorfic power directly traceable to weathering. 900 w. Trans Am Soc of Mech Eng, No. 796—Nov., 1898.

**CALORIMETER.**

See also **CALORIFIC VALUE; CALORIMETRY; COAL ANALYSIS; COAL TESTS.**

Combustion and Calorimeters. H. J. Williams. Extracts from a paper presented at the December meeting of the New England R. R. Club. Shows the importance of ascertaining the heating power of coals, and describes various calorimeters, stating their defects and advantages. 2800 w. R R Gaz—Feb. 17, 1899.

The Calorimeter Determination of Heating Values of Combustibles (Kalorimetrische Heizwertbestimmung). L. C. Wolff. A very full investigation of the method by chemical analysis, compared with the calorimeter tests by Mahler-Stohmann, and Kröker, with carefully worked examples. A valuable paper. 6000 w. Zeitschr d Ver Deutscher Ing—July 3, 1897.

**Junker Gas.**—The Junker Calorimeter (Calorimètre Industriel Junkers). An illustrated description of the Junker Calorimeter, by means of which the calorific power of a gas to be used for heating, or in a gas engine, may be readily and accurately determined. 1200 w. Génie Moderne—June 1, 1897.

**Steam.**—A New Form of Calorimeter for Measuring the Wetness of Steam. Prof. John Goodman. A paper before the British Association, giving an illustrated description of a continuous condensing calorimeter using only one scale beam. 2500 w. Col Guard—Sept. 14, 1900.

Apparatus for Determining Moisture in Steam (Appareils Servant à Mesurer l'Humidité d'une Vapeur). Describing various calorimeters, including those of Barrus, Carpenter, Gehre, and Rateau. 2500 w. La Rev Tech—Sept. 10, 1897.

New Form of Steam Calorimeter. R. C. Carpenter. Read before the A. S. M. E. Illustrated detailed description of a calorimeter in use in Sibley College, for about one year, and of the proper method of using it. 1800 w. Trans Am Soc of Mech Engs—Vol. XVII., 1896.

Steam Calorimeters. A. H. Eldredge. Treats of their construction, value and use to the engineer. Ill. 1600 w. Mach, N. Y.—April, 1898.

Steam Calorimeters: Construction, Value and Use to the Engineer. A. H. Eldredge. Presents two of the principal forms of calorimeters for determining the quality of steam, with the methods of using and their importance in boiler trials. Ill. 1500 w. Prac Eng—June 3, 1898.

**Throttling.**—Some Experiments with the Throttling Calorimeter. A. A. Goubert and E. H. Peabody. Presented at the N. Y. meeting of the Am. Soc. of Mech. Eng. Describes methods, apparatus, and experiments, proving unreliability of the throttling calorimeter tests as commonly conducted. 2000 w. Trans Am Soc Mech Eng—Dec., 1895.

The Reliability of Throttling Calorimeters. James E. Denton. Shows that the small throttling calorimeters, in testing the quality of steam, are unreliable unless used in conjunction with a separator to eliminate water from the steam and uniting determinations of drip from the separator, with those of the calorimeter. 1100 w. Eng News—Dec. 5, 1895.

The Reliability of "Throttling Calorimeters." J. E. Denton. Presented at the N. Y. meeting. Gives description of method and apparatus, and describes an experimental investigation by which it is proved that without certain precautions, results may be entirely unreliable. 8700 w. Trans Am Soc of Mech Eng—Dec., 1895.

**CALORIMETRY.**

See also **CALORIFIC VALUE; CALORIMETER COAL ANALYSIS; COAL TESTS.**

**Berthier.**—Berthier Method of Coal Calorimetry. Charles V. Kerr. Describes this method of finding the heating power of fuels. Its practical convenience is claimed. 2500 w. Jour W Soc of Engs—Dec., 1898.

The Berthier Method of Coal Calorimetry. C. V. Kerr. Describes this method, stating its advantages. 2000 w. Trans Am Soc of Mech Engs, No. 841—Dec., 1899.

**Cooling Correction.**—Calorimetry. Methods of Correction for Cooling. Silas W. Holman. A general method of treating the cooling correction which is applicable to nearly all non-continuous calorimetric processes, such as the measurement of specific heats by the "method of mixture" of heat of combustion by the Berthelot or Mahler bomb, etc. 2500 w. Tech Quar—Dec., 1896.

**Gas.**—Calorimetry. C. D. Jenkins. Brief account of investigations with short discussion. 1200 w. Am Gas Lgt Jour—March 22, 1897.

**Magdeburg Laboratory.**—Calorimetric Experiments at the Magdeburg Boiler Testing Laboratory (Kalorimetrische Ergebnisse aus dem Laboratorium des Magdeburger Vereins für Dampfkesselbetrieb). L. C. Wolff. With tabulated results of tests of the calorific power of a large number of coals and an account of the trials; the Kröker bomb was used. 3000 w. Zeitschr d Ver Deutscher Ing—March 25, 1899.

**CAM.**

**Cylinder.**—Pattern for a Cylinder Cam. John M. Richardson. Describes a cam for converting a rotary motion into a reciprocating one (within certain limits), and usually in a horizontal direction. Ill. 1300 w. Mach, N. Y.—May, 1897.

**Design.**—The Drafting of Cams. Louis Rouillion. The use of cams is explained, and the process of laying them out, with diagrams. Serial. Mach—March, 1897.

**CAMP.**

**Hygienic.**—Hygienic Camps. H. R. Hopkins. Abstract of paper read at the meeting of the Medical Soc. of the State of New York. Discusses the approved appliances of civil life which may be adapted to camp life aiming to prevent disease, by giving clear soil, pure water and fresh air. 1500 w. San—March, 1899.

**CAMPANILE.**

**Siena.**—Peruzzi's Campanile at Siena. W. P. P. Longfellow. Interesting account of the work of this noted architect of the Renaissance. Ill. 3200 w. Br Build—Nov., 1897.

**CANAL.**

See also **GREAT LAKES; RIVER; WATERWAY.**

**Accidents.**—Accidents to Vessels in Narrow Channels and the Proposed Great Lakes and Atlantic Ship Canal. Relates three recent accidents illustrating the defects and delays in the passage through narrow channels. 800 w. Eng News—April 19, 1900.

**Alsace-Lorraine.**—The Rebuilding of the Rhine-Marne, and Saar-Kohlen Canals (Ueber die Reconstructions-Arbeiten am Rhein-Marne und Saar-Kohlen Canal). Giving details of the new locks, aqueducts, tunnels and other improvement works on these important waterways of Alsace-Lorraine. 4500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Aug. 6, 1897.

**Baltic-Black Sea.**—A Black Sea and Baltic Canal. Description, with map, of the route proposed, work, cost, etc. 800 w. Engr, Lond—April 9, 1897.

From the Baltic to the Black Sea. The Maritime Canal from Riga to Kherson (De la Baltique à la Mer Noire. Le Canal Maritime de Riga à Kherson). Georges Leugny. Fully illustrated description of this important work, which is intended to make an all-Russian outlet for the Black Sea. The canal will have a total length of 1600 kilometers. 6000 w. La Rev Tech—Nov. 25, 1898.

Project for a Russian Ship Canal Between Riga and Kherson (Project für einen Russischen Seeschiffahrts-Canal Riga-Kherson). A plan to connect the Black Sea with the Baltic by means of a ship canal in connection with the Rivers Düna, Beresina and Dneiper. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 13, 1897.

**Baltic—North Sea.**—See Kiel.

**Bank Failure.**—Failure of Canal Bank. Illustrates and describes the collapse of an embankment in England, at Dudley Port. 1200 w. Engr, Lond—Sept. 22, 1899.

**Birmingham, Ala.**—The Proposed Canal Outlet for the Birmingham (Alabama) District. W. M. Brewer. Describes a plan to connect this district with the Black Warrior River; a project of importance on account of the probable effect on freight rates. 500 w. Map. Eng & Min Jour—Oct. 30, 1897.

**Breslau.**—The Opening of the Ship Canal Through Breslau, and the Canalization of the Upper Oder to Kosel (Die Eröffnung des Grosschiffahrtsweges durch Breslau und die Canalisirung der Oberen Oder bis Kosel). With maps showing the location of the work and data concerning its commercial importance. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 4, 1898.

**Bridgewater, Eng.**—Navigation of the River Parrett—Proposed Ship Canal to Bridgewater. E. Duncan Stoney. A prize competition design, fully illustrated by drawings of contours, sections and structural details, with itemised cost sheet. 2600 w. Engr, Lond—Nov. 1, 1895.

**Bristol and English Channels.**—Proposed Ship Canal for Connecting the Bristol and English Channels. W. O. E. Meade-King. A full description of the scheme. Serial. Engr, Lond—March 13, 1896.

**Bruges.**—The Ship Canal of Bruges, Belgium. Abstract of description given in a pamphlet issued by the company to whom the contract was let. Ill. 900 w. Eng News—Dec. 22, 1898.

See also **HARBOR IMPROVEMENT—Bruges.**

**Canada.**—A Great Canadian Canal Scheme. Notes the revival of the scheme for the construction of a ship canal to connect the St. Lawrence River with the great lakes, discussing its advantages, and the route. 1900 w. Engng—Feb. 3, 1899.

Canada's Improved Canal System. On the canal schemes aiming to divert the trade of the lakes from New York to Montreal. 2000 w. Engng—Dec. 22, 1899.

The Canals of Canada. Arthur Weir. From a paper read before the Applied Science Students of McGill University. Canal history and canal engineering. Ill. Serial. Can Engr—Jan., 1900.

The Canal System of Canada. Describes the improvements recently made, which will make it possible for vessels drawing 14 ft. to steam from Lake Superior to the sea. 2000 w. Engr, Lond—Nov. 3, 1899.

**Carillon, Ottawa River.**—The Carillon Canal, Dam and Slide. Ernest Marceau. A short history of earlier work toward improving the navigation of the Ottawa River, with a description of the works named. 4 plates. 7000 w. Can Soc of Civ Engs (Adv Proof)—Oct. 11, 1900.

**Chicago Drainage.**—Condition of Work on Chicago Drainage Canal. A graphical and tabular statement of the progress of the work, by the president of the board of trustees. The figures given are instructive and to the point. 800 w. Ry Rev—Dec. 21, 1895.

Drainage Canal. Isham Randolph. Statistics relating to the growth of Chicago are given, with illustrated account of work on the sanitary canal. 8000 w. Jour of W Soc of Engs—Dec., 1897.

Drainage Canal Difficulties. Hearing of the vessel interests and Chicago representations by the Sec. of War. 2500 w. Marine Rev—May 24, 1900.

Financial Statement of the Sanitary District of Chicago. Tabular statement to Oct. 1, 1897, showing that nearly $25,000,000 have been expended on this work. 700 w. Eng News—Nov. 11, 1897.

Final Report of the Special Commission on the Chicago Drainage Canal. Abstract of the final reports recently issued. 2400 w. Eng News—Aug. 9, 1900.

Mechanical Methods of Rock Excavation Used on the Chicago Main Drainage Channel. W. G. Potter. Treating first of the methods of excavation in a few of the recent foreign canals, and of the rock excavation on the Chicago Main Drainage Channel, with particular reference to cost of work. Also abstracts of papers in foreign and American transactions and periodicals, on the status, cost and progress of work on this canal. Ill. 14500 w. Jour of W Soc of Engs—April, 1896.

Methods of Work and Special Plant on the Chicago Drainage Canal. The first of a series of articles giving a comprehensive résumé of the design and work on this important project. It is well illustrated by maps and profiles. Serial. Eng Rec—April 4, 1896.

Methods of Work on the Chicago Main Drainage Channel. A summary of previous articles on the canal. The purpose of the enterprise was not only to prevent the sewage laden waters of Chicago River from polluting the lake water supply, but also to be a ship canal, connecting the Great Lakes with the Mississippi River. 4500 w. Eng News—Dec. 12, 1895.

Opening of the Chicago Drainage Canal. A brief account of the opening on January 2, with short review of the work. 1400 w. Fire & Water—Jan. 6, 1900.

Opening of the Chicago Drainage Canal. Brief account of the letting of the river water into the canal, with outline of the work, and remarks made by Isham Randolph. 1000 w. Eng News—Jan. 11, 1900.

Progress of Work on the Chicago Drainage

Canal. Table showing the amount of work done up to Sept. 1, 1897, on each of the several contracts, and the amount of work remaining to be done. From report of Mr. Isham Randolph, chief engineer. 500 w. Eng News—Sept. 30, 1897.

Report of the Special Commission on the Chicago Drainage Canal. An abstract of the report of the special commission appointed to see if the work was executed in accordance with the law, and of the reply of the Trustees, who dispute some points. 4500 w. Eng News—Dec. 7, 1899.

The Chicago Drainage Canal. A description of some of the methods of excavation, illustrated by half tone cuts. 1500 w. Stone—Jan., 1896.

The Chicago Drainage Canal. Historical and descriptive account, with some figures. 2000 w. R R Gaz—Aug. 28, 1896.

The Chicago Drainage Canal. This series of articles proposes to consider the immediate purpose of this great work, and to describe the manner in which the canal has been constructed. Serial. Engng—Jan. 1, 1897.

The Chicago Drainage Canal. Frank W. Skinner. Brief reference to the history and conditions that led to the construction of this canal, with statement of the plan and some account of the work. Ill. Serial. Eng, Lond—Aug. 6, 1897.

The Chicago Main Drainage Canal. J. F. Lewis. Geological evidences that the valley being opened for drainage is connected with the processes and effects of the ice period, and is the renewing of a drainage direction which formerly existed. Also a brief description of the work on each section. Ill. 8800 w. Trans Am Inst of Min Engs—Sept., 1897.

The Chicago Drainage Canal. Illustrates the great beartrap dam, and explains the benefit the channel will be to towns on its banks, where it will furnish power for various purposes. 1000 w. Fire & Water—Feb. 17, 1900.

The Chicago Drainage Canal. Edwin O. Jordan. Brief review of this work, now nearing completion, and questions relating to it. 8000 w. Rev of Revs—Jan., 1900.

The Memorial of the Chicago Sanitary District. A statement of the reasons for making the drainage channel for Chicago's sewage a navigable waterway, and the necessity of improving the Illinois River to avoid disastrous floods, which, the engineers have predicted from the inception of the work, would follow the discharge of 600000 cu. ft. of water per minute into the river in its present state. 1500 w. Eng Rec—March 24, 1900.

The New Inland Waterway. J. A. Stewart. A technical description of the Chicago drainage canal, with a brief review of the considerations which led to its construction, and many illustrations. 3000 w. Sci Am—Feb. 17, 1900.

The Progress of the Chicago Main Drainage Channel. An abstract of the report of William Boldenweck, President of the Board, outlining the litigation and decision which has caused so much delay of the work. 2500 w. Eng News—Dec. 15, 1898.

The Protest of St. Louis Against the Chicago Canal. Review of the report of a commission appointed to investigate the effect of the use of the Chicago Canal on the interests of St. Louis. 1800 w. Eng Rec—April 29, 1899.

The Report of the St. Louis Commission on the Chicago Drainage Canal. The report in full is given, in view of its interstate and international complications, and the discussion of the engineering and legal principles. 6000 w. Eng News—April 27, 1899.

The Salient Features of the Chief Engineer's Annual Report of the Drainage Canal of the Sanitary District of Chicago for 1898. Isham Randolph. Ill. 5000 w. Jour W Soc of Engs—Aug., 1899.

The Status of Work on the Chicago Drainage Canal. Abstract of message of the new president, William Boldenweck, reviewing progress of the work and outlining works yet to be executed. 2000 w. Eng News—Dec. 23, 1897.

See also **TAIL RACE; WATER POWER.**

**Crinan, Scotland.**—The Crinan Ship Canal. A short account of the present canal, with details of a proposed canal along the same route, capable of accommodating vessels drawing 18 ft. of water. Map. 1000 w. Engr, Lond—May 15, 1896.

**Danube-Moldau-Elbe.**—The Danube-Moldau-Elbe Canal (Der Donau-Moldau-Elbe-Canal). An official account of the plans for the canal communication between Vienna and the North Sea. 15000 w. and 3 plates of map and profits. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1897.

**Depth.**—The Economic Depth for Canals of Large Traffic. Joseph Mayer. Showing that the question has not been settled, and noting the points needing to be determined before it can be decisively answered. 4400 w. Pro Am Soc of Civ Engs—Feb., 1898.

**Dismal Swamp, Va.**—Dismal Swamp Canal. An account of the reopening of this canal which connects the Chesapeake Bay with Albemarle Sound, and its importance as an inland waterway. 1800 w. Bos Jour of Com—Jan. 28, 1899.

Reconstruction of the Dismal Swamp Canal. Description and profile showing the condition of the canal when the improvements were started, with account of the work now in progress. Ill. 2300 w. Sci Am—March 5, 1897.

Re-opening a Canal. A prospectus has been issued by the Lake Drummond Canal & Water Co., for the reconstruction of the old, and now disused, Dismal Swamp Canal. 3500 w. Mfrs Rec—Jan. 24, 1896.

The Dismal Swamp Canal. J. Clinton Ranson. Account of a new traffic route between the North and South. 2200 w. Tradesman—March 1, 1897.

The Dismal Swamp (North Carolina) Canal. Croatan. Letter to the editor calling attention to errors in an article published in this same paper in the issue of March 5. 1100 w. R R Gaz—March 19, 1897.

**Dortmund-Ems.**—The Dortmund-Ems Canal (Der Kanal von Dortmund nach den Emshäfen). General description of this important waterway, with map, profile, and views of bridges and locks. Two articles. 5000 w. Deutsche Bauzeit—July 23, 27, 1898.

The Dortmund-Ems Canal. An account of a waterway built at a cost of $18,000,000. 1200 w. Eng Rec—Sept. 23, 1899.

The Emperor at the Dortmund-Ems Canal and at the Union Works (Der Kaiser am Dortmund-Ems Kanal und auf der "Union"). With maps and profiles of this canal, and views of the canal lift and in the Union Works. 2500 w. Stahl und Eisen—Sept. 1, 1899.

The Dortmund-Ems Canal (Le Canal de Dortmund à l'Ems). G. Henry. A very full account of the engineering features of the canal, with numerous illustrations and drawings of the lift at Henrichenburg. 4500 w. 1 plate. Génie Civil—Oct. 7, 1899.

The Dortmund-Ems Canal. A brief account of this important waterway. Ill. 1200 w. Engr, Lond—Nov. 17, 1899.

See also **LOCK—Henrichenburg.**

**Dortmund-Rhine.**—General Meeting of the Society for the Construction of a Canal from Dortmund to the Rhine (General Versammlung des Vereins für Erbauung eines Kanals von Dortmund nach dem Rhein). The construction of the canal was strongly urged, and the inadequacy of the existing railway facilities shown. 8000 w. 4 plates. Glückauf—Dec. 18, 1897.

**Elbe-Trave.**—The Elbe-Trave Canal (Der Elbe-Trave Kanal). A full and very well illustrated account of this 42-mile canal between Lübeck and Lauenburg on the Elbe, with its locks and the bridges crossing it. Compiled from official sources. 12000 w. 2 plates. Zeitschr d Ver Deutscher Ing—June 16, 1900.

The Elbe-Trave Canal (Le Canal de l'Elbe à la Trave). G. Henry. An illustrated description, with especial reference to the Hotopp pneumatic locks. 3000 w. 1 plate. Génie Civil—Oct. 13, 1900.

The Elbe-Trave Canal (Der Elbe-Trave-Canal). J. Riedel. With map and profile, also details of locks. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 28, 1900.

The Lübeck Canal. From "Ueber Land und Meer." Illustrated description of this canal and the difficulties met in its construction. 1600 w. Sci Am. Sup—Oct. 28, 1899.

See also **LOCK—Hotopp.**

**English Grand Western.**—An Old West Country Canal. History of an old canal of England, the Grand Western Canal, constucted about a century ago. 1700 w. Engr, Lond—Dec. 25, 1896.

**English Ship.**—Some Early Ship Canals. A review of the various schemes projected in England. 1100 w. Engr, Lond—Nov. 26, 1897.

**Erie.**—Concerning Erie Canal Improvements. Chauncey N. Dutton. Letter offering comments on an editorial on this subject, published in the Jan. 6 issue of this journal, and giving opinions of the writer. 4500 w. Eng News—Jan. 27, 1898.

The Erie Canal Problem. Editorial outlining the plans presented for consideration. 1400 w. Sci Am—Feb. 3, 1900.

The Future of the Erie Canal. Explains the legal aspect of canal improvements. 700 w. Eng Rec—Feb. 5, 1898.

Waste of Money on Erie Canal. Discusses editorially the proposal to spend large sums of money on this canal, giving historical review of past waste on this enterprise. 1100 w. Loc Engng—March, 1900.

See also **Great Lakes—Atlantic; New York.**

**Erie Break.**—Description of a Break on the Erie Canal. Albert J. Hymes. The large break that occurred at Pattersonville, ten miles west of Schenectady, on June 5, 1897. The cause supposed to be some defect in the culvert. The construction of such culverts is illustrated and described. 8000 w. Trans Assn of Civ Engs of Cornell Univ—June, 1896.

**Erie, Federal Control.**—The Future of the Erie Canal. Thomas W. Symons. Advocates federal control. 3000 w. Eng Rec—March 19, 1896.

See also **New York, Federal Control.**

**Erie, Jordan Level.**—The Improvement of a Portion of the Jordan Level of the Erie Canal. William B. Landreth. An illustrated description of the difficulties encountered and the methods used in overcoming them. 4700 w. Pro Am Soc of Civ Engs—Dec., 1899.

The Improvement of a Portion of the Jordan Level of the Erie Canal. Discussion of paper by William B. Landreth. 2200 w. Pro Am Soc of Civ Engs—Feb., 1900.

The Improvement of a Uortion of the Jordan Level of the Erie Canal. Continued discussion of paper by William B. Landreth on this subject. 4500 w. Pro Am Soc of Civ Engs—April, 1900.

**Erie Railway.**—The Canal Problem in New York: A New Solution. A reprint of editorial in the "Journal of Commerce." Suggests the building upon the banks of the Erie Canal a double-track railway for freight traffic only. 3500 w. Eng News—Nov. 9, 1899.

**Florida Ship.**—The Proposed Florida Ship Canal. Information of the proposed construction of this canal, with the arguments in its favor. 1700 w. Bd of Trade Jour—Oct., 1897.

**France.**—Improvement of the System of Canals from Paris to the North of France (Verbesserung der von Nord-Frankreich gegen Paris führenden Schiffahrts-Canale). A. Dumas. With map of existing and projected works and a statement of past and present tonnage. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—Aug. 1898.

**Galops, Ontario.**—The Galops Canal. Illustrates and describes the improvements on this canal in Ontario, with remarks on the general improvement of the canal system. 1100 w. Fire & Water—April 1, 1899.

**Germany and Austria.**—Proposed Deep-Water Canals in Germany and Austria. W. Powell. Consular report of the proposed eulargement of the waterway between Stettin and Berlin and other projects. 500 w. Prac Eng—July 9, 1897.

**Ghent.**—See **HARBOR—Ghent.**

**Great Lakes—Atlantic.**—American Railroads and Canals. Editorial on the position of New York State in relation to the transportation trade, and the competition of other American ports and of the Canadian canals and Montreal. 1700 w. Engng—Feb. 16, 1900.

A Survey of a Great Lakes and Hudson River Ship Canal. A presentation of the principal facts and a discussion of the results, as based on data from report by Albert J. Heines. No great accuracy is claimed for the estimates. The editor's views regarding the construction of a ship canal from the Great Lakes to the Atlantic Ocean are given briefly. 1800 w. Eng News—Nov. 19, 1896.

A Ship Canal from the American Lakes to the Sea. Main conclusions of the report of Thomas W. Symons, with examination of the report in some detail, showing how the conclusions have been reached. 2700 w. R R Gaz—Nov. 5, 1897.

A Ship Canal from the Lakes to the Hudson. A summary of the findings and conclusions reached and discussed in the report of Thomas W. Symons, on the question of this American ship canal. 1100 w. Ir Age—Nov. 4, 1897.

A Ship Canal to the Sea. H. S. Canby. Discusses the question of transportation, favoring the construction of a ship canal, and considering the new lock invented by Chauncey N. Dutton. 2000 w. Yale Sci M—April, 1898.

From the Lakes to the Sea. Carl Snyder. An account of the inventions and devices that have now rendered feasible a great ship canal connecting the Great Lakes in the United States with the sea. Reviews the importance of the freight question, and of the invention of the pneumatic, quick-acting, high-lift locks, devised by Chauncey N. Dutton. Ill. 9500 w. Am Rev of Revs—Nov., 1897.

Lakes and Atlantic Waterway. Memorandum in regard to certain profiles designed to exhibit the ruling points, and accompanied by four profile sheets. Compiled by the publication committee from the records of the santiary district of Chicago. 1400 w. Jour W Soc of Engs—Jan., 1896.

Proposed Canal from American Lakes to Atlantic. Discusses the project and Major Symons' report. 1100 w. Engng—March 11, 1898.

Waterways from the Ocean to the Lakes. Thomas Curtis Clarke. Interesting illustrated historical account of the Erie Canal, cost, transportation rates, etc., with comments on proposed improvements; also brief review of the history of ship canals, with considerations relating to the Nicaragua Canal. 4000 w. Scribner's Mag—Jan., 1896.

Will a Ship Canal from the American Great Lakes to the Atlantic Pay? Abstract of the report of Thomas W. Symons, with editorial review of facts concerning the enterprise, and letters from engineers. Ill. 15000 w. Eng News—Nov. 11, 1897.

See also **Canada; Erie; Lake Huron-Montreal; New York; Oswego-Mohawk.**

**Impurities.**—See **SANITATION—Canal Impurities.**

**Inclined Plane.**—See **CANAL LIFT.**

**Interlaken.**—The Canal from the Lake of Thun to Interlaken (Der Schiffahrtskanal vom Thunersee bis Interlaken). A very complete account of the correction works on the River Aar and the construction of a navigable waterway to Interlaken, with map and profiles. Four articles. 7000 w. Schweiz Bauzeit—Sept. 16, 23, 30, Oct. 14, 1899.

**Isthmian.**—A Comparison of the Isthmian Canal Projects. George A. Burt. A careful review of both the Panama and Nicaragua plans, showing clearly their relative advantages, difficulties and costs. 3500 w. Eng Mag—April, 1900.

An Inter-Oceanic Canal. Presents the need of such a canal in view of recent changes—the annexation of the Sandwich Islands, etc. Discusses routes suggested, and the difficulties in the way. 1500 w. Bankers' Mag, N. Y.—July, 1898.

Comparison Between Three Proposed Routes Across the Isthmus. Thomas Wright Hurst. Considers these different routes in regard to harbors, distance, level, climate, and troublesome rivers and lakes. 4800 w. Clay Rec—May 12, 1899.

Difference of Opinion on an Isthmian Canal. Gives opinions expressed by Jas. D. Phelan and by C. P. Huntington. 1800 w. Ry & Engng Rev—May 19, 1900.

Interoceanic Canal Problems. Brief editorial review of the rights guaranteed the U. S. in any canal that may be built at Panama, and of matters relating to the Nicaragua Canal. 1500 w. Harper's Wk—Dec. 24, 1898.

Joining the Atlantic to the Pacific. George Ethelbert Walsh. A review of interesting facts connected with the three great canal routes whose construction has engaged the attention of the commercial world. 4500 w. Chau—Sept., 1896.

The Nicaragua and Panama Canals. Editorial discussion of these enterprises and their relations. 1600 w. R R Gaz—Dec. 23, 1898.

The Nicaragua Canal and Its Rivals. Reviews the various bills presented during the last session of the U. S. Congress, and the question as it now stands. 4500 w. Engr, Lond—April 7, 1899.

The Ship Canal Across the American Isthmus. A review of the engineering difficulties not considered in the report of the Walker Commission, which investigated the Nicaragua route. Serial. Eng Rec—April 28, 1900.

The Trans-Isthmian Canal. Henderson Gilbert. A review of the various projects for the construction of such a canal, and the present outlook. 1800 w. Yale Sci M—April, 1900.

See also **Nicaragua; Panama.**

**Isthmian Commission.**—The Appointment of a Commission to Investigate Isthmian Canal Routes. Editorial criticism of the reported reappointment of the Walker Commission. 2700 w. Eng News—March 23, 1899.

The New Trans-Isthmian Canal Commission. Editorial comment on the members of the commission and outline of the recent history of the project. 2500 w. Eng News—June 15, 1899.

**Isthmian Diplomacy.**—The Diplomacy of the United States in Regard to Central American Canals. James Gustavus Whiteley. Historical review of the interoceanic canal problem. 5500 w. N Am Rev—Sept., 1897.

**Isthmian Geological Waterways.**—Geological Waterways Across Central America. J. W. Spencer. A discussion of the geological and biological evidence of interoceanic connections. Ill. 5500 w. Ap Pop Sci M—Sept., 1898.

**Isthmian Neutralization.**—The Proposed Neutralisation of the Isthmian Canal. Editorial discussion favoring the neutralisation by international agreement, and giving reasons for the opinions expressed. 2500 w. Eng News—Feb. 22, 1900.

**Isthmian San Blas.**—Sea Level Canal Across the Isthmus of San Blas. William W. Redfield. Presenting the merits of this route, and giving information concerning it. Map. 4800 w. Jour Assn of Engng Socs—May, 1900.

**Japan.**—The Lake Biwa-Kioto Canal, Japan. Sakuro Tanabe. Illustrated description of a canal constructed with the objects of opening a line of boat navigation between the lake and Yodo River through Kioto, the production of water power and the distribution of power and light in the city by electricity, and the irrigation of rice fields in the vicinity. 1400 w. Sci Am—Nov. 7, 1896.

**Kiel.**—The North Sea and Baltic Canal. Max am Ende. Paper read before the Inst. of Civ. Engs. An interesting description of the work, giving many items of cost, dimensions, etc. 3000 w. Ind & Ir—Dec. 27, 1895.

The Traffic on the "Kaiser Wilhelm" Canal. Report of the British Consul-General at Hamburg on the traffic of this canal during the year 1896-1897. Shows an increase of traffic; also gives other particulars of interest. 1000 w. Bd of Trd Jour—Feb., 1898.

The Influence of the Kaiser Wilhelm Canal Upon the Port of Hamburg (Die Einwirkung des Kaiser Wilhelm Canals auf die Seeschiffahrtsstellung Hamburgs). Showing that Hamburg has been benefitted rather than injured by the opening of the canal between the North Sea and the Baltic. 2500 w. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1897.

**Lake Erie-Ohio River.**—The Lake Erie and Ohio River Ship Canal Information from the report of the provisional committee of the Pittsburg Chamber of Commerce. Gives argument for the building of this canal, route proposed, summary of estimates of cost, etc. 1200 w. Eng News—Dec. 23, 1897.

The Lake Erie and Ohio River Ship Canal. William Gilbert Irwin. Discussed the economies that will result from the construction of this canal, giving figures from carefully compiled statistics concerning the traffic of this region, the cost, etc. 1700 w. Sci Am—Sept. 24, 1898.

The Lake Erie and Ohio Ship Canal. Harold Allen. Considers the general advantages of a waterway in this section, and the plans of a route recently advocated. 2400 w. Yale Sci M—Nov., 1898.

**Lake Huron-Montreal.**—Canadian Canals and Trade. Editorial concerning the project for the construction of a deep-water canal from Georgian Bay to Ottawa and Montreal by way of Lake Nipissing and the Ottawa River, and the effect on traffic of the Great Lakes. 1600 w. Engng—June 15, 1900.

**Lining.**—Lining of the Marne-Saone Canal (Etanchement du Canal de la Marne à la Saone). Gustave Cadart. Detailed illustrated description of methods used in lining a leaky canal in calcareous earth. The best results were obtained from thin layers of concrete made of lime and the sandy gravel of the neighborhood, though many other methods were used successfully. 14000 w. Ann des Ponts et Chaussées—3e. Trimestre, 1898.

**Loire, France.**—The Transformation of the Lateral Canal of the Loire (Transformation du Canal Latéral à la Loire). E. Rouyer. A full account of this important engineering work, with views of the aqueducts, locks, and bridges. A map and profile of the canal are given, and dimensioned drawings of important details. 2500 w. 1 plate. Génie Civil—Jan. 13, 1900.

The Transformation of the Lateral Canal of the Loire (Transformation du Canal Latéral à la Loire). M. Masoyer. A full account of the improvement works, with illustrations of the aqueducts, bridges, and masonry details. 18000 w. 3 plates. Ann des Ponts et Chaussées—2 Trimestre, 1899.

**Lübeck.**—See **Elbe-Trave.**

**Manchester.**—Equipment, Management and Economic Influence of the Ship Canal. W. Henry Hunter. A handsomely illustrated article, taking as its text the Manchester ship canal. It shows the enormous traffic that has resulted from the opening of this waterway and the great increase in the trade of Manchester flowing from it, and states that, to-day, the canal is worth £1,000,000 annually to that city. In more general terms the author deals with the broader question of the economic influence of canals, which by stimulating competition in the carrying industry produce progress and aid development. 2800 w. Eng Mag—Jan., 1899.

The Manchester Ship Canal, and Canal and River Hydraulics. A discussion of the "omnibus bill" promoted by the Manchester Ship Canal Co.—What ground it covers and the opposition, with reasons. 2800 w. Engr, Lond—May 15, 1896.

The Manchester Ship Canal. A discussion of the financial position and prospects, based upon the half yearly report. The conclusion is that the earnings will for many years at any rate disappoint the promoters. 1200 w. R R Gaz—Sept. 9, 1898.

The Manchester Ship Canal. Elmer L. Corthell. Discusses the reasons for constructing this canal, and describes this great work and the results. Ill. 3000 w. Jour W Soc of Engs—Feb., 1899.

The Manchester Ship Canal. Willard S. Mattox. The influence of this canal on trade, an account of the difficulties that attended its construction, and the dock and quay equipment, and the prospect of its financial success. 2800 w. Ir Age—Feb. 2, 1899.

The Effects of the Manchester Ship Canal. Abstract of paper by A. Woodroofe Fletcher. Credits the canal with causing the great revival in trade and general prosperity. 2500 w. Engr, Lond—Dec. 8, 1899.

**Marne-Saone.**—Canal Between the Marne and Saone Rivers, France (Canal de la Marne à la Saone). Gustave Cadart. A full description of the canal, 151 kilometers long, though not yet finished, with maps, plans and illustrations. 21000 w. 4 plates. Ann d Ponts et Chaussées—4th quarter, 1899.

The Completion of the Marne-Saone Canal (L'Achèvement du Canal de la Marne à la Saone). G. Leugny. With map and sections of various portions of the canal, and a table showing the shortening in route effected. 3500 w. Rev Tech—Aug. 10, 1900.

See also **Lining.**

**Marseilles-Rhone.**—A Canal from Marseilles to the Rhone. Gives the general features of a new scheme to aid the trade of Marseilles, with critical remarks concerning it. 1600 w. Engr, Lond—Sept. 8, 1899.

The Decadence of the Port of Marseilles and the Proposed Rhone Canal. Discusses the general decadence of French ports, and especially Marseilles, and M. Charles Roux's solution of the problem by connecting Marseilles with the Rhone and so give communication with all the canals and rivers of Europe. 1600 w. Bd of Trd Jour—July, 1897.

The Marseilles-Rhone Canal (Le Canal de Marseille au Rhone). G. Leugny. A discussion both of the economic and engineering features of the proposed canal, with map of the route and sections at various points. 3000 w. La Rev Tech—May 25, 1899.

**Mechanical Propulsion.**—See **CANAL BOAT; CANAL HAULAGE.**

**Mexico Drainage.**—The Mexican Drainage Canal. F. H. Cheesewright. Read at a meeting of the Soc. of Arts. An interesting historical account of this great work which it is prophesied will make Mexico the most healthy city in the world. 4400 w. Arch, Lond—Feb. 21, 1896.

**Midlands, England.**—Canal Communication from the Midlands to the Sea. A brief review of the four main routes which are referred to as of prime importance to the Midlands, with other information. 3000 w. Engr, Lond—March 26, 1897.

**New York.**—Canal Improvement Postponed. Editorial on the situation in New York State, the legislature haveing refused to pass a bill to continue the work. 1600 w. Sea—April 7, 1898.

Canal Improvement to Date. Herschel Roberts. Progress of the work under the nine-million dollar expenditure. Contracts now under way. Contracts about to be let. Statement of advancement. 4000 w. Sea—July 8, 1897.

Canal Work Well Done. Abstract of statement of George W. Aldridge, with editorial comment. 7000 w. Sea—Nov. 3, 1898.

Improving New York's Canals. Report as to the nature of the work to be immediately undertaken. The worst portions of the Erie, Oswego and Champlain canals to be first improved. 3000 w. Sea—Oct. 22, 1896.

Mr. Hewitt on the Canals of New York. Reply of Mr. Abram S. Hewitt to the letter of inquiry sent out by the committee. Thinks there is no justification for the expenditure of any considerable sum of money for their enlargement. 1100 w. R R Gas—Aug. 4, 1899.

New York and Its Canals. Editorial on the Commissioner's report. 2000 w. Engr, Lond—Feb. 16, 1900.

New York's Canal Improvement. Full report of C. W. Adams, State Engineer and G. W. Aldridge, Superintendent of Public Works. Statements concerning work in progress and projected, cost, etc. 11000 w. Sea—Dec. 30, 1897.

New York's Canal Policy. What Shall It Be? Editorial discussion, presenting facts that may have influence, and discussing the claims made. 3000 w. Eng News—Feb. 8, 1900.

New York's Canal Problem. William G. Raymond. A discussion of the report of the advisory committee appointed by the governor. Serial. R R Gas—March 2, 1900.

New York's Canals and Commerce. Alex. R. Smith. The conception, construction, cost, purpose, traffic, improvement and management of the canals, and their effect upon New York's commerce. 4500 w. Sea—Aug. 26, 1897.

New York's Canals. Campbell W. Adams. An exhaustive but not too technical discussion of the work under the nine-million dollar canal improvement bill. States opposition to a ship canal and benefits to follow present improvement of free canals. Also editorial. 6000 w. Sea—March 4, 1897.

New York's Canals. State engineer, C. W. Adams, discusses the report of the Canal Investigating Commission. Also editorial. 4500 w. Sea—Oct. 13, 1898.

New York State Canals. A statement of the five possible solutions under consideration by the committee appointed by the governor. 1500 w. Marine Rec—May 18, 1899.

Present Status of the New York State Canals Improvements. Statements relating to the progress and cost of the work, from the report of Campbell W. Adams, State engineer of New York, with editorial notes. 2000 w. Eng News—Dec. 30, 1897.

Recent Engineering Work on the New York State Canals. Review of the State engineer's reply to criticisms on the preliminary work for enlarging the canals, the choice of specifications and the classification of rock and earth. 4800 w. Eng Rec—Oct. 22, 1898.

The Condition of the New York State Canals. Illustrates the old and new work. 500 w. Eng Rec—Jan. 29, 1898.

The Future of the New York State Canals. A statement of the relative merits of estimates for various improvements. 2000 w. Eng Rec—May 13, 1899.

The New York State Canals Improvement. Part first treats of the purpose and nature of the improvements, giving table of contract prices for principal items of work, and profile from Buffalo to Albany. Serial. Eng News—Sept. 2, 1897.

The New York State Canal Investigation. A full and interesting account of the project to improve the canals, the estimates given, the results of the careful investigation of the Commission appointed by the governor, etc. 4800 w. R R Gaz—July 29, 1898.

The New York State Canals. Editorial comment on recent developments concerning the estimates of cost of proposed improvements. 1600 w. R R Gaz—Jan. 7, 1898.

The Prospects of the New York Canals. Editorial discussion of this question and the importance of prompt action by the New York legislature. 1800 w. Eng News—March 31, 1898.

The Reply of State Engineer Adams to the Canal Investigating Commission. Abstracts of replies of the State engineer and Supt. of Public Works, with editorial comment. 5500 w. Eng News—Nov. 3, 1898.

What Had Best Be Done With the New York State Canals? A Symposium. Editorial summary of replies to the inquiry letter sent out by the expert commission appointed by the governor, and the arguments presented. 4400 w. Eng News—Aug. 3, 1899.

What Shall New York Do With Its Canals? Editorial discussion of the present situation and the best course to pursue. 2700 w. Eng News—Jan. 6, 1898.

See also **Erie; Oswego-Mohawk.**

**New York Commission.**—The Canals of the State of New York. Editorial comment on the appointment, by the governor, of a special commission to investigate the policy of the state toward its canals. 800 w. R R Gaz—March 17, 1899.

The Canal Commissioners' Report. A summary of the report of the commission, appointed to investigate matters relating to the New York State canals, with editorial comment. 6000 w. Sea—Aug. 11, 1898.

The New York Canals. A full abstract of a report of an investigation conducted with hitherto unequalled resources and advantages, by a special commission appointed by the Governor of New York. Also editorial on the importance of the investigation. 6200 w. Eng Rec—Feb. 3, 1900.

The New York State Canal Inquiry. An abstract of the report of commission appointed by the governor to investigate the work done under the $9,000,000 appropriation, with editorial comment. 4700 w. Eng News—Aug. 11, 1898.

What Shall New York Do With Its Canals? The report of the Governor's advisory committee in full. 16000 w. Eng News—Feb. 1, 1900.

**New York Engineering.**—Recent Engineering on the New York State Canals. Extract from report by E. P. North and L. E. Cooley concerning the present administration of the State Engineer's office. 1200 w. Eng Rec—Aug. 20, 1898.

**New York, Federal Control.**—Federal Ownership of New York's Canals. Hearing before the Senate judiciary committee on Wednesday, March 9, on the Pavey resolution providing for the amendment of the constitution so as to make possible the transfer of New York's canals to the Federal Government. 2800 w. Sea—March 17, 1898.

See also **Erie, Federal Control.**

**New York, Railway Competition.**—Railway Competition with Canals in New York. Extracts from the circular letter issued by the commission appointed by the governor to investigate the canal question, with editorial comment on the problem. 3500 w. Eng News—May 11, 1899.

**Nicaragua.**—Advantages of the Nicaragua Canal. A. S. Crowinshield. A résumé of isthmus canal projects, with a statement of the advantages, feasibility and costs, the value to the Pacific coast and Gulf states, uses in war, etc. Map. 6000 w. Century Mag—Jan., 1899.

A Proposed New Location for a Nicaragua Ship Canal. J. T. Ford. A skeleton sketch with a proposed survey which the writer thinks would economize. 1000 w. Eng News—Aug. 13, 1896.

A Review of the Nicaragua Canal Scheme. W. Henry Hunter. A careful discussion of the proposed route, showing its difficulties and uncertainties, and calling for a most careful investigation of the scheme. 6000 w. Eng Mag—March, 1899.

A Spanish View of the Niacaragua Canal. José Guitiérres Sobral. States briefly the three proposed routes and the difficulties to be met;

then discusses the value of a canal cutting the isthmus, and its importance in a military sense. 3500 w. N Am Rev—April, 1897.

National Influence and the Isthmus Canal. Lewis M. Haupt. A discussion of the military and commercial importance to the United States of a canal through the isthmus, and the desirability of having it under the control of the U. S. Government. 3500 w. Eng Mag—July, 1898.

Nicaragua Ports and the Nicaragua Canal. Discusses the necessity for and advantages of the canal and the ports where the greatest extension of trade may be expected. 1700 w. Bd of Trd Jour—April, 1897.

Some Engineering Features of the Nicaragua Canal. Alfred Noble. Describes the general features of the region, and gives an outline of the engineering features of the project. Also discussion and maps. 10000 w. Jour W Soc of Engs—Feb., 1898.

The Absence of Facts About the Nicaragua Canal. Charles B. Going. Showing the insufficient investigation and erroneous claims upon the strength of which the United States is asked to risk at least a hundred millions, and nobody knows how much more. 4300 w. Eng Mag—June, 1896.

The Advantages of the Nicaragua Route. J. W. Miller. The advantages of the route of the canal as at present located, considering the Lake of Nicaragua, its advantages to an isthmian canal, and its approaches. natural and artificial. 1700 w. An Am Acad—Jan., 1896.

The Dream of Navigators. A. S. Crowninshield. Showing the value and importance of the Nicaragua Canal and urging its construction under the auspices of the United States Government. 2800 w. N Am Rev—Dec., 1897.

The Latest Aspects of the Nicaraguan Canal Project. Corry M. Stadden. Reviews the history of the project, the propositions that have been before Congress for its construction, the opposition, and the present situation. 5000 w. N Am Rev—Dec., 1898.

The Nicaragua Canal (Der Nicaragua Canal). A discussion by Herr H. Claus, of the isthmian canal question from a German point of view, with reference to the papers of Messrs. Haupt and Nimmo in the "Engineering Magazine." 2500 w. Glaser's Annalen—Dec. 15, 1898.

The Nicaragua Canal. Archibald Colquhoun. An address at the London Chamber of Commerce, speaks of the benefit to the trade of the Eastern United States, and the advantage it will give the latter in competition with British trade in the Far East. 700 w. Ind & Ir—Nov. 1, 1895.

The Nicaragua Canal. Brief discussion of the project as it now appears, of the effect on trade routes, and the desirability of an Anglo-American understanding. 1700 w. Engng—Feb. 17, 1899.

The Nicaragua Canal. Day Allen Willey. Discusses the route, the topography, the difficulties in construction, cost, the effect on commerce, and in developing the western coast of the United States. 2800 w. Chau—Nov., 1898.

The Nicaraguan Canal. Editorial comment on statements made in urging the need of this canal, and the United States' duty concerning it. 1000 w. R R Gaz—Aug. 12, 1898.

The Nicaragua Canal. Editorial summing up briefly the situation. 1500 w. R R Gaz—Jan. 22, 1897.

The Nicaragua Canal. Lewis M. Haupt. Digest of a lecture delivered before the Friends' Inst. Lyceum, Philadelphia. Briefly reviews the history of this project, discusses the objections urged, and the advantages claimed, and the commercial aspect. Ill. 2800 w. Sci Am Sup—April 1, 1899.

The Nicaragua Canal. Joseph Nimmo, Jr. An appeal for a thorough governmental investigation of its commercial and military aspects. 2800 w. Mfrs Rec—Dec. 18, 1896.

The Nicaragua Canal. I. The political Consideration. L. M. Keasbey. II. The Commercial Interests. Emory R. Johnson. Two interesting papers on the questions to be considered in relation to the construction of this canal. 9000 w. Am Rev of Revs—Nov., 1898.

The Nicaragua Canal. Urging the importance of this work and quoting from the paper by Alfred Noble, published in the "Journal of the Western Society of Engineers." 2700 w. Gunton's Mag—July, 1898.

The Nicaragua Canal Again. Editorial criticism of the attitude of the officers of the company, with statement of the situation. 900 w. R R Gaz—Jan. 29, 1897.

The Nicaragua Canal and the Economic Development of the United States. E. R. Johnson. The writer believes that the future industrial and economical development of the country is largely conditioned upon the early construction of this canal. He gives a brief outline of the influences it will exert, showing that the benefits will be shared by all parts of the country. 4000 w. An Am Acad—Jan., 1896.

The Nicaragua Canal an Impracticable Scheme. Joseph Nimmo, Jr. The author declares from results of his own compilation that the amount of tonnage that has been estimated would pass through an American interoceanic ship canal has been great exaggerated. Upon this and other considerations he concludes that the scheme of a Nicaragua canal is impracticable, and he charges that from the beginning, its promoters and advocates have studiously avoided anything like a thorough discussion of the economic and commercial conditions which determine the question of practicability. 6000 w. Forum—March, 1896.

The Nicaragua Canal Enterprise. Gen. William Ludlow, U. S. A. Extract from article in "Harper's Magazine" for May, discussing the "Trans-Isthmian Canal Problem." 1400 w. Eng News—May 5, 1898.

The Nicaragua Canal in its Commercial and Military Aspects. Joseph Nimmo, Jr. An argument against the construction of the canal, showing the objections and difficulties in which the project is involved. 3000 w. Eng Mag—Aug., 1898.

The Proposed Nicaragua Canal. An illustrated comprehensive description of this canal is given, and a comparison of its natural, commercial and political advantages, with those of the Panama route. 6400 w. Sci Am—Feb. 18, 1899.

The Topography of the Nicaragua Canal Route, and the Plans and Estimated Cost of Constructing the Canal. E. S. Wheeler. Presents the principal results of the Nicaragua Canal Commission's report, without data or discussion, giving a map showing the topography of the region. 7200 w. Eng News—July 12, 1900.

See also **Isthmian.**

**Nicaragua Bill.**—Plain Words About the Morgan Bill for Purchasing the Nicaragua Canal Concession. Editorial reviewing briefly the recent history of the enterprise and explaining the present situation, giving reasons why the Morgan bill should not be passed. 3000 w. Eng News—Dec. 15, 1898.

The Hepburn Bill for a Nicaragua Canal. An editorial discussion of the "amendment" to the Senate bill. 2200 w. Eng News—Feb. 9, 1899.

The Nicaragua Canal in Congress. Editorial discussion of the amended bill as passed by the U. S. Senate. 2400 w. Eng News—Jan. 26, 1899.

**Nicaragua Board.**—The Report of the Nicaragua Canal Board. The full text of the report is given with a map of the route. It includes the general characteristics of the country, a history of former projects and a full discussion of the present scheme. Also editorial. 36000 w. Eng News—March 26, 1896.

The Report on the Nicaragua Canal. An editorial review of a portion of the report of the United States Board of Engineers on the Nicaragua Canal, going to show the insufficiency of information heretofore collected. 1900 w. R R Gaz—March 20, 1896.

The Report on the Nicaragua Canal. An editorial review of some of the most significant points brought out in the recent report made by a Board of Engineers on the Nicaragua Canal project. This article is confined to showing how entirely insufficient the information now available is, to enable one to form a judgment of the cost and practicability of the scheme. 3500 w. R R Gaz—March 13, 1896.

**Nicaragua Commission.**—Preliminary Report of the Nicaragua Canal Commission. Gives full text of this report, with brief comment. 1100 w. Eng News—Jan. 5, 1899.

The Nicaragua Canal—Hearing of the Commissioners. Editorial discussion of the report of the Commissioners before the Senate Committee. 2200 w. R R Gaz—June 1, 1900.

The Nicaragua Canal Estimates. Editorial. Surprise is expressed that a difference of 18 millions sterling more than the estimate of Nicaragua Canal Co. should have been presented in the estimate of the United States Government Commission, and the editorial is substantially a review of the report of the commission. 3000 w. Engng—May 1, 1896.

The Report of the Nicaragua Canal Commission. A full abstract of the report made to the President by the Walker Commission, as published in the "N. Y. Journal" for Sept. 10. 11200 w. Eng News—Sept. 21, 1899.

The Report of the Nicaragua Canal Commission. Briefly compares the various reports, and shows the limited nature of investigations hitherto authorized by Congress, as compared with that ordered in 1899. 1500 w. Eng Rec—June 10, 1899.

**Nicaragua Lake Level.**—An Assumed Inconstancy in the Level of Lake Nicaragua; a Question of Permanency of the Nicaragua Canal. C. Willard Hayes. Undertakes to answer the questions raised in a recent paper by Angelo Heilprin, and claims the region is favorable for the proposed canal. 2200 w. Nat Geog Mag—April, 1900.

An Assumed Inconstancy in the Level of Lake Nicaragua; A Question of Permanency of the Nicaragua Canal. Angelo Heilprin. A discussion of the important bearing on the proposed canal, giving instances of marked oscillation in other lakes. 2500 w. Sci Am—Feb. 24, 1900.

**Nicaragua, Menocal's Reply.**—Mr. Menocal's Reply to the Nicaragua Canal Commissioner's Report. In this reply, Civil Engineer A. G. Menocal takes the ground that while the company regards and has treated the project as a business enterprise, with a view to commercial requirements, technical success, and financial results, the Board of U. S. Engineers ignores two of these conditions and considers the project from the point of unlimited expenditure, without any question as to financial results, and provides beyond commercial requirements for the present, for the accommodation of demands that, at the utmost, can only be claimed to be occasional. The editorial on this reply expresses the view that further surveys are advisable, and otherwise criticises Mr. Menocal's remarks. 10500 w. Eng News—April 30, 1896.

**Nicaragua, Monroe Doctrine.**—The Nicaragua Canal and the Monroe Doctrine. L. M. Keasbey. An outline of the issue between England and America in the case of the Nicaragua Canal Route. An interesting historical review. 11500 w. An Am Acad—Jan., 1896.

**Nicaragua Surveying.**—Surveying in Nicaragua. J. Francis Le Baron. Experiences in work on the interoceanic canal; location, climatic peculiarities, animal and insect pests. 3800 w. Eng Rec—April 24, 1897.

**Nicaragua Test Borings.**—Test Borings for the Isthmian Canal Commission. Describes methods of sinking bore-holes through rock and earth on the projected line of the Nicaragua Canal. 1700 w. Eng Rec—Sept. 29, 1900.

**Nicaragua Treaties.**—The Clayton-Bulwer Treaty. Mayo W. Hazeltine. This treaty, which declared that a canal crossing the Nicaragua Isthmus should remain forever under the joint control of the United States and Great Britain, is discussed, with actions bearing upon it, and whether it has been rendered voidable. 3000 w. N Am Rev—Oct., 1897.

The Text of Two Much-Discussed Treaties. The full text of the Hay-Pauncefote and Clayton-Bulwer treaties, with editorial comment. 4000 w. Rev of Revs—March, 1900.

**Nicaragua Versus Railway Transportation.**—See **TRANSPORTATION—Railway vs. Canal.**

**North Sea and Baltic.**—See **Kiel.**

**Operation.**—The Efficiency and Cost of Operation of Canals (Leistungsfähigkeit und Betriebskosten der Canäle). J. Deutsch. A long discussion of the relative advantages of inclined planes and locks for canals, and containing much useful information concerning the operation of internal waterways. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 14, 1898.

**Oswego-Mohawk.**—Methods and Results of Surveys and Borings for Oswego-Mohawk Ship Canal Route. D. J. Howell. Part first describes the methods of work, conditions, etc. Serial. Eng News—June 21, 1900.

See also **New York**

**Ottawa Valley.**—The Montreal, Ottawa and Georgian Bay Canal. A summary of the leading arguments in a paper by Henry K. Wicksteed before the Can. Soc. of Civ. Engs. 1300 w. Can Engr—March, 1890.

The Ottawa Valley Canal. Andrew Bell. Discusses the difficulty of getting deep water on what is called the Lower Ottawa. 900 w. Can Engr—Aug., 1897.

**Panama.**—Concerning the Actual Condition of the Panama Canal. Charles Paine. The testimony of an eye-witness as to the advanced condition of the work at Panama at the present time and of the advantages of completing this undertaking rather than the commencement of new work. With valuable topographical map. 3500 w. Eng Mag—Feb., 1900.

General Abbot on the Panama Canal. Full text of the report presented to the U. S. Congress. 5500 w. Eng Rec—Jan. 14, 1899.

The American Isthmus and the Interoceanic Canal. W. Henry Hunter. A finely illustrated and complete description of the Panama canal, the plans of its engineers, present status of the work and future prospects. 5500 w. Eng Mag—Feb., 1899.

The Latest Plans for the Panama Canal (Der Panama-Canal nach dem Neuesten Entwurfe). A review of the report of the Technical Commission upon the Panama Canal, showing the cost of completion and the general condition of the work. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—June 30, 1899.

The New Panama Canal. Discusses the present status and future prospects of this undertaking. Gives the history of the work under Ferdinand de Lesseps, and of the investigations made by the new company, the amount of work done, the cost of completion, etc. Also editorial. Ill. 4500 w. Sci Am—Feb. 4, 1899.

The New Panama Canal. Showing the project as provisionally adopted. Profile is given. 1800 w. R R Gaz—Jan. 15, 1897.

The Panama Canal (Le Canal de Panama). A. Dumas. A historical sketch, with a general discussion of the plans of the new company. Serial. Génie Civil—April 7, 1900.

The Panama Canal. Statement of work done by the international committee of engineers. 900 w. Eng Rec—Oct. 1, 1898.

The Present Condition of the Panama Canal (Etat Actual des Travaux du Canal de Panama). Description, with photographs of the existing state of affairs along the line of the works. 3000 w. Rev Tech—June 10, 1897.

The Present Status of the Panama Canal. Henry L. Abbot. Sets forth the work of the international engineering commission which visited and inspected the works on the Isthmus and examined the engineering problems, with the conclusions they reached. Also editorial. Ill. 5500 w. Eng News—Oct. 6, 1898.

See also **Isthmian.**

**Panama, Chagres Regulation.**—A Plan for an Artificial Torrent (Un Projet de Torrent Artificiel). Leo Dex. A discussion of the plan of M. Bartissol to control the waters of the Chagres for use in a form of hydraulic mining in connection with the excavation of the Panama canal. 3500 w. La Rev Tech—Jan. 25, 1899.

**Paris-Rouen.**—Paris a Seaport (Paris Port de Mer). A revival of the scheme for a ship canal between Rouen and Paris. 1500 w. La Rev Tech—Sept. 25, 1897.

**Passenger Travel.**—Passenger Travel on Canals. Reviews some of the types of boats used on British canals for passenger traffic, when this was the popular way of travelling. 1400 w. Engr, Lond—July 22, 1898.

**Pennsylvania.**—Transportation on the Pennsylvania Canal. Canal transportation of freight and passengers in the forties across the Allegheny mountains to Pittsburg, with illustrations of the boats used. 500 w. Am Mfr & Wld—Nov. 22, 1895.

**Rhine-Elbe.**—The Rhine-Elbe Canal—A Feature in German Politics. James Howard Gore. An explanation of the importance of this project. 1800 w. Rev of Revs—April, 1900.

The Rhine-Elbe Canal (Der Rhein-Elbe-Kanal). A general account of the proposed waterway to connect the Elbe and the Rhine, with especial reference to the action of the German Government. 3000 w. Stahl und Eisen—April 15, 1899.

The Rhine-Elbe Canal (Der Rhein-Elbe-Kanal). A review of the conditions which have led to the present demand for the extension of internal waterways in Germany, with map and profile of the proposed canal between the Rhine and the Elbe. Two articles. 7500 w. Glaser's Annalen—July 1, 15, 1899.

The Rhine-Elbe Canal and German Industries. On the proposed canal construction, which will furnish a fine system of inland waterways and greatly benefit the coal and iron industries. Map. 7100 w. Ir & Coal Trds Rev—Feb. 9, 1900.

The Rhine-Elbe Canal and the Railways of the Ruhr District (Der Rhein-Elbe-Kanal und die Eisenbahnen des Ruhrbezirks). A discussion of the question of the capacity of the railways to handle the traffic of the district, and of the necessity of the proposed canal. 4000 w. Glückauf—Nov. 18, 1899.

The New Canal Plans (Die Neue Kanal-Vorlage). A special number devoted entirely to the Rhine-Elbe canal question, with a number of fine maps. 7500 w. 10 plates. Glückauf—April 8, 1899.

The Rhine-Elbe Canal Project. Information concerning a great project for increasing the traffic facilities in Germany. 4400 w. Engng—June 22, 1900.

**Santa Ana, Cal.**—Santa Ana Canal. J. B. Lippincott. Extract from Report of the U. S. Geol. Survey. Illustrated detailed description of this canal and the water resources of southern California. Serial. Sci Am Sup—March 10, 1900.

**Sault Ste. Marie.**—Sault Ste. Marie Canal. Views of the old state lock, with a historical résumé of the development of the canal. 800 w. Marine Rev—Feb. 23, 1899.

The Busiest Canal in the World. William V. Kibbee. Describing St. Mary's Falls canal. Ill. 2900 w. Eng Mag—July, 1897.

**Seepage.**—See also IRRIGATION—Seepage.

**Ship.**—Cost of Ship Canals. Henry E. P. Cottrell. A table showing the actual cost of excavation on ship canals and the proportion it bears to that of accessory and contingent works. Communicated by the writer as an addenda to his article in the issue of Nov. 29. 500 w. Engng—Jan. 31, 1896.

Equipment, Management, and Economic Influence of the Ship Canal. W. Henry Hunter. Takes the ground that engineering is applied economics, and discusses the subject from this broad standpoint. It describes the necessary terminal docks, railway connections, wharves, cranes and tackles, storage docks and warehouses, and extols the benefit to be derived from the construction of these waterways. Serial. 1st part. 4000 w. Eng Mag—Dec., 1898.

Physical and Commercial Aspects of the World's Ship Canals. E. L. Corthell. A critical comparison of the constructive features and operative details of existing ship canals, enabling the possibilities of future undertakings to be studied in the light of previous experience. 4500 w. Eng Mag—May, 1899.

The Economic Effects of Ship Canals. J. A. Fairlie. Traces the economic effects, showing how, in consequence of the canals, important changes have been made in business machinery, in business methods, in producing and marketing commodities, and in general economic development. 7500 w. An Am Acad—Jan., 1898.

**Soulanges, Canada.**—The Soulanges Canal. Describes the 14-mile canal passing boats of 2000 tons on a 14-ft. draft around Cascades, Split Rock, Cedars and Coteau Rapids in the St. Lawrence River. 1400 w. Eng Rec—April 8, 1899.

The Soulanges Canal. Thomas Monro. Describes this canal and calls attention to the many essential features in which it differs in design from the other links of the St. Lawrence system. 12000 w. Can Engr—March, 1899.

**Stone and Concrete.**—Artificial Stone and Concrete Work. A drainage canal twelve miles long, with a section five feet wide at the bottom, 12 ft. at the top, and 5 ft. deep. The ditch is lined with cement, which is said to have doubled the discharge. Three half tones illustrate the canal finished and under construction. Ill. 200 w. Min & Sci Pr—Nov. 9, 1895.

**Thames-Severn.**—Thames and Severn Canal. Brief account of the work of restoration recently completed. 800 w. Engr, Lond—Dec. 23, 1898.

The Thames and Severn Canal. Historical description with map of route, connections and illustrations. 1700 w. Engr, Lond—May 8, 1896.

**Traffic.**—The Traffic of Notable Canals. Abstract of figures and general information from a condensed summary issued by the Bureau of Statistics of the United States. 800 w. Ry & Engng Rev—Dec. 10, 1898.

**United States.**—The Passing of the Canal. Editorial on the reasons why river and canal transportation in the United States has been gradually abandoned, and why railways have superseded water routes. 2200 w. Eng News—Nov. 24, 1898.

**Vienna.**—Notes on the History of the Danube Canal at Vienna (Beitrag zur Geschichte des Wiener Donaucanals). A. Prokesch. A review of the improvements in the canalized arm of the Danube at Vienna since the early works in 1688. 4500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1899.

**Wyoming and Colorado.**—The West Side Irrigation and Mining Canal in Wyoming and Colorado. Elwood Mead. Illustrated description. The most interesting feature is the extent to which wooden pipe has been utilized. 1600 w. Eng News—July 30, 1896.

CANAL BOAT.

**Lake Carrier.**—Vessel to Carry Canal Boats. Describing a novel craft designed for the Lake Erie service of the Cleveland Steel Canal-Boat Co. 1000 w. Marine Rev—Feb. 2, 1899.

See also Self-Propelling.

**Screw Propulsion.**—The Propulsion of Barges. From "La Nature." Illustrated description of a new method of propulsion by screws. 900 w. Sci Am—Sept. 12, 1896.

Screw Propellers for Canal-Boats. Henry Barcroft. Consideration of the principles involved in the action of partially immersed screw propellers for canal-boats, with the experience resulting from experiments and observations on the influence of section of waterway upon the progress of canal-boats. Ill. 3300 w. Engng—Feb. 26, 1897.

**Self-Propelling.**—Self-Propelling Steel Canal Boats. Waldon Fawcett. Describes these boats briefly, and gives information concerning a pontoon barge to be constructed for conveying these boats on the American Great Lakes from Cleveland to Buffalo and return. Ill. 1100 w. Sci Am—Aug. 26, 1899.

**Steel.**—Steel Canal Boats. Lewis Nixon. Condensed from a paper read before the Soc. of Naval Archts. and Marine Eng. Describes the boats and gives midship cross-section drawings. The paper is devoted largely to an argument on the economy of running boats through from lake ports to New York. 2000 w. Eng News—Nov. 19, 1896.

CANAL HAULAGE.

**Cable.**—Cable Towing (Halage Funiculaire). A brief abstract of the application of continuous cable towage on the Aisne and Marne Canal, in the north of France. 1200 w. Comptes Rendus—Jan. 10, 1898.

The Cable Towage of Boats (Le Halage Funiculaire des Bateaux). Describing the cable system devised by M. Maurice Lévy for towing the boats through the Mont-de-Billy tunnel on the canal between the rivers Aisne and Marne. 7500 w. 1 plate. Ann des Ponts et Chaussées—Part II., 1897.

**Electric.**—Electrical Canal Haulage. Editorial discussing the causes of the decline in transport by canal, and predicting a revival in consequence of the introduction of improved methods; particularly the use of electricity for hauling. 1000 w. Elec Rev, Lond—Sept. 9, 1898.

Electrical Canal Traction. The first of a series of articles aiming to present a résumé of the salient points given in the "Bulletin of the Assn. of Elec. Engs. of Liege," for May, 1898. The writer of the original paper was Mr. Van der Wallen. Serial. Elec Rev, Lond—Dec. 9, 1898.

Electric Haulage for Canals (Elektrische Kanalschleppschiffahrt). E. Müllendorff. Giving illustrations of various systems of electric traction for canals, with a comparison of their advantages. 2500 w. Glaser's Annalen—Nov. 15, 1899.

Electric Towage on Canals. The first of a series of articles on this subject, dealing with chain haulage boats. Ill. Serial. Engng—Aug. 27, 1897.

Electric Towing upon Navigable Waterways. Reviews the various attempts that have been made to solve the problem of towing boats on canals, and illustrates and describes the system devised by M. Galliot. He uses an electric traction engine. 1800 w. Sci Am Sup—Feb. 4, 1899.

Electric Traction on Canals (La Traction Electrique sur les Canaux). R. Dubreuil. With descriptions and illustrations of the various devices used in France, Germany, and elsewhere, and data of the results of practical operation. 3000 w. Revue Technique—Jan. 10, 1900.

Experiments Upon the Lamb and the Köttgen Systems of Electric Towing (Elektrische Schleppschiffahrtsversuche mit dem System Lamb und dem System Köttgen). G. Klingenberg. With a number of illustrations showing the practical applications of the two systems on the Finow Canal. 7000 w. Elektrotech Zeitschr—Aug. 3, 1899.

The Development of Electric Canal Towing (Die Entwickelung der Elektrischen Schiffstauerei). H. Cox. An illustrated review of the various methods which have been tried for propelling canal boats by electric power. 3500 w. Zeitschr d Ver Deutscher Ing—June 18, 1898.

Trolley Connection and Locomotive for Towing Canal Boats. Describes the invention of Frederick J. Shewring; also the device invented by Edwin A. Leland. Ill. 700 w. Elec Eng, N. Y.—Dec. 23, 1897.

**Electric, Belgium.**—Electric Traction on Canals in Belgium. Illustrated description of the system of M. Gérard, installed between Brussels and Charleroi. 1500 w. Tram & Ry Wld—July 5, 1900.

**Electric, Cawley.**—Cawley System of Canal Haulage. The boats are drawn by electric motors running on elevated tracks beside the canal. The motors run on two tracks, one above the other, so that there is no interference in passing each other. They are controlled from the boat. Ill. 150 w. St Ry Rev—Nov. 15, 1895.

Electric Canal Haulage. A. H. Allen. Read before the British Assn., at Bristol. Describes an adaptation of electrical traction to canal haulage, invented by Messrs. Thwait and Cawley. It can be applied without interfering with the use of horses. The barges are hauled by means of rope, and an aerial railway is provided for the motors. Ill. 2500 w. Elec Eng, Lond—Sept. 30, 1898.

**Electric, Erie.**—Canal Boat Towing Test on the Erie Canal. Report of the test at Tonawanda. By the side of the tow-path are two cables; the upper 1¼ in. cable is 16 ft. from the ground and supports the motor, the smaller ⅝ in. cable is wound around the hauling drum of the motor and carries the return current. Five loaded boats were towed at the rate of 4.7 miles per hour. It is estimated that this method will reduce the cost 82 per cent. over mules, and 55 per cent. over steam. The test was under official supervision. Ill. 1300 w. St Ry Rev—Nov. 15, 1895.

Official Report of Experiments in Electric Propulsion on the Erie Canal. Full text of the report of Charles R. Barnes, from which it will be seen that the system is looked upon with much favor. 2200 w. W Elec—Jan. 18, 1896.

**Electric, France.**—Electric Canal Haulage in France. From "l'Industrie Electrique." Illustrated description of a system being installed in the Aire and Deule Canal. 700 w. Elec Eng, N. Y.—Oct. 21, 1897.

Electric Towing on French Canals. Illustrated description of systems used, and experiments made. 700 w. W Elect'n—Oct. 30, 1897.

The Electric Traction of Boats (La Traction Electriques des Beteaux). An illustrated account of the Denèfle system of electric trolley haulage for canal boats now being tested on several French canals. 1 plate. 2500 w. La Revue Technique —July 25, 1897.

**Electric, Lamb.**—Canal Improvements and the Lamb Motor on the Erie Canal. An illustrated description of this electric motor and its operation. 1000 w. Elec Eng—Nov. 20, 1895.

The Development of Electric Cableways. Richard Lamb. An illustrated account of the electric cableways, and their application to canal-boat towing. Also other uses to which they may be applied. Discussion. Ill. 1150 w. Trans Am Inst of Elec Engs—Jan., 1898.

**Electric, Prussia.**—Electric Traction for Canals. Report by Consul-General Richard Guenther, Frankfort, on experiments made on behalf of the Prussian Government by Siemen & Halske on a short length of the Finow Canal between Berlin and Stettin. 600 w. U. S. Consular Reports—Sept. 20, 1900.

**Mechanical Propulsion.**—Mechanical Propulsion on Canals. Leslie S. Robinson. Part first reviews early investigations, with study of resistance on rivers. Serial. Ind & Ir—March 5, 1897.

Mechanical Propulsion on Canals. Leslie S. Robinson. Read before the Inst. of Mech. Engs. A review of the general question of propulsion or haulage on canals. Also discussion. Serial. Engng—April 30, 1897.

Mechanical Traction on Canals. Historical review of the various methods tried. 4000 w. Engr, Lond—Sept. 29, 1899.

**CANAL LIFT.**

See also **LOCK.**

**Cylindrical Tank.**—Canal Lift Without Gates or Locks (Schiffshebewerk ohne Haltungsthore und Schleusen). A very complete account of the Tensschert-Czischek system, in which the canal boat is floated into a cylindrical tank and rolled up an inclined plane by rope tackle. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—July 7, 1899.

**Inclined Plane.**—The Inclined Plane, as a Canal Lift (Die Schiefe Ebene als Schiffs-Hebewerk). Victor Schönbach. A discussion of the inclined plane system as a substitute for canal locks, showing the conditions under which it is mechanically and commercially applicable. Describes an improved form. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—June 17, 24, 1898.

Inclined Planes for Boats—Their Early Use and More Recent Examples. Illustrated description of inclined planes used to shift boats in canals, lagoons, etc. This device is still in use in the Orient. 3500 w. Sci Am Sup—April 18, 1896.

**CANAL LOCK.**—See **LOCK.**

**CANNON.**—See **ARTILLERY; GUN.**

**CAPITOL.**

**Albany, N. Y.**—Commissioner Russell's Report on the New York State Capitol. An abstract of the report which was adopted, and plans ordered prepared in accordance with the recommendations. 1300 w. Arch & Build—Dec. 14, 1895.

The New York Capitol Building. Cuyler Reynolds. Historical account of this edifice, which has cost nearly thirty million dollars, illustrating many parts, describing and criticising the work. 5000 w. Arch Rec—Oct.-Dec., 1899.

**Pennsylvania.**—The Pennsylvania State Capitol. A brief history of the competition to furnish plans, its abolition, and the result. 1600 w. Eng Rec —Jan. 21, 1899.

**Washington, D. C.**—History of the United States Capitol. Glenn Brown. Account begins with the selection of the site and carefully reviews all points of interest connected with the preparation for building, the plans submitted, and final selection in this first number. Serial. Am Arch—May 9, 1896.

The United States Capitol Building, and the Architects of the Capitol. Historical account of the building, with views and features of special interest, and biographical accounts of the architects connected with the work. 3800 w. Arch & Build—Dec. 4, 1897.

**CAPSTAN GEAR.**

**Freight Handling.**—See **CRANE.**

**"Oceanic."**—Windlass and Capstan Gear of R. M. S. "Oceanic." Illustrated description of gear proportioned to work cables of iron 3¼ in. in diameter. 1400 w. Engng—Oct. 6, 1899.

**CAR.**

See also **ROLLING STOCK; TRAIN.**

The Passing of the Wooden Freight Car. Editorial on the changes taking place in the construction freight equipment. 1300 w. Am Eng & R R Jour—Dec., 1897.

**American.**—An English View of American Railroad Cars. Jeremiah Head. Extract from a paper read before the Cleveland Institute of Engineers showing the superior conveniences and comfort of American cars, and though the dead weight is comparatively greater on American roads for passenger traffic, it is less with freight. 1600 w. R R Jour—Nov., 1895.

**American at Paris.**—American Railroad Cars at the Paris Exposition. Gives half-tone engravings of drawing showing the development of American cars, with description. 4000 w. R R Car Jour —June, 1900.

Paris Exposition. American Cars and Car Supplies in the Transportation Building. An illustrated account of American exhibits at Paris. 1800 w. Ry Age—Sept. 21, 1900.

**Automotor.**—Automotor Cars for Railways. Describes and illustrates the "hydro-carbon" car tried at Columbus, Ind., and gives schemes for the transformation of Italian railways. 1500 w. Transport—Aug. 25, 1899.

See also **Gasoline Motor; Steam Motor.**

**Baggage Sanding Ends.**—Sanding the Ends of Baggage Cars. A. J. Bishop. A letter reporting satisfactory results on the Northern Pacific Railway, and the method used in sanding. 900 w. R R Car Jour—Aug., 1897.

**Ballast.**—See **TRACK—Ballasting.**

**B., R. & P. R. R.**—Passenger Cars for the Buffalo, Rochester and Pittsburg Railroad. Illustrations and descriptions of interesting features of these cars. 1700 w. R R Car Jour—March, 1900.

**Baltimore and Ohio.**—New Freight Cars for the Baltimore & Ohio R. R. Gives dimensions and abstracts of specifications for a large order of freight cars. 1100 w. Eng News—June 11, 1896.

**Box.**—A Typical Box Car. Extracts from discussion at meeting of the Western Railway Club, on the subject, "What Would Be the Advantage to Railroads in Adopting a Box Car of Typical Inside Dimensions?" 3200 w. R R Gaz—Nov. 24, 1899.

Baltimore and Ohio 60,000-Pound Box Car. Illustrated description. 700 w. Loc Engng—Dec., 1896.

Northern Pacific 70,000 lbs. Capacity Box Car. Engravings showing the principal features, and also the steel truck. 1400 w. R R Gaz—Sept. 30, 1898.

60,000-Pound Box Car for the Baltimore & Ohio R. R. Description with measurements and detail drawings. 600 w. Eng News—Sept. 24, 1896.

New Box Cars for the Big Four. Description, with engravings of details, of the 1000 box cars which Pullman's Palace Car Co. has lately built for the Cleveland, Cincinnati, Chicago & St. Louis R. R. 1200 w. R R Gaz—Oct. 29, 1897.

Standard 60,000 Pounds Capacity Box Cars—Lake Shore and Michigan Southern Railway. Engravings showing construction, with description. 1500 w. R R Gaz—June 10, 1898.

Uniform Dimensions for a Typical Box Car. Discussions by Messrs. A. M. Waitt, and R. P. C. Sanderson. 5000 w. N Y R R Club—Oct. 19, 1899.

**Box and Hopper.**—A Convertible Box and Hopper Car. Illustrates and describes a car designed by W. T. Manning, adapted to various classes of freight ordinarily transported in cars of the two classes. 1000 w. Ry Age—May 25, 1900.

**Box, Chesapeake and Ohio.**—New Box Cars for the Chesapeake and Ohio. Illustrated description. 1200 w. R R Gaz—Sept. 3, 1897.

**Box Standard.**—Report of Committee on Typical Dimensions of Standard Box Cars. Ill. 3500 w. Cent Ry Club—Jan., 1900.

Design for Standard Box Car. Committee report, with drawings. 400 w. Cent Ry Club—May, 1900.

Standard Dimensions for Interchange Box Cars. A table is given showing suggested standards reported to date, with editorial comment. 2000 w. R R Gaz—Jan. 22, 1897.

**Box Ventilated.**—See **Ventilated Box.**

**Breakages.**—Character of Breakages Shown in Service of Modern Freight Cars. Editorial discussion of defects arising in operation, and the treatment these heavy cars receive. 1200 w. Ry & Engng Rev—Jan. 27, 1900.

**Buffer Blocks.**—See **CAR-COUPLER—Buffer Blocks.**

**Buffet.**—A Novelty in Buffet Cars—C. G. W. Ry. Illustrates and describes a decidedly novel and pleasing car recently placed on the Chicago-St. Paul division of this road. 500 w. Ry Mas Mech—Sept., 1898.

**Burglar-Proof.**—R. R. Arsenals and Burglar Traps. Arthur H. Giles. Illustrated descriptions of devices to protect cars from railway robberies. 1400 w. R R Car Jour—Dec., 1897.

See also **Mail.**

**C. C. C. and St. L. Ry.**—80,000 Lbs. Capacity Cars for the Cleveland, Cincinnati, Chicago and St. Louis. Brief illustrated description. 400 w. R R Gaz—Feb. 17, 1899.

**Caboose.**—Caboose Car. Lake Shore and Michigan Southern Railway. Describes some new caboose cars recently built by this road, from the designs and drawings of A. M. Waitt. Ill. 900 w. Am Eng & R R Jour—June, 1897.

Improved Caboose for the Lake Shore and Michigan Southern Railway. Illustrated description of cars designed by A. M. Waitt, showing a greater degree of convenience by careful arrangement and some innovations in construction. 800 w. Ry Rev—Sept. 25, 1897.

**Caledonian Ry.**—Fifty-Ton Bogie Wagons for the Caledonian Railway. Illustrations showing details, also brief description. 500 w. Engng—Jan. 19, 1900.

Large Capacity English Cars. Detail drawings of a 50-ton capacity goods wagon for iron ore service on the Caledonian Railway. 300 w. Ry Age—July 21, 1899.

**Canda.**—Canda's 100,000 Lbs. Capacity Cars. Illustrates designs of a box car, a double hopper bottom coal car, and a truck for use under cars intended to carry loads of 100,000 pounds, on the Southern Pacific R. R. 3800 w. R R Gaz—June 9, 1899.

**Canda Coal.**—The Canda 100,000-Pound Capacity Coal Cars. Illustrated description of the interesting features. 1200 w. Ry Age—Dec. 22, 1899.

**Capacity.**—See **Size.**

**Center Plates.**—A Study in Center Plates. George L. Fowler. Discusses design and choice of material, and recommends a form of plate that may be adopted as a standard. Ill. 3300 w. R R Car Jour—Jan., 1899.

**Chapel.**—Chapel Cars on Railroads. Rev. C. H. Rust. Illustrates and describes these cars and the work which they do. 1000 w. Ry & Engng Rev—Sept. 16, 1899.

**Classification.**—Classification and Numbering of Passenger and Freight Equipment. J. A. Gohen. Calls attention to the need of improvement, with suggestions. 1500 w. St. Louis Ry Club—May 11, 1900.

**Coal.**—Coal Car, 60,000 lbs. Capacity; N. Y., N. H. & H. R. R. Illustrated description of cars presenting some interesting details. 900 w. R R Car Jour—Feb., 1898.

Double Hopper Bottom Coal Car, 100,000 lbs. Capacity, Northern Pacific Railroad. Elevation, plan, sections and truck, with descriptions. 600 w. Ry & Engng Rev—Sept. 10, 1898.

80,000 and 85,000-Pound Coal Cars. Illustrates and describes two new designs of wooden cars in use on the Buffalo, Rochester & Pittsburg Ry. They are known as the "shovel car" and the "dock car." 600 w. Am Engr & R R Jour—May, 1900.

New Coal Cars of 80,000 lbs. Capacity—Illinois Central Railroad. Illustrated detailed description of low-draft coal cars. 800 w. Ry & Engng Rev—March 12, 1898.

New 80,000 lb. Coal Cars, Norfolk & Western Ry. Illustrated detailed description. 900 w. R R Gaz—June 15, 1900.

New York, New Haven & Hartford 60,000-lbs. Coal Cars. The article is illustrated by dimension drawings, and notes some improvements in construction designed to meet the severe strain endured by large cars. 800 w. Loc Engng—June, 1896.

New 60,000-Pound Coal Cars—Lake Shore and Michigan Southern Railway. Illustrates a design for special service in the coal and ore trade from Lake Erie ports and for use with the McMyler unloading machine. 900 w. Am Eng & R R Jour—June, 1898.

60,000-lbs. Coal Car, Southern Railway. Detail drawings with dimensions. 200 w. R R Gaz—April 17, 1896.

80,000-lb. Coal Cars. Illinois Central R. R. Illustrated description giving dimensions. 1000 w. Eng News—June 16, 1898.

Double Drop-Bottom Coal Car, 65,000 Pounds Capacity. Illustrated description of a car for heavy service, the design of C. E. Turner. 800 w. Loc Engng—Feb., 1897.

Double Hopper 100,000-lb. Coal Car—Michigan Peninsular Car Co. Illustrated detailed description. 1200 w. Ry. Rev—June 5, 1897.

Hopper Coal Car. Chesapeake and Ohio Railway. Illustrated description of a car of 80,000 lbs. capacity, with dimensions. 1400 w. R R Car Jour—May, 1897.

New 100,000 lbs. Capacity Coal Cars of the Norfolk & Western. Illustrates and describes an interesting hopper bottom coal car with a steel underframe. 800 w. R R Gaz—July 28, 1899.

Rolling Stock for Mineral Traffic. Illustrated description of the latest built cars used in the United States for this purpose, comparing the wooden and metal cars, the increase in size, etc. 1800 w. Ir & Coal Trds Rev—Dec. 17, 1897.

Seventy-Thousand Pound, Twin-Hopper Coal Cars. Illustrated detailed description. 600 w. R R Gaz—Feb. 4, 1898.

Standard Coal Car, 80,000 Lbs. Capacity, Wabash Railroad. Illustrated detailed description of cars in use on this line. 500 w. R R Car Jour—Aug., 1899.

36-Foot 80,000-Pound Coal Cars. S. S. Stiffey. Illustrates and describes cars weighing 29,000 pounds, built of wood and having the side boards outside of the stakes. 600 w. Am Engr & R R Jour—Jan., 1900.

**Coal Steel-Frame.**—80,000-Pound Steel-Frame Coal Cars with Drop Doors. Illustrated description of cars for the Norfolk & Western Ry., having frames of structural steel with wooden floors and siding. 800 w. Am Engr & R R Jour—April, 1900.

**Coating.**—Report of Special Committee on Protective Coating for Iron and Steel Cars. Papers by A. P. Dane and J. L. Johnson. Read at convention of Master Car and Locomotive Painters' Assn., at Philadelphia. Report and discussion. 9300 w. R R Car Jour—Oct., 1899.

**Coke.**—80,000-Pound Coke Car—Buffalo, Rochester and Pittsburgh Railway. Illustrated description. 500 w. Loc Engng—Dec., 1897.

**Collection of Data.**—Facts Going to Waste. George S. Hodgins. A plea for the collection of data by car inspection and other departments, in the interest of valuable general conclusions. 2500 w. R R Car Jour—June, 1896.

**Combination.**—A Novel Design for a Combination Freight Car. Illustrated description of a novel design embodying the ideas of T. S. Easterbrook, of the Toledo, St. Louis and Kansas City R. R. 800 w. R R Car Jour—Dec., 1896.

Combination Car; B. & O. RR. Illustrated description of a combination baggage and passenger car recently built and put into service. 1500 w. R R Car Jour—Feb., 1897.

Combination Passenger and Baggage Cars—Baltimore & Ohio. General dimensions and cuts showing in detail the framing and sections of first-class combination passenger and baggage cars. 1000 w. R R Gaz—June 4, 1897.

**Combination Ballast and Gondola.**—Combination Ballast and Gondola Cars, Wisconsin Central Ry. Illustrated description of a novel design. 700 w. Eng News—June 21, 1900.

**Combination Coal and Ballast.**—New 80,000 Lbs. Capacity Combination Coal and Ballast Cars for the Illinois Central. Illustrated description. 800 w. R R Gaz—Nov. 3, 1899.

**Combined Locomotive.**—See **Steam Motor; LOCOMOTIVE CAR.**

**Compartment.**—How People Travel in Europe. Angus Sinclair. Briefly traces the progress of locomotion, describes the compartment car and comments on its drawbacks. Discussion follows. 11000 w. N Y R R Club—Dec. 15, 1898.

**Compartment, France.**—First-Class Compartment Car—Paris, Lyons & Mediterranean Railway. Illustrations with brief description. 400 w. R R Car Jour—Aug., 1900.

**"Composite."**—The "Composite" and Its Field. C. Peter Clark. Abstract of a paper read before the New England Railroad Club. Sets forth the advantages and qualifications of this car for certain uses. 2300 w. R R Gaz—Dec. 24, 1897.

**Construction.**—See **CAR CONSTRUCTION.**

**Copper Sheathed.**—A Copper Sheathed Passenger Coach. Describes a novelty in passenger car construction recently made in the shops of the N. Y., N. H. & H. RR. 900 w. R R Gaz—Jan. 29, 1897.

Metal-Plating for Passenger Coach. Illustrates and describes a car in which each piece of wood is covered with sheet copper in such a manner that the metal fits into and around the conformations. 500 w. Ry & Engng Rev—July 22, 1899.

**Correspondence School.**—The Correspondence School Car. Engraving and description of car for the International Correspondence School of Scranton, Pa. 700 w. Ry Age—Feb. 18, 1898.

**Corridor, England.**—Composite-Corridor Carriages of the Great Western Railway. Cars containing separate compartments for first, second, and third class passengers and luggage-room in each carriage. 250 w. Ry Wld—Jan., 1896.

The Great Central New Corridor Trains. Illustrates and describes the rolling stock of the new line of the Great Central Ry. Co., England. 1600 w. Engr, Lond—March 10, 1899.

The New East Coast Corridor Trains. An enthusiastic description of an English approach to the American vestibuled train. 2400 w. Trans—July 3, 1896.

New Corridor Dining Trains on East Coast Route to Scotland. Charles Rous-Marten. Describes the train and the trial trip. 2000 w. Engr, Lond—Aug. 3, 1900.

Lavatory Carriage, London and South Western Railway Co. Illustrates and describes a car recently built for service on this line, which combines peculiarities of the American and English practice. 2300 w. R R Car Jour—April, 1899.

New Bogie Carriages. Illustrates and describes some bogie composite corridor lavatory carriages being constructed for English railways. 500 w. Engr, Lond—June 2, 1899.

See also **English Passenger.**

**Corridor, France.**—Corridor Carriages for the Eastern Railway of France. Illustrated description. 1100 w. Engng—Sept. 10, 1897.

Corridor Cars of the Eastern Railway of France (Les Wagons à Intercirculation de la Compagnie de l'Est). D. Bellet. Illustrated description of these new railway carriages; a corridor along one side enables circulation to be made through the train without passing through the compartments. 2000 w. 1 plate. Revue Technique—April 10, 1899.

New Rolling Stock for Express Trains of the Northern Railway of France (Le Nouveau Matériel à Bogies pour Trains Rapides du Chemin de Fer du Nord). M. Defauconpret. A very detailed account of the new corridor bogie railway carriages of the Northern Railway of France. 18000 w. 5 plates. Rev Gen des Chemins de Fer—July, 1900.

**Cost.**—Cost of a Passenger Car.—Detailed and itemized cost sheet giving the number of pieces of each article entering into construction and fitting, with labor required, at a total cost of $4411.67. 2800 w. R R Car Jour—Nov., 1898.

The Cost of Railway Trains. The value of a regular train is about $50,000, and an ordinary passenger coach costs as much as a comfortable home, or half as much as a locomotive. 700 w. Ry Rev—Jan. 18, 1896.

**Cost per Year.**—The Annual Cost of a Freight Car to its owner. Edmond Gardley, in "Equipment Guide. The annual charge against box cars is calculated at $83; against gondolas $74.70. 1800 w. R R Gaz—Dec. 24, 1898.

**Depressed Platform.**—A Car with Depressed Platform (Note sur un Wagon à Plateforme Surbaissée). M. J. Koechlin. A description, with detailed drawings, of a special car with the bottom depressed as low as possible, to permit large pieces of machinery to be shipped. 250 w. 2 plates. Rev. Gen des Chemins de Fer—March, 1899.

**Derrick.**—See **DERRICK CAR.**

**Dining**—Model Modern Dining Cars for the Southern Railway. Illustrated description. 400 w. Loc Engng—Nov., 1899.

Modern Dining Cars for the Southern Railway. Plan and interior views, with description of carefully arranged and handsome cars. 700 w. Ry & Engng Rev—Sept. 9, 1899.

New B & O. Dining Cars. Plan and views, with brief description, 200 w. R R Gaz—Sept. 8, 1899.

Southern Railway Dining Cars. Brief description with plan. 900 w. Ry Age—Aug. 3, 1900.

See also **Corridor, England.**

**Ditching.**—Ditching Cars; St. Louis Southwestern Ry. Describing and illustrating a portable device for maintaining railroad ditches or lowering track. The machinery is operated by compressed air and is said to ditch and dress embankments on one side of the track, for 1½ or 2 miles per day. 1100 w. Eng News—May 7, 1896.

See also **DITCHING MACHINE.**

**Door.**—See **Grain Door; CAR DOOR.**

**Double Deck Boarding.**—Double Deck Boarding Cars Built by and in Use on the St. Paul & Duluth

R. R. Illustrated description. 600 w. Loc Engng—June, 1900.

**Draft Beams.**—Metal Draft Beams. A general discussion, with special description of various designs. Ill. 4200 w. R R Gaz—Oct. 13, 1899.

**Draft Gear.**—Freight Car Draft Gears. Edward Grafstrom. Discussion of present devices in use and the fundamental principles of an approved draft rigging. 1800 w. Am Engr & R R Jour—June, 1900.

Some Observations on Draw Gear. George S. Hodgins. Calling attention to defects, and changes needed. 1400 w. R R Car Jour—Sept., 1900.

The Draft Gear Question. Communication, with plans showing present and proposed construction, the improvement consisting in bringing the line of draft and buffing strains to the center of the sills, instead of several inches below as at present. 1700 w. Ry Mas Mech—May, 1896.

The Sessions-Standard Friction Draft Gear. Illustrated description with report of tests. 1400 w. R R Gaz—Aug. 17, 1900.

The Westinghouse Friction Draft Gear. Describes the buffer as now made, and notes other improvements, describing the action of the apparatus in buffing and its release, and its performance as a draft gear, reporting experiments of a satisfactory nature. Ill. 2000 w. R R Gaz—June 10, 1898.

The Westinghouse Friction Draft Gear. Illustrated description of this device and its operation. 1800 w. Am Engr & R R Jour—May, 1900.

The Dayton Draft Rigging. Illustrates and describes three applications of a new draft rigging designed by Edward Grafstrom. 700 w. R R Gaz—Sept. 1, 1899.

Interesting Draft Rigging Test. An account of tests made at Lima, O., on draft rigging, devised by Clement F. Street. Ill. 2200 w. Ry & Engng Rev—Aug. 11, 1900.

**Drawbar.**—Improvement in Railway Drawbars (Verbesserung der Zugvorrichtung für Eisenbahnwagen). H. Wick. An improved spring drawbar, suggested as the standard for the German railways. 1200 w. Glaser's Annalen—March 15, 1898.

Yielding Continuous Drawbars for Railway Cars (Die Nachgiebige Durchgehende Zugstange für Eisenbahnwagen). H. von Borries. A paper read before the German Society of Mechanical Engineers advocating the introduction of the continuous drawbar of similar construction to that used in the United States. 3500 w. Glaser's Annalen—Jan. 15, 1898.

**Drawbar Springs.**—Stiffer Drawbar Springs. Claims that the strength of the drawbar springs should be increased in proportion to the increase in the tractive power of the locomotive. 600 w. Loc Engng—Dec., 1899.

**Dudley Dynograph.**—See **TRACK INSPECTION—Boston & Albany.**

**Dump.**—A Sectional Dump Car. Illustrates and describes the Page Car, which consists of a series of dumping boxes mounted on the car frame. 1000 w. Eng News—Dec. 22, 1898.

Door Fastenings for End-Dump Cars. J. E. Johnson. Illustrated description of the device and its operation. 1500 w. Eng News—Oct. 26, 1899.

80,000-Pound Side-Dump Cars. Drawings and description of fifty cars recently built for the transporting of coal, ore and ballast on the C. L. and W. Ry. 700 w. Am Eng & R R Jour—Sept., 1900.

The Goodwin Dump Car. Illustrates and describes the most recent type of this car, used for handling and dumping material for railroad work. 800 w. Eng News—Nov. 17, 1898.

The McMahon Dump Car. A simple positive action, downward thrust device which forces open the drop doors, thus obviating the annoyance due to the chains usually employed, freezing fast to the coal and refusing to let the doors open. Ill. 1000 w. R R Gaz—Feb. 28, 1896.

**Dynamometer.**—A New Dynamometer Car. Illustrated description of a car built by the C. C. C. & St. L. Ry. and equipped by the University of Illinois for the mutual advantage of both parties. 800 w. R R Gaz—Nov. 25, 1898.

Car for Determination of the Resistance to Hauling (Wagen zur Bestimmung der Widerstände bei Streckenförderungen). An illustrated description of a dynamometer car used at Lens, Belgium. The pull on the draw bar is automatically registered upon a paper drum. 1000 w. 1 plate. Glückauf—Oct. 16, 1897.

New Dynamometer Car. Illustrated description of the novel features of a car recently completed by the Chicago & Northwestern Ry. 900 w. Am Engr & R R Jour—June, 1900.

The Dynamometer Car in Tests for Railroads. L. P. Breckenridge. Paper and discussion. The construction and operation of the car is discussed. Ill. 10800 w. Cent Ry Club—May, 1900.

See also **Inspection; Test.**

**Electric.**—See **ELECTRIC CAR; ELECTRIC TRAMWAY.**

**Elevated Railway.**—Light. Passenger Cars—The Manhattan Elevated Railroad. Illustrates the framing of the cars which have been in use on the Manhattan Elevated Railroad in New York, and given satisfactory service. 800 w. R R Car Jour—Jan., 1899.

See also **ELECTRIC CAR; ELEVATED RAILWAY.**

**Elevated Ry., Boston.**—Passenger Cars for Boston Elevated Railway. A. Richards. Illustrated description. 1000 w. R R Car Jour—June, 1900.

**Elevated Railway, Summer.**—Some New Ideas in Elevated Railroad Equipment. Illustrated description of cars built for the South Side Elevated Co., of Chicago, which have met with great popularity. 1200 w. Ry Rev—Aug. 28, 1897.

**Empty Mileage.**—See **Large.**

**English Passenger, Great Western Ry.**—Passenger Carriage; Great Western Railway of England. Description, elevation and plan. 500 w. R R Car Jour—May, 1896.

See also **Corridor.**

**English vs. American.**—The Construction and Supply of Rolling Stock. The article is almost entirely devoted to a discussion of the comparative merits of the English goods wagon and the American freight car, with the conclusion that each type is probably best suited to its own surrounding conditions. 1200 w. Ir & Coal Trds Rev—April 10, 1896.

See also **American.**

**Fish-Commission.**—See **FISH-COMMISSION CAR.**

**Flat.**—Lehigh Valley Flat Car; 110,000 Pounds Capacity. Illustrated description of a car built in 1887 from the designs of John S. Lentz. 700 w. R R Car Jour—Aug., 1898.

**Flat, Belgian.**—Flat Car of 77,000 Lbs. Capacity, North Belgian Railway. An interesting example of fine car construction is illustrated and described. 1500 w. R R Car Jour—May, 1900.

**Frame.**—See **CAR FRAME.**

**Furniture.**—B. & O. Southwestern New 50-Ft. Furniture Car and Freight Car Truck. General dimensions and illustrated description. 1200 w. R R Gaz—Aug. 11, 1899.

Forty-six Foot Furniture Car—Chicago, Milwaukee and St. Paul Railway. Description and drawings. 1000 w. Am Eng & R R Jour—Sept., 1896.

Sixty Thousand Pounds Furniture Car, Chicago & Great Western Railway. A large car carefully designed to exclude superfluous material. Partial drawings and dimensions. 1400 w. Ry Mas Mech—June, 1896.

The New 50-Ft. Furniture Cars of the Chicago, Rock Island & Pacific Ry. Some enormous cars, exceptionally large even for furniture cars, are illustrated and described. 1300 w. Eng News—Oct. 27, 1898.

**Gasoline Motor.**—A Gasoline Motor Car. Illustrated description of a car built by the Jewett Car Co., of Jewett, O. 1000 w. R R Gaz—May 5, 1899.

See also **Automotor.**

**Gates.**—Gates on Cars. George De Haven. Extracts from an address before a meeting of travelling men at Grand Rapids, Mich., with editorial. Explains the operation and states the advantages. 4300 w. Ry & Engng Rev—Aug. 13, 1898.

**German at Paris.**—The Collective Exhibit of the North German Car Building Association (Kollektivausstellung der Norddeutschen Wagenbau-Vereinigung). A fully illustrated description of the various railway carriages exhibited at Paris. Two articles. 6000 w. 5 plates. Glaser's Annalen—Sept. 1, 15, 1900.

**Gondola.**—An Improvement in Gondola Car Construction. Diagrams showing a new method for the construction of gondola, coal, coke and other cars, where the sides are supported by stakes, now placed outside the sills. 600 w. Ry Mas Mech—June, 1897.

80,000-Pound, 35-Foot, Coal Cars. Drawings and description of a new design for drop-bottom coal cars of the gondola type. 1100 w. Am Eng & R R Jour—May, 1899.

80,000-Pounds Capacity Gondola Car for the Lake Shore and Michigan Southern Railway. Engravings showing the principal features, with brief description. 800 w. R R Gar—April 28, 1899.

Four-Wheeled Gondola Car, Delaware & Hudson Canal Co. Illustrates the construction of a car rapidly disappearing from use, but once the standard cars for the conveyance of coal. 800 w. R R Car Jour—Nov., 1898.

Gondola Car; Chicago & Eastern Illinois R. R. Illustrated description of a car of 80,000 pounds capacity. 900 w. R R Car Jour—Jan., 1898.

80,000 lbs. Capacity Gondola Car for the Lake Terminal Railroad. Engravings, showing the principal features, with particulars. 600 w. R R Gaz—March 31, 1899.

Standard Twin-Hopper Gondola Car—New York Central and Hudson River Railroad. Illustrated description of a car considered the proper thing for the coal traffic of one of the most important systems. 800 w. Loc Engng—March, 1897.

See also **Coal; Hopper.**

**Grain Doors.**—Grain Doors. H. C. Barnard. Read before the Cent. Assn. of R. R. Officers, Louisville, Ky. Reviews the doors which have been used, discussing their objections. 1100 w. St. Louis Ry Club—July 18, 1900.

See also **CAR DOOR.**

**Granite.**—Special Granite Car. Illustrates and describes a car of special design. 400 w. R R Car Jour—Feb., 1898.

**Holland, Passenger.**—Carriages for Local Passenger Traffic; Dutch Central Railway. Illustrated description of carriages used by the Dutch Central Railway Company at Utrecht. 400 w. Engng—Oct. 16, 1896.

**Hopper.**—100,000 Pound Hopper Car, Norfolk & Western Railway Company. Illustrated description of a plain strong construction intended for hard service. 600 w. R R Car Jour—June, 1899.

100,000-Pound, Steel Frame, Hopper Cars—Norfolk & Western Railway. Illustrated description. Also arguments by R. P. C. Sanderson favoring this form of construction. 2500 w. Am Engr & R R Jour—June, 1899.

See also **Box; Coal; Gondola.**

**Hopper Gondola.**—Hopper Gondola Car of 60,000 Pounds Capacity—Central Railroad of New Jersey. A brief description of some details of design, with drawings of the car, pocket castings and draft-rigging. 500 w. Am Eng & R R Jour May, 1896.

**Horse Transportation.**—Express Car for the Transportation of Horses. Drawings and description of specially designed cars for the N. Y. C. & H. R. R. R. 700 w. Am Engr & R R Jour—Oct., 1900.

**Hospital.**—Hospital Car on the Long Island Railway. Brief illustrated description of a nicely fitted hospital car for use at a wreck. 500 w. Ry Rev—Sept. 25, 1897.

See also **HOSPITAL TRAIN.**

**Hungary.**—See **Size, Hungary.**

**Ice.**—Ice Car. Chicago & Northwestern Railway. Illustrated description of cars designed for this special service, but also adapted to carrying grain or coal. 600 w. Am Eng & R R Jour—June, 1897.

**Inspection.**—An Inspection Car for the M. K. & T. R. R. Illustrated description of an open car carrying six persons at a speed of 35 miles an hour. 400 w. R R Gaz—Nov. 22, 1895.

See also **Dynamometer; Test; LOCOMOTIVE CAR; TRACK INSPECTION.**

**Instruction.**—Instruction Car of the Wabash Railroad. Illustrated description. 2500 w. R R Gaz—Aug. 28, 1896.

**Interchange.**—See **CAR INTERCHANGE.**

**Ladle.**—See **STEEL MANUFACTURE—Ladle Carriage.**

**Large.**—See **Size.**

**Light Railway.**—See **Narrow Gauge; LIGHT RAILWAY.**

**Loading Machine.**—A Machine for Loading Box Cars. Gives a description and drawing of an ingenious machine for loading crushed phosphate rock into box cars. 600 w. Eng News—June 16, 1898.

**Loads.**—The Increase of Loads on Railway Cars (Die Erhöhung des Achsdruckes an Eisenbahnfahrzeugen). Rudolf Sanzin. A plea for increasing the loads on cars and locomotives in Central Europe so as to promote economy in transportation, with table of axle loads in Europe and America. 2000 w. Zeitschr d Oest Ing u Arch Ver—May 18, 1900.

**Locks.**—Continuous Safety Lock System for Railway Cars (Chiusura Continua di Sicurezza per i Veicoli Ferroviari). G. Kaiser. Describes a method for locking all the doors of a train of compartment cars by a compressed air system operated from the locomotive or from each car and automatically unlocking in case of accident. 1000 w. 1 plate. Annali d Soc d Ing e d Archit Ital—Sept.-Oct., 1898.

**Locomotive.**—See **Steam Motor; LOCOMOTIVE CAR.**

**M. C. B. Convention.**—Annual Convention of the Master Car Builders' Association at Saratoga, N. Y. Extracts from reports, with editorial. 8500 w. Eng News—June 28, 1900.

The Master Car Builders' Convention. Abstracts of a number of reports and partial list of exhibits. Some of the important topics are metal under framing for freight car doors and attachments, mounting wheels, stenciling of cars, handholds and height of drawbars, location of air-brake cylinders, supervision of standards, etc. 10000 w. R R Gaz—June 19, 1896.

**M. C. B. Reports.**—Master Car Builders' Reports. Committee reports presented at the Saratoga meeting—Thermal tests for car wheels, steel car framing, care of journal boxes, springs for freight car trucks, etc. 5500 w. R R Gaz—June 17, 1898.

**M. C. B. Rules.**—The Revised M. C. B. Rules. George S. Hodgins. A discussion of the defects of the code. 2200 w. R R Car Jour—Sept., 1897.

**M. C. B. Standards.**—How to Bring the M. C. B. Standards Into Use. Letters from the members of a committee appointed to consider the question, read at meeting of the Central Ry. Club. 1700 w. R R Gaz—Dec. 18, 1896.

M. C. B. Association Standards and Recommendations. An abstract of the recent M. C. B. A circular embodying suggestions received and recommendations adopted by the committee to date. 1000 w. R R Car Jour—April, 1896.

**Mail.**—Improved Mail Cars. Illustrated description of some new wreck-proof and robber-proof mail cars. They are without platforms, close coupled, very strongly framed, doors and roof protected by iron plates, and are brilliantly lighted by gas and oil. 1000 w. Business—Dec., 1895.

Mail Car—L. S. & M. S. Railway. Illustrated description of a carefully planned mail car for the Lake Shore & Michigan Southern Railway. 500 w. Ry Mas Mech—April, 1898.

New Postal Cars, Chicago & Alton Railroad. Illustrated description of cars of improved design. 700 w. Am Eng & R R Jour—Feb., 1898.

New 60-ft. Postal Cars for the St. Louis, Iron Mountain & Southern Railway. Description and drawings. 500 w. R R Gaz—Nov. 20, 1896.

Postal Car—Erie Railroad. Description, drawings of construction and photographs showing interior arrangement. 700 w. Loc Engng—July, 1896.

**Metal Plated.**—See **Copper Sheathed.**

**Mexican Central.**—New Freight Cars for the Mexican Central. An order of about one thousand cars, including box, coal, and stock cars is being filled for this road, and the engravings and description show the construction in detail. 1100 w. R R Gaz—Oct. 8, 1897.

**Milk.**—New Milk Cars, Lehigh Valley Ry. Illusttrated description of improved refrigerator milk cars. 500 w. Ry & Engng Rev—Feb. 17, 1900.

**Narrow-Gauge Tramway.**—Cars for Narrow Gauge Tramways. Illustrations of a type of car specially constructed for small narrow-gauge tramways. 400 w. Ry Wld—Nov., 1896.

**New South Wales.**—New South Wales Railways. Passenger Carriages. Information of the passenger vehicles added during the term of office of the present Railway Commissioners. Ill. 1700 w. Eng, Lond—Aug. 27, 1897.

**Northern Pacific.**—Two New Car Designs—Northern Pacific Railway. Illustrated description of a hopper-bottom coal-car of 50-tons capacity, only

30 ft. long and weighing 35000 lbs.; and a box car of 70000 lbs. capacity. 1200 w. Am Eng & R R Jour—Oct., 1898.

**Observation Buffet.**—New Observation Buffet Cars for the Northern Pacific. Brief illustrated description of new cars to run between St. Paul and the Pacific coast. 300 w. Ry Age—April 27, 1900.

**Oil-Sprinkling.**—Oil-Sprinkling Car—Long Island Railroad. Engravings showing the details, with description, and a letter from C. S. Addison, General Road Master, stating the advantages. 800 w. R R Gaz—April 29, 1898.

**Ore.**—Combination Ore Car: Duluth, South Shore and Atlantic Ry. Descriptive text and full drawings. 900 w. R R Car Jour—April, 1896.

80,000-lb. Ore Car for the Erie Railroad. A very full description, condensed from specification, with dimensional and sectional drawings. 1400 w. R R Gaz—June 12, 1896.

**Owner's Responsibility.**—Car Owners' Responsibility. F. H. Stark. Largely a review of the unsatisfactory results, insufficient earnings and heavy repair charges on freight cars under the present system. 2800 w. R R Car Jour—June, 1900.

**Parlor.**—New Parlor Cars. Illustrated description of the interior of two fine parlor cars in service on the C., M. & St. P. Ry. 600 w. Ry Age—June 29, 1900.

**Parlor, C. B. & Q. R. R.**—New Trains on the C. B. & Q. Railroad. Illustrated description of two handsome trains of cars, said to be probably the finest built in any country, with the exception of the World's Fair train. 500 w. R R Car Jour—Sept., 1897.

**Parlor, Chicago & Alton.**—The Alton Limited. Gives four fine plates illustrating the daylight limited train recently placed in service on the Chicago and St. Louis. 1200 w. Ry Age—Dec. 8, 1899.

A Handsome Train. Describes a train soon to be placed on the Chicago & Alton Ry., between Chicago and St. Louis, for a daylight limited service. 800 w. Ry & Engng Rev—Nov. 18, 1899.

**Parlor, Egypt.**—Special Egyptian Railway Saloons. Illustrated detailed description of fine coaches. 900 w. Engr, Lond—June 15, 1900.

**Parlor, Erie.**—The Erie's New Through Train. Brief illustrated description of a fine train recently put in service on this road. 600 w. Loc Engng—June, 1897.

**Parlor, Siberian.**—A Siberian Train-de-Luxe. From the St. Louis "Globe Democrat." Illustrations and description of the Russian idea of a fine train. 1500 w. R R Car Jour—May, 1900.

**Parlor, Wagner.**—The Lake Shore Limited. Description and engravings giving an idea of the handsome appearance and conveniences of these cars, built for special service. 700 w. R R Car Jour—Dec., 1897.

**Philadelphia and Reading.**—70,000 Lbs. Capacity Cars for the Philadelphia & Reading Railway. Illustrated detailed description. 1200 w. R R Gaz—April 27, 1900.

**Pile-Driver.**—See **PILE-DRIVER CAR.**

**Plumbing.**—See **PLUMBING—Cars.**

**Poling.**—Standard Poling Car: Pennsylvania R. R. Illustrates and describes the latest type of poling car, explaining its use. 700 w. Eng News—Oct. 13, 1898.

**Pooling.**—See **CAR POOLING.**

**Postal.**—See **Mail.**

**Private.**—Modern Private Cars. Duane Doty. General remarks on progress, with illustrated description of the private car "Alexander." 2000 w. R R Car Jour—April, 1897.

Private Cars. Duane Doty. Illustrated description of the De Beers private car and the car "Marion." 2000 w. R R Car Jour—June, 1897.

Modern Private Cars. Duane Doty. Illustrated description of the "Pioneers" and "Virginia." 1900 w. R R Car Jour—May, 1897.

Private Cars. Duane Doty. Illustrated description of the car "Ellsmere," with remarks defending the practice of using private cars. 1800 w. R R Car Jour—Aug., 1897.

Private Car; Florida East Coast Railway. Illustrated description of the luxurious car built for H. M. Flagler, president of the road named. 500 w. R R Car Jour—Aug., 1898.

Private Railway Car. Illustrated detailed description of the fine car built for H. M. Flagler. 500 w. Engr, Lond—Jan. 13, 1899.

**Private, Duke of Sutherland.**—An English Private Car. Illustrated description of a private car for the Duke of Sutherland, L & N. W. R. R., England. 400 w. R R Car Jour—Sept., 1900.

**Private, French Presidential.**—The French Presidential Train Built by the International Sleeping Car Company on the Occasion of the Czar's Visit to France. General description, with illustrations and details of construction. 2000 w. R R Car Jour—Nov., 1898.

**Private, Lincoln's.** Lincoln's Private Car. Illustrated description. 1200 w. R R Car Jour—April, 1897.

**Private Lines.**—The Relation of Private Car Lines to the Railroads. G. W. Showers. Read at meeting of the Car Foremen's Assn. of Chicago. Reviews the early conditions of railroading and the work of the private car lines. 3800 w. Ry Mas Mech—Aug., 1898.

**Private, Mexican, Presidential.**—A Presidential Train. Illustrated description of handsome equipment built by the Pullman Company for the president of Mexico. 1800 w. Ry Age—Nov. 5, 1897.

President Diaz's Private Cars. Duane Doty. Illustrated detailed description of the fine cars recently built by the Pullman Co. for the Government of Mexico. 2800 w. R R Car Jour—Nov., 1897.

**Private, Presidential.**—A Private Car for the President of the United States. A project to construct a special car of the most approved design and from the best materials, to be subscribed for and built by the car-building and allied industries and presented to the nation for the use of the President. Names of the advisory committee are given and expressions of approval. 2700 w. R R Car Jour—Feb., 1897.

President McKinley's Inauguration Car. Illustrated description of the car used to convey President McKinley from Canton, Ohio, to Washington to be inaugurated. 500 w. Ry Mag—Aug., 1897.

Proposed Design for the Presidential Car. Archer Richards. Illutsrated description. 700 w. R R Car Jour—April, 1897.

Proposed Plans for Presidential Car. Illustrations of plans proposed by E. D. Nelson and Thomas Anderson, with editorial, and an article from the "Railway Agent" in criticism of the project, and other articles bearing on this subject. 3300 w. R R Car Jour—May, 1897.

The Presidential Car. A. Richards. Suggestion for the decoration of the dining portion of the special car for the President. Ill. 500 w. R R Car Jour—June, 1897.

**Private, Queen's.**—Another Royal Train. Brief description of train prepared to convey the Queen from Windsor to Paddington on occasion of the long reign commemoration. 700 w. Ill Car & Build—June 11, 1897.

The English Royal Train. Brief illustrated description of the carriages recently built for the use of the Queen of England. 700 w. R R Car Jour—Sept., 1897.

The Queen's Railway Train. Interesting description of the particular carriage by which the Queen travels northward. 1200 w. Ill Car & Build—May 21, 1897.

**Private, Royal, German.**—The German Kaiser's Train. A twelve car train costing over half a million dollars. Half tone views of the interior of the private car are given. 200 w. Nat Car & Loc Build—Dec., 1895.

The Private Train of the Emperor of Germany. Illustrated detailed description. 2500 w. R R Car Jour—Dec., 1898.

**Private, Royal Hungarian.**—The Hungarian Train (Der Ungarische Hofzug). An illustrated description, with interior views of the various cars, of the private train for the use of the royal family on the Hungarian railways. 1500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Dec. 18, 1897.

**Rail-Sawing and Drilling.**—Rail-Sawing and Drilling Car; Chicago, St. Paul, Minneapolis &

Omaha Ry. Illustrated detailed description. 800 w. Eng News—Dec. 7, 1899.

**Refrigerator.**—Refrigerator Car. Merchant's despatch Transportation Company. Illustrated description with detail drawings. 1600 w. R R Car Jour—Nov., 1895.

Refrigerator Cars for the Colorado Midland Railroad. Illustrated description of cars for the handling of perishable freight. 1500 w. Ry Rev—Sept. 4, 1897.

**Repairs.**—See **CAR CONSTRUCTION; CAR INTERCHANGE.**

**Roadbed Trimming.**—A Roadbed Trimming Car. Illustrated description of the general features of a car used on the Boston & Maine R. R. for a variety of purposes. 1000 w. Ry Age—May 18, 1900.

**Roofing.**—See **CAR CONSTRUCTION.**

**Safety Appliances.**—Safety Appliances in Mexico. Translation of the order issued by the Mexican Government requiring railroads to equip their cars with certain safety appliances. 600 w. R R Gaz—April 20, 1900.

See also **CAR COUPLER.**

**Size.**—Economical Use of Large Freight Cars. Report of the Committee on Official Classification and Large Cars. C. H. Bieber (Mich. Central), Chairman, read at the Convention of the International Assn. of Car Accountants at Cleveland (Condensed). The striking feature is the recommendation of a radical change in the reduction of present minimum weights for many classes of freight. 1200 w. R R Gaz—June 12, 1896.

Empty Car Mileage. Editorial review of A. E. Mitchell's paper before the New York R. R. Club on the "Large Car Problem." 500 w. R R Car Jour—April, 1896.

Light and Heavy Cars. O. H. Reynolds. Discussion showing the effect of the heavy car on the revenue of railways. Ill. 3300 w. Am Eng & R R Jour—April, 1899.

Report of the Committee of Mechanical Superintendents, Appointed by the Central Traffic Association and the Western Freight Association. A report on the dimensions of freight cars. The tabular statements of various loads are interesting. 1800 w. Pro N Y R R Club—Feb. 20, 1896.

Report of the Committee on Large Cars. The article is especially valuable as containing the letters printed in full which the Committee received from various authorities on railroad matters and which contain intersting data. 22000 w. Pro N Y R R Club—Feb. 20, 1896.

Report of the Western Classification Committee. A lengthy discussion among the various members on the limiting of size and weight of freight cars. 13000 w. Pro N Y R R Club—Feb. 20, 1896.

Shall the Cubic Capacity of Ordinary Box Cars be Increased? H. H. Perkins. Read before the Central R. R. Club. Traces the growth in size and advises the associate roads to agree on a maximum size and refuse to handle or haul beyond that limit. 2000 w. Am Eng & R R Jour—Jan., 1897.

Some of the Questions of Large Cars. E. W. Judd. Opinions from various sources, giving views of representative men in different departments of the service, showing the importance of the problem. Serial. R R Gaz—Nov. 6, 1896.

The Most Economical Size of Freight Cars. L. F. Loree. Paper prepared for the International Ry. Cong. Abstract. Showing the advantages gained by the use of large capacity cars. 1600 w. R R Gaz—July 6, 1900.

The Question of the Big Car. Discusses the effects of increase of length of box cars, as being increase in earning capacity and decrease of operating expenses. But as this is only one side of the question, the writer concludes with a series of formulated questions designed to elicit discussion of other phases of the subject. 1700 w. R R Gaz—April 10, 1896.

The Question of Large Cars. An abstract of a report by a special committee of the New York Railroad Club on the important subject of an agreement for limiting the size of freight cars. The question is whether it is desirable or whether it is practicable to reduce the number of types of cars built and to keep the sizes down to specified maximum limits. The committee recommends keeping box cars down to 70,000 lbs. capacity and open cars to 80,000. 2500 w. R R Gaz—March 6, 1896.

The Size and Capacity of Freight Cars for Interchange Service. Editorial discussion of the report of the special committee on "Large Cars," to the N. Y. Railroad Club. Some interesting figures are given on weights and dimensions of cars on various roads. 1800 w. Eng News—March 12, 1896.

**Size, Hungary.**—Capacity of Freight Cars. Short abstract of a report by Mr. de Marx, traffic manager of the Hungarian State Railroads. 450 w. R R Gaz—July 13, 1900.

**Sleeping.**—Canadian Pacific Sleeping Car. Plan, interior view, and description of very elaborate decoration, designed by a Parisian designer brought from France for the work. 1200 w. R R Car Jour—Nov., 1898.

Sleeping Cars for the Florida East Coast Railway. Illustrated description of luxurious cars recently built. 900 w. R R Car Jour—March, 1899.

**Sleeping, English.**—An English Sleeping Car. Illustrated description of cars recently put upon the Northeastern Railway of England. Each passenger is given a stateroom. 3000 w. R R Car Jour—Feb., 1897.

**Sleeping, Europe.**—The International Sleeping Car Company of Europe. E. G. An account of the operations of this company, the growth and present extent, with interesting particulars of the service rendered. 1700 w. R R Gaz—June 9, 1899.

**Sleeping, Japan.**—The First Japanese Sleeping Car. Williard C. Tyler. Views of a car built in Japan and put in service on the Sanyo Ry., with description. 600 w. Ry & Engng Rev—Aug. 11, 1900.

**Sleeping, Prussia.**—New Sleeping Cars for the Prussian State Railway (Neue Schlafwagen der Preussichen Staatseisenbahn-Verwaltung). An improved stateroom car with corridor on one side, excellent toilet, and vestibuled platforms. 1200 w. 1 plate. Glaser's Annalen—April 1, 1898.

**Sleeping, Second Class.**—Second-Class Sleeping-Car Rates. Editorial on the movement toward second-class sleeping-car service and describing the tourist cars. 900 w. Ry Age—Dec. 17, 1898.

**Southern Pacific.**—Wooden Box Cars and Coal Cars of 100,000 lbs. Capacity; Southern Pacific Ry. Two-page plate with description and dimensions. 4200 w. Eng News—July 19, 1900.

**Stability of Motion.—See Vibration.**

**Standardization.**—See **LOCOMOTIVE.**

**Steam Motor.**—A Composite Steam Motor Car for the Erie Railroad. Illustration, general dimensions and equipment. 400 w. Ry & Engng Rev—April 2, 1898.

Steam Motor Car; New England Railroad. Illustrated description of a composite car the operation of which is being watched as an interesting experiment. 600 w. R R Car Jour—Nov., 1897.

Steam Motor Cars by the Baldwin Locomotive Works. Illustrated description of two recently completed cars, one to be used on the C. H. & D. R. R. and the other on the D. & L. N. R. R. 900 w. Am Eng & R R Jour—April, 1898.

The Baldwin Motor Car for the C. H. & D. Traction Company. Illustrated detailed description. 400 w. R R Gaz—March 4, 1898.

Steam Motor Cars for Minor Railway Lines. Illustrates the combination cars built by the Baldwin Works of Phila., for the C. H. & D. railroad. 1000 w. Ry Wld—May 5, 1898.

The Patton Motor Car. Illustrated description with brief history and editorial. 3500 w. Ry Rev—Nov. 13, 1897.

Steam Motor Cars for Branch Lines. Illustrated description of a car constructed by the Baldwin Locomotive Works for the Cincinnati, Hamilton & Dayton Railroad. 700 w. Sci Am—June 24, 1899.

The Application of the Serpollet Traction System to Main Line Service (Application du Système de Traction Serpollet à des Wagons Automoteurs de Grandes Lignes). The Serpollet motor cars have been applied to the Würtemberg railway and also to the Paris, Lyons-Mediteranée system successfully for local traffic. 4000 w. 1 plate. Le Génie Civil—June 22, 1897.

See also **LOCOMOTIVE CAR; STEAM TRAMWAY.**

**Steel.**—An Epoch in Railroad Transportation. Henrik V. Van Z. Loss. Extracts from a paper for the Paris International Railroad Congress, calling attention to the advantages of pressed steel cars. 2500 w. R R Gaz—Sept. 28, 1900.

A Pressed Steel Coke Car. Illustrations and brief description of a car for the Chicago, Lake Shore & Eastern Ry. 250 w. R R Gaz—May 11, 1900.

Development of the Structural Steel Hopper Car. George I. King. Illustrated account of the development, giving interesting detailed information. 2000 w. Ry Age—June 22, 1900.

Economy of Mineral Transport. An illustrated article showing the present state of steel wagon construction in England. 4300 w. Ir & Coal Trds Rev—Dec. 1, 1899.

100,000-Lbs. Steel Car. N. Y. C., H. R. R. R. Illustrated description. 700 w. Ry & Eng Rev—June 11, 1898.

Life of the Steel Car. Comments on the life of the steel car as compared with the wooden car, and the protection needed to prevent corrosion. 1100 w. R R Car Jour—Dec., 1897.

Opposing Steel Cars. Cites arguments in favor of wooden cars, based upon German and American practice and experience. 1200 w. Loc Engng—Sept., 1896.

Recent Designs for Steel Cars, Universal Construction Company, Chicago, Ill. Illustrated description of the improved Pennock car. 1200 w. Eng News—March 4, 1897.

Steel Cars—Norfolk & Western Railway. Description, general construction, with partial detail drawings. 800 w. Loc Engng—Aug., 1896.

Steel Freight Cars—M. C. B. Designs. Editorial discussion of the three designs for steel cars presented at the 1897 convention, also replying to questions asked by the committee in their circular of inquiry. 1700 w. Am Eng & R R Jour—Jan., 1898.

Steel Freight Cars of 100,000 lbs. Capacity, Pittsburg, Bessemer & Lake Erie R. R. Illustrates and describes one of the latest styles of steel cars. 1000 w. Eng News—Jan. 19, 1899.

Summers' 100,000 lbs. Capacity Steel Hopper Car. An illustrated detailed description of a new design. 1000 w. Ry & Engng Rev—Aug. 25, 1900.

The Advantages of Steel Cars. Discusses the economies of large steel cars, considering those intended for special service, and also for general interchange. 1600 w. Am Eng & R R Jour—Feb., 1898.

The Construction of Steel Cars. Editorial on the report of the M. C. B. Association committee. The introduction of steel is considered inevitable. 2400 w. Eng News—July 2, 1896.

The Development of the Steel Car. Notes on the large number of cars in service and in demand, giving some of the troublesome features. 1500 w. Am Engr & R R Jour—Jan., 1900.

The Pressed Steel Car. From a paper by Sumner B. Ely before the Engineers' Society of Western Pennsylvania, giving an illustrated account of pressed steel and pressed steel cars. 2000 w. Ir Age—Sept. 27, 1900.

The Steel Car. An account of the development. 2000 w. R R Car Jour—Dec., 1899.

**Steel, Belgium.**—Special Steel Car for Transporting Heavy Loads; North Belgian Railway. Illustrated detailed description of a special car of interest as showing French methods in car construction. 1100 w. Eng News—Aug. 17, 1899.

**Steel, France.**—Pressed Steel Cars for France. Illustrations showing the construction and general dimensions of 100 flat-bottom gondola cars being shipped to the Paris, Lyons & Mediterranean Railroad Co., of France. 800 w. R R Gaz—Aug. 10, 1900.

**Steel, Goodwin.**—The Goodwin Steel Car in Collision. John M. Goodwin. Illustrated description, showing recent progress in metal car construction. 900 w. R R Gaz—Jan. 12, 1900.

**Steel Hopper.**—Steel Hopper Cars—Pittsburg, Bessemer and Lake Erie Railroads. Illustrations and description, showing the method of construction which is to be employed in several hundred new steel cars. 1300 w. Ry Rev—Feb. 20, 1897.

**Steel Ore.**—112,000-Pound Steel Ore Cars in Scotland. Illustrated description of cars introduced on the Caledonian Railway. 700 w. Am Engr & R R Jour—Oct., 1899.

Steel Hopper Car of 100,000 Lbs. Capacity—Pittsburg, Bessemer and Lake Erie Railroad. Illustrated description of car especially intended to carry ore from the Lake Erie terminal to Pittsburg. 2500 w. R R Car Jour—March, 1897.

**Steel, Pennock.**—The Pennock Steel Car. Illustrated description of a 30-ton capacity flat top freight car made entirely of steel. Not a particle of cast iron or wood was used in its construction, and its weight is 2,000 to 4,000 lbs. less than a similar wooden car. 900 w. Ry Rev—Nov. 23, 1895.

**Steel, Schoen.**—The Schoen Steel Car. Brief dedescription with illustrations. 800 w. R R Gas—June 25, 1897.

**Street.**—See **ELECTRIC CAR; STREET RAILWAY.**

**Test.**—See also **Dynamometer.**

**Test, Illinois Central.**—Test Car of the Illinois Central Railroad and the Railway Mechanical Engineering Department of the University of Illinois. Edward C. Schmidt. Illustrated description of the car and its equipment. Designed for general railroad experimental work. 1200 w. Am Engr & R R Jour—Aug., 1900.

**Tramway.**—See **Narrow Gauge; ELECTRIC CAR; ELECTRIC TRAMWAY; TRAMWAY.**

**Tubular.**—See **CAR FRAME.**

**Unloading Apparatus.**—Tipping Apparatus for Car Unloading (Appareil Basculeur pour le Déchargement des Wagons). An illustrated account of the Boisin unloader, with plate showing its arrangement in connection with conveyors at the beet root sugar works of M. Bouchoire. 3000 w. 1 plate. Génie Civil—June 5, 1897.

See also **COAL HANDLING; MECHANICAL HANDLING.**

**Ventilated Box.**—Standard Ventilated Box Car—Louisville and Nashville R. R. Describes and illustrates a car of 60,000 lbs. capacity, adapted to the conveying of either ordinary or perishable merchandise. 1600 w. R R Car Jour—Dec., 1897.

**Vestibule.**—A Home Made Vestibule—Great Northern Railway, U. S. A. Drawings and description of the standard design finally adopted. 800 w. Ry Mas Mech—Jan., 1898.

The Vestibule Car. Arthur H. Giles. Illustrates and describes various forms, comprising the most important inventions in vestibules and vestibule cars. 1000 w. R R Car Jour—June, 1899.

Wide Vestibuled Passenger Cars. Illustrated description of cars recently equipped for the Lake Shore & Mich. So. Ry. 250 w. R R Gaz—Jan. 1, 1897.

**Vestibuled.**—The New Vestibuled Train of the Chicago, Burlington & Quincy. Illustrated description of train. The arrangement, finish and decoration of the interior is especially interesting. 1000 w. R R Gaz—June 4, 1897.

**Vestibule, England.**—Carriages for the South-Eastern Railway. Illustrations, with description of the interior work of the cars composing the new vestibule train for the Continental Express. 1500 w. Engng—Sept. 17, 1897.

New Vestibule Train for the South-Eastern Railway Company, England. Description and dimensions of cars. 1100 w. Engng—Sept. 10, 1897.

**Vibration.**—Stability of Motion of Vehicles. Discusses the disturbing causes affecting the motion of railroad cars. 1500 w. R R Car Jour—Nov., 1899.

The Vibration of Railway Carriages. A. Rudolff. Brief account of tests by the author, the observations being confined to carriages running on a well-kept road, properly coupled, uninfluenced by neighboring carriages, and situated in the center of the train. 600 w. Prac Eng—April 30, 1897.

**Weed-Burning.**—Weed-Burning Car, M., St. P. & S. St. M. Ry. Illustrated description of car and its operation and statement of cost. 1000 w. Ry & Engng Rev—April 21, 1900.

**Weight.**—Stenciled Light Weight of Cars. Central Railroad Club Committee's report and discussion of change in car weights, and means of checking. 4000 w. Pro Cent Ry Club—March, 1896.

Weight of Passenger Cars. A review of the American practice of building very heavy cars, and suggestion of return to lighter weights in the interest of increased speed possibilities. 1800 w. R R Car Jour—May, 1896.

## CAR AXLE.

**Discussion.**—Discussion on Axles. R. A. Mould. A paper read before the National Railway Master Blacksmiths' convention. Advocates steel axles. Also statement of the superiority of iron axles, as presented in a paper by George F. Hinkens. 3500 w. Ry Rev—Sept. 11, 1897.

**Divided.**—Divided Axles for Railways (Ueber eine getheilte Eisenbahnachse). A brief description of experiments with axles divided in the middle, with a loose sleeve coupling, to permit independent action of the wheels. 900 w. Glaser's Annalen—Feb. 1, 1897.

**Journal Box.**—See **CAR BEARINGS.**

**M. C. B.**—Axle and Journal Box for 80000 lb. Cars. From the M. C. B. Committee report. An extensive abstract giving formulae for dimension calculations, discussion of stress and breakage, friction and lubrication in the journal, specifications and test. 5200 w. R R Gaz—June 26, 1896.

An Axle for Heavy Cars. Extracts from letter of E. D. Nelson, presented at the M. C. B. convention, on this subject. 900 w. R R Gaz—July 1, 1898.

The New Master Car Builders' Axle for 80,000 lb. Cars. An explanation and summary of the work of the committee which directly affected the design of the axle between wheel hubs. Serial. R R Gaz—Nov. 13, 1896.

**Steel and Iron.**—Steel and Iron Axles. R. A. Mould. Read before the National Railway Master Blacksmiths' Assn. Information respecting the wearing qualities of iron and steel axles, showing the superiority of the latter. 1600 w. Ir & St Trds Jour—Oct. 30, 1897.

**Testing Machine.**—See **TESTING MACHINE—Car Axles.**

**Tests.**—Tests of a Wrought-Iron Car Axle. W. F. M. Goss. Describes and illustrates recent test of a 60000-pound axle made in the Engineering Labaratory of Purdue University. 1100 w. Pamphlet.

**Tests, Abrasion.**—Abrasion and Etching Tests of Wrought-Iron and Steel Car Axles. Report of L. R. Pomeroy of tests made in the laboratory of the Cambria Iron Co., with illustrations. 1200 w. R R Gaz—Dec. 4, 1896.

Comparative Abrasion Tests of Axles. Records of an interesting series of wearing tests on a number of car-axles conducted at the laboratory of the Cambria Iron Co. Gives results and chemical analyses. 1000 w. Ry Mas Mech—Jan., 1897.

**Tests, Sheffield.**—Axles. A series of tests on railway axles, conducted at Sheffield, Eng., by the proprietor of the Worthy Iron Works. 2200 w. Ind & East Eng—Dec. 14, 1895.

**Wrought-Iron.**—Making Wrought-Iron Axles. Stephen Uren. Read at the convention of the Nat. R. R. Master Blacksmiths' Assn. Describes details in the manufacture of good axles. 1900 w. Ry Age—Sept. 8, 1899.

### CAR BEARINGS.

Journal Bearing Metals. Considers the best means of attaining a solid bearing to give the greatest satisfactory service at the least cost. 1100 w. Ry Mas Mech—May, 1898.

**German.**—Novelties in the Construction and Internal Arrangement of Wrought-Iron Car-Axle Boxes for Railway and Tram Cars (Neuerungen in der Herstellung, Bauart und Inneren Einrichtung Schmiede-eiserner Auchslager-Kasten für Eisenbahn-u. Strassenbahn Fahrzeuge). F. Sürth. A paper read before the Verein Deutscher-Maschinen-Ingenieure, giving a well illustrated description of recent German practice. 4500 w. Glaser's Annalen—June 1, 1900.

**Hot.**—Hot Bearings. H. Rolfe. The paper deals with causes of heating in detail. General discussion follows. Ill. 35000 w. N Y R R Club—May 17, 1900.

How Can Traveling Engineers Reduce the Delays Caused by Hot Boxes and Bearings? Communications from chairman, William Conger, Mr. I. H. Brown, and Mr. George T. Wells, presented in lieu of a report which was expected, with discussion. The letters and discussion are important and interesting. 5000 w. Trav Eng's Assn—Sept., 1895.

Some Causes of Hot Bearings with a New Form of Brasses for Railroad Car Journals (Ueber einige Ursachen des Heisslaufens der Lager und über eine Neue Lagerschale für Eisenbahnfahrzeuge). Josef Grossmann. Discussion of the causes of hot journals, with suggestions for diminishing them. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—March 23, 1900.

The Use of Water on Hot Bearings of Engines and Tenders. Extracts from the committee report presented by Charles A. Crane to the Traveling Engs. Assn. Gives replies to circular letter of inquiry. Information favors the use of water. 1100 w. Ry & Engng Rev—Sept. 16, 1899.

**Korbuly Box.**—The Korbuly Railway Journal Box (Korbuly's Achsenlager für Eisenbahnwagen). Description and detailed drawings of a new journal box which has given excellent results on the Hungarian State Railways. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 27, 1896.

**Locomotive.**—See **LOCOMOTIVE AXLE BEARINGS.**

**M. C. B. Box.**—The Proposed 5½ by 10 M. C. B. Journal Box. F. M. Whyte. A criticism, with replies. Ill. 1100 w. Am Engr & R R Jour—Sept., 1900.

**M. C. B. Journal Box.**—See **CAR AXLE—M. C. B.**

**Micro-Structure.**—Some Causes of Excessive Heating in Bearing Metals. Robert Job. Showing the importance of the microscope in studying these alloys. Ill. 3000 w. Am Engr & R R Jour—Feb., 1900.

The Micro-Structure of Bearing Metal. Quotes conclusions of Dr. Dudley, chemist of the Pennsylvania R. R., and the results of personal study. 1000 w. R R Gaz—May 13, 1898.

The Microstructure of Bearing Metals. Guilliam H. Clamer. An interesting study of the structure and composition of the various bearing metals, especially those used in railroad service, has led to the conclusion that an alloy of the proper proportions of copper, tin and lead seems best suited for the purpose. Discussion. Ill. 5500 w. Jour Fr Inst—Aug., 1898.

**Model.**—Instruction in Care of Journal Boxes. Describes a model used in instructing the men on the New York Central & Hudson River R. R. 1200 w. Am Engr & R R Jour—Feb., 1900.

**Packing.**—The Proper Care of Packing in Journal Boxes, and Its Important Relation to Successful Lubrication. Discussion of the subject by H. C. McCarty and others. Ill. 11200 w. Cent Ry Club—Jan., 1900.

**Prussia.**—The Defects of Existing Axle Boxes (Mängel der Jetzigen Achsbüchsen). Discussion of the axle boxes of the Prussian State Railways, with interesting data about breakages wear and lubrication. 7500 w. Glaser's Ann—April 15, 1897.

**Roller.**—See **ROLLER BEARINGS.**

**Roller Tool.**—Roller for Car Axle Journals. Description of a tool for finishing journals, which is claimed to be almost a cure for hot boxes. 250 w. Loc Engng—May, 1896.

**Side.**—Side Bearings for Cars. A. M. Waitt. Letter to the editor giving the writer's views. 1000 w. Am Eng & R R Jour—Oct., 1898.

**Side vs. Center.**—Center Bearings or Side Bearings. Extracts from an interesting discussion at the May meeting of the Western Railway Club. 2000 w. R R Gaz—July 15, 1898.

Center Plates and Side Bearings for Freight Cars. Substance of two committee reports presented at convention of Master Car Builders' Assn. 4500 w. Eng News—June 21, 1900.

### CARBIDE.

**Calcium.**—See **CALCIUM CARBIDE.**

**Moissan Method.**—A New Method of Preparing Carbides (Nouvelle Méthode de Préparation des Carbures). A paper by M. Moissan before the French Academy upon the preparation of metallic carbides by the action of carbide of calcium upon the corresponding oxides. 1500 w. Comptes Rendus—Nov. 29, 1897.

**Silicon.**—See **SILICON CARBIDE.**

### CARBOLIC ACID.

**Crude.**—Valuation of Crude Carbolic Acid. Carl E. Smith. From the "Am. Jour. of Pharmacy." Considers the impurities of the commercial article, the methods of examination, and the difficulties met. 3000 w. Am Gas Lgt Jour—Sept. 19, 1898.

### CARBOLITE.

See **IRON MANUFACTURE—By-Products.**

### CAR BOLSTER.

Calculating the Strength of Body and Truck

Bolsters. Part first considers the truck bolster only. 1000 w. Ry Mas Mech—Feb., 1897.

Finding the Stresses in Trussed Bolsters. Explanation of the graphical method, with diagrams, showing how clearly this method brings out the result of the combination of various assumptions. 1000 w. Ry Mas Mech—March, 1897.

Body Bolster, 70000-lb. Car—Northern Pacific Railway. Description of construction with detail drawings. 800 w. Ry Rev—May 9, 1896.

**Deflection.**—The Computation of the Deflection of Body and Truck Bolsters. William Kendrick Hatt. Derives a formula for the case of uniform loading and for end loading. Also gives a description of a graphical process for drawing the curve into which the bolster will bend under any loading, from which curve the deflection at any point may be obtained. 2000 w. R R Gaz—Dec. 23, 1898.

**Rock Island.**—Recent Freight Car Body Bolsters of the Chicago, Rock Island & Pacific. Illustrates designs in malleable iron and cast steel which provide ample strength for cars of 60000 and 80000 lbs. capacity, and have many features of interest. 1000 w. R R Gaz—Jan. 27, 1899.

**Specifications and Tests.**—Bolster Specifications and Tests. Some considerations in regard to the design of bolsters, and suggestions for testing. 900 w. Am Engr & R R Jour—Feb., 1900.

**CARBON.**

Carbons for Electric Lighting and Other Purposes. Francis Jehl. From a forthcoming book to be published by the "Electrician." Part first considers the physical properties of carbon, and gives historical notes on uses. Serial. Elect'n, Lond—Feb. 4, 1898.

**Crystallization.**—Contributions to the Investigation of the Crystallization of Carbon (Beiträge zur Kenntnis der für die Krystallization des Kohlenstoffes Günstigen Bedingungen). A paper by Dr. Borchers describing his own experiments with a special form of electric furnace, and indicating the lines on which further experiments should be continued. 3000 w. Zeitschr für Elektrochemie—March 20, 1897.

**Electrical Purposes.**—Carbon for Electrical Purposes. Facts of interest about the carbon used in the arc lamp and for electrolytic work. 2000 w. Ir & Coal Trds Rev—Oct. 1, 1897.

The Properties of Carbon in Electrical Work. Elihu Thomson. The first part of an interesting paper showing the importance and use of carbon in the electrical arts. Serial. Elec Wld & Engr—May 12, 1900.

See also **ARC LAMP—Carbons; BRUSH—Carbon.**

**Electrolytic.**—See **ELECTRO-CHEMISTRY—Carbon.**

**Energy Transformation.**—The Transformation of the Energy of Carbon into Other Available Forms. C. J. Reed. A discussion of the subject, and a consideration of the five general methods or processes known at present, for converting this form of energy into forms directly available to man. 8000 w. Jour Fr Inst—July, 1896.

**CARBON BISULPHIDE.**

See **BISULPHIDE OF CARBON.**

**CARBONIC ACID.**

**Liquefaction.**—The Liquefaction of the Carbonic Acid Produced by Breweries and Distilleries (Liquefaction de l'Acide Carbonique des Brasseries et Distilleries d'Alcohol). An account of the Meuus method of recovering the waste carbonic acid gas of breweries, etc., and liquefying it for subsequent use. 1000 w. Moniteur Industriel—Nov. 11, 1899.

The Manufacture of Liquefied Carbonic Acid. An account of the London Carbonic Acid Gas Works. Ill. 1300 w. Engng—Oct. 20, 1899.

**CARBONIC OXIDE.**

See also **AIR ANALYSIS; COAL MINE EXPLOSION; FIREDAMP.**

Investigations Upon Carbonic Oxide in Confined Air (Reucherche de l'Oxide de Carbone dans l'Air Confiné). Including the use of the "grisoumetre" of Dr. Grehant for determining the proportion of the gas in the air. 3500 w. Génie Civil—July 24, 1897.

Study of Carbonic Oxide Confined Air (Recherche de l'Oxyde de Carbone dans l'Air Confiné). Dr. Grehant. With an account of experiments upon animals showing the absorption of carbonic oxide by the blood, and also the production of carbonic oxide when air comes in contact with the metal of red hot stoves. 3000 w. Génie Civil—Jan. 8, 1898.

The Toxic Properties of Carbonic Oxide. N. Grehant. Experiments recently made upon absorption by the blood, describing apparatus and method, and giving results. 2000 w. Gas Wld—April 9, 1898.

**Gases.**—Water Gas and Other Gases Containing a Large Proportion of Carbonic Oxide. A few of the important facts and theories embodied in the recent report of the committee appointed by the Home Secretary to inquire into their manufacture and use. 4000 w. Prac Engr—May 12, 1899.

**Inflammability.**—The Limits of Inflammability of Carbon Monoxide and Other Combustible Gases. H. Le Chatelier and Boudouard. Gives the results of investigations and calculations. 700 w. Col Guard—June 10, 1898.

**Iron and Nickel Compounds.**—See **GAS BURNER—Deposits.**

**Poisoning.**—See **COAL MINE EXPLOSION—Causes of Death.**

**Testing.**—A Preliminary Study of a Method of Testing Carbonic Oxide in the Atmosphere (Etude préliminaire d'une Méthode de Dosage de l'Oxyde de Carbone Dilué d'Air). A. Gautier. A contribution to the French Academy giving tests of very small quantities of carbonic oxide by the use of iodic anhydride. The reaction is shown to take place when the carbonic oxide is diluted with 30000 times its volume of air. 2500 w. Comptes Rendus—March 28, 1898.

**CARBON MONOXIDE.**

See **CARBONIC OXIDE.**

**CARBORUNDUM.**

See also **ABRASIVE.**

Carborundum. L. J. Gray. An account of the discovery, the development of the manufacture, the remarkable properties, etc. Ill. 2000 w. Foundry—Aug., 1900.

Manufacture of Carborundum. An excellent illustrated description of the method and furnace employed in the production of this new abrasive. It is a carbide of silicon produced in an electric furnace, 16x6x5 ft. in size, working at 6000 to 7000 degrees temperature. 1500 w. Min & Sci Pr—Jan. 4, 1896.

**Furnace.**—Details of the Carborundum Furnace and its Operation. Illustrated detailed description. 1200 w. Elec Eng—Feb. 24, 1897.

**Niagara.**—Carborundum. An illustrated description of the processes used at Niagara in the manufacture of this product. 2000 w. Am Mach—Aug. 11, 1898.

Making Carborundum. Sturgis B. Rand. Extracts from "McClure's Magazine." Account of high temperature furnaces and its practical uses at Niagara Falls. 3500 w. Am Mfr & Ir Wld—Jan. 25, 1900.

Manufacture of Carborundum at Niagara Falls. Illustrated description of the method. 2200 w. Sci Am—June 16, 1900.

The Carborundum Works at Niagara Falls. Orrin E. Dunlap. An illustrated description of the manufacture of carborundum as now carried out. 1800 w. Elect'n, Nov. 15, 1895.

The Manufacture and Development of Carborundum at Niagara Falls. Francis A. Fitzgerald. Traces the manufacture of carborundum from the preparation of the crude material for the mixture to the production of grains and powders in a commercial form and considers its properties and uses. Ill. 5500 w. Jour Fr Inst—Feb., 1897.

The Manufacture of Carborundum at Niagara Falls, Ont. Brief description of the process of manufacture. 1000 w. Can Engr—Dec., 1898.

A Product of the Electric Kiln. Interesting illustrated description of the Carborundum Company's Works, Niagara Falls, N. Y. 2000 w. Brick—July, 1897.

See also **ELECTRIC PLANT; HYDRO-ELECTRIC PLANT; TRANSFORMER—Carborundum Plant.**

**CAR BUFFER.**

See **CAR COUPLER; CAR PLATFORM.**

**CAR CLEANING.**

Car Cleaning. F. T. Slack. A statement of methods employed and material used. Discussion. 9500 w. N Y R R Club—May 19, 1898.

How Cars Are Cleaned by the Wagner Palace Car Co. The account is designed to show how fully important sanitary requirements are complied with. 700 w. Loc Engng—June, 1896.

**CAR CONSTRUCTION.**

See also **CAR DESIGN.**

A Point in Freight Car Construction. William J. Knox. Calls attention to the lack of bracing in long cars of great height and width, and thinks many cars now in service are deficient in this particular. Ill. 600 w. Loc Engng—Aug., 1899.

Car Roofing. Taken from discussion on this subject at a meeting of the Northwest Ry. Club. The opinions of Alfred Child of the Northern Pacific, and C. D. Brooke, of the St. Paul & Duluth Ry. 900 w. R R Gaz—April 8, 1898.

The Progress of American Car Construction. H. S. Haines. Address delivered at the Master Car Builders' Convention, reviewing the rapid improvement in comfort and safety and the wide field still open to inventive genius. 3200 w. Ry Rev—June 20, 1896.

**Art.**—Art in Car Building. Duane Doty. A summary of modern practice in interior and exterior finish and decoration, based on Pullman standards and artistically illustrated with reproduction of designs. 3000 w. R R Car Jour—June, 1896.

**Chic., Mil. & St. Paul.**—Building 15 Freight Cars per Day—Chicago, Milwaukee and St. Paul Railway. Describes the plan by which this creditable performance is carried on. The record was not broken from the middle of January, 1898, to the 6th of June. Ill. 2000 w. Eng & R R Jour—Feb., 1899.

**Maintenance.**—Construction and Maintenance of Railway Car Equipment. Oscar Antz. An extended illustrated description of each part in detail. Serial. Am Eng & R R Jour—Jan., 1896.

**Malleable Iron.**—Malleable Iron in Car Construction and Repairs. Eugene Chamberlin. Read before the Central Railway Club. Facts with relation to the benefits obtained from its general use. 1500 w. Pro of Cent Ry Club—Sept., 1897.

Malleable Iron in Car Construction. R. M. Galbraith. Showing that economy is secured in its use, but that there is great difference in the quality, and that the design of patterns is important. 1300 w. R R Car Jour—June, 1898.

The Use of Malleable Iron in Car Construction. Drawings and description with tests of a malleable iron bolster. 1000 w. Loc Engng—June, 1898.

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The Framing of Cars. F. M. Whyte. Extract from paper read before the Western Railway Club, with editorial comment. Suggestions for improvements in the distribution of loads. 3000 w. Ry & Engng Rev—Dec. 24, 1898.

**Bolster.**—See **CAR BOLSTER.**

**Box.**—The Framing of a Box Car. George L. Fowler. An analysis of the stresses and their distribution through the framing of a box car. 2200 w. R R Car Jour—June, 1897.

**France.**—The Maintenance of Iron and Wooden Underframes of Freight Cars in France. M. L. Tolmar. Part first classifies the cars, giving general description and maintenance of the general types. Ill. Serial. Am Eng & R R Jour—March, 1897.

**Metal.**—Preservation of Metal Frames for Tenders and Cars. E. M. Herr. Abstract of a discussion before the Western Railway Club, with diagram showing corrosion. 1100 w. Ry Rev—Nov. 7, 1896.

Some Examples of Metal Uunderframes from Foreign Countries. Illustrated description of a number of designs used in European practice. 1800 w. R R Gaz—Oct. 23, 1896.

The Preservation, Maintenance and Probable Durability of Rolling Stock with Metal Underframes and Metal Upperframes. M. L. Tower. Translated from the "Revue Génerale des Chemins de Fer." Describes a most careful investigation of the wear and corrosion in cars built since 1861. Metal upperframes are not found to increase the life of the car. The metal underframes are given a life of 50 to 60 years. With editorial. 5000 w. Am Eng & R R Jour—Aug., 1896.

**Steel.**—Steel Underframes for Freight Cars. D. L. Barnes. Contributed to the discussion on large freight cars at the meeting of the N. Y. R. R. Club. A prediction as to the limited agreement likely to be reached upon questions of construction, and the general agreement as to shapes of roller sections. 800 w. Ry Rev—April 25, 1896.

Steel Underframing for Freight Cars. Report of the committee submitted at the Master Car Builders' Convention. Ill. 3300 w. Ry Rev—June 28, 1897.

**Tubular.**—The Church and Ettenger Tubular Car. Illustrates and describes this construction and discusses why it is not a success in the United States, when it seems in favor in Tasmania. 3000 w. R R Car Jour—April, 1898.

See also **CAR TRUCK—Church and Ettenger.**

**Wood and Metal.**—Car Frames of Wood and Metal. F. E. Stebbins. Diagrams and characteristic points of all principal types. 1500 w. R R Car Jour—Sept., 1896.

### CAR HEATING.

Heating Passenger Cars. William Garstang. Abstract of a paper read at the November meeting of the Western Ry. Club. Traces the progress made, and discusses the systems in use, noting points that need special attention. 3000 w. Ry & Engng Rev—Dec. 25, 1897.

**Automatic Control.**—Automatic Temperature Control for Passenger Cars. Illustrates and describes a modification of the Powers system, which has been tried with success on a number of roads. 1100 w. R R Gaz—Nov. 17, 1899.

**Automatic Trap.**—Improved Automatic Trap for Indirect Car Heating. Illustrated description of a trap operating on the same principle as the compensating pendulum, letting in hot water or steam only after the temperature lowers. 700 w. Ry Rev—Nov. 9, 1895.

**Electric**—The Present Status of Electric Heaters. A report of the principal changes made since last year. Ill. 1800 w. St Ry Jour—Sept., 1897.

**Europe.**—Car Heating in Germany, Austria and Switzerland. Illustrated description of the systems used. 2600 w. R R Car Jour—Feb., 1900.

Note on the Status of Car Heating (Note sur la Situation de Chauffage des Trains). MM. Pfitzinger and Mauclère. A very full review of the construction and operation of apparatus for heating railway carriages in Germany, Austria and Switzerland during the winter of 1897-'98. Two articles. 12000 w. 9 plates. Rev Gen des Chemins de Fer—Feb., March, 1899.

**France.**—Heating Carriages on the Eastern Railway of France. The first number reviews the crude and unsatisfactory methods still largely in vogue, and describes the Lancrenon steam heating apparatus and diagrams. It affords an interesting comparison with American practice. Serial. Engng—June 5, 1896.

New Methods of Heating Railway Trains (Méthodes Nouvelles de Chauffage des Trains). A description of the methods employed on the various railways of France; both hot water and steam are used. 3500 w. Rev Tech—Feb. 25, 1900.

**Hot Water.**—Heating Apparatus, Belgian Grand Central Railway. E. Belleroche. From a paper published in the Bulletin of the International Railway Congress. Describes the system of heating passenger trains on this road, which consists essentially of circulating hot water along the train and back again, from the engine. 1500 w. Am Eng & R R Jour—Aug., 1897.

**Steam.**—Car Heating by Steam. R. M. Dixon. The success of steam heating, description of method, rules for handling steam heating equipment, etc. 1200 w. Am Eng & R R Jour—Nov., 1896.

Combined High and Low Pressure Steam Heating System of the Prussian State Railways (Vereinigte Hoch-und Niederdruck-Dampfheizung der Preussischen Staatsbahnen). A system especially adapted for the compartment carriages used in Germany, and enabling the temperature to be regulated independently in each compartment. 1000 w. 1 plate. Glaser's Annalen—Dec. 15, 1897.

Heating Cars by Steam on the Paris-Lyons-Mediterranean Railway (Chauffage des Trains par la Vapeur sur le Réseau Paris-Lyons-Mediterranée). M. Mottet. A general description of the apparatus used, with plates of details of connections, valves, radiators, etc., and diagrams of the results of tests. 4000 w. 4 plates. Rev Gen des Chemins de Fer—Aug., 1898.

Improvements in Steam Heating of Passenger Carriages on the Prussian Railways (Neuere Anordnungen für die Dampfheizung der Personenwagen auf den Preussischen Staats-Eisenbahnen). The improved system permits of moderate heating in mild weather or full heating in cold weather, with control of each compartment by the passengers. 6000 w. 1 plate. Glaser's Annalen—June 1, 1897.

Steam Heat on Passenger Equipment. A communication on the use of steam heat and the advisability of using a steam trap. A lengthy and interesting discussion followed the reading. 9400 w. Cent Ry Club—Nov., 1895.

The Heating of Railway Carriages. Discusses the details in connection with the distribution along the length of the train when steam heating is used. 2200 w. Engr, Lond—Aug. 3, 1900.

The Heating of Railway Trains by Steam (Chauffage des Trains à la Vapeur). E. Belleroche. A discussion of the Lancrenon and Dery system, using mixed air and steam. 4000 w. 3 plates. Rev Univ des Mines—Nov., 1899.

**Steam Hose Connections.**—See **HOSE—Car Heating.**

### CAR HOUSE.

**Boston.**—Car House Construction in Boston. Each part is described and illustrated by place and section. The design embodies the results of long experience. 1100 w. St Ry Jour—April, 1896.

### CAR INSPECTOR.

**Examination.**—Examination of Car Inspectors. A symposium of correspondence, chiefly commendatory. 1800 w. R R Car Jour—April, 1896.

### CAR INTERCHANGE.

See also **CAR MOVEMENT; CAR POOLING; RAILWAY TRAFFIC; RAILWAY TRANSPORTATION.**

Car Service Reforms. A forthcoming report to the International Association of Car Accountants, with an editorial argument for daily rental instead of mileage, for disregard of line marks, and a prediction of a great pool for joint ownership. 3000 w. Ry Age—May 23, 1896.

Handling of Foreign Cars. W. E. Beecham. From the report to the Central and Western Car Assn. Gives recommended practice. 2500 w. Ry Age—July 2, 1897.

**Accounts.**—Car Accounts Without Books. Illustrates and describes the system of car accounting, invented by W. E. Beecham, recently adopted on the Chicago, Milwaukee & St. Paul Ry. 1400 w. Ry Age—March 25, 1898.

**Box Standard.**—See **CAR.**

**M. C. B. Rules.**—M. C. B. Rules. The revision of the Master Car Builders' rules of interchange as recommended by the Southern & Southwestern Ry. Club. 1100 w. R R Gaz—April 23, 1897.

Revision of the M. C. B. Interchange Rules. The rules include specific instructions to inspectors, repair men, for billing cars and miscellaneous matters. In constitutes the report of the "Committee of Twenty-one" and is open to revision. 4000 w. Ry Rev—Jan. 18, 1896.

Revision of the M. C. B. Rules of Interchange. Changes made at the annual convention of the M. C. B. Assn., to take effect Sept. 1, 1900. 900 w. R R Car Jour—Sept., 1900.

Suggestions for the Revision of the M. C. B. Code of Rules. George S. Hodgins. Suggested modifications by the writer and editor. 3500 w. R R Car Jour—May, 1897.

The M. C. B. Rules of Interchange. The proposed changes, and the discussion by the Jersey City Lodge of the Car Inspectors' and Repair Men's Assn. 2800 w. R R Car Jour—May, 1898.

The Relation of the M. C. B. Rules of Interchange and the Basis or Rate of Car Hire to Facility of Car Movement. W. W. Wheatly. An exposition of the inadaptability of present basis of payment or inspection to expediting car movements. 2000 w. R R Car Jour—June, 1896.

The Revision of the M. C. B. Rules of Interchange. George S. Hodgins. Suggestions and observations on the rules governing the interchanging of cars, traffic and repairs on connecting railroads. 2000 w. R R Car Jour—Dec., 1895.

The Rules of Interchange. Discussion of the M. C. B. Code of interchange rules at the recent convention of the Master Car Builders' Assn., with editorial. 17000 w. R R Car Jour—July, 1897.

**Owner's Responsibility.**—See CAR.

**Owner's Standpoint.**—The Rules of Interchange from the Car Owner's Standpoint. Maurice. Communication representing the high value of private equipment to the railroad, and urging better and more liberal treatment of the owners, especially in the matter of repairs. 1600 w. R R Car Jour—May, 1896.

**Per Diem Service.**—The Settlement of Car Hire Accounts on Per Diem or Mileage Basis. J. M. Daly. A discussion of the irregularities of the mileage plan, and favoring the per diem basis. Discussion by members. 15000 w. N Y R R Club—Feb. 16, 1899.

Per Diem Car Service. Editorial discussion of Mr. Daly's scheme for the use of exchanged cars. 1200 w. R R Gaz—July 8, 1898.

**Repairs.**—Additional Compensation for Car Repairs Done West of the 105th Meridian. J. H. Goodyear. Discussing the schedule of prices and the allowing of a differential charge to give relief to roads making repairs at a loss. 2700 w. R R Car Jour—April, 1899.

Car Repairs Under the New Rules of Interchange. A discussion of the interpretation of the rules and of repair problems arising thereunder. 13000 w. Cent Ry Club—Sept., 1896.

Charges for Repairs West of the 105th Meridian. George S. Hodgins. Discussion of differential charges. 1500 w. R R Car Jour—Dec., 1897.

Differential Prices for Repairs. An examination of the underlying principles claiming to show the fallacy of the claims for differential rates under the M. C. B. rules. 1400 w. R R Car Jour—Aug., 1898.

The Adjustment of Prices of Car Repairs. Editorial considering the difficulties of the problem. 1200 w. Am Eng & R R Jour—Nov., 1898.

**Size.**—See CAR.

**Terminals.**—Handling of Foreign Cars at Large Terminals. Interesting remarks in regard to errors and abuses in connection with the handling of interchanged cars at terminals. Taken from report by W. E. Beecham, chairman of a committee of the Central Western Assn. of Car Service Officers, appointed to investigate this subject. Serial. 1st part. 3000 w. Ry Age—June 18, 1897.

### CAR JOURNAL.

See **CAR BEARING.**

### CAR LIGHTING.

Railway-Carriage Lighting. Herr H. Gerdes, in "Journal für Gasbeleuchtung." Extracts giving use, cost, etc., of Pintsch gas, electricity, and acetylene. 1800 w. Gas Wld—May 1, 1897.

The Lighting of Railway Cars. H. Gerdes. Read before the Assn. of German Technical Engineers. Part first discusses briefly the various kinds of illumination, especially the electric light and Pintsch gas. Serial. Pro Age—Sept. 15, 1897.

The Lighting of Railway Cars (Eisenbahn-Waggon-Beleuchtung). A paper by H. Gerdes, the chief engineer of the Pintsch establishment, making comparisons between oil, gas, electricity, and acetylene for car lighting. 5000 w. Glaser's Annalen—April 1, 1897.

Train Lighting. George D. Shepardson. Discusses the sources of lights, results produced and cost, but gives the greatest attention to the illumination of passenger cars. Ill. 8400 w. N W Ry Club—May, 1900.

**Acetylene.**—Acetylene and Car Lighting. P. H. Conradson. Abstract of paper read before the Northwest Railway Club. Reviews briefly the manufacture and use, and gives comparative illumination and cost of oil, carburetted air, Pintsch gas, electricity and acetylene. 1800 w. Ry Rev—July 25, 1898.

Acetylene for Train Lighting. A. Lipschultz. From a paper read before the Civil Engineer's Society of St. Paul, Minn.,, on "The Use of Acetylene in Railway Station and Train Lighting." 3000 w. Am Gas Lgt Jour—Sept. 17, 1900.

Acetylene Gas on a Canadian Railway. Describes the installation of an express train of the Pontiac, Pacific Junction Railway Co., stating its advantages and disadvantages. 800 w. Can Eng—April, 1898.

Experience with Acetylene Gas for Car Lighting. Letter from P. W. Resseman, giving information of the economy and convenience resulting from the adoption of this system of lighting on the Pontiac, Pacific Junction Ry. of Canada. 600 w. Eng News—March 31, 1898.

Railway Carriage Lighting and the Latest Experiments with Acetylene. From the "Zeitung des Vereins deutscher Eisenbahn-Verwaltungen." Reports the experiments made by the Berlin firm of Messrs. Julius Pintsch, with criticisms and comments. 1800 w. Ry & Engng Rev—Dec. 4, 1897.

The Lighting of Trains by Acetylene (Eclairage des Trains à l'Acétylène). Discussing the various experiments made in Germany and France, and recommending a mixture of acetylene and nitrogen as being safe under pressure as well as efficient and economical. 5000 w. Génie Civil—July 3, 1897.

See also **ACETYLENE GENERATOR**—Bournonville.

**Acetylene-Oil Gas.**—Acetylene and Mixed Gas Plants for Lighting Railway Cars (Acetylen-und Mischgasanstalten für Beleuchtung der Eisenbahnwagen). A paper by Herr Bork, describing a plant for the production of calcium carbide, and acetylene in connection with oil gas, the whole forming a complete car-lighting plant. 4500 w. 1 plate. Glaser's Annalen—June 15, 1898.

Railway Carriage Lighting by Compressed Oil Gas and Acetylene. Giving an illustrated account of the plant used in Berlin for an oil-gas enriched with acetylene and compressed in tanks for lighting carriages on the Prussian State Railways. 1000 w. Engr, Lond—Sept. 9, 1898.

**Electric.**—Electric Car Lighting from the Axle. Illustrated description of the construction and application of the system of direct cog wheel gearing from the axle to the dynamo. 900 w. Ry Rev—June 5, 1897.

Electric Lighting of English Railroad Trains. The systems which have been tried in Great Britain and on the continent are described, especially the Stone system. 1600 w. R R Gaz—Sept. 16, 1898.

Electric Lighting of Railway Trains Abroad. Reprint from the "Car." A short account of the development of this branch of electric installation work. 2000 w. Sci Am Sup—Sept. 5, 1896.

Electric Lighting of Railway Trains. George D. Shepardson. An illustrated account of the "Burlington Limited" train and its lighting and electrical features. It has been in service three years. 3500 w. Elec Wld & Engr—July 7, 1900.

Electric Train Lighting. Alton D. Adams. Briefly describes the methods tried with success. 1500 w. Sci Am—March 3, 1900.

Railway Train Lighting. Favoring electric lighting and describing a system by which each coach is self-contained, having each a small set of accumulators. 1600 w. Elec Rev—Dec. 6, 1895.

The Electric Lighting of Railway Carriages (Ueber Elektrische Beleuchtung von Eisenbahn Personenwagen). A very thorough paper by Dr. Buettner, giving comparative results as to the cost of electricity as opposed to gas. 3000 w. Glaser's Annalen—May 15, 1897.

The Electric Lighting of Trains. Robert A. Ross. Considers the several systems and their cost; their advantages and disadvantages, and the need of suiting the system to the conditions. 1800 w. Can Engr—Jan., 1899.

The Electric Lighting of Railway Carriages. Illustrated description of a system with dynamo run from car axle, and charging accumulators. The advantages are stated and a trial described. 3000 w. Ind & Ir—Nov. 29, 1895.

The Lighting of Cars by Electricity (L'Eclairage Electrique des Wagons). A very full review of experience and practice in France, Switzerland, Italy and Germany, with details of arrangement and data of cost. Three articles. 7000 w. Génie Civil—July 31, Aug. 7 and 14, 1897.

**Electric, Australia.**—Electric Lighting of Railway Trains in Australia. Daniel W. Maratta. Describing an installation of charging dynamo and storage cells, the method of running and the cost of maintenance. 800 w. Elec Rev—July 15, 1896.

**Electric, Austria.**—Electric Car Lighting in Austria. Summary of a paper, by W. Rayl, published in a recent number of the bulletin of the International Railway Congress. A satisfactory electric lighting equipment. 1400 w. Ry Rev—Dec. 19, 1896.

The Electric Lighting of the Austrian Railway Car Post-Offices (Die Elektrische Beleuchtung von Eisenbahn Postwagen in Oesterreich). Illustrated description of the system of incandescent lamps and storage batteries used in the railway post-office cars in Austria. 2500 w Elektrotech Zeitschr—March 4, 1897.

**Electric, Dick.**—The Dick System for Electric Train Lighting (Emil Dick's Anordnung für Elektrische Zugbeleuchtung). L. Kohlfürst. The lamps are supplied from accumulators in the respective cars, the accumulators being charged from a dynamo attached to the axle of the baggage car. 3000 w. Schweizer Bauzeit—Oct. 21, 1899.

The Dick System of Electric Train Lighting (Elektrische Zugbeleuchtung, System Dick). The system uses accumulators charged by a dynamo on one car axle. A full description is given and an account of practical experience on the local railway between Vienna and St. Pölten. 5000 w. Electrotech Zeitschr—April 28, 1898.

Dick's System of Electric Lighting for Trains (Dick's Elektrische Zugbeleuchtung). L. Kohlfürst. An illustrated account of this system, which derives current from a dynamo geared to the car axle, with comparisons of the cost with that of other systems of train lighting. 2000 w. Schweiz Bauzeit—March 31, 1900.

**Electric, England.**—Electric Train Lighting on the Southeastern Railway. Brief remarks on improvements made in rolling stock, and general details of the train, and a description of the electric lighting gear. 1400 w. Elec Engr, Lond—Dec. 4, 1896.

**Electric, France.**—A New System of Train Lighting. Abstract from the "Revue Géneralé des Chemins de Fer." Reviews briefly the arrangements of the best known systems and describes in detail one recently applied experimentally by the Paris, Lyons and Mediterranean Co. Ill. 2400 w. Elect'n, Lond—Oct. 13, 1899.

Electric Lighting of Railway Carriages. Illustrates and describes a system recently tried on the Paris, Lyons and Mediterranean. 1400 w. Engr, Lond—March 2, 1900.

**Electric, Germany.**—The Electrical Lighting of Mail Cars (Die Elektrische Beleuchtung von Bahnpostwagen). Editorial comments on the results of accumulator lighting during four years' experience in Germany. The lamps are changed after about 200 hours' use. The cost is about 8½ pfennigs per lamp hour at 12 candle power. 1200 w. Elektrotech Zeitschr—Feb. 24, 1898.

See also **Electric, Prussia.**

**Electric, Hungary.**—Experiments with Accumulators for Lighting Railway Carriages. G. Klose. Examinations of systems of accumulators made in a series of experiments carried out by the Hungarian State Railways during the past year, on the lighting of railway carriages by electricity. 600 w. Engr, Lond—April 24, 1896.

**Electric, Moskowitz.**—National Electric System of Car Lighting. Illustrated description of the system of this company, which is the result of the investigations and experiments of Mr. Morris Moskowitz. 1200 w. R R Car Jour—Nov., 1896.

The Moskowitz Independent System of Car Lighting by Electricity. Illustrated description of a system which seems to possess many practical advantages. 1200 w. Eng News—Oct. 29, 1896.

**Electric Oil Engines.**—Oil Engines for Train Lighting. Alton D. Adams. Suggests a plan for lighting trains by electricity, using an oil engine and a dynamo in each car. Also editorial comment. 2700 w. R R Gaz—July 20, 1900.

**Electric, Pollak.**—A New System for the Electric Lighting of Railway Carriages (Ein Neues System der Elektrischen Beleuchtung von Eisenbahnwagen). H. Massenbach. A paper read before the Frankfurt Electrotechnical Society discussing the Pollak system, which employs a generator driven by the car axle, a small storage battery, and an automatic switch. 3500 w. Elektrotech Zeitschr—Jan. 11, 1900.

**Electric, Prussia.**—Electric Lighting on Prussian Railway Postal Cars. From "Der Electro-Techniker." Information relating to the advantages of using the electric light on postal cars, and the success which has led to the decision to use it on all such cars in Prussia. 1800 w. R R Car Jour—April, 1900.

The Electric Lighting of the Prussian Railway Mail Cars (Die Elektrische Beleuchtung der Preussischen Bahnpostwagen). F. Millius. Storage batteries and incandescent lamps are used, about two-thirds of the mail cars in Prussia now being lighted by electricity. 1500 w. Elektro-Techniker—Feb. 15, 1899.

**Electric, Stone.**—Lighting Railway Carriages by Electricity. Describes and illustrates Stone's apparatus as applied to the Metropolitan railway carriages. 2200 w. Engr, Lond—July 14, 1899.

**Electric vs. Gas.**—Electricity Versus Gas for Train Lighting. Alton D. Adams. Favors electricity, considering it safer and less costly. 1600 w. W Elect'n—Aug. 11, 1900.

**Gas.**—Car Lighting with Pintsch Gas, City Gas and Acetylene Mixture. An explanation of why city gas and mixtures with acetylene are not used in the United States. 700 w. Am Engr & R R Jour—Oct., 1899.

Comparative Efficiency of Pintsch and City Gas. Abstract of report by Mr. P. H. Branga, Electrician of the D., L. & W. R. R., showing results extremely favorable to Pintsch. 1200 w. R R Gaz—June 19, 1896.

Tests of Gas and Lamps for Car Lighting. A report by Professors Chandler and Denton on tests with both Pintsch and city gas in Argand lamps of the Pintsch and Gordon-Mitchell types. The tests were made for the Lehigh Valley Railroad. 1700 w. R R Gaz—Dec. 27, 1895.

The Latest Information about Car Lighting. Editorial comment, with abstracts, directing attention to the report of Profs. Chandler and Denton to the Lehigh Valley R. R. The report is highly favorable to the Pintsch lamp and gas. 1400 w. R R Gaz—May 1, 1896.

The Relative Cost of Car Lighting by Pintsch Oil Gas and by Compressed City Gas. The tests show that for equal illumination compressed city gas costs 2½ times as much as Pintsch gas. 850 w. Eng News—Feb. 13, 1896.

**Pintsch.**—See Acetylene Oil Gas; Gas.

**Tramway.**—Improved Tramcar Lighting. An English opinion of the New York situation, gleaned from the local press. Contains an interesting comment on the effect of good lighting upon volume of travel. 250 w. Ry Wld—April, 1896.

### CAR MOVEMENT.

See also **CAR INTERCHANGE; CAR POOLING; RAILWAY TRAFFIC; RAILWAY TRANSPORTATION.**

The Daily Car Situation. J. R. Cavanagh. Read at a meeting of the Indianapolis Div., Central Assn. of R. R. Officers. Suggestions as to forms governing the movements of cars. 1000 w. Ry Age—Feb. 22, 1896.

**Graphic Block System.**—The Graphic Block System of Recording Car Movements. Illustrated description of the system developed by G. H. McNamara for keeping a record of the movements and location of freight cars. It consists in using a separate card for each car, the cards being arranged in special filing cases. 2000 w. Eng News—Feb. 8, 1900.

### CAR PAINTING.

See **PAINTING.**

### CAR PLATFORM.

See also **CAR COUPLER.**

**Buffer.**—A Continuous Platform Buffer for Elevated Cars. Illustrated description of a new type of continuous platform buffer and automatic coupler, which has been in service on the Yonkers Branch of the New York Central, and is designed specially to meet the conditions imposed by a service on which the curves are very sharp. 600 w. R R Gaz—March 5, 1897.

The Trojan Passenger Equipment. Brief description, with sections of buffer, of a recently introduced centre stem platform, with some novel features. 400 w. Ry Age—Feb. 19, 1897.

**Steel.**—Steel Platforms for Passenger Cars. Compares wood and steel platform construction, noting the superiority of the latter in preventing telescoping of cars, and other damages. 800 w. R R Gaz—June 10, 1898.

**CAR POOLING.**

See also **CAR INTERCHANGE; CAR MOVEMENT; RAILWAY TRAFFIC; RAILWAY TRANSPORTATION.**

Pooling of Freight Equipment. J. R. Cavanagh. Presents causes that show the necessity of considering this problem, and claims for the pooling of freight equipment. Also editorial. 2800 w. R R Car Jour—Sept., 1897.

The Pooling of Freight Equipment. J. R. Cavanagh. Read before the Assn. of Ry. Officials at Toledo, O. Some practical suggestions as to how to do it. 1000 w. Ry Age—July 31, 1896.

The Pooling of Railway Freight Cars. J. R. Cavanagh, in the "Journal of Political Economy." A discussion of the loss to railroads by the present system, and suggesting a plan that would greatly increase the revenue. 2200 w. R 3 Car Jour—Sept., 1900.

**CARRIER.**

**Electric.**—See **TELPHERAGE.**

**CAR SHOPS.**

See also **RAILWAY SHOP.**

**Canadian Pacific.**—The Canadian Pacific Shops—Car Department. Brief description of the workshops, and illustrated description of work now receiving special attention. 2000 w. R R Gaz—Aug. 19, 1898.

**John Stephenson Co.**—The New Car Shops of the John Stephenson Company, Ltd. Charles Henry Davis. Historical sketch and illustrated detailed description with other information. Serial. Eng Rec—Sept. 23, 1899.

**Preston, Eng.**—New Electric Tramcar and Railway Carriage Works at Preston. A description of the various departments in the order in which they receive the materials. 1700 w. Engr, Lond—March 31, 1899.

The Electric Railway and Tramway Carriage Works. Illustrated detailed description of the new factory at Preston, England, and the course of car construction, power distribution, etc. 2800 w. Ry Wld—April 18, 1899.

**CAR SPECIFICATIONS.**

Concerning Specifications. Editorial, questioning the economy of specifying individual makes for component parts in car construction, exemplified by illustrations from correspondence and practice. Discussion is suggested. 1600 w. R R Gaz—May 1, 1896.

Suggestions for Specifications for New Rolling Stock. A. M. Waitt. From a paper read before the Western Railway Club. Calls attention to the need of careful consideration in the selection of materials, the care and inspection of equipment, etc. Editorial comment is also made. 4500 w. Ry Rev—Jan. 23, 1897.

**CAR TRUCK.**

See also **TRUCK.**

Car Truck Construction. Extracts from a paper by J. C. Barber, read at the September meeting of the Northwest Railway Club. Advocates the diamond frame or arch-bar type. 2000 w. R R Gaz—Oct. 21, 1898.

Improvements in Freight Car Trucks. Designs of cast steel and rolled steel I beam truck frames, having in consideration economy of first cost, simplicity, durability, and facility for repairs. Ill. 1100 w. R R Car Jour—Nov., 1895.

Passenger and Freight Car Trucks; Their Principles and Design. General discussion with illustrations. 17600 w. N Y R R Club—April 19, 1900.

Two New Trucks for Freight Cars and Tenders. Designs for metallic construction brought out by the Buckeye Engine Co., of Salem, O. Ill. 700 w. Ry Rev—Oct. 24, 1896.

**Arch Bars.**—Graphics of Truck Arch Bars. The importance of proper designing, exhibited by designs showing the stresses in correctly and incorrectly proportioned arches. The subject is urged upon the attention of the M. C. B. Association. 1100 w. Loc Engng—May, 1896.

The Stresses in Arch Bar Frames. George I. King. Results of investigations of the stresses developed in arch bars for diamond frame trucks. Ill. 3500 w. R R Gaz—Oct. 5, 1900.

**Brill Passenger.**—The Brill "Perfect" Passenger Truck. The object in the design was to provide additional safety against derailments, improvement in riding qualities and the relieving the wheels of stresses other than those due to the weight of the car. Illustrated description. 1200 w. Ry Rev—Feb. 6, 1897.

**Church & Ettenger.**—Church & Ettenger's Truck for 60000 lbs. Capacity Car. Design for a diamond frame freight car truck, by an English firm, resembling in most respects American practice. The truck and bolsters are adapted to tubular frame car construction. 900 w. R R Car Jour—Nov., 1895.

**Cloud.**—The Cloud Truck. Illustrated description of a new design, consisting of a combination of plate steel side frames and malleable iron pedestals, which are riveted thereto. 1400 w. Ry Rev—June 12, 1897.

**Construction and Repairs.**—Car Truck Construction and Repairs. J. C. Barber. Condensed from a paper presented at the Sept. meeting of the Northwest Ry. Club. Calls attention to features in which there is room for improvement, and discusses bolsters, center plates, bearings, etc. 1800 w. Eng News—Nov. 3, 1898.

**Electric.**—Car Trucks. W. H. Heulings, Jr. Read at the Lancaster meeting of the Penn. St. Ry. Assn. Favors the use of the maximum traction truck. 4200 w. St Ry Rev—Nov. 15, 1899.

Peckham's Swivel Trucks. For High Speed Electric Service. Illustrated description of trucks designed for high speeds and heavy loads. 800 w. R R Gaz—Oct. 15, 1897.

Street Railway Trucks. John N. Akarman. The object of the paper is to give hints to street railroad men which will enable them to decide what type of truck is best adapted to the purpose. Read at the St. Louis Convention. 8000 w. St Ry Jour—Nov., 1896.

The American Electric Truck. W. E. Partridge. A description of the truck as found in the best American practice. 1000 w. Ry Wld—March, 1897.

Trucks for Lake Street Elevated Electric Motor Cars. Three designs are illustrated. 1500 w. Ry Rev—Feb. 15, 1896.

New Motor Truck for the Lake Street Elevated, Chicago. Illustrates and describes a design by Frank Hedley. The construction is simple, with a large clear space for the motors. 400 w. R R Gaz—Sept. 16, 1898.

See also **TRUCK.**

**English Bogie.**—Discussion of a Bogie Truck for Passenger Cars on the Great Western Railway of England. George L. Fowler. A complete set of illustrations of a bogie truck for passenger cars that is built at Swinton, Eng., with discussion of the design. 6600 w. R R Car Jour—March, 1898.

**Kindl Metal.**—The Kindl Metal Truck for 100000 Pounds Capacity Cars. Truck designed by F. H. Kindl. Illustrated description of the interesting features. 500 w. R R Gaz—April 23, 1897.

**Leeds Freight.**—Freight Truck of Rolled Shapes. Illustrated description of truck designed by Mr. Pulaski Leeds. 700 w. R R Car Jour—Jan., 1897.

**Locomotive Passenger.**—See **TRUCK.**

**Metal.**—Metal Trucks for Freight Cars. Giving descriptions of the principal varieties used in the United States, with editorial upon the general advantages of metal over wood for trucks. 5000 w. Eng News—Sept. 15, 1898.

Metal Trucks for Cars of 100000-Pounds Capacity. Description and drawings of trucks to be used under the metal cars being built for the Pittsburg, Bessemer & Lake Erie Railroad. Describes the Schoen, Fox, Kindl, Cloud, Vogt, and American Steel Foundry Company's trucks. Also editorial. 2500 w. Ry Mas Mech—June, 1897.

Three New Metallic Car Trucks. Illustrated descriptions of the Standard truck, the L. & N. freight truck, and the Buckeye truck. 1700 w. Ry Mas Mech—Dec., 1896.

**Peckham.**—A Test of the Peckham Truck. This company having the contract to furnish trucks for the South Side Elevated in Chicago, a special test to demonstrate the strength was made, and is described. Ill. 700 w. R R Gaz—Nov. 25, 1898.

See also **Electric**

**Standard.**—Standard Trucks. F. D. Bronner. Discussion of the merits of diamond and steel-plate types, before the M. C. B. convention, June, 1898. 1400 w. Eng & R R Jour—Aug., 1898.

**Steel.**—The Present Standing of the Steel Truck. Editorial comment on design and cost. 1600 w. R R Gaz—June 4, 1897.

**Steel, Mexico.**—Standard Steel Truck—Mexican Central Railroad. Illustrated description of the peculiar features of the construction of a metal, diamond-frame truck designed by A. A. Robinson. 500 w. R R Gaz—June 4, 1897.

**Symons.**—Symons Boltless Cast Steel Truck. Illustrated description of a truck made of three members and no bolts. 500 w. Loc Engng—March, 1900.

**Track Curves.**—See **RAILWAY CURVE—Wheel Bases.**

**Transporting.**—Transporting Trucks (Trucks-Transporteurs). M. Claise. Illustrated description of the independent trucks used on the Ardennes narrow-gauge railway for the transport of pieces for which the cars are unsuited. 10000 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre, 1899.

**United States.**—Swivel Trucks Used on American Cars (Trucks Articulés de Voitures et de Wagons Usités aux Etats-Unis). M. Demoulin. A general account of the various trucks used in the United States, especially in comparison with the rigid axles of European practice. 7500 w. 4 plates. Rev Gen des Chemins de Fer—Aug., 1898.

The Bogie Truck. Maurice Demoulin. An illustrated review of the different types of bogie trucks in use in the United States. The present number deals with freight car trucks. Serial. R R Car Jour—May, 1899.

### CAR VENTILATION.

A Plan for the Ventilation of Railway Carriages (Ein Vorschlag zur Ventilation Fahrender Eisenbahnwaggons). Dr. A. Hinterberger. A description of a method by which air is forced through a small pipe and delivered into the compartments of each carriage through a number of perforations. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 11, 1899.

Car Ventilation. Abstract of a paper by S. H. Woodbridge, of the Mass. Inst. of Technology, giving the requirements in car ventilation and stating that if pure air is introduced there will be no trouble in expelling the vitiated air. 600 w. Am Eng & R R Jour—Nov. 14, 1895.

Car Ventilation. An editorial upon the importance of fresh air in railway cars, and how to secure this without draughts, cinders and other annoyances. 3800 w. Am Eng & R R Jour—Nov. 14, 1895.

Car Ventilation. Editorial comment on the difficulties in securing good ventilation. 1300 w. R R Gaz—Dec. 18, 1896.

Passenger Car Ventilation. Granville P. Conn. Considers what constitutes a vitiated atmosphere, and the points especially to be studied in car ventilation. 2000 w. R R Car Jour—June, 1898.

The Ventilation of Passenger Cars on Railroads. Charles B. Dudley. Showing the difficulties to be overcome in this problem, and a general study of the subject, with tests and experiments. Ill. 7000 w. Jour Fr Inst—July, 1897.

The Ventilation of Railway Coaches. Present and possible ventilation of railway coaches discussed from a mechanical standpoint. 2500 w. Eng Rec—Nov. 30, 1895.

**Hanover.**—The Ventilation of Cars with Filtered Air (Lüftungseinrichtung für Eisenbahnwagen mittelst Filtrirter Luft). Describes a simple air filter which has given good results on the Hanover State Railway. 4000 w. Glaser's Annalen—March 15, 1897.

**Massachusetts.**—Car Ventilation. Investigation of the subject, as reported in the latest annual report of the Massachusetts Board of Railroad Commissioners. 3000 w. Ry Rev—April 10, 1897.

**Pennsylvania R. R.**—Ventilating Passenger Cars on the Pennsylvania. Illustrated description of the system used. 600 w. R R Gaz—Feb. 9, 1900.

### CAR WHEEL.

Locomotive Tenders and Truck Wheels. Editorial discussion of the difference between American and British practice, with the opinions of motive-power men and locomotive builders. 3000 w. Eng News—June 9, 1898.

Some Observations on Wheels. George S. Hodgins. Devoted chiefly to an argument as to the over-rated importance of depth of chill, and the underestimated value of good balancing and careful mounting. 1800 w. R R Car Jour—May, 1896.

**Balancing.**—Balancing of Car Wheels. J. E. Simons. Is of the opinion that cast-iron wheels should be balanced before being placed in service. 1000 w. R R Car Jour—June, 1898.

**Cast-Iron.**—Specifications and Guarantee for Cast-Iron Car Wheels. Report o fa committee of the Master Car Builders' Assn. presented at the annual convention held at Old Point Comfort, Va. 2000 w. Eng News—June 10, 1897.

Specification and Guarantee for Cast-Iron Wheels. Report of committee appointed by the M. C. B. Assn. to revise the specifications and guarantee for cast-iron wheels, and to consider the form of wheel. 3400 w. Ry Rev—July 3, 1897.

Chilled Cast-Iron Wheels. E. W. Grieves. A discussion of defects in wheels, and the question of replacing wheels which have failed. Ill. 1200 w. R R Car Jour—June, 1898.

See also **Stress and Chill; Tests.**

**Cast-Iron vs. Steel-Tired.**—Cast-Iron and Steel-Tired Wheels. R. C. P. Sanderson. From a paper before the Southern and Southwestern Ry. Club. Briefly touches the questions of safety, weight, running qualities, rail wear and cost. 2000 w. Engr, Lond—Nov. 20, 1896.

Cast-Iron vs. Steel-Tired Wheels. R. P. C. Sanderson. From a paper before the Southern and Southwestern R. R. Club. The questions of safety, weight, running qualities and rail wear are briefly considered, and also the cost. 1100 w. Am Eng & R R Jour—Nov., 1896.

The Chilled Cast-Iron Wheel. R. P. C. Sanderson. Considers the relative merits of cast-iron and steel wheels, favoring the former. 3300 w. R R Gaz—April 29, 1898.

Cast-Iron vs. Steel-Tired Wheels. R. P. C. Sanderson. From a paper read before the Southern & Southwestern Railway Club. A comparison of merits, defects and economy, with argument for the chilled wheel. Also editorial. 10600 w. Ry Rev—Oct. 10, 1896.

Steel-Tired Versus Chilled Iron Wheels. H. M. Bois. A reply to Mr. Sanderson's paper on chilled cast-iron wheels. Thinks cast-iron cannot be made strong enough or cast drilled wheels uniformly reliable enough to meet the requirement of present railway service. 2800 w. R R Gaz—May 13, 1898.

**Comparative Record.**—Comparative Wheel Record. A tabulated comparison of five makes of wheel under severe service. Payment for wheels on a mileage record basis is recommended. 400 w. St Ry Jour—May, 1896.

**Construction.**—Car-Wheel Construction. Edward Grafstrom. Gives a method of analyzing the stresses in a wheel. Ill. 2800 w. Am Engr & R R Jour—June, 1899.

The Manufacture of Car Wheels. G. R. Henderson. Points about the manufacture of car wheels which have been observed by the writer. The lessons learned from chemical analysis and physical tests. 3500 w. Trans Am Soc of Mech Engs—May, 1899.

**Dressing.**—A New Method of Dressing Car Wheels, Axles, etc. R. Atkinson. Read before the Canadian Soc. of Civ. Engs. Describes the working of iron in the cold state by means of machinery, and specially describes the Sibbald machine and process with trials. 2000 w. Eng News—Feb. 25, 1897.

**Electric.**—A Comparison of American and European Wheel Practice, with Notes on General Condition of Service. P. H. Griffin. The results obtained from chilled iron- and steel-tired wheels, the advantages of each, the difficulties in electric wheel service, etc. 3500 w. St Ry Jour—April, 1897.

The Development of the Modern Electric Railway Car Wheel. P. H. Griffin. The effect of local regulations concerning form of rails, etc., is shown, and the service, material and design discussed. 1700 w. St Ry Jour—Jan., 1897.

Street Car Wheels; Shall They Be Made Heavier? F. D. Russell. Read before the N. Y. State Convention. The changes needed because of change of power. Thinks, taking the 32-in. wheel for a standard, that 380 lbs. to 400 lbs. on 2¼-in. and 2½-in. tread is not too much for the present service. 1800 w. St Ry Rev—Sept. 15, 1897.

The Breakage of Street Car Wheels. R. J. McCarty. An examination into the causes for the breakage of car wheels. 1800 w. St Ry Jour—Jan., 1896.

**Failure.**—The Anticipation of Failure. George S. Hodgins. Considers the symptoms of a wheel malady which indicate a near approach to danger. 1500 w. R R Car Jour—June, 1897.

**Flanges.**—Sharp Flanges—Their Causes and Remedies. C. C. Borton. Extracts from a paper read before the Pacific Coast Ry. Club. Discusses faults in car construction that produce flange wear. 1400 w. R R Gaz—Nov. 3, 1899.

The Discussion of the Proper Shape of Wheel Flange. C. F. Uebelacker. Demonstration of a shape of flange which present practice in track laying would call for. Diagrams. 2000 w. St Ry Jour—Feb., 1897.

Wheel Flanges and Rail Grooves. William Glenny Keagey. Discussion of the causes of the breaking of wheel flanges, and the remedy. Ill. 1000 w. Tram & Ry Wld—Aug. 9, 1900.

**Flanges and Treads.**—The Irregular Wear of Wheel Treads and Flanges. H. S. Cooper. The causes and some remedies. Part first considers defects in tracks or rails, defects of wheels and defects in running gear, trucks, motors, or in adjustment of same. Serial. St Ry Jour—Feb., 1897.

The Standard Wheel Tread and Flange. Discussion of the suggestion of J. N. Barr at the last annual convention of the Master Car Builders', and advising the getting the rails into a proper shape rather than attempt any modification of the wheel tread. Also a letter on the subject from George S. Hodgins. 2300 w. R R Car Jour—Nov., 1896.

**Flange Wear.**—Flange Wear of Car Wheels. Editorial discussing the increase in flange wear of late and the causes. 1600 w. R R Gaz—Dec. 22, 1899.

**Heating.**—See **Thermal Tests.**

**Iron.**—The Mileage of Chilled Cast-Iron Wheels in Freight and Passenger Service. Tables up to date, showing service. 500 w. Am Eng & R R Jour—Jan., 1898.

**Mounting.**—Correct Gaging in Mountain Car-Wheels. Facts brought out in the paper presented by Mr. George Tatnall at meeting of N. Y. R. R. Club, with editorial comment. 1500 w. R R Gaz—Feb. 26, 1897.

Mounting Wheels and Gauge of Track. A. P. Gest. Read before the annual meeting of the Am. Soc. of R. R. Supts. at Nashville, Tenn. The correct gauge of car wheels, considered in its relation to the gauge of the track, and particularly with reference to frogs and guard rails. 3300 w. Ry Age—Sept. 24, 1897.

Wheel Mounting and Its Relation to the Wheel Gauge. Edward Grafstrom. Calls attention to a defect in Rule 3, of the new M. C. B. code. Ill. 1200 w. Aug. 27, 1897.

**Pattern.**—A Model Car Wheel Pattern. Illustrated description of a modern car wheel pattern. 400 w. Ir Tr Rev—Jan. 2, 1896.

**Rail Section.**—See **RAIL—Wheel.**

**Slid-Flat.**—Slid-Flat Car Wheels. F. B. Farmer. Abstract of paper presented at Jan. meeting of the Northwest Railway Club. Discussing the causes. 1800 w. , R R Gaz—March 9, 1900.

**Street.**—See **Electric.**

**Tests.**—Tests of Special Quality Chilled Iron Car Wheels at Buffalo, N. Y. Reports tests, under the auspices of the Central Railway Club made to demonstrate the comparative value of steel-tired wheels, and special quality chilled iron wheels for high-grade service. 1300 w. Eng News—Jan. 27, 1898.

Testing Car Wheels. From a pamphlet issued by the New York Car Wheel Works, of Buffalo, N. Y., entitled: "A Series of Tests Made by the P. H. Griffin Machine Works, of Buffalo, N. Y., on Nov. 8, 1895, with Special Qualities of Wheels Made by the New York Car Wheel Works." Illustrated description. 2500 w. Foundry—Feb., 1896.

Car Wheels—Mileage and Thermal Tests. T. A. Griffin. A general average computation of the life of freight car wheels, and a statement of the conditions that have affected the results, with conclusions on thermal tests. 6000 w. Ry Age—June 10, 1898.

**Thermal Tests.**—Thermal Tests for Car Wheels. S. P. Bush. Abstract of a paper presented at the Saratoga, N. Y., convention of the Master Car Builders' Assn. A presentation of facts relating to these tests, showing that there is no reason to believe that in obtaining greater safety, durability is sacrificed. 1500 w. Eng News—June 23, 1898.

Thermal Tests of Car Wheels. Describes tests and suggests the influence of form of wheels upon their behavior under such testing. 800 w. Am Eng & R R Jour—Sept., 1896.

The Heating of Car Wheels and Its Relation to the Heat Test. Gives results of some novel experiments for determining the temperature to which drilled wheels can be heated by brake shoes under severe conditions, and the relation of this heating effect to the usual thermal test. Also editorial. 4200 w. R R Gaz—June 9, 1899.

The New Heat Test for Car Wheels. Describes the methods of making heat tests used by the Pennsylvania Railroad, and by H. J. Small. Thinks these tests will furnish valuable information on the subject of wheels and wheel metals. 1800 w. R R Car Jour—Dec., 1896.

**CAR WORKS.**

See also **CAR SHOPS.**

**Sheffield.**—Victoria Works, Sheffield. Illustrates and describes an extension of these works for the manufacture of railway fittings. 3200 w. Engng—Feb. 17, 1899.

**CASEHARDENING.**

See **ANNEALING—Casehardening.**

**CASTING.**

See also **CUPOLA; FOUNDRY; FOUNDRY IRON; MOLDING; PATTERN.**

A Casting With a Troublesome Core. R. H. Palmer. Illustrates and describes the casting of a drying machine column. 900 w. Am Mach—March 15, 1900.

Notes on Iron Founding (Aus der Giesserei). A. Ledebur. A discussion of the influence of the method of casting on the strength of cast iron, with comparisons of German and American data. 3000 w. Stahl und Eisen—March 1, 1898.

**Brass.**—See **BRASS—Castings.**

**Bronze.**—A Phenomenal Piece of Bronze Casting. Description of the work of molding and casting the largest single piece of bronze ever poured in the United States—a statue of Pan. 3000 w. Sci Am—Sept. 10, 1898.

The Art of Bronze Casting in Europe. Geo. Simonds. History and hints upon the molding and casting of artistic works in bronze. 13500 w. Jour Soc of Arts—June 19, 1896.

The Casting of Art Bronze. From "La Nature." Describes processes and gives interesting information. Ill. 1000 w. Sci Am—Nov. 6, 1897.

**Centrifugal.**—Centrifugal Casting (Ueber Zentrifugalguss). Ernst Lewicki. Describing the centrifugal method of obtaining sound castings. The mould is revolved rapidly, forcing the melted metal to the circumference. 3500 w. Zeitschr d Ver Deutscher Ing—June 25, 1898.

**Chills.**—Casting Axle Boxes, Wheels, etc., on Chills. Walter J. May. Directions for a cheap way of preparing castings for certain applications. 700 w. Prac Engr—Oct. 20, 1899.

**Cleaning.**—Cleaning Castings by Hydrofluoric Acid. R. Moldenke. Hydrofluoric acid is recommended as a substitute for sulphuric acid as a pickle for castings, and its superior advantages are set forth. It actively dissolves the silica in the scale, and only attacks the iron in strong pickles. 1800 w. Age of St—March 28, 1896.

Making Clean Castings. The necessary safeguards to prevent dirty castings are stated. 800 w. Foundry—Sept., 1896.

The Sand Blast Apparatus for Cleaning Castings. Fred C. Brooksbank. An interesting paper setting forth at length the uses of the sand blast in the treatment of castings, its advantages as compared with pickling, some of the disadvantages of pickling, and other matter of interest to iron founders. 5000 w. Ir Age—March 12, 1896.

**Clean Iron.**—Clean Iron Castings. Walter J. May. General discussion of the subject, noting the difficulties, faults, etc., and means of overcoming them. Gives test results where one of the new forms of ferro-sodium is used, showing how this flux affects iron. Considers a good flux a desirable thing. 1700 w. Col Guard—Jan. 7, 1898.

**Contraction.**—Volumnar Contraction of Castings in Cooling. Francis Schumann. This paper contains addenda to the paper entitled "Contraction and Deformation of Iron Castings in Cooling from the Fluid to the Solid State" and is intended to open and continue discussion on that subject. 500 w. Trans Am Soc of Mech Engs, Vol. XVIII.—May, 1897.

**Copper-Aluminum.**—Casting a Difficult Metal. Methods used by the writer to get a perfect casting of copper, with the addition of from eight to twelve per cent. of aluminum. Ill. 700 w. Ir Trd Rev—Aug. 26, 1897.

**Corliss Cylinder.**—Casting a Corliss Cylinder. R. H. Palmer. Illustrates and describes the manner of casting as approved by William H. Harris, builder of the Harris-Corliss engine. He considers this type of cylinder is more satisfactory cast horizontally and with the valve seats vertical. 2000 w. Am Mach—Nov. 24, 1898.

**Cost.**—Itemized Cost of Castings. Robert Grimshaw. A system of cost accounting for foundry work as carried out in the shops of a well known leading manufacturing establishment. 1400 w. Mach—March, 1896.

**Crane Work.**—See **PATTERN—Crane Center.**

**Cylinders.**—See also **CYLINDER—Cast Iron.**

**Cylinder in Dry Sand.**—Casting a Cylinder in Dry Sand. R. H. Palmer. Illustrated detailed description. 3000 w. Am Mach—Oct. 26, 1899.

**Defects.**—Defects in Cast Iron Castings. A foreman moulder presents the practical aspect of the question. Emphasizes the importance of making a good mould. 1500 w. Engng—Dec. 25, 1896.

Defects in Iron Castings. D. Brown. The causes of defects are explained, and their remedies in venting, coring, mixing metals for the cupola and pouring are set forth. 1800 w. Ir & Steel Tr Rev—Dec. 27, 1895.

Defects in Iron Castings. D. Brown. The variety of causes inherent in materials and workmanship, and the remedies. 2200 w. Prac Eng—Nov. 29, 1895.

**Direct.**—Hints on Castings Direct from the Blast Furnace. W. H. Butlin. An investigation of some of the forces present in the production of castings run direct from the blast furnace. 1600 w. Ir & Coal Trds Rev—April 2, 1897.

**Engine Bed.**—Casting a Harris-Corliss Engine Bed. R. H. Palmer. Illustrates and describes a cast for a 32-inch engine, weighing about 23,000 pounds. 1700 w. Am Mach—Feb. 16, 1899.

**Expansion.**—See **Shrinkage.**

**Failure.**—Some Pencil Sketches of Failures. H. Hansen. A study of bad castings and their causes. 1400 w. Foundry—Nov., 1896.

**Feeding.**—Feeding Castings. R. D. Moore. The writer's experience in feeding with criticism of work examined. 1200 w. Foundry—April, 1898.

Feeding, or the Compressing of Metals. William Roxborough. Considers the influence certain brands of metal have upon castings, position of castings and related matters. 2000 w. Foundry—Dec., 1898.

**Fillets.**—Fillets and Round Corners on Castings. John M. Richardson. Read at Pittsburg meeting of the Am. Foundrymen's Assn. Discusses the merits and demerits of fillets, and means of securing good castings. 2500 w. Sci Am Sup—May 5, 1900.

Fillets and Round Corners on Modern Machinery Castings. John M. Richardson. Discusses the value of the fillet in patterns, advantages in the finished casting, and fillets in core work. 2400 w. Ir Trd Rev—June 15, 1899.

**Fly-Wheel.**—Casting a Fly-Wheel. R. Brief description of the plant of the Sessions Foundry Co., of Bristol, Conn., with account of the casting of a big fly-wheel. Ill. 2300 w. Am Mach—Jan. 13, 1898.

**Header.**—Casting a Header in the Floor. R. H. Palmer. Illustrated description of the work. 2200 w. Am Mach—Dec. 28, 1899.

**Inspection.**—Inspection of Castings. E. H. Putnam. Read at the Cincinnati meeting of the Am. Foundrymen's Assn. Emphasizes the importance of thorough inspection, as early as possible after the casting is made. 1200 w. Ir Trd Rev—June 23, 1898.

**Joints.**—Joints. Eli H. Pearce. Illustrated discussion of the care needed to make good points in castings. 600 w. Foundry—April, 1900.

**Kytchtym Medal.**—See **KYTCHTYM MEDAL.**

**Lathe Bed.**—The Casting of a Lathe Bed. R. H. Palmer. Illustrates and describes the casting of a lathe bed 27 feet long. 8000 w. Foundry—Feb., 1900.

**Locomotive Cylinder.**—Casting a Locomotive Cylinder. W. T. Mohan. A description of present practice. 1200 w. Sib Jour of Engng—Nov., 1898.

Locomotive Cylinders. Herbert M. Ramp. Full directions, illustrated by engravings, for performing a difficult piece of foundry work. 2000 w. Foundry—Nov., 1895.

**Malleable.**—Coke and Charcoal Iron for Malleable Castings. Erastus C. Wheeler. Considers some of the comparable qualities in each iron, giving deductions gathered from experience. Serial. Ir Age—March 30, 1899.

Malleable Castings. Considers early and recent methods employed. 1800 w. Foundry—Oct., 1899.

Pig Iron for Malleable Castings. C. E. Wheeler. Deductions gathered from experience concerning heat influences, silicon, sulphur and phosphorus. 3800 w. Ir Trd Rev—July 13, 1899.

Shrinkage of Malleable Iron Castings. H. O. Evans. Read before the Foundrymen's Assn., at Philadelphia. A reply to Dr. Moldenke's critique of Mr. Davis' paper. 1100 w. Ir Age—April 12, 1900.

See also **ANNEALING—Malleable Castings.**

**Mitis.**—See **MITIS.**

**Occluded Gases.**—Porous Castings and Occulated Gases, Max H. Wickhorst. Read at the meeting of the Western Foundrymen's Assn. Explains what occluded gas is, and the trubles caused by it, dealing with the various gases separately. 4000 w. Ir Trd Rev—Dec. 29, 1898.

**Patching.**—Mending Holes in Retorts. R. D. Moore. Describes manner of patching castings by "melting on." 900 w. Foundry—Jan., 1899.

**Plates.**—The Casting of Plates. R. H. Palmer. Suggestions concerning methods of molding. Ill. 1000 w. Foundry—Dec., 1899.

**Power-Press Frame.**—Casting a Power-Press Frame. R. H. Palmer. Sketches, with description of a casting weighing some 4000 lbs. 1500 w. Foundry—April, 1899.

**Reuniting.**—Reuniting Broken Iron Castings. Thomas F. Kennedy. Describes this method of repairing, and calls attention to points requiring special care. 1500 w. Met Work—Oct. 29, 1898.

**Riser.**—The Use of the Riser in Casting. Showing the action of risers for feeding, for relieving the mold of dirty metal, and for indicating the filling of the mold. 1800 w. Mech Wld—Nov. 5, 1897.

**Shot Iron.**—Shot Iron and Hard Spots in Castings. Edward Kirk. Discusses the value of dump iron, showing it to be more economical to save only the larger pieces. Gives numerous experiments made in trying to utilize this material. 4000 w. Foundry—April, 1900.

**Shrinkage.**—Absolute Shrinkage. William Roxburgh. Discusses irregular shrinkage, considering design, equality of metal, slackening, comber, etc. 2300 w. Foundry—Aug., 1900.

Contraction and Deformation of Iron Castings in Cooling from the Fluid to the Solid State. Francis Schumann. The results of twelve years of observation and research by the writer, with conclusions. 3800 w. Am Soc of Mech Engs—Dec., 1896.

Expansion and Shrinkage of Cast Iron. William R. Webster. Contributed to the discussion on "The Physics of Cast Iron" at the Pittsburg meeting of the Amer. Inst. of Min. Engs. The results of tests made in 1889 are plotted in curves, and the manner of making the tests is illustrated and described. 500 w. Ir Tr Rev—Feb. 27, 1896.

Shrinkage and Disintegration of Metals. W. Roxburgh. Remarks on the relation of the two terms used, with the opinion that shrinkage must be recognized as the cause of disintegration. 1400 w. Foundry—March, 1900.

Stretching Cast-Iron and Elements Involved in Its Contraction. Thomas D. West. Read at the meeting of the Western Foundrymen's Assn., at Chicago. A paper on the relations between contraction and conditions of molding, mixing and cooling the castings, with illustrative examples. 4400 w. Ir Tr Rev—Nov. 28, 1895.

The Effect of Expansion on Shrinkages and Contraction in Iron Castings. Thomas D. West.

Contribution to the discussion of "Physics of Cast Iron." 3800 w. Trans Am Inst of Min Engs—April, 1896.

**Shrinkage Strains.**—Shrinkage Strains. R. D. Moore. Explains the cause of these strains and discusses the casting of what was known as the Rodman cannon. 1500 w. Foundry—Sept., 1899.

**Six-Way Pipe.**—Casting a Six-Way Pipe Without a Pattern. Jas. A. Murphy. Illustrated directions for the work. 1000 w. Am Mach—Feb. 22, 1900.

**Skimming.**—Skimming Castings. R. D. Moore. Explains the principle of skimming metal effectually, or of constructing a skim gate that will separate the dross from the pure metal. Ill. 900 w. Am Mach—Sept. 16, 1897.

**Steel.**—The Manufacture of Steel Castings. Stewart Johnston. Read at Cincinnati meeting of the Am. Foundrymen's Assn. A brief review of the methods employed, with some of the uses. 3000 w. Am Mfr & Ir Wld—June 10, 1898.

**Straight.**—Producing Straight Castings, and Methods of Straightening. R. D. Moore. Considers various methods, and the treatment in special cases. 1700 w. Am Mach—Aug. 10, 1899.

Some Suggestions for Producing Straight Castings. J. W. Du Bois. Brief discussion of what should be done to keep a casting straight. 1100 w. Foundry—April, 1898.

To Make Straight Castings. P. R. Ramp. Suggestions with illustrations. 500 w. Foundry—March, 1899.

**Straightening.**—Straightening Crooked Castings. R. H. Palmer. Discusses some of the causes of crooked castings and means of straightening them. 1600 w. Foundry—June, 1898.

**Vacuum.**—Steel Casting in Vacuum. A description of the Ellis-May process, with drawings and details; also a consideration of the practical results that must follow. 4500 w. Ir & St Trds Jour—Dec. 4, 1897.

**Vent.**—Lighting Vents in the Foundry. R. Watson, in "Iron Moulders' Journal." Considers the general practice a mistake and gives reasons. 1000 w. Prac Eng—Oct. 8, 1897.

The Arch-Enemy and How to Control It. L. C. Jewett. Discusses "vent," or the outlet for pent-up gases. 1200 w. Foundry—Dec., 1896.

**Warping.**—The Warping of Castings and the Remedy. R. D. Moore. Suggestions for the prevention of warping and for straightening. 1500 w. Am Mach—July 13, 1899.

**Wrought-Iron.**—Some Recent Experience in Casting Wrought-Iron. C. Vickers. An account of methods successfully used by the writer. 2000 w. Am Mach—Dec. 1, 1898.

**Yellow Metal.**—Yellow Metal Castings. P. Longmuir. Suggestions for obtaining good results in this class of castings. Ill. 900 w. Foundry—April, 1900.

**CASTING LADLE.**

See also **STEEL MANUFACTURE—Ladle Carriage.**

**Harnsworth Cylindrical.**—Harnsworth's Cylindrical Casting Ladle. Consists of a horizontal cylinder revolving on trunnions, and is applied to Bessemer practice. The accompanying drawings fully explain construction and operation. 3300 w. Ir Age—Dec. 26, 1895.

**CASTING MACHINE.**

See also **IRON MANUFACTURE.—Metal Mixer.**

A New Casting Machine for Blast Furnaces. Richard Hanbury Wainford. Read at the Manchester meeting of the Iron and Steel Inst. In regard to a new mechanical apparatus for casting sandless pig-iron in insulated moulds, so as to maintain a good crystalline fracture, at a reduced cost. Ill. 1400 w. Engng—Aug. 25, 1899.

Rotary Molds for Casting Pig-Iron. J. M. Hartman. Illustrated description of a casting machine and the accompanying arrangement of the troughs and the iron notch. Ill. 1800 w. Ir Age—Sept. 22, 1898.

Sand on Pig Iron and Its Avoidance. H. D. Hibbard. Describes apparatus for casting pig iron, claiming a saving in cost and labor. 2000 w. Ir & Coal Trds Rev—Sept. 4, 1896.

**Cambria, Johnstown, Pa.**—Casting Pig Iron by Machinery. Illustrated description of machines built for the Cambria Steel Co., of Johnstown, Pa. 1000 w. Sci Am—Feb. 24, 1900.

**Uehling.**—A New Method of Casting Pig Iron. Illustrated description of a new apparatus recently designed by Edward A. Uehling, for casting and conveying pig iron at blast furnaces. 1400 w. Eng News—April 29, 1897.

Sandless Pig Iron. E. A. Uehling. Read before the Pittsburg Foundrymen's Assn. Showing the advantage of sandless, or machine made, pig iron, and its superiority. 4000 w. Ir Age—March 3, 1898.

The Uehling Casting Machine (Die Uehlingsche Giessmaschine). E. A. Uehling. A paper read before the Eisenhütte Düsseldorf devoted mainly to a description of the operation of the Uehling casting machine at the Carnegie Works in Pennsylvania. 2000 w. Stahl und Eisen—Jan. 1, 1900.

The Uehling Pig Iron Casting Machine. Illustrated description of a machine invented by E. A. Uehling, which has stood the test of practical experience. 1100 w. Ir Age—April 22, 1897.

See **IRON MANUFACTURE—Metal Mixers.**

**CAST IRON.**

See also **CASTING; FOUNDRY IRON; PIG IRON.**

Cast Iron. Dr. Richard Moldenke. Read before the Engs. Soc. of W. Penna., at Pittsburg. Considers the materials, processes of melting, constitution, micro-structure, segregation and shrinkage, tests, etc. 4000 w. Ir Trd Rev—Nov. 17, 1898.

Cast Iron. Dr. R. Moldenke. Considers chemical properties, the making, tests, etc. 2200 w. R R Gaz—March 10, 1899.

Cast Iron. W. R. Lethaby. Lecture before the Arch't. Assn., London, with discussion. Suggestions as to the uses and treatment. 9000 w. Builder—Feb. 3, 1900.

Constitution and Properties of Cast Iron. A. J. Rossi. An examination of parts of an article by A. Pourcel, a well-known French metallurgist, published in "Revue des Sciences." 3000 w. Ir Age—Dec. 31, 1896.

**Aluminum.**—The Influence of Aluminum on the Carbon in Cast Iron. Godfrey Welland and Harry W. Wardron. Read before the Iron and Steel Inst. An account of experiments to determine the amount of aluminum necessary to produce the maximum separation, and to ascertain the effect of slow and rapid cooling. Also discussion. Ill. 4000 w. Col Guard—Sept. 28, 1900.

**Chemistry and Physics.**—The Chemistry and Physics of Cast Iron Briefly Considered. J. E. Johnson, Jr. Furnishes information from the large experience of the writer. Serial. Am Mach—April 5, 1900.

**Coal Mine Water.**—Action of Water of the Hubb Coal Mine Upon Cast Iron. Frank W. Durkee. It was found that the cast iron, used for the purposes of construction within the mine, had undergone such radical changes that, while retaining their original size and shape, they could easily be broken and were no longer strong and fairly tough like cast iron. Investigations are given. 2400 w. Am Chem Jour—Dec., 1896.

**Cooling Curves.**—Properties of Cast Iron shown by Keep's Cooling Curves. W. J. Keep. The effect of silicon on shrinkage and results of some recent tests. 2300 w. Ir Tr Rev—Nov. 28, 1895.

**Crystallization.**—Crystallization and Segregation of Cast Iron. C. Kreuzpointner. Extract from a discussion of a paper on "The Deceptive Fracture of Pig Iron," by Thomas D. West, read before the Am. Foundrymen's Assn. Showing that it is not the chemical composition alone that secures a sound casting. 1500 w. Eng News—June 1, 1899.

**Electric Machinery.**—The American Foundrymen's Association Tests on Cast Iron as Related to Electrical Machinery. R. Moldenke. Gives a brief outline of the plans and study of the work already completed in which designers and builders of electrical machinery will be interested. 2500 w. Elec Wld—Aug. 26, 1899.

**Ferro-Sodium.**—The Effect of Ferro-Sodium on Cast Iron. Walter J. May. An account of the writer's experience with these fluxes. 800 w. Prac Eng—Jan. 28, 1898.

**Hardness.**—A Novel Method of Testing Cast Iron for Hardness. Describes a test made by the general manager of the Warder, Bushnell & Glessner Co., at Springfield, O., which is simple and believed to give accurate knowledge. 1200 w. Am Mach—April 1, 1897.

A Test for Determining the Hardness of Cast Iron. C. A. Bauer. Read before American Foundrymen's Association. The test proposed is by counting the revolutions needed to drill to a certain depth under uniform conditions. Duplicates agree closely. 1300 w. Foundry—Sept., 1898.

A Test for Hardness of Cast Iron. Charles A. Bauer. Read at the Cincinnati meeting of the Am. Foundrymen's Assn. Describes a test by the use of a drill press, which is believed to be reliable and of practical value. 800 w. Ir Trd Rev—June 9, 1898.

**Impact Tests.**—Cast Iron under Impact. W. J. Keep. Describes experiments made to determine the influence of shock on cast iron, showing incidentally the use of mechanical analyses in determining the cause of physical changes which take place in cast iron. 8400 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Malleable.**—See **MALLEABLE CAST IRON.**

**Melting Point.**—The Melting Point of Cast Iron. Dr. R. Moldenke. Read before the Pittsburg Foundrymen's Assn. Describes and illustrates the Le Chatelier pyrometer modified for determining melting temperatures of cast iron, giving results obtained, and general observations. 2000 w. Ir Age—Oct. 20, 1898.

**Molecular.**—On the Molecular Changes in Cast Iron Caused by Vibration. Report of the Franklin Institute, through its Committee on Science and the Arts, on the investigations of A. E. Outerbridge, Jr. 700 w. Jour Fr Inst—July, 1898.

The Mobility of Molecules of Cast Iron. A. E. Outerbridge, Jr. A contribution to the discussion of the Physics of Cast Iron. Tests proving that, within limits, cast iron is materially strengthened by subjection to repeated shocks or blows. 3300 w. Trans Am Inst of Min Eng—April, 1896.

The Mobility of Molecules of Cast Iron. Alexander E. Outerbridge, Jr. An exceedingly interesting paper, in which the general belief that repeated shocks make cast iron brittle is disproved by results of about 1000 tests, showing that within certain limits cast iron is strengthened by subjection to shocks. 2800 w. Foundry—March, 1896.

The Mobility of Molecules of Cast Iron. Alex. E. Outerbridge, Jr. A paper read at the Pittsburg meeting of the Amer. Inst. of Min. Engs. As the result of experiments the surprising statement is made that "cast iron is materially strengthened by subjection to shocks or repeated blows." 3000 w. Eng News—Feb. 27, 1896.

**Physics.**—The Physics of Cast Iron. Continued discussion. 7500 w. Trans Am Inst of Min Engs—July, 1896.

See also Chemistry; **CASTING—Shrinkage; CUPOLA; FOUNDRY IRON.**

**Railway Practice.**—Cast Iron in Railway Practice. G. R. Henderson. Reports experiments and analyses, with a study of the needs of certain classes of castings and the chemical constitutents needed to meet the requirements. Ill. 1800 w. Am Eng & R R Jour—Jan., 1899.

**Silicon and Carbon.**—Silicon Control of Carbon in Cast-Iron. F. E. Bachman. A contribution to the discussion of the paper of B. S. Summers, read at the Buffalo meeting of the Am. Inst. of Min. Engs. Paper, omitting the tables, giving the writer's comments, which differ from the usual teaching concerning silicon. 1500 w. Ir Trd Rev—Aug. 3, 1899.

The Silicon-Control of Carbon in Cast-Iron. F. E. Bachman. A discussion of the paper of Mr. Summers on "Modern Cupola Practice," etc. Gives tabulated analyses of the pig-iron of the Buffalo furnace, made during three years, from ore-mixtures varying slightly; also analyses of other irons from different places. 5000 w. Trans Am Inst of Min Engs—Oct., 1898.

See also **SILICON.**

**Steel Mixtures.**—Concerning Mixtures of Cast-Iron and Steel (Du Mélange de la Fonte el de l'Acier). M. J. Vinsonneau. Giving the results of tests of cast-iron to which steel has been added during the melting. A marked increase in strength is obtained. Not more than 15 per cent. of steel should be added. 2000 w. Moniteur Industriel—Oct. 23, 1897.

**Stress and Chill.**—Transverse Strength of Chilled Car Wheel Metal as Affected by the Relative Directions of Stress and Chill, with Some Notes on the Chemistry of Cast-Iron. Asa W. Whitney. A study of the peculiarities of cast-iron, and the phenomena due to the relations of stress and chill. Ill. 4000 w. Jour Fr Inst—April, 1897.

**Surface Impressions.**—Impressions Upon Cast-Iron Surfaces From Lace, Embroideries, Fern Leaves, etc. W. J. Keep. Gives full description of the way these impressions may be produced, and illustrates in half-tone engravings the effects so obtained. 1600 w. Foundry—April, 1896.

**Testing.**—Testing Cast-Iron for Ultimate Stresses. Walter J. May. Showing the results to be only comparative, and suggesting experimental work to determine the relation of test bars to large castings. 1200 w. Prac Engr—Jan. 5, 1900.

Testing the Strength of Cast-Iron. Walter J. May. Remarks on means of securing as accurate tests as possible. 1300 w. Col Guard—April 12, 1900.

See also **TESTING—Cast-Iron.**

**CAST-IRON CYLINDERS.**

**Water Pressure.**—See **WATER PRESSURE—Cast-Iron Cylinders.**

**CAST-STEEL.**

See **STEEL CASTING.**

**CATALOGUE.**

See also **INDEX.**

**Engineering Library.**—A Classification and Catalogue System for an Engineering Library. F. R. Hutton. Read before the A. S. M. E. General discussion of library cataloguing, and an attempt to evolve a good system for engineering libraries. 3800 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

**Trade.**—Considerations in Catalogue Making. C. D. Frost. Nine points of importance to be considered in making of a trade catalogue. 1000 w. Ind Rub Wld—Jan. 10, 1896.

**CATCH-BASINS.**

**Providence, R. I.**—See **SEWER—Providence, R. I.**

**CATENARY.**

See also **BRIDGE DESIGN.**

A Spherical Catenary in Stereo. Description of the properties of this curve, and a mathematical discussion of it, also description of an optical effect of the curve. 700 w. Engng—Dec. 13, 1895.

Catenary Problems. G. M. Minchin. Graphic methods for solving problems in catenary curves involving, by the mathematical method, the use of transcendental equations. Serial. Engng—Feb. 7, 1896.

The Stiffened Catenary (Die Steife Kettenlinie). A full analytical and graphical investigation of this most important problem in the subjects of combined resistance to bending and tension. 6000 w. Zeitschr d Ver Deutscher Ing—July 24, 1897.

**CATHEDRAL.**

See also **CHURCH.**

**Belem, Portugal.**—See **CLOISTER.**

**Berlin.**—The New Cathedral at Berlin. Descriptive. 1600 w. Am Arch—Jan. 18, 1896.

**Burgos, Spain.**—Burgos Cathedral. Illustrated description. 2200 w. Builder—Jan. 25, 1896.

**England.**—The Cathedrals of England. S. Parkes Cadman. A careful survey of these cathedrals with illustrations. 3000 w. Chau—Oct., 1898.

**Glasgow.**—Glasgow Cathedral. William J. Anderson. Review of a book recently edited by George Eyre Todd, giving the history and an illustrated account of the greatest fane of Scotland. 3000 w. Jour Roy Inst of Brit Archt's—Oct. 15, 1898.

**Milan.**—Milan Cathedral. Introductory remarks on the many architectural works of interest in the city, with account of the magnificent Gothic structure—the Cathedral dedicated to St. Mary. 1600 w. Am Arch—Aug. 6, 1898.

**Mylapore, Madras.**—The New Cathedral of St. Thomas, Mylapore, Madras. Interesting description. 2000 w. Ind Engng—Aug. 1, 1896.

**Peterborough.**—Peterborough Cathedral: Actual State of the Front. Editorial condemnation of the method of restoration advocated by the Soc. of Antiquaries. 3500 w. Builder—Jan. 23, 1897.

Peterborough Cathedral. Description of the interesting fan vaulting of this cathedral, by the late Prof. Willis. Extract from his essay on the "Construction of the Vaults of the Middle Ages." Ill. 4000 w. Arch, Lond—July 8, 1898.

Peterborough Cathedral. Preliminary specification written at the request of the Society of Antiquaries, to explain what would be necessary in works of repair to secure a part of the fabric of the portico from further dilapadation, and to secure its present condition and appearance. 5700 w. Arch, Lond—Jan. 15, 1897.

**CATHETOMETER.**

A Very Simple and Accurate Cathetometer. F. L. O. Wadsworth. Illustrated detailed description of a new cathetometer, designed by the author and, which, while claimed to be equal in accuracy and convenience to the best German and English cathetometers for laboratory purposes, can be made for a cost of less than one-tenth of what the best of these instruments have hitherto cost. 2400 w. Am Jour of Sci—Jan., 1896.

### CATHODE RAYS.

See also **ELECTRO-PHYSICS; RADIOGRAPHY; ROENTGEN RAYS.**

Cathode Jets. C. E. S. Phillips. An account of experiments made and facts observed. Ill. 700 w. Elect'n, Lond—July 22, 1898.

Cathode Rays. J. J. Thomson. Discourse delivered at the Royal Inst. An account of some of the more recent investigations. Ill. 5500 w. Elec'n—May 21, 1897.

Cathodographic Experiments. Elihu Thomson. Illustrated suggestions for the purpose of assisting experimentation in this field. 1200 w. Elec Eng—Feb. 12, 1896.

Experiments with Cathode and Röntgen Rays. J. Precht. Abstracted from "Wiedemann's Annalen." Considers the deviation of cathode rays by a magnet and the properties of rays emerging from discharge tubes, giving experiments. Ill. 1600 w. Elec Wld—Dec. 18, 1897.

Experiments Upon the Cathode Rays and Their Effects. Arthus W. Wright. Illustrated description of experiments performed at Sloane Physical Laboratory, of Yale University, and suggestions derived from a consideration of the circumstances under which the different shadowgraphs were produced. 4200 w. Am Jour of Sci—March, 1896.

Mr. Swinton on Cathode Rays. Some interesting and unexpected properties as developed in the focus tube generally employed for the production of Röntgen rays, presented in a paper read before the Royal Soc. Ill. 1400 w. Elec Rev, Lon—April 9, 1897.

New Properties of the Cathode Rays. Jean Perrin. Translated from "Comptes Rendus." An account of experiments made by the writer for the purpose of investigation. 900 w. Elect'n—Feb. 14, 1896.

On the Energy of the Cathode Rays. W. G. Cady. An investigation carried out at the Physical Inst. of the Univ. at Berlin. Ill. 3500 w. Am Jour of Sci—July, 1900.

On the Motions of the Luminous Glow in Rarefied Gases Produced by Electric Oscillations. J. Elster and H. Geitel, in "Wied Annalen." An account of experiments which give further proof of the nature of cathode rays. 1400 w. Elec Eng—Feb. 5, 1896.

Properties of Simple Cathode Rays (Propriétés des Rayons Cathodiques Simples). H. Deslandres. Note on investigations made at the Paris observatory, showing that simple cathode rays correspond to simple electric oscillations. 1500 w. Comptes Rendus—June 8, 1897.

Some Experiments with Cathode Rays. A. A. C. Swinton. Abstract of a paper read before the Royal Society. Investigation of the discharge in Crookes' tubes. Illustrated description of experiments from which it seems that X-rays can only be produced by cathode rays when these strike solid matter. 3300 w. Nature—April 15, 1897.

Some New Studies in Cathode and Röntgen Radiations. Alan A. Campbell Swinton. Abstract of discourse delivered at the Royal Inst. Reviews the methods of producing cathode discharges, the theories more generally accepted, late work and results. Ill. 3800 w. Nature—May 26, 1898.

The Cathode Ray,—Its Character and Effects. A. W. Wright. Historical Sketch of the steps leading up to the discovery of the cathode ray, and a general summary of the present state of knowledge with respect to its nature. 2200 w. Forum—April, 1896.

The Phenomena of the Cathode Rays. Suggested Apparatus for their Production. Elihu Thomson. Suggests a novel method of constructing a cathode ray generator. 700 w. Elec Eng—Feb. 5, 1896.

**Absorption.**—Absorption of Cathode Rays. P. Lenard. Experiments in proof of assumptions made. Serial. Elec Rev, Lond—Jan. 24, 1896.

**Celestial Phenomena.**—A Simple Explanation of Some Celestial Phenomena by the Cathode Rays (Explication Simple de Plusieurs Phenomènes Célestes par les Rayons Cathodiques). A communication to the French Academy from M. H. Deslandres, suggesting an explanation for some of the phenomena of the solar corona during a total eclipse. 1800 w. Comptes Rendus—May 9, 1898.

**Electrostatic Deflection.**—Electrostatic Deflection of Cathode Rays. G. Jaumann. Showing that the electrostatic deflection of cathode rays is as characteristic of them as their magnetic deflection. 3500 w. Elect'n—July 10, 1896.

**Magnetic Deflection.**—The Magnetic Deflection of Reflected Cathode Rays. Ernest Merritt. Interesting experimental research described, with conclusion that Crookes' hypothesis is the most nearly correct. 5500 w. Phys Rev—Nov., 1898.

The Cathode Rays Under the Influence of Strong Magnetic Forces. A brief illustrated account of the investigations of Herr Kr. Birkeland, published in the Norwegian "Elektroteknisk Tidsskrift." Serial. Elec Rev, Lond—June 12, 1896.

An Experiment showing the Deflection of Cathode Rays—by a Magnetic Field. J. A. Fleming. An illustrated description of an interesting experiment. 700 w. Elect'n—Jan 1, 1897.

**Oscillating Field.**—Cathode Rays in an Oscillating Electric Field. Discusses the theory most in favor in England, giving investigations of J. J. Thomson, Jauman, and others, especially explaining the investigations of Prof. Ebert, of Kiel. 2800 w. Elec Rev, Lond—June 3, 1898.

**Photo-Electric Effect.**—A Residual Photo-Electric Effect of Cathode Rays. J. Elster and H. Geitel, in Wiedemann's Annalen. Describes in detail experiments and results. 2800 w. Elect'n—Dec. 4, 1896.

See also **ELECTRO-PHYSICS—Electro-Photography.**

**Reflection.**—The Reflection of Cathode Rays. A. Campbell Swinton. Abstract of a paper communicated to the Royal Soc. Investigations which show that the field of reflected cathode rays is not uniform, but increases on both sides to a maximum. 600 w. Elec Eng, Lond—March 3, 1899.

**Salts.**—The Action of Cathode Rays upon Salts (Ueber die Veränderung von Salzen durch Kathodenstrahlen). Investigations by Dr. Abegg show that some salts which are affected by light rays are unaffected by cathode rays, and vice versa. 1200 w. Zeit für Elektrochem—Aug. 20, 1897.

**Spectrum.**—On the Cathode Ray Spectrum. M. Birkeland. From the "Comptes Rendus." Describes results obtained in recent experiments. 1200 w. Elect'n, Lond—May 13, 1898.

### CAUSEWAY.

**Hydraulic Construction.**—Hydraulic Causeway Construction. Describes a long road over the marshes of Jamaica Bay, built up with sand and mud obtained by hydraulic dredging and deposited between banks of turf. 1900 w. Eng Rec—Sept. 22, 1900.

### CAUSTIC SODA.

See also **ELECTRO-CHEMISTRY.**

**Electrolytic.**—Gravity-Electrolytic Processes for the Production of Caustic Soda. G. H. Robertson. Reviews the processes that have been devised and presents the claims of the latest introduced by the Oesterreischischer Verein für Chemische und Metallurische Produktion, in Bohemia. 1500 w. Elect'n, Lond—Jan. 27, 1899.

The Production of Caustic Soda and Bleach by Electrolysis. Editorial discussion of the Holland process, which is pronounced a marked improvement over all hitherto existing processes, and destined to effect a notable reduction in the cost of caustic soda. 1800 w. Engng—April 24, 1896.

### CEILING.

See also **BUILDING CONSTRUCTION; ROOF.**

Ceilings. L. A. Shuffrey. Résumé of a paper read before the Liverpool Arch't Soc. Reviews the progress, illustrating famous ceilings in England from the time of Henry VIII. 2500 w. Builder—Dec. 16, 1899.

Ceilings and Their Decoration. Walter J. Pearce. Suggestions for the treatment of ceilings, with illustrations of designs for stencilling are given in part first. Serial. Plumb & Dec—July 1, 1897.

The Form of Ceilings in Connection with Ventilation, Healing, and Acoustics (Die Form der Saaldecken in ihren Beziehungen zur Luftbewegung, Heizung, und Akustik). H. C. Nussbaum. A general discussion of the problems involved. 1200 w. Gesundheits-Ingenieur—Sept. 15, 1899.

**Steel Furring.**—Steel Furring for Ornamental Ceilings. Illustrates and describes the methods employed to produce the effect of gothic masonry ceilings by light concrete-steel construction. 800 w. Eng Rec—Dec. 23, 1899.

**Steel Vaulted.**—A Steel Vaulted Ceiling. Illustrated description of a Gothic church roof of steel beams with metal furring. 700 w. Eng Rec—July 14, 1900.

**Suspended.**—Suspended Ceilings and Metallic Furring. Illustrated description of the construction of deep-paneled dome and arch ceilings with wire-cloth backing. 1500 w. Eng Rec—Oct. 7, 1899.

**Tests.**—Tests of Ceilings (Probelastung von Decken). M. Gary. A report of tests made at the Government Testing Laboratory at Charlottenburg, with illustrations of the methods of loading. 1500 w. Mitt aus der Kgl Tech Versuchsanstalt—Part III., 1899.

## CELLULOSE.

A New Form of Cellulose. E. L. Freeland. On the process, invented by Mark W. Marsden, utilizing the pith of cornstalks as an absorbent for water entering through shot-holes. The advantages are presented. 1200 w. Yale Sci M—Nov., 1897.

The Marsden Corn-Pith Cellulose. Lewis Nixon. A simple explanation of some of the phenomena connected with the behavior of vessels under various conditions, is followed by a discussion of the use of cellulose as a water excluder in armored vessels as related to buoyancy and stability of vessels at sea. 3300 w. Jour Fr Inst—March, 1896.

**Colomés Stopper.**—The Colomés Life and Ship Protector. Illustrates and describes this cellulose plug for closing shot holes, and explains the usefulness of the device. 1700 w. Sci Am—Aug. 20, 1898.

## CEMENT.

See also **CONCRETE; LIME; PORTLAND CEMENT.**

Cement and Its Uses. Alfred Noble. The writer's notes include many facts and much data of use to cement consumers. A large number of cement tests accompany the communication. 4400 w. Jour W Soc of Engs—Jan., 1896.

Limes, Mortars, Cements and Concretes. Fred T. Hodgson. Information concerning these products and history of their use. The present article is devoted to the first two. Serial. Bridges—July, 1899.

Notes on Cement. Ira O. Baker. Influence of water and sand on the quality of cement, and the effect of different methods of moulding and treatment. 800 w. Jour W Soc of Engs—Jan., 1896.

The Cement Age. G. W. Percy. Historical review of the use and manufacture of cement, its endurance and remarkable qualities. 5000 w. Jour Assn of Engng Socs—April, 1900.

**Arkansas.**—The Cement Materials of Southwest Arkansas. John C. Branner. Information concerning the chalk and clay-beds, gained by a visit to the localities. Ill. 6200 w. Trans Am Inst of Min Engs—May, 1897.

**Electrical Conductivity.**—See **ELECTRIC CONDUCTIVITY—Cement and Concrete.**

**Fineness.**—Fineness of Cement. Ira O. Baker. Gives reasons why cement should be well ground, data on fineness, and method of selecting the most economical cement. 1200 w. Br Build—April, 1899.

The Value of Extreme Fineness of Grinding for Hydraulic Cement. A study of this subject demonstrating the advantage of fine grinding, but showing that it is accompanied with disadvantages. 2200 w. Eng News—Aug. 18, 1898.

**Florida Rock.**—Cement Rock in Florida. From the report of Uriah Cummings concerning this remarkable deposit of natural hydraulic cement. 900 w. Brick—Nov. 1, 1899.

**Freezing.**—The Effect of Freezing Cement Mortar. A. C. Hobart. Describes experiments made, giving results which differ from generally accepted ideas. 3000 w. Technograph, No. 12—1897-8.

See also **CEMENT—Magnesia.**

**Hardening Process.**—The Hardening Process of Calcareous Hydraulic Cements. W. Michaels. Read before the Society for the Unification of Methods of Testing Technical Materials at Stockholm. A careful study of the process of hydraulic hardening. 4200 w. Engng—Feb. 4, 1898.

**Heat Action.**—The Action of Heat on Cement. J. S. Dobie. A paper read before the Eng. Soc. of School of Prac. Science, Toronto, Canada. In the interest of fire-proof protection, showing what may be expected from a mass of concrete or cement when subjected to great heat. 2300 w. Am Arch—July 11, 1896.

The Action of Heat on Cement. J. S. Dobie. Read before the Engineering Society of the School of Practical Science, Toronto, Canada. The purpose of the paper is to show what may be expected from a mass of concrete or cement, when subjected to great heat. 2400 w. Arch, Lond—Sept. 11, 1896.

**Hungarian Standard.**—The New Normal Cement of the Hungarian Engineering Society (Die Neuen Cement—Normalien des Ungarischen Ingenieur—und Architekten-Vereines). An account of the standard cement adopted by the society, giving the mesh of screen, the proportion of mixture, and the tests which must be sustained. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—May 28, 1897.

**Hydraulic.**—A Hypothetical New Hydraulic Cement. A. D. Elbers. A scientific discussion of the essential properties in hydraulic cements and the effects upon the cement of hydration. 2200 w. Eng & Min Jour—April 18, 1896.

An Investigation of the Relative Strength of Hydraulic Cements. H. C. Estee. Investigations based on data of reports of tests made by about twenty city engineers and by several cement dealers. A table gives the average strength of each class at various ages. 1000 w. Tech—May, 1896.

Hydraulic Cements. Clifford Richardson. Discusses the characteristics of the best Portland cement, and its setting, hardening, etc. Also natural cements. Serial. Br Build—June, 1898.

Hydraulic Cements. William S. MacHarg. A review of the manufacture, uses, successes and failures. 2500 w. Cal Arch't—Feb., 1900.

Hydraulic Cements. William S. MacHarg. From "The Building Arts." Comments on the new uses to which this material has been applied. Briefly reviews the history of the modern product, and gives information concerning it. 2000 w. Sci Am Sup—Feb. 24, 1900.

Notes on Hydraulic Cement. A. W. Hale. Report of experiments to determine the percolation. 1400 w. Eng & Min Jour—Nov. 5, 1898.

See also **LIME; PORTLAND CEMENT.**

**India-Rubber.**—India-Rubber Cement, George B. Scott. The uses of this cement and its promising future. 700 w. Ind Rub Wld—Feb. 10, 1896.

**Laboratory, Philadelphia.**—The Cement Laboratory of the City of Philadelphia. Its Equipment and Methods. Richard L. Humphrey. Illustrated description of laboratory for testing and inspecting the cement used in municipal work. Apparatus explained in detail, and system used. 9500 w. Pro Engs' Club of Phila—Nov., 1896.

**Lime Sulphate.**—Influence of Sulphate of Lime on the Hardening and Adhesion of Cements (Influence du Sulfate de Chaux Contenu dans les Ciments sur le Durcissement et la Tenue les Bétons et Mortiers). An abstract and review of recent work of M. Vialler on this subject. 1900 w. Génie Civil—Nov. 5, 1898.

**Louisville.**—See **BUILDING MATERIAL—Stone, Cement, etc.**

**Magnesia.**—Effect of Magnesia on the Strength of Cements When Subjected to Freezing. Frank Haas and John Alexander McGraw. Thesis receiving second honorable mention in Eng. News Thesis Competition for 1895. Experiments made to find a means for counteracting the loss of strength from effects of low temperature. 1000 w. Eng News—April 30, 1896.

**Mortars.**—Cement and Cement Mortars. Thomas T. Johnson. The author gives the reasons for the failure of cement under ten heads, and appends the results of numerous tests. 2800 w. Jour W Soc of Engs—Jan., 1896.

Effect of the Fineness of Sand upon the Strength of Cement Mortar. Tests which indicate that below 40 meshes there is no preference in sands used; the coarser grades are the better above 40 msh; the condition of the surface of sand particles largely affects their efficiency. The results of the tests are given in a diagram. 1200 w. Eng News—Jan. 23, 1896.

Ingredients of a Cubic Yard of Cement Mortar and the Cost. L. C. Sabin. Discusses methods of obtaining approximate results, giving tables with explanation of their use. 1100 w. Munic Engng—Feb., 1899.

Notes on Cement Mortars. Edward Mead. Practical experiences in inspecting and testing cements, and facts which may serve as means of determining reliable materials for cement mortars, thus rendering a more satisfactory grade of work. A large number of tests of cements manufactured in the Louisville district, are given with results. 4800 w. Eng Assn of the South—April, 1896.

See also **MORTAR.**

**Portland.**—See **PORTLAND CEMENT.**

**Reservoirs and Canals.**—Hydraulic Cement for Reservoirs and Canal Works. Illustrates and describes work on the continent of Europe. 1100 w. Fire & Water—Sept. 30, 1899.

**Salt Water Effect.**—The Effect of Salt Water on Cement. A. S. Cooper. Gives results of experiments showing conclusively the ill-effect of salt in gauging mortar. 1500 w. Jour Fr Inst—Oct., 1899.

**Sand.**—The Effect of Grinding Mixed Sand and Cement. H. E. Reeves. A summary of results of experiments undertaken in the Cement Laboratory of the University of Illinois. 800 w. Tech—May, 1896.

The Manufacture and Use of Sand Cement. Discussion of the qualities and tests of this new cement with illustrated description of works just put up at Long Island City. One part of sand is ground with one part of cement in a cylindrical flint ball pulveriser making a cement which possesses great strength. 1800 w. Eng News—April 16, 1896.

**Setting Test.**—A New Test of the Rate of Setting Cement. William S. MacHarg. Letter presenting a simple method of testing the rate of setting of cement, apparently worthy of investigation. Also brief editorial. 1600 w. Eng News—Jan. 7, 1897.

**Sewage Effect.**—The Influence of Sewage on Cement. A résumé of experiments made at Lehigh University. 1100 w. Eng Rec—Aug. 19, 1899.

**Slag.**—Cement from Blast Furnace Slag. Account of a series of experiments made at the North Works of the Illinois Steel Co. in Chicago, which lead to the conclusion that this cement, like the Roman, will stand the test of time. The conditions which form the basis of this conclusion are given, the process described and a statement of practical results. 1400 w. Ry Rev—July 4, 1896.

Notes on the Manufacture and Properties of Blast-Furnace-Slag Cement. A. D. Elbers. Criticism of article by Henri Détienne, in the "Revue Universelle des Mines." 1100 w. Eng & Min Jour—Oct. 30, 1897.

Slag Cement in Germany. Reports in answer to instructions from the Department of State, from the various consuls, with supplementary report describing the method of manufacturing slag cement. 4000 w. Consular Reports—Feb., 1896.

Slag Cement, its Production and Properties (Der Schlackencement, seine Herstellung und Eigenschaften). E. May. An exhaustive treatment of the methods of making cement from slag as practised in Germany, Austria, Belgium, France, and Russia, with data as to its properties and behavior under test. Two articles. 7500 w. Stahl und Eisen—March 1, April 1, 1898.

Slag Cement (Le Ciment de Latier). An account of the manufacture of slag cement at Vitry-le-Français, with data as to the precautions to be observed to insure success. 1000 w. Moniteur Industriel—Feb. 13, 1897.

Slag Cement (Ueber Schlacken-Cement). Giving chemical analyses, and numerous results of tests of the Königshofer cement. 3000 w. Stahl und Eisen—Sept. 1, 1900.

The Manufacture of Slag Cement in France. Describes the manufacture as practiced in Vitry-le-Francais, one of the latest manufactories. From the "Nouvelles Annales da la Construction." 700 w. Eng News—Jan. 7, 1897.

The Manufacture of Slag Cement. E. May, in "Stahl und Eisen." A description of the manufacture and properties. 1600 w. Ir Age—Sept. 1, 1898.

**Slag vs. Portland.**—The Distinction between Slag and Portland Cements. Presents the unfortunate results of selling as Portland cements. 1800 w. Eng Rec—July 9, 1898.

**Specification.**—See **CEMENT TESTS.**

**Test.**—See **CEMENT TESTS.**

**Waterproof.**—Practical Points About Waterproof Cements (Pracktische Erfahrungen über die Herstellung Wasserdichter Kitte). A discussion, with many practical receipes for cements, glues, luting, etc., etc., which will resist the action of moisture. 2500 w. Glaser's Annalen—March 1, 1897.

## CEMENT KILN.

**Candlot Oscillating Grate.**—The Candlot Oscillating Grate for Cement Kilns. Frederick H. Lewis. Illustrates a grate, used in France, for improving the draft and preventing balling in shaft kilns. 400 w. Eng Rec—May 21, 1898.

**Rotary.**—The Economical Value of the Rotary Cement Oven (Ueber den Oekonomischen Wert der Rotierenden Cement Brennöfen). L. Tetmaier. A description of various types of rotary ovens, with discussions of the economy based upon various prices for labor and fuel. 2500 w. Schweizerische Bauzeitung—June 24, 1899.

See also **PORTLAND CEMENT.**

## CEMENT PLASTER.

The Technology of Cement Plaster. Paul Wilkinson. Gives the history of the discovery of the product bearing this name, and explains the process of preparing the material for use. 3700 w. Trans Am Inst of Min Engs—Nov., 1897.

## CEMENT SIDEWALK.

See **SIDEWALK—Cement.**

## CEMENT SPECIFICATIONS.

See **CEMENT TESTS.**

## CEMENT TESTS.

Cement Tests. A. S. Cooper. On the need of uniformity in testing, with critical remarks on method adopted by the Am. Soc. of Civ. Engs. and suggestions for improvements. 1500 w. Wis Engr—June, 1900.

Cement and Cement Testing. Robert W. Lesley. The paper aims to give, both from the manufacturer's and engineer's points of view, some idea of the various specifications that have to be met in the use of cement, the difficulties in the testing, and of the machinery, with some description of the laboratories in this country and in Europe. Ill. 8000 w. Pro Engs' Club of Phila—May, 1899.

Comparative Tests of Different Forms of Cement Briquettes. Illustrated review of experiments made by H. C. Belcher and Jerome Sondericker fixing certain features of testing apparatus as necessary to obtain comparable results. 2700 w. Eng Rec—Dec. 30, 1899.

Comparative Tests on Different Forms of Cement Briquettes. Jerome Sondericker. Describes the manner of testing and discusses the conditions which should be considered in standard methods, as determined by results. 3000 w. Jour Assn of Engng Soc's—Jan., 1899.

Methods of Cement Testing. Replies to a series of questions sent to civil engineers, chemists and others. 3400 w. Munic Engng—April, 1897.

Notes on Cement Testing. H. M. Norris. Explicit instructions as to the best methods of testing cements and mortars. The usual tensile strength, or cohesion test, is regarded as least important. 2200 w. Digest of Phys Tests—Jan., 1896.

Notes on Cement Testing. H. M. Morris. The first paper deals briefly with sampling, fineness, sand, mixing, moulding, setting, checking, boiling and tension tests. 1800 w. Ill Car & Build—April 10, 1896.

Notes on the Use and Testing of Hydraulic Cements. H. P. Boardman. These notes are the result of nearly two years' experience in the cement testing laboratory of the Sanitary District of Chicago. Effects of varying proportions of water, testing, machine mixing, etc., are treated in part 1st. 2700 w. Wis Eng—Jan., 1897.

Portland Cement Tests from the Manufacturer's Point of View. John W. Dickinson. On the value of testing and some of the methods, and its importance to the reliable manufacturer. 1400 w. Munic Engng—Feb., 1898.

Testing Cement. A discussion introduced by Thomas T. Johnston. 2500 w. Jour of W Soc of Engs—Dec., 1897.

**Accelerated.**—Accelerated Tests for Cement. A letter on the manner of conducting the Michaelis test, with editorial on the reliability of accelerated tests in general. 1400 w. Eng Rec—Oct. 13, 1900.

**Am. Soc. Civ. Engs.**—Revision of the Method of Making Tests of Cement. Report of the Board of Directors of the American Soc. of Civ. Engs., in the matter of the proposed appointment of a special committee to report on the proper manipulation of tests of cement. 800 w. Eng Rec—Jan. 23, 1897.

Progress Report of the Special Committee on the Proper Manipulation of Tests of Cement. 21500 w. Pro Am Soc of Civ Engs—April, 1900.

The Proper Manipulation of Tests of Cements; a Symposium. Reviews the results given in the committee report of the Am. Soc. of Civ. Engs. of tests of hydraulic cement. 2500 w. Eng News—June 21, 1900.

The Manipulation of Cement Tests. A review of the replies received by a special committee of the Am. Soc. C. E. to a circular letter for information concerning the best methods of making cement tests. 3300 w. Eng Rec—May 5, 1900.

The Proper Manipulation of Tests of Cement. A copy of questions sent out by committee appointed to report on this subject. 7200 w. Am Arch—Feb. 19, 1898.

The Standardization of Cement Testing. Editorial comment on the questions submitted by the Am. Soc. of Civ. Engs. discussing the merits of the enterprise and the value of the steps being taken for its accomplishment. 2500 w. Engr, Lond—May 13, 1898.

**Berlin Laboratory.**—Cement Tests in the Year 1896-1897 (Cementuntersuchungen aus dem Betriebsjahre 1896-1897). Official report of the tests made in the Royal Testing Laboratory at Berlin, with many tables of data and results of the work of the past fiscal year. 15000 w. Mitt aus d Kgl Tech Versuchsanstalt—Part V., 1897.

**Böhme Hammer.**—Testing with the Böhme Hammer Apparatus (Prüfung der Hammerapparate, Bauart Böhme). The cement is placed in a mould and struck rapidly by a mechanically operated trip-hammer, which also records automatically the number and amplitude of its blows. 1800 w. Mitt aus d Kgl Tech Versuchsanstalt—Part 2, 1898.

**Boston Water-Works.**—Cement Testing, Metropolitan Water-Works. Reprinted from the Third Annual Report of the Metropolitan Water Board. Describes the methods adopted by F. P. Stearns on the water-works for Boston and vicinity. 1200 w. Eng Rec—May 28, 1898.

**Budapest.**—Tests of Cement and Concrete (Cement und Beton Proben). Josef Schustler. A tabulated account of tests made during 1896-97 in the laboratory of Robert Wünsch at Budapest, with carefully arranged data concerning the various specimens tested. Two articles. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 20, 27, 1899.

**Chemical.**—Chemical Tests of Cement. John F. Wixford and S. Bent Russell. Gives the method of testing used in the chemical laboratory of the St. Louis Water Dept. 2000 w. Jour Assn of Engng Socs—June, 1899.

**Chemical and Physical.**—Relations Between Physical and Chemical Tests of Cement. A letter from Chas. F. McKenna, discussing new methods of analysis recommended in a report of the Commissioners of Accounts of New York City, and printed in the "Eng. Rec." of Aug. 4. 1600 w. Eng Rec—Aug. 18, 1900.

Relations Between Physical and Chemical Tests of Cement. An abridgment of a report by Otto H. Klein and S. F. Peckham to the New York Commissioners of Accounts. Gives a new scheme of cement analysis that claims to establish a law of correspondence between the physical properties and chemical composition of cement. Also editorial. 5400 w. Eng Rec—Aug. 4, 1900.

**Filtration.**—The Testing of Cement by Filtration (Essais des Cements par Filtration). M. L. Deval. An attempt to determine the value of cement for marine construction by testing for filtration of sea water through the specimen under pressure. The difficulty in obtaining comparable results appears to be great. 2000 w. Bull de la Soc d'Encour—Feb. 28, 1900.

**French Commission.**—Tests of Cements. Conclusions adopted by the French Commission. Reprinted from the translation by O. M. Carter and E. A. Gieseler, and published by the War Department. Serial. Eng Rec—July 10, 1897.

**French Lighthouse.**—Experiments upon the Strength and Elasticity of Portland Cements (Expériences faites sur la Résistance et l'Elasticité de Ciments Portland). M. de Joly. These experiments were carried out for the French lighthouse service to attain data for the construction for concrete towers. They were made on samples of neat cement, sand mortar, and concrete, and included tension, shearing and pounding. 8500 w. 1 plate. Ann des Ponts et Chaussées—3e. Trimestre, 1898.

**German.**—German Methods of Testing Cement. Translation of articles in the official organ of the International Society for the Unification of Tests of Materials. 2200 w. Eng Rec—Oct. 15, 1898.

German Tests of Cement. Replies from a German point of view, to the questions issued by the Am. Soc. of Civ. Engs. Translated from the "Baumaterialienkunde." 2200 w. Arch, Lond—Oct. 28, 1898.

Tests of the Constancy of Volume of Portland Cement. A review of the report of the Society of German Portland Cement Manufacturers and the Mechanical Testing Laboratory of the Berlin Technical School on the value of accelerated tests for soundness. Serial. Eng Rec—Jan. 20, 1900.

**Hungary.**—See **Budapest; CEMENT.**

**Municipal Work.**—Cement Testing for Municipal Work. Horace Andrews. Read before the Am. Soc. of Munic. Imp. Suggests that cements be tested near their place of manufacture and the packages sealed and marked as to their quality. 1200 w. Munic Engng—Sept., 1900.

Cement Tests for Municipal Works. Discusses the advantages of testing cement for different cities in a state laboratory. 1400 w. Eng Rec—Dec. 16, 1899.

**Russia.**—Government Tests for Cement. A copy of the tests and conditions enforced by the Russian Government, in selection of Portland cement. 1000 w. Stone—April, 1899.

**St. Louis.**—See **BRICK PAVEMENT—Tests, St. Louis.**

**Shock and Explosion.**—The Shock and Explosion Tests of Cement. Eugene Ackermann. Translated from "Chemiker-Zeitung." Suggestions for tests of cements to be used in fortification works. 1500 w. Stone—Aug., 1899.

**Specifications.**—Cement Specifications and Cement Testing. Robert W. Lesley. Abstract of an interesting paper recently read before the Engs' Club of Phila. on the wide divergence between specifications for the same material for the same purposes, with hints for standardizing, with specifications and tests. Ill. 3700 w. Eng Rec—Feb. 25, 1899.

Comparison of Recent Specifications for Fineness and Tensile Strength of Cements. Requirements in specifications for cement, with editorial. 2000 w. Eng News—July 28, 1898.

Model Specifications and Tests for Cement. A copy of the specifications for the city of Pittsburg for the construction of bridges, streets and sidewalks. 2700 w. Munic Engng—July, 1900.

Specifications for Cement. A copy of the specifications for testing cement, based on actual tests, issued by the Cement Users Testing Assn., of London. 1400 w. Arch & Build—Feb. 4, 1899.

**Standard.**—See **Am. Soc. Civ. Engs.; Variation.**

**Tensile.**—Forms of Clip and Briquet for Tensile Tests of Cement. L. C. Sabin. The form of briquet recommended by the committee of the Am. Soc. of Civ. Engs. was used in the tests described, with various styles of clips. Serial. Munic Engng—Dec., 1896.

Requirements for Tensile Strength in Cement Specifications. J. M. Porter. The author shows that the personal equation of the person testing the cement enters into the test so largely that the results are not at all reliable. Nine samples were sent to different laboratories whose averaged reports ranged from 75 to 247 pounds. Testing requirements are suggested, among which is abolishing the use of testing machines. 2800 w. Eng News—March 5, 1896.

Tensile Tests of Cements. Ira O. Baker. A complete statement of the method of making the tests, calling attention to such variations in practice as are in common use. Part first deals with tensile tests. Serial. Br Build—Aug., 1898.

**Transverse.**—Testing Cement by the Modulus of Rupture for Transverse Strain. John Paterson.

A summary of results of experiments for ascertaining the modulus of rupture, and some of the conclusions. 5000 w. Engr, Lond—Aug. 10, 1900.

Transverse Tests for Cement and Cement Mortar. A statement of the relative advantages of different methods of testing. 1000 w. Eng Rec—Sept. 1, 1900.

**Variation.**—Causes for the Variation in Cement Tests in Different Places (Ueber die Ursachen der Abweichungen in den Festigkeits-Ergebnissen der Cementprüfung an Verschiedenen Orten). M. Gary. An exhaustive paper on the testing of cement and mortars, showing the number of variable elements which enter into the problem and affect the results. An important and valuable paper. 4000 w. Mitt aus d Kgl Tech Versuchsanstalt—Part 1, 1898.

Standard Methods of Testing Cement. Rules deduced by Max Gary to prevent variations by changes in manipulation. 700 w. Eng Rec—May 28, 1898.

**Volume Variations.**—The Measurement of the Variations in Volume of Hydraulic Cements (Mesure des Variations de Volume des Liants Hydrauliques). M. Deval. A general report upon the tests made by a committee of the Society, with tables of the results and diagrams showing the behaviour of various cements. 10000 w. Bull de la Soc d'Encour—Jan. 31, 1900.

**CEMENT WALK.**

See **SIDEWALK—Cement.**

**CEMENT WORKS.**

See also **PORTLAND CEMENT WORKS.**

**James River, Va.**—Hydraulic Cement in the United States. Describes the works of the James River Cement Co. 1500 w. Engr, Lond—Sept. 29, 1899.

**Krause.**—New Works of the William Krause & Sons Cement Company. Horace DeK. Haight. Illustrates and describes a plant of 600 bbls. capacity, in which the power-transmission apparatus received particular attention. 2500 w. Eng Rec—March 31, 1900.

**Lafarge, France.**—Some French Cement Works. H. K. Landis. Illustrated description of works and processes at and near Lafarge on the banks of the Rhone. 1700 w. Pav & Mun Eng—July, 1896.

**Maryland.**—Plant of the Maryland Cement Company, Sparrows Point, Maryland. Frederick H. Lewis. Illustrated description of a plant making hydraulic cement from blast furnace slag. 1000 w. Eng Rec—July 15, 1899.

**Milwaukee.**—Plant of the Milwaukee Cement Company. Frederick H. Lewis. Illustrates a natural rock cement mill with a capacity of 2800 barrels daily, and describes the Campbell kiln and Berthelet separating system. 2000 w. Eng Rec—April 2, 1898.

**Speeds. Ind.**—Natural Cement Plant at Speeds, Indiana. F. H. Lewis. With views of the mill and the quarry, an analysis of the stone, and a general description of the operation of the plant. 2000 w. Eng Rec—Sept. 10, 1898.

**CEMENTATION.**

See **STEEL MANUFACTURE.**

**CENTERING.**

Centering. A. H. Cleaves. Methods are described and devices illustrated. 900 w. Am Mach—Aug. 19. 1897.

**Arch.**—See **ARCH CENTERING.**

**CENTRAL AMERICA.**

See also **SPANISH AMERICA.**

Central America: Its Resources and Commerce. William Eleroy Curtis. Discusses the resources of the country and the causes for the failure of the republics to keep pace with the progress of the world in general. Interesting accounts of Guatemala and Salvador. 6000 w. Forum—March, 1898.

**CENTRAL STATION.**

See **ELECTRIC STATION.**

**CENTRIFUGAL FORCE.**

**Diagram.**—Diagram for Finding Centrifugal Force and Rim Tension. N. J. Hopkins. Explanation for the use of curves which will reduce the labor of calculating. 250 w. Am Mach—Feb. 17, 1898.

**CENTRIFUGAL RAILWAY.**

**Coney Island.**—Coney Island's Centrifugal Railway. An illustrated description of a railway in which a car, carrying .passengers, runs around the inner circumference of a vertical circle. 400 w. Sci Am—Sept. 22, 1900.

**CERAMIC INDUSTRY.**

See also **BUILDING MATERIALS; CLAY; TERRA COTTA.**

**England.**—Building-Ceramic Industries in England. Translated from the "Thonindustrie Zeitung." Descriptive account of methods and products. 2200 w. Brick—Oct., 1898.

**CERAMIC PASTES.**

Research upon the Expansion of Ceramic Pastes (Etude sur la Dilatation des Pates Céramiques). M. Coupeau. A very elaborate illustrated paper containing a large number of tables of data, and giving the results of a very great amount of experimental work. A valuable and important paper. 14000 w. Bull Soc d'Encour—Oct., 1898.

Observations upon the Research upon Expansion of Pastes by M. Coupeau (Observations Déduites de l'Etude sur les Dilatations Céramiques de M. Coupeau). Georges Vogt. An addendum to Coupeau's paper containing further data. 2800 w. Bull Soc d'Encour—Oct., 1898.

Some Physical Properties of Ceramic Pastes (Sur Quelques Propriétés Physiques des Pates Cëramiques). M. Le Chatelier. Some valuable data, supplementing M. Coupeau's researches, giving measurements of the shrinkage, porosity, coefficients of elasticity, and tenacity of numerous pasters and glazes. 1800 w. Bull Soc d'Encour—Oct., 1898.

**CESSPOOL.**

See also **PLUMBING; SANITARY ENGINEERING; SEWAGE DISPOSAL.**

The Cesspool. Leonard P. Kinnicutt. From an address before the Mass. Assn. of Boards of Health. A comparison of primitive and modern method of treating sewage. 3200 w. Munic Engng—Aug., 1900.

**Cleaning.**—Odorless Cesspool Cleaning. Illustrated description of methods and apparatus used by Supt. of Health, at Malden, Mass. 700 w. Eng Rec—July 9, 1898.

**CHAINS.**

The Theory and Calculations for Link Chains (Beitrag zur Theorie und Berechnung der Gliederketten). R. Edler. An exhaustive mathematical discussion of the strength of chains made of elliptical links, showing the nature and extent of the stresses and strains, and deriving formulas for practical application. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 18, 25, 1899.

**Wear.**—The Wear of Chains. R. Weatherburn. Considers the wear attending the use of chains and the cause. 2800 w. Engr, Lond—July 8, 1898.

**Welded.**—Welded Chains. E. J. Taylor. Paper read before the Manchester Assn. of Engs. Describes the work and the testing. Serial. Mech Wld—Feb. 3, 1899.

**CHARCOAL.**

Charcoal and Coke. Notes wherein they resemble and differ from each other. Cleavage in coke and metals. Ill. 1500 w. Mines & Min—Jan., 1899.

**Foundry Purposes.**—The Manufacture of Charcoal for Foundry Purposes. L. S. Brown. Describes and illustrates methods of burning and calls attention to points where its use would be economical. 2700 w. Foundry—Dec., 1896.

**CHARCOAL KILN.**

The Ljungberg Continuous Charcoal Kiln. E. J. Ljungberg. States the principles to be observed, and describes the continuous kiln and its operation. 3500 w. Ir Age—July 28, 1898.

**CHEMICAL ANALYSIS.**

See **ANALYSIS; COAL ANALYSIS; IRON ANALYSIS;** etc.

**CHEMICAL RECTIFIER.**

See **ELECTRIC CURRENT RECTIFIER.**

**CHEMISTRY.**

See also **ELECTRO-CHEMISTRY.**

Chemistry. Rapid review of fifty years of progress. 1500 w. Sci Am—July 25, 1896.

**Building Aid.**—Chemistry as an Aid in Building. Calls attention to the subjects connected with building with which chemistry is associated. 1300 w. Builder—April 8, 1899.

**Education.**—Chemistry as a General Education. Peter T. Austen. A paper read before the Students' Chem. Soc. of the Polytechnic Inst. on the usefulness of the profession of chemistry in the arts, and general effects of the study as an educational pursuit. 5200 w. Sci Am Sup—Feb. 22, 1896.

The Chemical Industry and Technical Teaching. Argument favoring the introduction of industrial chemistry among the branches taught in high schools. The experience of Germany in the beneficial effect of such teaching is cited. 1000 w. Eng and Min Jour—Nov. 7, 1896.

**Engineering.**—Chemistry as an Elective for Engineers. F. F. Sharpless. Showing the importance of chemistry in the practice of the engineering profession. 3400 w. Eng's Year Book, Univ of Minn.—1897.

**Hypothetical Element.**—Professor Ramsey's Address before the British Association, at Montreal. Abstract of the address on the "undiscovered gas" whose place lies between argon and helium. 1700 w. Engng—Oct. 8, 1897.

**Machine Shops.**—Chemistry in Machine Shop Practice. Warren E. Willis. Gives a list of chemicals and their uses in practical work. 2200 w. Mach, N. Y.—Sept., 1899.

**Materials of Engineering.**—The Chemistry of Materials of Engineering. A. H. Sexton. The first of a series of articles in which it is intended to discuss the chemistry of the various materials used in engineering, as far as this is of importance to the engineer. The present number begins the discussion of metallic materials. 2500 w. Prac Eng—Sept. 8, 1897.

**Solutions.**—The Theory of Solutions. A. von Oettingen. An outline of newly-discovered laws, and their application. 4000 w. Jour of Chem & Met Soc of S Africa—Jan., 1899.

### CHILLED IRON.

See **CAR WHEEL; IRON—Chilled.**

### CHIMNEY.

A Story of Stacks. Robert Kunstman. Considers the functions of the chimney as a means to effect economic combustion, as a conveyor of surplus products and gases, and its construction in brick or iron. Serial. St Ry Rev—Jan. 15, 1897.

Chimneys. H. H. Kelley. The effect of height and area of the chimney on draft is considered, also form, fuel, etc. 3000 w. Engr, U. S. A.—Oct. 1, 1899.

Chimneys and Stacks for Steam Boilers. W. H. Wakeman. Calculations concerning chimney draft, with explanation. 3500 w. Mod Mach—Sept., 1900.

Chimney Construction. E. J. Philip. Read before the Can. Assn. of Sta. Engrs. Considers the method of designing chimneys for a given purpose. 1100 w. Can Engr—Oct., 1900.

Points on Chimneys. J. L. Bixby, Jr. Considers draft pressure, gauges, materials, etc., in part first. Ill. Serial. 1st part. 2500 w. Met Work—Sept. 15, 1900.

**Construction.**—On the Construction of a Factory Chimney of the Capacity to Suit a Plant of 2000 Horse Power. Robert Kunstman. Discusses the necessary examination of the ground, the foundation, and the shaft. Ill. 2300 w. Brick—April, 1897.

Some Points About Chimneys. Charles Desmond. Construction of chimneys for securing maximum efficiency. 2000 w. Heat & Ven—Aug. 15, 1896.

The Scientific Construction of Chimneys. H. J. Palmer. From "The Builders' Journal." A consideration of the laws and principles of good draught, and other points of importance in chimney construction. 1700 w. Ind & East Eng—April 11, 1896.

**Denver, Col.**—The Highest Chimney in America. W. P. Hardesty. Illustrates and describes the stack of the Omaha and Grant Smelter at Denver, Colo., which is exceeded in height by but four in the world. 900 w. Eng News—Sept. 1, 1898.

**Design.**—Calculation and Construction of Tall Chimney (Bau und Berechnung Hoher Schornsteine). Paper by H. Bastine before the Saxon Branch of the Society of German Engineers. A full discussion of the strength of masonry chimneys to resist wind stresses. 5000 w. Zeitschr d Ver Deutscher Ing—March 6, 1897.

Chimney Height and Area. Review of a paper by H. C. Brinckerhoff before the N. E. Cotton Mfrs. Assn., describing the procedure for designing a chimney for a given purpose. 1000 w. Eng Rec—April 28, 1900.

Design and Computations for Steam Boiler Chimneys (Einheitliche Bestimmung über Anordnung und Abmessung von Schornsteinen für Dampfkesselanlagen). G. Lang. A very exhaustive treatment of the subject of masonry chimney design, discussing the subjects of proportions and constructive details for various conditions. Two articles. 10000 w. Zeitschr d Ver Deutscher Ing—July 29, Aug. 5, 1899.

Designing a Smoke Stack. A. G. Carlson. Smoke stack for a steam plant of 7680 horse-power. Defects in formulas. 700 w. Power—Sept., 1896.

The Design of High Chimneys and Other Similar Structures. Editorial discussion of the stability, rather than the draft, of chimneys. 900 w. Eng Rec—Sept. 29, 1900.

The Statical Computations for Tall Chimneys (Die Statische Berechnung Grosser Schornsteine). Discussing the conditions of stability of tall masonry chimneys under wind pressures. 1500 w. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1897.

**Draft.**—A Chimney Trouble and the Cause of It. Frederick Dye. Describes a trouble called "Siphonage" by those who know of it, that occurred in an English home. 1400 w. Heat and Ven—March 15, 1897.

The Height and Area Required for Chimney Draft. H. G. Brinckerhoff. Read at a meeting of the N. E. Cotton Mfrs.' Assn. Suggestions for the designating of chimneys for meeting stated conditions. 2500 w. Power—June, 1900.

See also **MECHANICAL DRAFT.**

**Electric Hoist.**—See **ELECTRIC HOISTING—Chimney.**

**Electric Power Station.** See **ELECTRIC POWER STATION—New York.**

**Factory.**—The Factory Chimney. Robert Kunstman. The functions and construction of a serviceable factory chimney are considered. 3300 w. Brick—Dec., 1896.

**Felling.**—See **CHIMNEY FELLING.**

**Freiberg, Saxony.**—The Highest Chimney in the World. Louis Fort. Illustrates and describes a chimney in Germany which has a height of 459 feet. It is erected on a hill which gives it height equivalent to 656 feet. 900 w. Power—Aug., 1900.

**German Rules.**—New German Rules for the Stability of Chimneys. Translation of the rules and notes for calculating the stability and strength of masonry stacks, drawn up by the Society of German Engineers, the International Union of Boiler Insurance Societies, and a number of specialists. 2000 w. Eng Rec—Aug. 18, 1900.

**House.**—Chimneys' Science Relates some very instructive experience with chimneys and with stoves that would not work properly until they were properly connected with chimney flues. 2200 w. Met Work—Nov. 23, 1895.

**Masonry Tests.**—See **MASONRY—Tests.**

**Metal.**—Self-Supporting Metal Chimneys. C. G. Robbins. Discusses their design and construction. Ill. 5800 w. Power—April, 1897.

See also **Steel.**

**New York.**—New York's New Chimney. Illustrates and describes a brick chimney 353 ft. high for the 70,000 H. P. Station of the Metropolitan St. Ry Co. 1300 w. Eng Rec—Dec. 17, 1898.

The Chimney of the Metropolitan Street Railway Company's Power-House, New York. William Wallace Christie. Illustrated detailed description of one of the highest chimneys in America. 1800 w. R R Gaz—June 8, 1900.

**Paris Exposition.**—A Chimney at the Paris Exposition. Illustrated description of a highly ornamental stack 289 feet high and from 15 to 20 feet in diameter inside. 1300 w. Eng Rec—Feb. 17, 1900.

The Great Chimney of the La Bourdonnais Power House on the Champ-de-Mars (La Cheminée Monumentale de l'Usine La Bourdonnais au Champ-de Mars). Ch. Dantin. An account of the design and construction of the great chimney for the power-house of the Exposition of 1900, with elevation and section, and photographs of the excavations for the foundation. 2500 w. Génie Civil—May 6, 1899.

The Monumental Chimneys of the Champ-de-Mars (Cheminées Monumentales du Champ-de-Mars). E. Cayla and P. Lerolle. Giving illustrations of the two great chimneys of the Paris Exposition, and the full detailed calculations of the draft, with comparisons of other large chimneys. 4000 w. 1 plate. Génie Civil—Feb. 10, 1900.

The Monumental Chimney of the La Bourdonnais Power House (La Cheminée Monumentale de l'Usine La Bourdonnais). G. Leugny. A fully illustrated description of the great chimney for the power-house of the Paris Exposition, with views showing various stages of the work. 2500 w. Revue Technique—Oct. 25, 1899.

The Monumental Chimney of the Suffren Power House (La Cheminée Monumental de l'Usine Suffren). G. Leugny. A detailed description of the great chimney for the power-house of the Paris Exposition, with numerous views showing successive stages of the construction. 2000 w. Revue Technique—Dec. 25, 1899.

The Ornamental Chimneys at the Paris Exposition (Die Zierschornsteine der Weltausstellung in Paris 1900). G. Lang. An illustrated account of the two tall ornamental chimneys for the power plant. 2000 w. Zeitschr d Ver Deutscher Ing—April 7, 1900.

**Prussian Specifications.**—Standard Specifications for Chimney Construction (Einheitliche Bestimmungen zur Berechnung der Standfestigkeit von Schornsteinen). Standard regulations for calculating the stability of chimneys and the allowable wind pressure, compiled by a committee of the Prussian Society of Steam Boiler Inspectors. 3000 w. Zeitschr d Ver Deutscher Ing—June 30, 1900.

**Raising.**—The Raising of a 150-foot Stack in One Piece. Describes the raising of a stack at Haysville, near Pittsburg, at the works of the Sterling Varnish Co. Ill. 1200 w. Am Mfr & Ir Wld—Jan. 21, 1898.

See also **Steel Stack Erection.**

**Roundhouse Smoke Stack.**—Drop Smoke Stacks for Roundhouses. A description of the drop smokestack as used on the Chicago, Burlington and Quincy Railroad, with detailed drawings. 600 w. R R Gaz—March 13, 1896.

**Stability.**—The Stability of a Chimney (Standfestigkeit eines Schornsteines). J. Goebel. An analytical investigation of the resistance of chimneys of various sections and dimensions against wind stresses. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 12, 1898.

**Steel.**—A Cincinnati Steel Chimney. Illustrated description of the details of a 230-ft. steel chimney. 1600 w. Eng Rec—April 1, 1899.
See also **Metal.**

**Steel Stack Erection.**—The Erection of a Large Steel Stack. Fred N. Dillon. Illustrated description of the raising of one of three steel stacks of large dimensions, each stack being raised integrally and placed on its base. The one illustrated has a height of 130 ft. and a diameter of 60 in. 1400 w. Power—Nov., 1896.

**Straightening.**—Restoring the Verticality of Two Colliery Chimneys. M. Perrin. From a communication to the Société de l'Industrie Minérale. The work is described and its cost is given. Ill. 1300 w. Col Guard—April 1, 1898.

Straightening a Leaning Chimney. O. L. E. Weber. Describes a case where the straightening was effected by sawing the mortar joints. 1300 w. Technic—1897.

**Ventilated.**—A Ventilated Chimney Tower. Illustrated description of an aspiring chimney in a New York Hospital. 700 w. Eng Rec—Aug. 19, 1899.

## CHIMNEY ACCIDENT.

**Burnley, Eng.**—The Chimney Disaster at Burnley. The conditions precedent to and the immediate causes of the collapse of this great chimney are described. Incidentally some reference is made to other similar catastrophes, fortunately of rare occurrence. The evidence before the coroner's jury is the basis of the paper. Ill. 4000 w. Eng, Lond—Feb. 7, 1896.

**Hamilton, Ont.**—Collapse of a 200-Ft. Brick Chimney. Illustrated description of a stack which failed before it was put in use. 600 w. Eng Rec—April 28, 1900.

## CHIMNEY FELLING.

Felling Tall Chimneys. Illustrates an effective and cheap method used in England. 1100 w. Sci Am—June 16, 1900.

**Aberdeen.**—Chimney Felling from Aberdeen. From "Aberdeen Free Press." Interesting description of the felling of three chimneys, 50, 110, and .175 ft. high. 1100 w. Arch, Lond—Dec. 20, 1895.

**Germany.**—The Destruction of a Tall Chimney (Die Niederlegung eines Hohen Schornsteins). Description of the removal of a chimney of 20 feet base diameter, and 260 feet high, by the explosion of charges of roburite in holes drilled in one side at the base. Instantaneous photographs are given of successive stages of the fall. 1000 w. Zeitschr d Ver Deutscher Ing—June 11, 1898.

**Manchester.**—The Demolition of a Mill Chimney at Manchester. The chimney, which was over 11-ft. in diameter, and 270 ft. high was underpinned on one side and these props burned out, resulting in the collapse of the structure. 1200 w. Eng, Lond—Feb. 28, 1896.

## CHIMNEY GAS.

See **COMBUSTION; GAS ANALYSIS.**

## CHINA.

See also **COAL REGION; IRON REGION; MINERAL REGION; RAILWAY; RAILWAY PROJECT.**

A Recent Business Tour in China. C. A. Moreing. Summarises the silent features of the chief cities, the internal and external political influences at work, the characteristics of the governing classes and the people, the opening for commercial and industrial expansion, and the means by which the work can best be accomplished. 6500 w. Nineteenth Cent—Sept. 1898.

China in Regeneration. An Epoch and an Opportunity. John Foord. Considers the existing crisis as the birth of a new Chinese government, on a progressive basis, and reviews the enterprises already under way, especially the railway concessions. 2700 w. Eng Mag—Aug., 1900.

European Powers in the Far' East. Editorial on affairs in the far east and a short synopsis of the concessions recently obtained from China. 2000 w. Engng—April 15, 1898.

Industrial Problems in the Far East. Editorial dealing principally with these problems as related to the Chinese and Japanese empires, which are considered not only as important to the politicians and manufacturers of other nations, but as affording a most interesting study for sociologists. 2000 w. Engng—April 3, 1896.

Modern China from an Engineer's Point of View. Part first considers railways and railway projects, reviewing the steps already taken. Ill. Serial. Engr, Lond—March 18, 1898.

Observations of an American Engineer in China and Japan. August C. Christensen. The conditions of machine works in these countries is discussed, and other things observed by the writer. 2200 w. Am Mach—Dec. 15, 1898.

The Chinese and Recent Industrial Progress in China. J. S. Fearon and E. P. Allen. A discussion of the vast industrial interests awaiting development in China together with an account of the racial and political difficulties to be overcome. 4000 w. Eng Mag—Nov., 1898.

The Coming Engineering Development of the Far East. Wm. Barclay Parsons. An admirable illustrated analysis of the characteristics displayed in native Chinese construction, and of the departments of engineering work in which there will be opening for Caucassian enterprise. 3000 w. Eng Mag—July, 1900.

The Crisis in China. Its Meaning for Engineering Interests. Hon. John Barrett. Showing the identity of interests among the great industrial nations, with especial reference to the engineering development of the empire. 3000 w. Eng Mag—Sept., 1900.

The Industrial Situation in China. Considers the alliance with Russia, the Siberian Railway, the struggle for markets, railway progress, and other business aspects. 5000 w. Ir & Coal Trds Rev—Sept. 30, 1898.

The Industrial interests of the United States in the Far East. Wharton Barker. An account of the author's experience in industrial enterprise in China, outlining the general policy which he believes to be necessary to insure success in developing foreign interests there. 3000 w. Eng Mag—Oct., 1898.

The Opening Up of Southwestern China. Report of the opening of the territory of the West River to foreign trade. 3200 w. Bd of Trd Jour—Nov., 1897.

The Yangtse Basin and the British Sphere. Archibald Little. Descriptive sketch of this region and its resources. 5400 w. Jour Soc of Arts—Dec. 16, 1898.

The Yangste Valley and Its Trade. Archibald Little. A summary of the physical features, trade movement, business resources, and political aspects. 6000 w. Contemporary Rev—Sept., 1898.

The Trade of Shipping of the Yangtze-Kiang. Reports the value of the import and export trade of this important commercial highway of the Chinese Empire; the use of transit passes the shipping trade, and tabulated statements of value. 2300 w. Bd of Trd Jour—Feb., 1898.

**American Competition.**—American Competition in China. Editorial on the influence of war on trade and industry, and special consideration of the expansion of United States trade in China. 1500 w. Engng—June 3, 1898.

**American Railway Trade.**—American Trade in China. J. T. M. Reports an interview with T. R. Jernigan, ex-consul general of the United States to Shanghai, discussing the railway contract situation and the field for American supplies. Also editorial. 2500 w. Ry Age—Dec. 3, 1897.

**America's Interests.**—America's Interests in China. Some information of the country, people, and government given to make clear the commercial and diplomatic interests of the United States. 5000 w. N Am Rev—Feb., 1898.

**Open Door.**—America, England and Germany as Allies for the Open Door. John Barrett. A full review of existing conditions with regard to the development of engineering and commercial advancement in the Far East, showing the identity of interests of the three Powers, and the need of immediate action for the preservation of the vast markets which is equally to the interests of all to maintain in their entirety. 4000 w. Eng Mag—Sept., 1899.

England, America and Germany as Allies for the Open Door. Hon. John Barrett. Discussing the vast openings for engineering development in China, and the opportunity for the industrial nations which must supply her wants. 4000 w. Eng Mag—Oct., 1899.

### CHIPS.

Helical and Spiral Chips—Easy Rolling Chips. Tecumseh Swift. Calling attention to the fact that the chip made on the lathe is helical, while the chip made on the planer is spiral. 1500 w. Am Mach—Feb. 11, 1897.

### CHLORATE WORKS.

See **ELECTRO-CHEMICAL WORKS.**

### CHLORINATION.

See also **CYANIDE PROCESS; GOLD METALLURGY.**

Modification of the Chlorination Process. The process consists in the addition of caustic soda and slaked lime to the ores, to prevent the deterioration of the salt employed. The rationale is fully treated. 1400 w. Min & Sci Pr—Feb. 22, 1896.

Practical Workings of Chlorination. Thomas G. Taylor, Jr. Describes the process as carried on at the Champion Mine at Nevada City. 2500 w. Min & Sci Pr—July 17, 1897.

The Chlorination of Gold Ores. F. C. Smith. Gives briefly the history and chemistry of the process, its operation and the difficulties. 3300 w. N Z Mines Rec—Nov. 16, 1899.

The Chlorination Process. Charles P. Williams. An outline description of the peculiarities of the various methods and appliances. The chemical process, the varieties of ores to which it is applicable, the method of treatment and how the process accomplishes the desired results. 4000 w. Col Eng—Aug., 1897.

The Modern Gold Chlorination Process for the Treatment of Gold Ores. John E. Rothwell. Illustrated description of the barrel chlorination process and its application. 11000 w. Min & Sci Pr—Dec. 18, 1897.

**Australia.**—The Gold Industry in Australia (L'Industrie de l'Or en Australie). An account of the chlorination methods used in Australia, with illustration of plant. 2500 w. La Revue Technique—Feb. 25, 1897.

**Boulder Co., Colo.**—Ore Treatment in Boulder County, Colorado. C. C. Burger. Describes a 50-ton chlorination plant and its machinery, which has been in operation six months, its success and its adaptibility to tellurium ores. 2400 w. Eng & Min Jour—Jan. 29, 1898.

**Colorado City.**—The Chlorination Mill at Colorado City, Colorado. H. V. Croll. Brief description of plant designed to treat the ores of Cripple Creek and other districts. Ill. 1800 w. Eng & Min Jour—Oct. 8, 1898.

**Mount Morgan, Queensland.**—The Chlorination of Gold Ores at Mount Morgan, Queensland. Edgar Hall. A description of this plant, which is probably the largest chlorination mill in the world. 1200 w. Eng & Min Jour—Oct. 7, 1899.

**Utica Mine, Cal.**—The Utica Mine Chlorination Plant. Thomas N. Smith. Illustrates and describes this California plant, giving itemized statement of cost. 1000 w. Eng & Min Jour—April 22, 1899.

### CHLORINE.

**Electrolytic.**—See **ELECTRO-CHEMISTRY—Rhodin Process.**

### CHROME ORE.

Chrome Ore. M. A. Clouet. Translated from the French. Where found, analyses from various localities, and the character of the surrounding strata are given in part first. Serial. Am Mfr & Ir Wld—Aug. 6, 1897.

**Appalachian.**—Chrome in the Southern Appalachian Region. William Glenn. A historical description of the finding of chrome ore in the United States, with notes on the lithologic character of its associations and its manner of occurrence. 7000 w. Trans Am Inst of Min Eng—Nov., 1895.

**Newfoundland.**—The Chromite-Deposits on Port au Port Bay, Newfoundland. George W. Maynard. The discovery, location and original investigations, with statement of results. 1600 w. Trans Am Inst of Min Engs—May, 1897.

**North Carolina.**—The Occurrence, Origin, and Chemical Composition of Chromite; with Especial Reference to the North Carolina Deposits. J. H. Pratt. A careful study of these deposits was made by the writer and he gives reasons why the chromite should be regarded as having been formed at the same time with the peridotites. 8000 w. Trans Am Inst of Min Engs—Feb., 1899.

### CHROMIC IRON.

**Canada.**—Chromic Iron in Canada. The facts presented are from a recent report by J. Obalski, inspector of mines for Quebec. Its use in the chemical industries, and facts relating to the deposits. 1600 w. Can Engr—June, 1898.

### CHROMIUM.

**Electro-Chemistry.**—The Electrochemical Behavior of Chronium. From the "Electrician." London. Some facts obtained from the investigations of Prof. Hittorf. 1200 w. Elec, N. Y.—Aug. 3, 1898.

The Electromotive Properties of Chromium (Ueber das Elektromotorische Verhalten des Chroms). A paper by Dr. Hittorf before the Leipzig meeting of the Electrochemical Society, showing the different electrical properties possessed by chromium under different conditions. 5000 w. Zeitschr Elektrochemie—May 5, 1898.

**Electro-Deposition.**—Some Notes on the Electro-Deposition of Chromium. Sherard Cowper-Coles. Gives some of the characteristics, a summary of the results of experiments carried out by Prof. Hittorf, and the investigations of Herr Eschermann, Dr. Hans Goldsmidt, Claude Vautin, and others. 1000 w. Elec Rev, Lond—Sept. 30, 1898.

### CHRONOGRAPH.

**Photo.**—See **PHOTO—CHRONOGRAPH.**

**Watches.**—Chronograph Watches. Recent advances in the horological art. Measuring short periods of time with extreme accuracy. 2200 w. Engng—July 3, 1896.

### CHRONOMETER.

**Balance Variations.**—The Laws of the Variations in Amplitude of Chronometer Balances (Lois des Variations d'Amplitude du Balancier des Chronomètres). Marcel Brillouin. Describing the method of photographing continuously the vibrations of a balance wheel, enabling the variations to be recorded and studied. 10000 w. Bull de la Soc d'Encour—May, 1899.

### CHUCK.

**Magnetic.**—See **BICYCLE MANUFACTURE—Magnetic Chucks.**

**Split.**—Split Chucks. Describes a holder for split chucks for any lathe. Ill. 900 w. Am Mach—July 22, 1897.

### CHURCH.

See also **CATHEDRAL.**

**Architecture.**—Elements of Church Architecture. Part first considers the origin of the Christian churches. Ill. Serial. Ill Car & Build—Jan. 6, 1899.

**Basel.**—The New Church of S. Matthew at Bâle (Die Neue Protestantische Matthäus Kirche in Basel). Description and perspective of Gothic church building for 1200 sitters. 1000 w. 1 plate. Schweiz Bauz—March 13, 1897.

**Clay Materials.**—See **TERRA-COTTA—Churches.**

**Danish.**—Some Danish Churches. H. Rose. An account of a tourist's trip with brief architectural studies. Ill. 2500 w. Builder—Nov. 2, 1895.

**Double-Aisled.**—Double-Aisled Churches (Ueber Zweischiffige Kirchenbauten). A discussion of church design with wide nave and aisle on one side, with illustrations of buildings so altered. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—April 30, 1897.

**English Parochial.**—Parochial Churches. Oswald J. Reichel. Extract from a paper read before the Devon and Exeter Architectural Society, England. Some of the peculiar architectural features of these churches, with interesting information. 1700 w. Builder—Nov. 13, 1897.

**France.**—Church of Montivilliers. Interesting description, with inset, two-page line engraving. 1500 w. Arch, Lond—Aug. 7, 1896.

Saint Front of Périgueux, and the Domed Churches of Périgord and La Charente. R. Phené Spiers. Full paper read at the general meeting of the Roy. Inst. of British Arch., with discussion and illustrations. 13000 w. Jour of Roy Inst of Brit Arch—Feb. 20, 1896.

The Churches of Perigueux and Angouleme. M. G. Van Rensselaer. Illustrated description of these churches, written in popular style, and most interestingly tracing their influence upon architecture. 8500 w. Cent Mag—April, 1896.

**Jerusalem.**—The Church of the Redeemer, Jerusalem. From the London "Times." Brief historical account of the church to be dedicated by the German Emperor on Oct. 31, 1898. 1000 w. Arch, Lond—Oct. 14, 1898.

**London.**—Old London Churches. Editorial review, with illustrations, of a book by George H. Birch. 3700 w. Builder—June 6, 1896.

**Oxford.**—St. Mary's Oxford. Arthur Edmund Street. Review of work by T. S. Jackson, with something of the history of the church. Ill. 2400 w. Jour Roy Inst of Brit Arch—Oct. 14, 1897.

**Paris.**—The Most Remarkable Sight in Paris. Refers merely to the outward aspect of buildings and their surroundings. The writer thinks it the great modern church of the Sacré Coeur, Montmartre. 1300 w. Builder—Aug. 29, 1896.

**Philadelphia.**—See also **HEATING AND VENTILATION.**

**Pittsburg.**—See **DOME—Plate-Girder Construction.**

**Quetta, Baluchistan.**—Constructing Roman Church at Quetta. Description of work with estimates of cost. Ill. 3500 w. Ind Engng—Nov. 26, 1898.

**St. Petersburg.**—The Churches of St. Petersburg. Describes St. Isaac's Cathedral, exterior and interior, and briefly refers to other structures. 2700 w. Ill Car & Build—July 24, 1896.

**Scotland.**—Church Architecture in Scotland During the Past Century. John Honeyman. Abstracts from a lecture given before the architectural section of the Glasgow Phil. Soc. 1100 w. Brit Arch—March 20, 1896.

Ecclesiastical Architecture of Scotland. Review of a book by David MacGibbon and Thomas Ross, with critical remark. Ill. 1800 w. Builder—Oct. 23, 1897.

**Strasburg.**—The Evangelical Garrison Church at Strasburg (Die Neue Evangelische Garnison-Kirche zu Strassburg). Elevation, plans and section of this fine modern example of Gothic church architecture. 2000 w. 1 plate. Deutsche Bauzeitung—Jan. 8, 1898.

**United States.**—Church Architecture in America. Editorial review of a letter of Prof. Hamlin to the "Century." Agrees with Prof. Hamlin that the majority of the modern churches of the United States lack dignity, repose, and ecclesiastic character. 800 w. Arch & Build—Aug. 29, 1896.

**Wareham, Dorsetshire.**—The Church of St. Martin, Wareham, Dorset. Charles Lynam. A study of the details of this church, with illustrations. 2500 w. Builder—March 12, 1898.

**Worcestershire.**—Some Worcestershire Churches. Descriptions of special features, antiquities, etc., in the churches of Wyre, Throckmorton, Fladbury, Cropthorne and Wick in the diocese of Worcester, Eng. 3000 w. Arch, Lond—Aug. 14, 1896.

**Zastavna, Austria.**—Design for a Greek Catholic Church at Zastavna (Project für eine Griechisch-Katholische Kirche in Zastavna). An interesting example of effective wooden church construction. 3 plates. 1200 w. Oesterr Monatschr f d Oeffent Baudienst—July, 1897.

**Zürich.**—New Evangelical Church at Wiedikon-Zürich (Die Neue Evangelische Kirche in Wiedikon-Zürich). Paul Reber. Description, with plate and cuts. 1000 w. Schw Bauz—Dec. 5, 1896.

### CHURCH RESTORATION.

The Restoration of Ancient Churches. From the "Church Times." Suggestions and precautions given in the hope that they may assist in the preservation of what is left of good old work. 3000 w. Arch, Lond—Sept. 10, 1897.

### CIDER MAKING.

**France.**—Cider Making in France. Description in detail from the selection of the apples, to the final bottling of the rectified cider. 3800 w. Cons Repts—July, 1896.

### CINNABAR.

**Electrolysis.**—See **MERCURY—Determination.**

### CIRCUIT BREAKER.

See **ELECTRIC CIRCUIT BREAKER.**

### CISTERN.

Cisterns: Their Use and Necessity with Constant Water Supply. Ernest Collins. Read at the Congress of the Sanitary Inst. Discusses the need of reservoir cisterns, their care, and the best systems. 2200 w. Plumb & Dec—Nov. 1, 1899.

**Construction.**—See **TANK.**

### CITY.

See also **MUNICIPAL.**

### CITY CHARTER.

A Model City Charter; the Report of a Committee of the National Municipal League. Editorial presentation of the main features of the work accomplished by the committee appointed by the National Municipal League to report on a program embodying essential principles of municipal government, etc. 3000 w. Eng News—Dec. 1, 1898.

### CITY NOISES.

The Plague of City Noises. J. H. Girdner. The deleterious effect of confused noises upon sight and hearing, the needlessness of many city noises, and means for abating them are considered. 2800 w. N Amer Rev—Sept., 1896.

To Abate the Plague of City Noises. John H. Girdner. Presents the effect of unnecessary noise on the public health and comfort, and offers suggestions for lessening the disturbance. 3000 w. N Am Rev—Oct., 1897.

### CITY PLAN.

The City's Plan. J. F. Harder. Discusses to some extent the plans of cities in general, but is chiefly devoted to New York and the improvements that should be made. Ill. 6700 w. Munic Af—March, 1898.

**Vienna.**—The Plan of Vienna at the Beginning of the XVIII. Century (Die Wiener Stadtpläne aus dem Anfange des XVIII. Jahrhunderts). S. Wellisch. An interesting comparison of old surveys with modern data, with a discussion of the mean errors of the earlier maps. Two articles. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 6, 13, 1899.

The Plan of Vienna at the Time of the Second Turkish Siege (Der Plan von Wien zur Zeit der Zweiten Türkenbelagerung). S. Wellisch. A description of old surveys made before the siege of Vienna in 1683, comparing them with the Hirschvogel map of 1529, and with modern maps. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 11, 1899.

**Washington.**—L'Enfant and the Planning of Washington. Charles Burr Todd. Historical note. 800 w. Am Arch—Aug. 15, 1896.

**CITY RAILWAY.**

See also **ACCUMULATOR TRAMWAY; CABLE RAILWAY; COMPRESSED-AIR TRAMWAY; ELECTRIC TRAMWAY; ELEVATED RAILWAY; GAS TRAMWAY; UNDERGROUND RAILWAY.**

Rapid Transit in Dense Centers of Population. John Lundie. On the problem in New York, and the importance of speed on elevated roads. 2400 w. St Ry Jour—April, 1899.

Some of the Larger Transportation Problems in Cities. Edward E. Higgins. An explanation of the scheme of modern street railroading and the problems to be solved. Serial. Jour Fr Inst —April, 1899.

**Electricity vs. Steam.**—Electricity or Steam in Rapid Transit—Which? George Moffat. Concludes that the roads will undoubtedly be driven to use electric motors. 2000 w. Am Eng & R R Jour—June, 1897.

**Express Trains.**—The Economy of Express Trains on Urban Railroads. William Barclay Parsons. Strongly advocates the express system. Arguments based upon New York rapid transit experience. 2200 w. R R Gaz—Sept. 25, 1896.

**Financial Characteristics.**—Financial Characteristics of the Large City Transportation Systems of the World. Edward E. Higgins. Tabulated results of investigations of thirty cities are given, with explanations and discussions of different systems and their development. 3500 w. St Ry Jour—Oct., 1899.

**Greater London.**—Greater London Railways. Report of the returns for the first half of this year of the Metropolitan and the Metropolitan District railways, showing growth of traffic. 1200 w. Engng—Aug. 12, 1898.

**London.**—London's Internal Railways. An editorial review of London's position in regard to internal traveling facilities. 1600 w. Engr, Lond—April 8, 1898.

**New York.**—Notes on Rapid Transit. W. L. Derr. Full paper with appendix and discussion. Ill. 31000 w. N Y R R Club—March 18, 1897.

Rapid Transit in New York. An editorial review in the light of the court's decision against the plan of the commission. The solution favored is a development of the elevated system. 3500 w. R R Gas—May 29, 1896.

Rapid Transit in New York. A synopsis of the franchises which the N. Y. Rapid Transit Commissioners offer to the Manhattan Ry. Co. 1200 w. R R Gaz—March 25, 1898.

Rapid Transit in New York. G. Lindenthal. Discusses the conditions likely to affect the financial prospects of any new rapid transit railroad and suggests a plan that would give relief to suburban and city passengers from the north. 1200 w. R R Gaz—March 26, 1897.

Some Considerations on "Rapid Transit." Editorial comment called forth by the paper of W. L. Derr, presenting some of the strict conditions which must govern any intelligent study of this subject. 1500 w. R R Gaz—March 19, 1897.

The Motive Power of the City Railroads of New York. H. G. Prout. From the N. Y. "Times. Discusses the peculiar difficulties to be met in this city, and the steps being taken. 1800 w. Ir Age—July 28, 1898.

The Outlook for Rapid Transit in New York City. Editorial review of the peculiar difficulties and an argument for the tunnel scheme. 2200 w. Eng News—May 28, 1896.

Transportation Earnings and Profits on Manhattan Island. Reviews the changes brought about during the last fifteen years, by which the lines have passed within the control of three competing systems, and the changes in traffic and increased earnings. 5200 w. St Ry Jour —Dec., 1899.

**Paris.**—See also **RAILWAY TERMINAL—Paris.**

**Speed.**—Speed Ordinances. Replies to a letter of inquiry sent out for the purpose of learning what restrictions, if any, are put upon the speed of electric and cable cars in the principal cities of the United States. 1700 w. St Ry Jour—March, 1897.

**CITY TRANSPORTATION.**

**Vienna.**—The Progress of Transportation Improvements in Vienna in 1896 (Ueber den Fortschritt der Verkehrsanlagen in Wien in Jahre 1896). Including a review of the street improvements, the elevated railway, and the river and canal improvements. Two articles. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—May 7, 1897.

**CIVIL ENGINEER.**

See also **ENGINEER; ENGINEERING; ENGINEERING SOCIETY.**

**American Society.**—Presidential Address, American Society of Civil Engineers. John Findley Wallace. London address on the status of the engineering profession. 3200 w. Eng Rec—July 14, 1900.

The Engineer and the National Society. Benjamin Morgan Harrod. Extracts from the address at the annual convention at Quebec, with editorial. Calls attention to some of the relations of a national society to the profession. 3500 w. R R Gaz—July 2, 1897.

**American Society House.**—The New House of the American Society of Civil Engineers. Brief history of the society with illustration and description of their new building, 220 West 57th St., New York. 2200 w. Ir Age—Nov. 25, 1897.

**Compensation.**—Engineering Compensation. M. S. Parker. Brief statement of facts bearing upon the remuneration of civil engineers, and claiming that they are not compensated as highly as in other professional employments, nor as well in the United States as in England. 2000 w. Jour Assn of Engng Soc—Feb., 1897.

**French Society.**—The 50th Anniversary of the Society of Civil Engineers of France (Le Cinquantenaire de la Société des Ingenieurs Civils de France). A general historical notice in view of the coming celebration of the semi-centennial of the society. 1200 w. Moniteur Industrielle—April 9, 1898.

The French Society of Civil Engineers. History of this society, which has recently celebrated its fiftieth anniversay, with illustrations of its new building. 3300 w. Engng—Aug. 5, 1898.

**Institution.**—Address by Sir John Wolfe Barry before the Institution of Civil Engineers, London. After discussing details of business routine, the question of a meeting hall large enough to receive the entire membership is broached; as well as a new model room to receive the increasing collection. 5500 w. Engr, Lond—Nov. 5, 1897.

Homes of the Engineers. An illustration of the new house of the Institution of Civil Engineers in London, with a reference to the work which is being carried on within its walls, and brief history of the society. 2500 w. Ir & Coal Trds Rev—March 12, 1897.

A Change in the Requirements for Admission to the Institution of Civil Engineers. The age of admission raised, examination required, etc. Commented upon editorially. 1400 w. Eng News —April 22, 1897.

The Institution of Civil Engineers. Editorial comment on an extremely interesting lecture by Sir Benjamin Baker on the occasion of his occupying the presidential chair of the Institute of Civil Engineers. He shows in what ways a scientific society can be a material factor in the progress of the engineering profession, and states the specific ways in which such results may be obtained. 2800 w. Engng—Nov. 15, 1895.

The Institution of Civil Engineers. Report of the London conference, with abstracts of papers read, and discussions. 31500 w. Eng, Lond—May 28, 1897.

**U. S. Navy.**—Some Lessons of the New York Naval Dry-Dock Failure. An editorial on the difficulties under which the naval civil engineers work. 2000 w. Eng Rec—Feb. 12, 1898.

The Bureau of Yards and Docks, U. S. Navy Department. An editorial explanation of the cause of poor civil-engineering work in the navy yards. 1000 w. Eng Rec—Feb. 19, 1898.

**University.**—The Civil Engineer and the University. George S. Morison. Abstract of an address delivered at the commencement exercises of Rensselaer Polytechnic Inst., Troy, N. Y. 3000 w. Eng Rec—Aug. 28, 1897.

**CIVIL ENGINEERING.**

See also **ENGINEERING; ENGINEERING SOCIETY.**

A Year's Progress in Engineering. Alphonse Fteley. Slightly condensed from his address at the Detroit meeting of the Am. Soc. of Civ. Engs. Interesting review of railway construction and operation, canals, harbors, water supplies, buildings, tunnel construction, etc. 6800 w. Eng News—July 28, 1898.

**Address.**—Presidential Address before the Institute of Civil Engineers. Sir Douglas Fox. Condensed address of more than usual interest, touching upon many branches of engineering. 4700 w. Eng News—Nov. 30, 1899.

Presidential Address of Sir Benjamin Baker. Delivered before the Inst. of Civ. Engs. The ideas are interesting both historically and on account of their practical tendency. Editorial comment. Serial. Eng, Lond—Nov. 15, 1895.

**Japan.**—Civil Engineering Prospects in Japan. Notes of a few of the engineering projects which are being proposed as means for hastening the industrial and commercial development. 1700 w. Engng—Jan. 29, 1897.

**Manitoba Legislation.**—Civil Engineering a Close Profession in Manitoba. Text, and general remarks, of an act regulating the professional practice of civil engineering in Manitoba, approved March 19, 1896. 1800 w. Eng News—Aug. 20, 1896.

**Montana.**—Address before the Montana Society of Civil Engineers. John Herron. The retiring president gives a summary of the engineering progress in the state, with a statement of the needs of the society. 3800 w. Jour Assn of Engng Soc—March, 1897.

**Review.**—Civil Engineering. Review of the year in the various branches of civil engineering, with comment on the changed conditions. 3300 w. Eng, Lond—Jan. 1, 1897.

Civil Engineering. Editorial review of the outlook for this profession in England, and the work of the past year. Also considers work to be done in other lands. 5800 w. Engr, Lond—Jan. 7, 1898.

Civil Engineering. Editorial annual review of work, events, and undertakings in this field. 7500 w. Engr, Lond—Jan. 6, 1899.

**South America.**—Engineering in South America. W. C. Weeks. Experiences during several months of exploration of the Orinoco Delta in the Republic of Venezuela. Ill. 2500 w. Eng's Year Book, Univ of Minn—1897.

**Victorian Age.**—Presidential Address of J. Wolfe Barry before the Institution of Civil Engineers, London. An interesting retrospective survey of the general progress with which engineering is intimately connected, especially during Queen Victoria's reign, with other subjects of interest. Serial. Eng, Lond—Nov. 6, 1896.

### CLAY.

See also **BRICK MANFACTURE; BUILDING MATERIAL; FIRE CLAY; TERRA COTTA.**

Clay. G. J. M. Ashby. A paper read before the Chicago Ceramic Association. Reviews the origin, composition, classification, and uses of clay, and the processes and machinery used in potteries and brick works. 1400 w. Brick—Sept., 1898.

**Alabama.**—The Clay Resources of Alabama and the Industries Dependent Upon Them. Eugene A. Smith. Brief account of the clays and loams for building brick, material for vitrified brick, kaolins and stone-ware clays and fire-clays. 1200 w. Eng & Min Jour—Sept. 24, 1898.

**Analysis.**—The Ultimate and the Rational Analysis of Clays and Their Relative Advantages. Heinrich Ries. A discussion of the rational analysis of clay, briefly referring to the ultimate analysis, giving table. 2000 w. Trans Am Inst of Min Engs—Feb., 1898.

**Architecture.**—Clay in Architecture. Henry R. Griffen. Discusses the changes within the past few years in the use of the clay in architectural work; and the tendency of the times. Read at Nat. Brick Mfrs.' Assn. and followed by discussion. 5400 w. Brick—Feb., 1897.

**Building Material.**—Clay Material as Used in the Best Modern Buildings. William D. Gates. On the improvement made in this material, its use and adaptability. Ill. 1000 w. Col Arch't—Feb., 1900.

**Colorado.**—The Clays and Clay-Working Industry of Colorado. Heinrich Ries. Information of the clay bearing formations, in the belief that knowledge of the available materials will lead to an expansion of the clay-working industry of the state. 1800 w. Trans Am Inst of Min Engs—Sept., 1897.

See also **GYPSUM.**

**Cuba.**—Personal observations in Cuba During the War. W. J. Hopley. An account of the clay industry in the island with illustrations of Cuban scenes. 2800 w. Brick—Jan., 1899.

**Drying.**—See also **CLAY DRYING.**

**Education.**—Why I am Attending the Clay Workers' School. E. E. Gorton. Some interesting remarks on this new departure in technical education. 2000 w. Clay Rec—Feb. 26, 1896.

**Hudson Valley.**—A Geological and Economic Survey of the Clay-Deposits of the Lower Hudson River Valley. Clemens Catesby Jones. Gives an account of investigations made to determine in a practical manner the location, form and extent of all the clay-deposits at present existing in the lower Hudson River Valley, and to ascertain the quantity and suitability of a clay for the manufacture of common building bricks. Ill. 10500 w. Trans Am Inst of Min Engs—Feb., 1899.

**Kentucky.**—The Clays and Building Stones of Kentucky. M. H. Crump. Deals principally with the value of the clays for pottery, brick, etc., referring briefly to the excellent quality of the building stone. 1300 w. Eng & Min Jour—Aug. 13, 1898.

**Louisiana.**—Clays of Louisiana. W. W. Clendennin. Report of the deposits thus far known, which when developed, give promise of becoming an important source of wealth. 900 w. Eng & Min Jour—Oct. 15, 1898.

**Massachusetts.**—The Clays and Clay Industry of Massachusetts. Charles L. Whittle. Gives information of the workable beds of the state, and of the advancement of this industry. 2100 w. Eng & Min Jour—Aug. 27, 1898.

**Missouri.**—Clay Resources of Missouri. H. A. Wheeler. These clays comprise all the varieties used in the arts and are found in great abundance. 2200 w. Eng & Min Jour—Oct. 8, 1898.

**North Carolina.**—See **KAOLIN.**

**Ohio.**—Clay Mining. E. Lovejoy. A description of the methods employed in mining clay by the Columbus Brick and Terra Cotta Co., at Union Furnace, O. 1600 w. Mines & Min—April, 1899.

**Pacific Coast, U. S.**—The Clay Working Industry of the Pacific Coast. Heinrich Ries. Facts in regard to the clay deposits and the extent of their utilisation. 1500 w. Mines & Min—June, 1900.

**Preparation.**—The Preparation of Clay. W. A. Endaly. An interesting paper, by a specialist, upon the properties and treatment of common clays. 2200 w. Clay Rec—Feb. 26, 1896.

**Vitrified.**—Tests of Strength of Vitrified Clay. These tests are valuable for reference in designing structures where terra-cotta ware is to be used. 600 w. Eng News—March 19, 1896.

### CLAY BURNING.

Burning of Clay. Thomas Townsley. A practical article giving the results of the author's experience. 3000 w. Clay Rec—Jan. 29, 1896.

The Burning of Clays. Thomas Townsley. A practical discussion of means and methods of baking bricks, pottery, etc. 4000 w. Brick—Feb., 1896.

Theory of Burning Clay Ware. Max A. Th. Boehncke. A review of some things necessary for the successful burner of clay to know. 3000 w. Brick—May, 1896.

### CLAY DRYING.

Drying Clay Goods by Hot Floor System. C. J. Holman. Two types of drying floors are described; one heated by hot air; the other by exhaust steam. 1300 w. Clay Rec—Feb. 12, 1896.

**Toldt Furnace.**—Improved Furnace for Drying Clay (Nouveaux Fours pour le Séchage de l'Argile). Describing and illustrating the Toldt oven, in which the masses are turned as they descend inclined planes. 1500 w. 1 plate. Génie Civil —Sept. 18, 1897.

The Drying of Clay in Large Masses (Ueber das Trocknen von Thon in Grössen Massen). With a description of Toldt's new drying furnace, illustrated. 4500 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 10, 1897.

### CLINIC.

See also **HOSPITAL.**

**Philadelphia.**—A New Clinic for Philadelphia. Description with plans of what is believed to be the finest and largest clinical amphitheatre either in the United States or Europe. Describes in detail the warming and ventilation of the building. 3000 w. Eng Rec—Sept. 4, 1897.

**CLOCK.**

See also **CHRONOGRAPH; TIME; WATCH.**

**Atmospheric Pressure.**—A Remarkable Clock. W. F. Durfee. Illustrated description of a clock operated by variations in atmospheric pressure. 2400 w. Am Mach—Sept. 10, 1896.

**Automaton.**—Clocks Provided with Automatons. Illustrated description of ancient and modern examples. 1800 w. Sci Am Sup—Sept. 19, 1896.

**Electric.**—See **ELECTRIC CLOCK.**

**Japanese.**—Japanese Clocks and Pocket Sun Dials. Illustrated description, translated from "La Nature." 1800 w. Sci Am—Feb. 15, 1896.

**CLOISTER.**

**Belem, Portugal.**—The Cloister of St. Jerome at Belem, Portugal (Das Kloster Dos Jeronymos in Belem, Portugal). A description of the beautiful Romanesque cloisters belonging to the cathedral of Belem, near Lisbon, with illustrations. 2500 w. Wiener Bauindustrie Zeitung—March 24, 1898.

**CLUB HOUSE.**

**Vienna.**—The Olympion at Vienna. A brief description of an important building, to cost over $500,000 designed for the study of musical art, and the practice of many sports and pleasures, serving at the same time as a home for about eighty clubs, and a place where entertainments and festivals of all kinds can be held. 900 w. Sci Am Sup—Feb. 29, 1896.

**Yonkers, N. Y.**—The Hollywood Inn. Illustrated description of a workingman's club, at Yonkers, N. Y. 800 w. Harper's Wk—Sept. 18, 1897.

**CLUTCH.**

**Coil.**—Coil Clutches. Describes Lindsay's clutches, manufactured by the Coil Clutch & Pulley Co., of Gotha Works, Slough. Explains the principle and the various forms. 1500 w. Engng—May 7, 1897.

**Friction.**—Some Types of Friction Clutches. Gives the summary of the essential conditions of a clutch as given by Walter Bagshaw, discussing their uses and things to be considered before buying. Also gives illustrated descriptions of various types. 4200 w. Ir & Coal Trds Rev—Jan. 12, 1900.

**Friction and Positive.**—A Combined Friction and Positive Clutch. Illustrated description of a clutch in successful use in Germany and England, and recently patented in the United States by Jacob Missong. It possesses new and interesting features. 700 w. Am Mach—May 4, 1899.

**Magnetic.**—A Large Magnetic Clutch. Illustrated description of a magnetic clutch used to transmit 3000 h. p. in a St. Louis station. 600 w. Eng Rec—Feb. 3, 1900.

Walker's Magnetic Clutch for Drill Presses. Illustrated description of clutch as applied to a drilling machine. 400 w. Am Mach—July 30, 1896.

**Slipping.**—Slipping Clutch for Electrically-Driven Punches and Shears. Illustrated description of a clutch which is claimed to overcome difficulties experienced with clutches previously employed. 900 w. Am Mach—May 21, 1896.

**COAL.**

See also **COAL INDUSTRY.**

Early Use of Anthracite Coal. William Griffith in the "Bond Record." An interesting account of the discovery and use of anthracite, dating back to 1762. 1100 w. Bull of Am Ir & St Assn—May 20, 1896.

**Briquette.**—See **BRIQUETTE.**

**British.**—Our Coal Supplies. T. Forster Brown. A discussion of the problems that must be solved by Great Britain in the near future, especially as regards increase of cost. Discussion. 9800 w. Jour Soc of Arts—April 28, 1899.

The Production, Value and Distribution of Coal in 1895. Statistics from the report relating to the mineral industry of the United Kingdom. 1500 w. Col Guard—Oct. 9, 1896.

**British Association.**—Coal at the British Association. Abstracts of the principal papers relating to coal, such as, "The Origin of Coal," "Coal and Iron in China," etc. 3300 w. Ir & Coal Trds Rev—Sept. 14, 1900.

**Brown Coal.**—See **BROWN COAL.**

**Classification.**—Classification of Bituminous Coals. Baird Halberstadt. What constitutes good steam, gas, smithing and coking coals. 2100 w. Col Eng—June, 1896.

The Chemical Classification of Coal. Clarence A. Seyler. Read before the So. Wales Inst. of Engs. A discussion of the methods of classification, giving views of writers of note, and examining the results of the graphic method, and data on which various classifications are based. Serial. Col Guard—July 6, 1900.

Hard Coal Species. Theodor Hundhausen, in "Prometheus." On the classification of coals, giving typical analyses and stating all the difficulties involved in subclassifying any variety. 2300 w. Col Guard—Nov. 1, 1895.

**Clyde Basin.**—The Chemistry of the Coals of the Clyde Basin. W. Carrick Anderson. Summary of paper read before the Philosophical Society of Glasgow, written in competition for the Graham Gold Medal. Investigations with a view to finding out points of difference in character and reaction between non-coking and true coking varieties. 5500 w. Col Guard—April 22, 1898.

**Coking Power.**—The Adhesive Properties of Coal. M. Louis Campredon. Brief extract from a paper read before the Académie des Sciences, Paris, on the relative coking properties of coals. 500 w. Col Guard—Jan. 10, 1896.

The Practical Determination of the Binding Power of Coal. Louis Campredon. Paper read at the Académie des Sciences de Paris. The author shows by examples that the composition of coals does not indicate their coking properties. 800 w. Ind & Ir—Feb. 28, 1896.

**Coking Power, India.**—The Coking Quality of India Coal. From a report by R. H. Mahon on experiments made to test the coking quality. 4500 w. Col Guard—Feb. 2, 1900.

**Contraband of War.**—Coal as Contraband of War. Gives information of jurists and others respecting contraband of war generally, and the penalty of carrying it, with some discussion of the decision regarding coal, as given by the English Home Secretary to the Lords of the Admiralty. 2800 w. Col Guard—May 20, 1898.

**Culm.**—See **CULM.**

**Economical Use.**—Some Fuel Problems. Joseph D. Weeks. The Fuel Problem is to reduce the waste and increase the efficiency of the coal we possess. The question is considered under the divisions of (1) the mining of coal and its preparation for market; (2) the use of coal; (3) the products of the coal other than heat. 4500 w. Trans Am Inst of Min Eng—April, 1896.

**Efficiency.**—The Increased Efficiency of Coal. On the importance of getting as much motive power out of every pound of coal, indicating what has been done and what remains to be done. 1600 w. Col Guard—Jan. 20, 1899.

**History.**—Annals of Coal Mining and the Coal Trade. Robert L. Galloway. The first part is a review of the history previous to 1066 A. D. Serial. Col Guard—May 22. 1896.

**Hygrometric Properties.**—See **COAL TESTS.**

**Illinois.**—Notes on Mining Engineering and Economic Resources of Illinois. A valuable series of experiments on the economic value of Illinois coals, as shown by calorimeter tests and analyses and comparing actual value with selling price of various coals. 450 w. 10th An Rept of Ill Soc of Eng & Surv., 1895.

**Ind'a.**—Report on Indian Coals. Letter to the editor quoting from report by Sir Frederick Abel. 350 w. Ind Engng—June 20, 1896.

The Distribution, Methods of Working, and Quality of Indian Coals. Information on the occurrence and working of Indian coal, taken from the report of W. R. Durstan to the Imperial Inst. 3300 w. Ir & Coal Trds Rev—Dec. 2, 1898.

**Lignite.**—See **BROWN COAL.**

**Pittsburg.**—See **PITTSBURG.**

**Pulverized.**—See **COAL DUST FUEL.**

**Region.**—See **COAL REGION.**

**Rhenish-Westphalian Syndicate.**—See **COAL INDUSTRY—Westphalia.**

**Scotch.**—Scotch Coals in the Manufacture of Iron and Steel. F. W. Paul. Abstract of a paper read before the West of Scotland Iron and Steel Inst. Gives results of analyses and some practical results of the consumption of fuel in coal-fired heating furnaces and the boiler-evaporative duty. 2300 w. Ir & Coal Trds Rev—Nov. 25, 1898.

Chemical Notes on Scotch Coals. W. C. Anderson. Abstracted by the "Journal of the Soc. of Chem. Ind." from the Proceedings of the Glasgow Philosophical Soc. Considers the varieties, the caking power, oxidation, etc. 2000 w. Prac Eng—April 28, 1899.

**Small.**—The Utilization of Small Coal (Die Verwendung der Kleinkohle). A discussion by Dr. Caspaar of the various methods of utilising small coal, taking into account the commercial conditions as they exist in Germany. Two articles. 7500 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 3, 17, 1897.

**Smokeless.**—Coal for Naval Vessels. Reports a discussion following the introduction of an amendment to the Naval Bill appropriating $20,000 to test the qualities of smokeless coal; gives reasons for the preference for bituminous coal. 2000 w. Marine—March 9, 1899.

**South African Railways.**—South African Coal. Editorial on the trials and results to ascertain the relative value of the various kinds of coal used by the locomotive department of the government railways. The coals tried were the Welsh, Cape Colonial, Orange Free State and Transvaal. 1100 w. Engng—Oct. 14, 1898.

**Spontaneous Combustion.**—Spontaneous Combustion of Coal Cargoes. Conclusion of the Royal Commission appointed by the Government of New South Wales to inquire into the causes of the firing of coal cargoes, as given in their report. 1300 w. Aust Min Standard—May 13, 1897.

The Dangers of Coal Cargoes. Extracts from the report of the commissioners appointed by the New South Wales Government to inquire into the cause of the dangers to which vessels carrying coal are said to be peculiarly liable, and as to the best means for removing or lessening the same. 3500 w. Col Guard—Sept. 10, 1897.

Spontaneous Combustion of Coal. A discussion of the causes leading to the phenomenon with recommendations as to how this pyrophoric tendency of stored coal may be counteracted. 900 w. Col Guard—Jan. 10, 1896.

Spontaneous Ignition of Coal. John L. Howard. Read before meeting of the Pacific Coast Assn. Facts, theories, and statements bearing upon this subject, and gathered from various sources. 3300 w. Am Gas Lgt Jour—Aug. 9, 1897.

The Spontaneous Combustion of Coal. Discussion of paper by John L. Howard, read before the Pacific Coast Assn. 2200 w. Am Gas Lgt Jour—Aug. 16, 1897.

**U. S. Southern.**—The South's Coal. H. S. Fleming. The growth of coal mining as illustrated at the Atlanta Exposition. The article contains descriptions of coal from various localities and gives the analyses, and production, and other statistics. 4500 w. Mfrs Rec—Nov. 22, 1895.

**Warships.**—Coal in Modern War. From the St. Louis "Globe Democrat." Some of the reasons why coal is a tremendous factor in modern naval operations. 1500 w. Bos Jour of Com—May 21, 1898.

See also **COALING AT SEA.**

## COAL ANALYSIS.

See also **CALORIFIC VALUE; COAL TEST; FUEL ANALYSIS.**

Coal Analysis. A review of the final report of the Committee of the American Chemical Society on Coal Analysis, giving a description of all their recommendations which differ from the usual practice. 2200 w. Eng Rec—Feb. 10, 1900.

The Analysis of Coal. Durand Woodman. Considers the methods employed, showing that the choice depends on the purpose for which the coal is to be used. Serial. Stevens Ind—Jan., 1898.

The Chemical Analysis and Testing of Fuel. L. Campredon. From "Annales de Chimie Analyt." Explains the usefulness of analysis and testing in determining their suitability for the purposes intended, and defines chemical and ultimate analysis, describing special tests. 2500 w. Col Guard—April 29, 1898.

The Proximate Constituents of Coal. Results of investigations by a committee of the British Association. 2500 w. Jour of Gas Lgt—Jan. 5, 1897.

Ultimate Analysis of Coal. F. Haber and S. Grinberg, in "Zeitschrift für Analytische-Chemie." Describes the method of analysis which has been used for some time at experimental stations at Munich and Karlsruhe. 1300 w. Col Guard—Oct. 15, 1897.

**Gas.**—A Laboratory Method for the Analysis of Coals for Gas Manufacture. J. G. A. Rhodin. Read before the Manchester section of the Soc. of Chem. Ind. Detailed description of apparatus used and manner of working. 3000 w. Gas Wld—Feb. 17, 1900.

The Analysis of Gas Coal. Describes a laboratory method given in a paper by J. G. A. Rhodin. 900 w. Gas Wld—Jan. 13, 1900.

**Nova Scotia.**—Analysis of Nova Scotia Coals and other Minerals. E. Gilpin, Jr. Gives analysis made by J. T. Donald, taken from the workings at a depth of 800 to 1000 feet. Compares them with analysis made by the writer about 1880, and briefly considers iron and other ores. 1000 w. Can Eng—Oct., 1897.

Nova Scotia Coals as Steam Producers. F. H. Mason and W. G. Matheson. The object of the paper is to place on record some results obtained from an analysis of samples of coal from the various mines in Nova Scotia. This regards coal only as fuel. With its properties as a gas producer, or its value for coking it has nothing to say. 2200 w. Can Min Rev—April, 1896.

Nova Scotia Coals as Steam Producers. F. H. Mason and W. G. Matheson. The object of the paper is to place on record some results obtained from an analysis of samples of coal from the various mines of Nova Scotia. 2300 w. Col Guard—Dec. 24, 1896.

**Phosphorus.**—See **PHOSPHORUS—Coal and Coke Ash.**

**Sulphur.**—See **GAS ANALYSIS.**

**Volatile Combustibles.**—On the Determination of Volatile Combustible Matter in Coke and Anthracite Coal. Richard K. Meade and James C. Attix, in "Jour. Am. Chem. Soc." Describes an investigation looking toward a more satisfactory method of determining volatile combustible matter. 2500 w. Am Gas Lgt Jour—Jan. 8, 1900.

## COAL ASH.

The Relation between Composition and Fusibility in Coal Ash. Report of investigations made. 1500 w. Col Guard—Oct. 1, 1897.

**Fusibility.**—Fusibility of Coal Ash Determined by Its Composition. Eugène Prost. Showing that the fusibility of an ash depends upon the relation between the flux and the silica and alumina. 800 w. Col Guard—March 18, 1898.

## COAL BIN.

See also **COAL STORAGE.**

**Design.**—The Computation of Strains in Coal and Grain Bins. A discussion of bin pressures, computations of strains, etc. 1500 w. Eng News—Sept. 23, 1897.

**Paterson Electric Station.**—The Design of the Coal Bin at the Paterson Electric Light Station. Letter from Messrs. Milliken Bros., the designers and builders of the coal bin that failed recently at Paterson, N. J., with editorial comment. 2000 w. Eng News—Sept. 23, 1897.

## COAL BREAKER.

See **COAL PREPARATION.**

## COAL CARGOES.

See **COAL—Spontaneous Combustion.**

## COAL CLEANING.

See also **COAL PREPARATION; COAL WASHING.**

## COAL CONSUMPTION.

**Berlin.**—The Fuel Consumption of the City of Berlin in 1896 (Der Brennmaterialverbrauch in Berlin im Jahre 1896). An interesting report on the relative proportion of various kinds of coal used, with plate showing the results graphically from 1890 to 1896. 1500 w. 1 plate. Glückauf—Aug. 28, 1897.

**British Navy.**—Coal Consumption in the British Navy. Editorial discussion of statements made and of Commodore Melville's arguments. 1800 w. Engr, Lond—Aug. 18, 1899.

**Europe.**—Coal and Coke Consumption for Different Purposes in France, Belgium and Germany. Statistics showing the increase and activity in these industries. 900 w. Col Guard—Dec. 2, 1898.

**Locomotives.**—See **LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE.**

**Mines.**—Consumption of Coal for Steam at the Anthracite Collieries. A. D. W. Smith. Statistics are given showing that the Wyoming region, in 1897 used coal for steam amounting to 7 per cent. of its marketed product, and the balance of the region used 14 per cent. 1200 w. Eng & Min Jour—Jan. 21, 1899.

**COAL COST.**

The Fuel Factor in the Cost of Production. Statistics showing the reduction in the fuel cost due to mechanical contrivances for getting and handling the coal, and preparing it for the use intended. 1500 w. Col Guard—Feb. 3, 1899.

See also **COAL MINING—Cost.**

**COAL CUTTING MACHINERY.**

See also **COAL MINING MACHINERY; ELECTRIC EQUIPMENT—Coal Mine.**

Coal Cutting by Machinery. W. E. Garforth. A contribution to the discussion of W. T. Goolden's paper, read at the London meeting of the Inst. of Min. Engs. Ill. 1600 w. Col Guard—Sept. 23, 1898.

Coal Cutting Machinery. Cyrus Robinson. Considers its present efficiency and how it may be increased by a combination of electricity and compressed air. 1200 w. Mines & Min—May, 1898.

Coal Cutting by Machinery—Its Present and Its Future. Review of the history of the use of machinery in lieu of hand labor in mines. 3500 w. Ir & Coal Trds Rev—June 5, 1896.

Coal Cutting by Machinery. G. C. Allsebrook. Abstract of a paper which has been awarded the annual prize of £5 offered by the Inst. of Min. Engs. for the best essay written by a student or member under twenty-five years of age. Shows the need of coal cutting machinery, the advantages from its introduction, the effect upon the workmen, the essentials of a good machine, etc. 2400 w. Col Guard—Oct. 7, 1898.

Coal Cutting Machinery from the Humanitarian Point of View. Ernest Kilburn Scott. A study of the subject, showing the superiority of machinery over hand labor, and the saving of life resulting from its adoption. 1000 w. Elec Rev, Lond—June 9, 1899.

Coal Cutting Machinery. Cyrus Robinson. Reviews papers of Messrs. Gould and Hanford and shows that system to be best which best fits the conditions. 1200 w. Am Mfr & Ir Wld—Jan. 22, 1897.

Coal Cutting Machinery. Edward W. Parker. Discusses only those machines which have survived the test of practice, and have shown by actual use the success of applying mechanical methods to the mining of bituminous coal. 13500 w. Trans Am Inst of Min Engs—Feb., 1899.

Coal Cutting by Machinery. W. T. Goolden. Read before the Fed. Inst. of Min. Engs., England. Abstract with discussion. Shows that a greater variety of machines are needed to meet special conditions. From the electrical system. 4700 w. Ir & Coal Trds Rev—May 27, 1898.

Coal Getting by Machinery. Charles Latham. Report of lecture at the University College, Nottingham. Discusses the effect upon labor, number employed, wages, safety, etc. 1600 w. Col Guard—April 15, 1897.

Coal Mining by Machinery. A brief outline of the operation of coal getting is given, with comment on the limited progress yet made in this work. Broadly classifies all coal cutters under three heads and gives particulars relating to their use. 1700 w. Min Jour—Nov. 28, 1896.

Engineering Appliances in Mining. C. M. Percy. Read before the Manchester (Eng.) Assn. of Engineers. The work of the mechanical engineer in the industry of coal mining, indicating the branches in which his influence has been most effectively applied, and the lines for further improvement. Discussion. 4000 w. Col Guard—Feb. 4, 1898.

Improvements in Coal Cutting Machinery. Illustrates and describes a new tunnelling and ending machine especially useful for rapidly opening new mines. 1200 w. Col Guard—Oct. 6, 1899.

Machine Mining of Bituminous Coal. William Edwin Hall. A review of the machinery used, and its effect on the capacity of production, and health and safety of the miners. 1800 w. Yale Sci M—Feb., 1899.

Mechanical Appliances for the Getting of Coal. Ernest Kilburn Scott. The first of a series of articles which will describe and illustrate the more important coal cutting machines in use in England and other countries. Serial. Ir & Coal Trds Rev—Dec. 10, 1897.

**Compressed Air vs. Electric.**—Coal Cutting Machines. Cyrus Robinson. The comparative advantages and disadvantages of compressed air and electrically driven machines over pick mining. 1200 w. Col Eng—Feb., 1897.

See also **COAL MINING MACHINERY; COMPRESSED AIR—Mining; POWER TRANSMISSION.**

**1898.**—Machine Coal Cutting in 1898. Edward W. Parker. Postscript to a paper on "Coal Cutting Machinery," presented at the New York meeting. 1000 w. Trans Am Inst of Min Engs—Feb., 1899.

**Electric.**—Electrical Coal Mining Machinery. R. B. Blakeslee. Discusses mechanical engineering problems in the production of bituminous coal, including also problems of anthracite mining and coal cutting. 1700 w. Sib Jour of Engng—June, 1900.

Electrical Coal Mining Machines. Illustrates and describes the working of this type of coal cutting machines. 1100 w. Sci Am—June 23, 1900.

Electric Mining Machinery. Fred J. Platt. Read before the Anthracite Coal Operators' Assn. Some facts in regard to its successful use, efficiency, superiority over old methods, its adaptability to various portions of the workings, and the comparative cost of operation. 4000 w. Col Eng—June, 1897.

Two Types of Electrical Coal Cutters. Thomas H. Barr. From a paper read before the Min. Inst. of Scotland. Describes the Hurd coal cutting machine and the Clarke electric coal cutting machine. 1600 w. Col Guard—April 14, 1899.

See also **ELECTRIC EQUIPMENT—Coal Mine; POWER TRANSMISSION—Mine.**

**Electric, Cape Colony.**—Some Difficulties of Electric Coal Cutting. A detailed account of an attempt to cut coal by means of electric power in a Cape Colonial mine. 2000 w. Col Guard—Sept. 7, 1900.

**Electric, Long-wall.**—Electric Coal Cutting on Long-wall Faces. T. B. A. Clarke. The writer describes briefly the method and apparatus employed in cutting coal electrically; compares electricity as a motive power with compressed air, and gives some results obtained in seams of various thickness by electrically driven machines. 1700 w. Col Guard—Dec. 4, 1896.

**Electric, Schaub.**—Electric Coal Cutting Machinery (Schlitz-und Schrämmaschine mit Elektrischem Antriebe). Schaub's electric coal cutter consists of a number of parallel boring tools driven by chain connection to electric motors. 2500 w. 1 plate. Oesterr Zeitschr f Berg-u Hüttenwesen—Dec. 11, 1897.

The Schaub Electrical Coal Cutter. V. Waltl, "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Illustrated description of a machine presenting many interesting points, being tried at the Piberstein Brown Coal Colliery in Austria. 1800 w. Col Guard—Jan. 7, 1898.

**England.**—Coal Mining by Machinery. M. E. Part first discusses the difficulties of the application of coal cutting machines in England. Serial. Prac Eng—March 11, 1898.

**Iowa.**—Machine Coal Mining in Iowa, U. S. A. Foster Bain. Read before the Federated Institution of Mining Engineers. Describes methods of mining and machines used. 8300 w. Col Guard—June 11, 1897.

**Lee Long-Wall.**—The Lee Long-Wall Mining Machine. H. Foster Bain. A description of this machine, which is simple in operation and applicable to a wide range of long-wall work. Ill. 2500 w. Trans Am Inst of Min Engs—Sept., 1899.

**Lethbridge, Canada.**—Machine Mining at Lethbridge, N. W. T. W. D. L. Hardie. Read before the Min. Inst. of Scotland. Describes this coal field and the work and cost of mining with the Sergeant coal cutting machines. 3500 w. Can Min Rev—Sept. 30, 1899.

**Nova Scotia.**—Coal Cutting by Machinery. W. Blakemore. A description of the machines in use at the Dominion No. 1 mine, which was especially laid out for the purpose of machine mining. Ill. Serial. Can Min Rev—Dec., 1896.

The Capacities of Coal Cutting Machines. W. Blakemore. An interesting comparison of the work done by three coal cutting machines at the Dominion No. 1 mine, Nova Scotia, with discussion. 3000 w. Can Min Rev—Dec., 1895.

**Sergeant.**—See **Lethbridge, Canada.**

**United States.**—Increasing Use of Coal Mining Machines. Official figures, prepared by E. W. Parker, of the United States Geological Society, showing how machinery is superseding the pick. 1500 w. Am Mfr & Ir Wld—Sept. 3, 1897.

On Coal Cutting Machines in the United States. A. Bachellery. Read before the Min. & Met. Cong. at Paris. Brief account of the types in use. 1000 w. Ir & Coal Trds Rev—July 6, 1900.

### COAL DEPOT.

See **COAL STORAGE.**

### COAL DUST.

How a Mine May Be Dry, But Not Dusty. George Fowler. Paper read before the Chesterfield and Midland Counties Institution of Engineers. The author says that watering a mine to prevent dust may not be necessary; that dust is produced principally in transporting the coal through the mine, and recommends closed cars. 2400 w. Col Guard—April 10, 1896.

Methods of Dealing with Coal Dust. Discusses the methods used at the various stages of the work, and all the points of importance in connection with the work. Ill. 3300 w. Col Guard—Oct. 21, 1898.

**Damping.**—Rendering Coal Dust Non-Dangerous in the Saar District. From an official report by Bergassessor Dröge, Saarbrücken. The removing of the dust in this colliery was proved impracticable, and the methods of damping are described, and the advantages and disadvantages discussed. 6500 w. Col Guard—Dec. 9, 1898.

The Coal Dust Danger and Methods of Combating It (Die Kohlenstaubgefahr und ihre Bekämpfung). An address by Director Behrens upon the dangers of coal dust explosions in mines, with especial reference to the method of preventing them by sprinklers. Two articles. 6000 w. Glückauf—April 16, 30, 1898.

**Damping, Germany.**—Damping Coal Dust at German Collieries. A translation of the police ordinances concerning the sprinkling of dust in the collieries of the Dortmund district. 1800 w. Col Guard—Sept. 2, 1898.

**Electric Ignition.**—See **FIREDAMP.**

**Explosion.**—See also **COAL MINE EXPLOSION—Coal Dust.**

**Explosion, Colorado.**—A Dust Explosion. David Griffiths. A peculiar explosion on a tipple at the Crested Butte Mine, Colorado. 900 w. Mines & Min—June, 1898.

**Explosives.**—See **EXPLOSIVE—Coal Mines.**

**Precautions.**—Precautions Against the Dangers of Coal Dust. From M. Haton de la Goupillière's "Course of Mine Working." Gives methods in use as a preventive against danger. 200 w. Col Guard—Feb. 11, 1898.

**Testing Station.**—Coal Dust Testing Station at the Maria Colliery, Rhenish Prussia. From a communication by Bergassessor Sarter to "Glückauf." Descriptive. 1400 w. Col Guard—Sept. 22, 1899.

### COAL DUST FUEL.

See also **CULM.**

Coal Dust Fuel. From the "Zeitschrift des Vereins Deutscher Ingenieure," containing a tabulated statement of the heat distribution with the Wegener and the Schwartzkopff burners, with several kinds of powdered coal. 1400 w. Engr, Lond—Jan. 31, 1896.

Coal Dust Fuel. C. Schneider. On the use of coal dust in a boiler as fuel. The heating effect was 78 per cent. of the calorific capacity of the fuel. 900 w. Col Guard—Dec. 20, 1895.

Firing With Pulverized Coal (Kohlenstaubfeuerungen). A general review of the use of powdered coal, especially for boiler firing, both in connection with economy and smoke prevention. Various furnaces are described. Four articles. 4000 w. Schweis Bauzeit—July 8, 15, 22, 29, 1899.

Powdered Coal for Firing Steam Boilers: Wegener and Other Systems. Bryan Donkin. Read at meeting of Federated Inst. of Mining Engs., London. Combustion and air supply; analysis of gases; boiler efficiency; transmission of heat, etc. Systems of powdered coal firing now in use in Germany. Practical applications of the Wegener system to boiler firing. Description of the system and experiments therewith. Summary and discussion. A very able and thorough paper. 4200 w. Col Guard—June 12, 1896.

The Utilization of Coal Sludge and Coal Dust. From "Neues Saarbrueckener Gewerbeblatt." Gives the principal features of the Bechem and Post system of water-spray firing and the results of trials. 900 w. Col Guard—March 17, 1899.

**Brown Coal Briquettes.**—Coal Dust Fuel in the Brown Coal Briquette Industry. Dr. Kosmann. From the "Berg-und Hüttenmännische Zeitung," showing the heat efficiency of coal dust compared with coal. 1000 w. Col Guard—April 2, 1896.

**Cement Kilns.**—The Burning of Pulverized Coal. Describes the use of pulverized coal in rotary kilns for burning Portland cement, and advocates its use under steam boilers. 600 w. Eng Rec—Sept. 15, 1900.

**Economic Value.**—The Economic Value of Coal Dust. W. Blakemore. A brief paper summarizing the uses to which coal dust may be applied and the extent to which it has already been used. 1500 w. Can Min Rev—Sept., 1896.

**Firing Apparatus.**—Novelties in Coal Dust Firing Apparatus. From "Thonindustrie Zeitung." Illustrated description of mixers and feeding apparatus. 900 w. Col Guard—Sept. 16, 1898.

**Freitag Apparatus.**—The Freitag Coal Dust Firing System (Die Freitagsche Kohlenstaubfeuerung). L. Kauffmann. An illustrated description of an improved system of automatic stoking with finely pulverized coal, as used in sugar refineries at Amsterdam. 2500 w. Zeitschr d Ver Deutschr Ing—Aug. 19, 1899.

The Freitag Apparatus for Cold Dust Fuel. L. Kauffmann, in "Zeitschrift des Vereines Deutscher Ingenieure." Illustrated description of an improved system of automatic stoking with pulverized coal. 1400 w. Col Guard—Sept. 22, 1899.

**Furnaces.**—New Coal Dust Furnaces. Describes and illustrates recent devices, differing somewhat from those hitherto proposed. Considers the Pinther system; the Russell, Lester and Ernst systems; the Peck and Patterson systems, and the Juckes furnace. 1400 w. Ir & Coal Trds Rev—July 29, 1898.

**Illinois Central Ry.**—Burning Pulverized Coal. Describes the experiments being conducted by the Illinois Cent. Ry. Co. with apparatus for burning bituminous coal in a pulverized state, to ascertain whether the method would limit the smoke production and prove economical. Results are not yet available. Ill. 1500 w. Ry & Engng Rev—Oct. 6, 1900.

**Iron Industry.**—Coal Dust Firing in the Iron Industry. Victor von Neumann. Conclusion of a paper read before the Inst. of Austrian Engs. and Arch'ts. The advantages are said to be a saving in coal, a saving in labor, and absolute freedom from smoke. 1500 w. Am Mfr & Ir Wld—Aug. 28, 1896.

**Ruhl Apparatus.**—The Heating of Boilers with Pulverized Coal (Le Chauffage des Chaudières au Charbon Pulvérisé). Describing and illustrating the Ruhl system applied to a double flue boiler. 1000 w. La Rev Tech—May 25, 1897.

**Wegener Furnace.**—Burning Powdered Coal Under Steam Boilers. Account of a series of experiments, recently conducted in New York, on a new method invented by Carl Wegener, a German engineer. The apparatus is described and illustrated, and the results of the tests discussed editorially. 1600 w. Eng News—Sept. 16, 1897.

Smokeless Firing and Powdered Coal for Steam Boilers. Description of the Wegener apparatus. 600 w. Ind & East Eng—Feb. 8, 1896.

Smokeless and Smoke-Consuming Furnaces (Rauchlose und Rauch Verbrennende Feuerungen). W. Häntzschel. A discussion of the smoke problem with especial reference to the advantages of pulverized fuel; giving a description of the Wegener furnace. 3000 w. Gesundheits-Ingenieur—Aug. 15, 1899.

The Combustion of Powdered Coal. Illustrated description of the Wegener apparatus, with table of data of an experimental trial, conducted by Mr. Bryan Donkin and Prof. Kennedy of a Cornish boiler, fired according to this system. No fan is required for the operation. The fuel is fed to the furnace by a sieve and an ordinary chimney supplies the necessary draft. 700 w. Engng—Jan. 17, 1896.

Wegener's Powdered Fuel Boiler Furnace and Apparatus. Brief description and tabulated data of a test of the apparatus by Mr. Bryan Donkin. 1000 w. Engr, Lond—May 15, 1896.

### COAL FAMINE.

See **COAL INDUSTRY—Europe; Famine; Russia.**

## COAL GEOLOGY.

See also **COAL MINING; COAL REGION.**

The Mineralogy of the Carboniferous. Henry S. Poole. Paper to be discussed at the Montreal meeting of the Federated Canadian Mining Inst. Notes the presence of mineral infiltrations in addition to the regular stratified deposits of this formation. 1500 w. Can Min Rev—Feb., 1898.

**Anthracite.**—Some Local Disturbances in Anthracite Collieries. Hobt. Huxham. Read before the South Wales Inst. of Engineers. Instances of disturbances arising from the folding of the strata and the difficulties contended with. 3000 w. Col Guard—Dec. 10, 1897.

The Occurrence of Anthracite. W. S. Gresley. From the "American Geologist." Criticising Dr. Stevenson's theory of long exposure before covering, and leaning to that of the important influence of partial metamorphism. 7500 w. Col Guard—Aug. 7, 1896.

**Anthracite, Pa.**—Folds and Faults in Pennsylvania Anthracite Beds. Postscript. 400 w. Trans Am Inst of Min Engs—Feb., 1896.

**Ashland, Pa.**—A Geological Curiosity. H. N. Sims. An illustrated description of a peculiar split in the mammoth coal seam near Ashland, Pa. 700 w. Col Eng—July, 1897.

**Austria.**—Tertiary Pitch Coal at Wirtatobel, near Bregenz. Dr. Wilhelm von Gümbel, in "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Description of some curious coal deposits at the northern foot of the Alps, in the molasse formation. 1200 w. Col Guard—March 27, 1896.

**Belgium.**—The Rock Formation at La Tombe (Le Massif de La Tombe). A paper by M. J. Smeysters, upon the formation and faults in the coal measures about Charleroi, Belgium. 5000 w. 4 plates. Rev Univ des Mines—Jan., 1898.

See also **COAL MUSEUM.**

**British.**—Life Zones in the British Carboniferous Rocks. Report of the committee of the British Assn. Reports on carboniferous rocks and fossils from various districts. 2000 w. Col Guard—Oct. 13, 1899.

**Europe.**—The Correlation of the British and European Carboniferous Beds. Dr. Wheelton Hind. Address delivered before the Manchester Geological Soc. Discusses the question of the correlation of the beds below the millstone grit. Serial. Col Guard—April 21, 1899.

The Life Zones of the Carboniferous Deposits of Europe. Dr. Wheelton Hind, in the "Geological Magazine." A comparison of the life zones already established in Russia and Belgium, and as far as possible contrasting the distributing of fossils with that which is found in Great Britain. 3500 w. Col Guard—March 11, 1898.

**Faults.**—A Peculiar Fault and a Problem in Coal Mining. Arthur Lakes. An illustrated description of a coal seam thrown a half mile horizontally out of position. 1000 w. Mines & Min—May, 1900.

**Formation.**—Coal the Result of Flotation and Deposition in Lakes. Dr. Philippe Glangeaud, in "La Nature." Recent important modifications in ideas of the manner in which coal was produced. 800 w. Min & Sci Pr—Aug. 14, 1897.

Sidelight Upon Coal Formation. W. S. Gresley. A discussion of characteristics of plants which form the coal beds, and the manner in which they were deposited. 4000 w. Am Geol—Feb., 1899.

The Formation of Coal and Generation of Fire Damp. M. F. Rigaud. From a communication to the "Revue Scientifique," Paris. Part first considers the age and origin of coal deposits, ferrous central nucleus, and the carbon contribution of vegetable origin. Serial. Col Guard—Sept. 10, 1897.

The Formation of Coal. H. F. Bulman. From "Journal of the British Society of Mining Students." Brief consideration of theories advanced. 1200 w. Col Guard—Jan. 14, 1898.

The Manner of Coal Formation. G. Schmitz. From a communication to the "Revue des Questions Scientifiques." Presents the arguments of M. F. Rigaud in proof of coal being an eruptive rock and the difficulties in connection with the theory. 1700 w. Col Guard—Oct. 1, 1897.

See also **Origin.**

**Great Britain.**—The Yoredale Series. Wheelton Hind. Read before the Geological Soc. of London. Information concerning the carboniferous rocks of Great Britain. Serial. Col Guard—Oct. 14, 1898.

**Isle of Arran, Scotland.**—The Carboniferous Rocks of the Isle of Arran. From the annual report of the Geological Survey, 1897. Records important new discoveries in the geology of this island in the Firth of Clyde. 4000 w. Col Guard—Aug. 5, 1898.

**Kansas.**—Stratigraphy of the Kansas Coal Measures. Erasmus Haworth. The article gives the succession of rocks and the fossils contained in each. 6500 w. Am Jour of Sci—Dec., 1895.

**Lancashire.**—The Lancashire Coalfield. M. E. A short geological description showing arrangement of strata. 1200 w. Col Guard—April 10, 1896.

The Nomenclature of the Lancashire Coalfields. Herbert Bolton. Abstract of paper read at special meeting of the Manchester Geological Society. Considers the terms that might have been or are still in use in referring to the seams of the lower measures. 1800 w. Col Guard—Feb. 4, 1898.

**Metamorphism.**—The Metamorphism of Coal—How It Occurs and What Causes It. H. Bolton. The conversion of bituminous coal into anthracite and graphite, and the conversion of carbonaceous matter into diamond. 5500 w. Col Eng—June, 1896.

**Micro-Organisms.**—Micro-Organisms of Coal. B. Renault, in "Naturwissenschaftliche Rundschau." A brief account of investigations. 1200 w. Col Guard—May 5, 1899.

**Ohio.**—The Geology of the Jackson Shaft Coal. Andrew Roy. Read at meeting of Ohio Inst. of Mining Engs. Describes this peculiar deposit in Southern Ohio. 1800 w. Am Mfr & Ir Wld—Jan. 21, 1898.

**Ohio-New Mexico.**—Identification of an Ohio Coal Measures Horizon in New Mexico. C. L. Herrick and T. A. Bendrat. Calls attention to the remarkable similarity of forms in the measures near Newark, Ohio, and Albuquerque, N. M. 2500 w. Am Geol—April, 1900.

**Origin.**—The Carboniferous Age and the Origin of Coal. A statement of the different theories advanced. Ill. 1500 w. Ir & Coal Trds Rev—Feb. 4, 1898.

The Conditions Under Which the Plants of the Coal Period Grew. A summary of papers read before the British Association, at Bradford, on the origin of coal, coal-period flora, etc. 3500 w. Col Guard—Sept. 14, 1900.

The Origin of Coal. A. de Lapparent, in the "Revue de Questions Scientifiques." From a lecture to the Société Scientifique, Brussels. Part first explains proper methods of investigation, and gives some theories of prominent geologists. Serial. Col Guard—Jan. 28, 1898.

The Origin of Coal. E. Bertrand. Abstract of a lecture delivered in France, dealing with this subject. 1400 w. Col Guard—March 18, 1898.
See also **Formation.**

**Outcrops.**—Coal-Outcrops. Charles Catlett. Observations based on personal examinations. 1200 w. Trans Am Inst of Min Engs—Aug., 1900.

**Pennsylvania.**—A Peculiar Formation. George W. Engel. A description of a peculiar fault in the Mammoth coal bed, Panther Creek Basin, Pennsylvania. 700 w. Col Eng—Oct., 1897.

**Pittsburg.**—The Pittsburg Coal Bed. I. C. White. A consideration of the age, structure, area, importance and value. 4000 w. Am Geol—Jan., 1898.

**Plants.**—Fossil Plants of the Coal Measures as Stratigraphical Guides. Mark Stirrup. Abstract of paper read before the Manchester (Eng.) Geol. Soc. On the use that might be made of these plants as time marks. 1300 w. Col Guard—March 17, 1899.

Possible New Coal Plants in Coal. W. S. Gresley. An illustrated description of evidence obtained in studying coal, mostly anthracite. 2000 w. Am Geol—Oct., 1899.

**Pot-Holes.**—Pot-Holes and the Mt. Lookout Cave. William Griffith. Read at the annual meeting of the Anthracite Coal Operators' Assn. Describes the formation, and the mine accidents caused by these phenomena. 1700 w. Eng News—June 24, 1897.

**Quicksand.**—Dangerous Outcrops under Quicksand Deposits. G. M. Williams. Illustrates and describes a formation found in the ancient river bed of the Wyoming coal basin, which has caused great trouble and expense in mining. 3800 w. Mines and Min—April, 1900.

Dangerous Outcrops Under Quicksand Deposits. From the report of G. M. Williams. Illustrates and describes deposits in the Wyoming basin in Pennsylvania, and the reasons why their working is exceedingly dangerous. 1400 w. Ir & Coal Trds Rev—July 13, 1900.

**Trans-Mississippi.**—Structure of the Coal Deposits of the Trans-Mississippian Field. Charles R. Keyes. Calls attention to features brought out by recent information of this region, and facts that have an important bearing upon mining. Serial. Eng & Min Jour—Feb. 26, 1898.

**Tree-Trunks.**—Standing Tree-Trunks in a Liege Colliery. G. Schmitz in a communication to the Academie Royale de Belgique. Facts which the writer thinks call for a fresh examination of opinions hitherto advanced regarding the formation of coal from vegetation in the very spot where the trees grew. 900 w. Col Guard—Oct. 30, 1896.

**U. S. Central.**—Clay-Veins Vertically Intersecting Coal Measures. W. S. Gresley. Presents a record of observations on dike-like deposits of clay and other material traversing the bituminous-coal regions west of the Allegheny Mountains, together with illustrations of and references to allied phenomena in other countries. 6800 w. Bul of Geol Soc of Am—Jan. 18, 1898.

## COAL HANDLING.

See also **COAL MINING MACHINERY; COAL PREPARATION; CONVEYOR; DOCK—Coal; MECHANICAL HANDLING.**

A Simple Coal-Handling Equipment. James F. Hobart. Illustrates and describes a portable and easily managed device which is in operation on South street, New York. 700 w. Am Elect'n—Sept., 1899.

Coal and Ash Handling Apparatus. Descriptions with illustrations of the systems in general use. 2500 w. Am Elect'n—Oct., 1897.

Coal-Handling Machinery. Charles Piez. A discussion of continuous coal-handling machinery, under the two heads of elevators and conveyors. Ill. 4200 w. Pro of Engs' Club of Phila—Jan., 1899.

Coal-Handling Machinery. Notes the causes which have led to the development of economical methods of handling coal in power stations, giving illustrated descriptions of some of the installations. 1600 w. St Ry Rev—Oct. 15, 1898.

Modern Methods of Handling and Storing Coals. F. D. Marshall. Read at meeting of Inst. of Gas Engs., London. Describes machinery for discharging the bulk of the coals from steamers and storing the same. Discussion. 4200 w. Gas Wld—May 8, 1897.

Notes on Coal-Handling Machinery. Discusses correct designs in bearings, tension, the belt, power of the engine, fixing pipes to storage tanks, etc. Ill. 2000 w. Am Mfr & Ir Wld—April 28, 1899.

Recent Improvements in Coal-Handling Machinery. John D. Isaacs. Read before the Technical Society of the Pacific Coast. Illustrated description of improved apparatus for handling coal. Discussion follows. 4000 w. Jour of Assn of Engng Socs—April, 1896.

Some Modern Methods of Loading Coal. Illustrated description of some of the systems in use. Serial. Ir & Coal Trs Rev—Oct. 8, 1897.

Some Modern Methods of Loading Coal. Illustrates and describes the Werner system and the Wellman-Seaver system. 1200 w. Ir & Coal Trds Rev—July 29, 1898.

The Automatic Manipulation of Coal and Coke. Gilbert Little. Abstract of a paper read before the Inst. of Mining Engs, describing several systems of machinery for dealing economically with the loading, distribution and cleaning. 1300 w. Col Guard—Sept. 30, 1898.

The Transportation and Handling of Coal (Ueber Kohlen-Transport-und Lagerungs-Einrichtung). M. Buhle. A paper read before the German Society of Mechanical Engineers, with descriptions and illustrations of the devices used at many continental ports and terminals. Three articles, four plates. 15000 w. Glaser's Annalen—Aug. 1, 15, Sept. 1, 1898.

**Belgian Mine.**—Surface Arrangements at a Belgian Colliery. M. C. Minsier. From "Annales des Mines de Belgique." Illustrated description. 3000 w. Col Guard—June 22, 1900.

See also **COAL MINING MACHINERY.**

**Belt Conveyor.**—The Application of Traveling Belts to the Shipment of Coal. Thomas Wrightson. Read at meeting of Iron and Steel Inst., at Cardiff. Describes the way the author proposes to overcome the difficulties which have prevented the belt from being applied to the shipping of coal. Discussion follows. 4500 w. Col Guard—Aug. 6, 1897.

Coal Conveyor. An illustrated description of an improvement in coal conveying belting, patented by W. B. Kochs. 700 w. Engr, Lond—July 30, 1897.

**Boat Unloading.**—Emptying Coal Boats. Jenner G. Marshall. Read before the Assn. of Mech. Engs., Birmingham, Eng. Describes methods of handling coal, taking it from the vessel and depositing it some distance. 2800 w. Col Guard—March 9, 1900.

**Brooklyn.**—Coal-Handling for Large Boiler Plants. Illustrated description of the manner in which the problem has been worked out at the Ridgewood Pumping Station of the Brooklyn Water-Works and at the power stations of two of the Brooklyn street railway companies. 1300 w. Sci Am Sup—March 20, 1897.

**Car Dumpers.**—Car Dumpers and Their Work. Waldon Fawcett. Illustrated descriptions of improved types of these machines, which transfer the contents of cars to the holds of vessels with a minimum of breakage. 1800 w. Am Mfr & Ir Wld—April 26, 1900.

**Chicago Docks.**—Coal Handling Plant of Coxe Bros. & Co., Clybourne Ave. Docks, Chicago, Ill. Illustrated detailed description. 2300 w. Eng News—Feb. 11, 1897.

**Conveyors.**—Coal Conveyors. Extract from paper by Charles Piez, Philadelphia. Considers bucket conveyors, link-belt conveyors and the scraper conveyor. 2000 w. Gas Wld—June 3, 1899.

**Electric Stations.**—Handling Coal in Central Stations. James Francis. Considers plants of more than 2000 h. p. output; those of 500 to 2000 h. p. output; and plants of less than 500 h. p. output, describing and illustrating various systems. 2200 w. Am Elect'n—June, 1900.

**Gas Works.**—See **GAS MANUFACTURE—Apparatus.**

**Gladstone, Mich.**—Coal-Handling Machinery at Gladstone, Mich. Karl J. C. Zinck. Description of a coal-unloading and conveying machine. 700 w. Eng News—Feb. 4, 1897.

**Hase Drawbridge.**—The Hase Drawbridge System (Laufbrücke, System Josef Hase). Arranged especially to permit coal barrows to tip into open cars, and draw up to permit the passage of box cars. 3000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 24, 1897.

**Hoist.**—Combined Gravity and Power Hoist. A. W. Evans. A description of a unique plant for transporting coal at the mines of the New Soddy Coal Company. Ill. 2000 w. Mines & Min—July, 1899.

**Hunt Conveyor.**—Coal-Handling Machinery at the Yard of J. T. Story, Brooklyn, N. Y. Built by the C. W. Hunt Co. Illustrated description of a successful plant with a daily capacity of 600 or 700 tons. 1600 w. Am Eng & R R Jour—Jan., 1897.

**Illinois Steel Co.**—A Coal-Handling and Storage Plant. Illustrated descriptive account of the Illinois Steel Co.'s South Works plant, at South Chicago, Ill. 500 w. Ir Tr Rev—Aug. 20, 1896.

**Inclines.**—Transportation on Inclines. Edward H. Coxe. Describes the methods of getting coal down the mountain from mine to tipple in West Virginia. 1200 w. Mines & Min—Aug., 1900.

**Lake Erie.**—Coal-Unloading Machines. W. B. Hanlon. An illustrated description of different types of car-dumping machines used at Lake Erie ports, with an account of some earlier devices and the improvements to the present time. 4000 w. Mines & Min—May, 1898.

Some New Lake Erie Coal-Handling Plants. Illustrated description of some of the improved plants located at the beginning of the lake water routes. 1400 w. Eng News—Oct. 7, 1897.

**Lake Linden, Mich.**—The Coal Hoists of the Calumet and Hecla Mining Company. Julius Kahn. An illustrated description of the plant erected by this company at Lake Linden, Mich., and of its operation. 5500 w. Pro Am Soc of Civ Engs—Dec., 1898.

**Paris Gas Co.**—The Mechanical Handling of Coal and Coke (Manutention Méchanique du Charbon et du Coke). J. Laverchère. A very complete illustrated account of the apparatus and methods at the works of the Paris Gas Company. Two articles, two plates. 6000 w. Génie Civil—Sept. 22, 1900.

**Pikeville, Tenn.**—Coal-Handling. J. J. Ormsbee. Read at the meeting of the Eng's Assn. of the South. A description of the hauling and dumping plant at Pikeville, Tenn. 1500 w. Col Eng—July, 1896.

Coal-Handling Plant at Pikeville, Tenn. J. J. Ormsbee. Illustrated description of a plant designed to handle the coal carefully and clean it thoroughly. 1300 w. Eng Assn of the South —April, 1896.

**Surface Plants.**—Surface Plants of Bituminous Collieries. W. G. Wilkins. Read at meeting of Ohio Inst. of Min. Engs. Calls attention to some of the principles and appliances that should be considered in the design, laying out, and construction of the surface plants of bituminous collieries, in order to save labor and expense, and therefore reduce the surface cost of the mine output. 4400 w. Am Mfr & Ir Wld—Jan. 28, 1898.

The Design of Top Work for Coal Mines. F. W. Rickart. The paper discusses top work only. Location, output, methods of grading, hoisting outfit and dumping are considered. 4400 w. Tech—May, 1896.

See also **Belgian Mine; Pikeville; Welsh Mine; Whitwell.**

**Tipper, Hydraulic.**—A Special Hydraulic Coal Tipper at Ruhrort. Illustrated description. The excess of power furnished at the time of filling is utilized to raise the empty truck. 300 w. Am Mfr & Ir Wld—July 17, 1896.

**Tipping Device.**—A Tipping Device for Buckets (Eine Ausssturzvorrichtung für Kästen in Führungen). A. Lukaszewski. Illustrating and describing an arrangement by which the tipping and emptying of a mine bucket is accomplished by pins seating in an inclined support. 800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 24, 1900.

Tipping Arrangement for Kibbles Working in Guides. A. Lukaszewski. From "Zeitschrift für das Berg und Hüttenwesen." Brief illustrated description of a contrivance used in a colliery in Hungary. 800 w. Ir & Coal Trds Rev—March 2, 1900.

**Tipplers.**—Power-Driven Coal Tipplers. Illustrated description of an oscillating tippler which aims to avoid breakage and secure despatch. 1200 w. Col Guard—Aug. 20, 1897.

**Wabash, Ind.**—Coaling Station at Wabash. Cleveland, Cincinnati, Chicago & St. Louis Railway. A description, illustrated by half tones, plans, and sectional drawings, showing the conveyor system for handling both coal and ashes. 1200 w. Am Eng & R R Jour—May, 1896.

**Welsh Mine.**—Colliery Surface Arrangements for the Delivery of Coal from Pit Cage into Railway Wagons, for a Gross Quantity of, Say, 1500 Tons per Day, Exclusive of Coal Washing and Coking. S. A. Everett. Illustrated description of best arrangement suited to colliery conditions in South Wales. Serial. Can Min Rev—July 31, 1900.

**Whitwell, Tenn.**—Handling Coal by Gravity at Whitwell, Tenn. Tyler Calhoun. A description of the mines and manner of handling the coal. From 800 to 1000 tons per day is the output. 3400 w. Eng Assn of the South—April, 1896.

### COAL HOPPERS.

**Locomotive Tenders.**—Coal Hoppers on Standard Tenders—A. T. & S. F. Ry. Description and drawing of a substitute for the rack and boards. 200 w. Ry Rev—May 9, 1896.

### COAL INDUSTRY.

Coal Is King. I. The Advantage of England and the United States in the World's Commerce. Edward Atkinson. II. The Supply of Anthracite Coal in Pennsylvania. Edward W. Parker. The advantages due to the predominance of coal, iron and steel. 1800 w. Cent Mag—April, 1898.

A New Work on the Coal Industry. Review of a work by H. F. Bulman and R. A. S. Redmayne. Many extracts are given and very favorable comment. 4300 w. Ir & Coal Trds Rev—Nov. 20, 1896.

Coal Production, Consumption and Value. Editorial on the report of the British Board of Trade regarding the fuel supply of the world. 1800 w. Engng—June 24, 1896.

Coal Production of the Principal Countries of the World. Statistics from the annual statement of the British Board of Trade. 2200 w. Col Guard—May 12, 1899.

Notes on Foreign Coal and Coke Trades in 1899. Notes on the trade of Germany, France, Belgium, Austria-Hungary, New Zealand, etc. 4800 w. Ir & Coal Trds Rev—Jan. 5, 1900.

Statistics of Coal Production and Consumption. Tabular statements are presented giving the statistics of the British, Russian, Swedish, German, Belgian and French coal industries. 2500 w. Col Guard—March 13, 1896.

Technical Progress of the Coal Industry in 1897. Considers the improvements in explosives, shipment, lighting, mining work, shaft sinking, etc. 5500 w. Ir & Coal Trds Rev—Dec. 17, 1897.

The Coal and Iron Ore Mining Industries of the World. C. Le Neve Foster. From the general report for 1897 on mines and quarries. Statistics of all kinds of solid mineral fuel, and the working of the mines. 4000. Col Guard—March 10, 1899.

The Coal Production of the Principal Countries of the World. Interesting statistics taken from the annual statement by the Board of Trade. 2200 w. Col Guard—April 29, 1898.

The Coal Reserves at the Close of the Nineteenth Century. Edward Hull. Abstract of an address at meeting of Victoria Inst., London. Discusses the export of this mineral from England, and things in reference to the supply that should be investigated by the Royal Commission. 2000 w. Ir & Coal Trds Rev—July 20, 1900.

The Coal Situation and the World's Coal Fields (La Crise du Charbon). A review of coal fields of the world, particularly new ones, and a consideration of international coal trade and transportation. 1000 w. Moniteur Industriel—June 9, 1900.

The Coal Supplies of the World. Benjamin Taylor. An interesting review of the production, importance and consumption of this mineral in all parts of the world, with special statistics of the English supply. 7300 w. Nineteenth Cent—July, 1898.

The Foreign Coal and Iron Trades in 1897. Review of these industries in Germany, France, Sweden, Belgium, Russia and Austria. 6500 w. Ir & Coal Trds Rev—Dec. 31, 1897.

The Production of Coal: Its Consumption and Cost. Presents the objections to the estimate of the consumption of coal per capita, and discusses the production of the different countries, and the cost of producing. 2000 w. Engng—March 26, 1897.

**Alabama.**—Coal and Iron in Alabama. William M. Brewer. A brief history of these industries is given as an introduction to a series of articles to be published in the same paper. Serial. Am Mfr & Ir Wld—June 25, 1897.

Mineral Production of Alabama. William M. Brewer. Comments on recent statistics of coal, coke and iron and information of the mines, production, etc. Am Mfr & Ir Wld—July 9, 1897.

**American.**—See **United States.**

**Anthracite.**—The Anthracite Coal Trade. Waldon Fawcett. Figures on the output, showing its importance and the effect the strike may have on commerce. 2000 w. Am Mfr & Ir Wld—Sept. 27, 1900.

The Anthracite Question. Editorial discussion of the troubles which beset this trade, outlining a plan for the conversion of the coal into gas and its transmission, as the use of gas for domestic purposes is continually increasing. 1400 w. Eng & Min Jour—Aug. 6, 1898.

The Competition Against Anthracite Coal. From the monthly letter of the Anthracite Coal Operators' Assn. A statement of the conditions of to-day and their effect on the anthracite coal trade. 2300 w. Ir Age—Oct. 14, 1897.

**Australasia.**—Australasian Coal. Concerning the advance in price and the output. 1200 w. Engng—Aug. 3, 1900.

**Belgian Syndicate.**—A Collier's Syndicate. History of the Associated Colliers of Rive-de-Gier. The attempt resulted in failure but is of interest especially at the present time. Condensed from account in "Annales des Mines." 2800 w. Col Guard—Dec. 10, 1897.

**Belgium.**—Belgian Coal Industry in 1894. M. Emile Harzé. Abstract from the "Statistique de Mines, Minières Carrières, Mines Métallurgiques et Appareils à Vapeur, pour l'Annee 1894." The article gives the production as 20,584,501 tons from the 262 collieries, produced by 117,108 workers, receiving £4,406,792 in wages, making after proper deductions 2s. 7d. per man per day. Also a vast amount of detail statistics given. 2300 w. Col Guard—Nov. 1, 1895.

See also **IRON INDUSTRY—Belgium.**

**British.**—British Coal Resources. A. D. Provand. Letter to the First Lord of the Treasury calling attention to new facts ascertained since the Royal Commission reported in 1871. 1200 w. Col Guard—March 23, 1900.

Coal Exports and National Trade. A survey of the position of Great Britain at the present time, the home industries which absorb coal in the production of steam power, the exports, etc. 2300 w. Col Guard—Oct. 14, 1898.

Coal Mining Puzzles. The present position of the coal trade of Great Britain, and the causes. Editorial. 1400 w. Engr, Lond—July 17, 1896.

Economic Aspects of the Coal Industry. The first part deals with the extent and duration of the English coal fields. 1200 w. Ir & Coal Trds Rev—Sept. 25, 1896.

Our Coal Resources and Consumption—A Reconsideration of Some Estimates. Considers the question of the quantity of coal in Great Britain, examining information given by Profs. Edward Hull and Stanley Jevous. Serial. Jour Gas Lgt—Feb. 20, 1900.

The British Coal Industry—Its Troubles and Their Remedies. Considers the movement to regulate production and prices, not only in England, but in all coal producing countries. 8700 w. Ir & Coal Trds Rev—Sept. 10, 1897.

The British Coal and Coke Industries for 1897. A review of the output, exports, prices and conditions for 1897. 3500 w. Ir & Coal Trds Rev—Dec. 17, 1897.

The Burden of Coal. Benjamin Taylor. A detailed discussion of the coal question in England, showing its vital importance and where to look for relief. 5800 w. Nineteenth Cent—Sept., 1900.

The Coal Supply of the United Kingdom. Leonard H. Courtney. Substance of presidential address before the Royal Statistical Society. Tracing from facts of recent experience, confirmation of the anticipations of Jevons as published in his book, "The Coal Question," thirty years ago. 3300 w. Col Guard—Dec. 17, 1897.

The Coal Trade Centers of the United Kingdom. Part first illustrates and describes Cardiff. Serial. Ir & Coal Trds Rev—Nov. 24, 1899.

The Coal Industry in 1896. A review of the industry in Great Britain, shows the production to be probably the highest on record, but the prices unsatisfactory. The article deals with prices, production, labor disputes, etc. Serial. Ir & Coal Trds Rev—Dec. 24, 1896.

The Output, Value and Distribution of Coal During 1898. From the official report of the United Kingdom. 2400 w. Col Guard—Oct. 20, 1899.

The Present Position of the Coal Trade and Some of Its Difficulties. William Armstrong. An address before the North of England Inst. of Min. and Mech. Engs. Reviews the present condition, the difficulties and the line of action by which they might be advantageously met and overcome. 2000 w. Col Guard—Oct. 14, 1898.

See also **MINERALS.**

**British, 1896.**—The Coal Trade in 1896. Review of the year in different districts. 8000 w. Col Guard—Jan. 1, 1897.

The Production, Value and Distribution of Coal in 1896. Tabulated statements and discussion of the coal industry of the United Kingdom. 1500 w. Col Guard—Sept. 24, 1897.

**British, 1897.**—The Coal Trade in 1897. Reviews the English trade of the year in Northumberland, Durham, Lancashire, Yorkshire, etc., also the business in Scotland and London. 8500 w. Col Guard—Jan. 7, 1898.

The Output, Value and Distribution of Coal in 1897. Statistics and detailed particulars relating to the distribution of coal, compiled from the General Report on Mines and Quarries. Map. 1800 w. Col Guard—Nov. 18, 1898.

**British, 1898.**—The Coal Trade in 1898. Report of Northumberland, Durham, Lancashire, Yorkshire, Derbyshire and Nottinghamshire, South Staffordshire, South Wales and Monmouthshire, Scotland, and London. 8500 w. Col Guard—Jan. 6, 1899.

**British, 1899.**—The Coal Trade in 1899. Discusses each of the districts in Great Britain, and reports general prosperity. 11200 w. Col Guard—Jan. 5, 1900.

The Coal and Coke Trades in 1899. A general review and also articles by able writers reviewing various districts of Great Britain. Maps. 11500 w. Ir & Coal Trds Rev—Jan. 5, 1900.

**British Exports.**—Coal and Iron Exports. An editorial giving figures for the British export trade in coal for August, 1900, and for the first eight months of 1900. 500 w. Col Guard—Sept. 14, 1900.

**British in France.**—British Coal in France. In a Foreign Office Report, dated Feb. 13, 1896, Consul O'Neill, of Rouen, makes some observations with reference to the consumption of British coal in France, and the effect which the new railway tariffs are likely to have upon the trade, with colonial statistics. 1500 w. Col Guard—March 27, 1896.

**Canada.**—Canadian Mining Notes. A review of coal and iron ore production and trade. 1100 w. Col Guard—Sept. 14, 1900.

**Capital and Labor.**—Capital and Labor in Coal Mining During the Last 200 years. J. B. Simpson. Extracts from a paper read before the Newcastle (Eng.) Economic Society. Reviews the changes and present conditions, concluding that the selling price will continue to be the guiding factor for wages. 2800 w. Col Guard—March 18, 1898.

**East.**—Coal in the East. Editorial showing that the supplies of coal from Japan, British India, and China must soon cause keen competition in eastern markets. 1200 w. Engng—Aug. 5, 1898.

**East Durham, Eng.**—The East Durham Coalfield. From the "Newcastle Chronicle." Report of the condition of the coal trade in this district, which has seriously felt the recent depression. 1400 w. Col Guard—Nov. 19, 1897.

**1896.**—The Production of Coal in 1896. Report of the production in India, Spain, and the United States. 1600 w. Bd of Trd Jour—Aug., 1897.

**1897-98-99.**—The Coal Production of the Principal Countries of the World. Statement showing what has been the production in the five principal coal producing countries in the years 1897, 1898 and 1899. 2200 w. Col Guard—May 25, 1900.

**1899.**—Coal in 1899. Reports for the year showing the largest output on record, and giving interesting information. 9800 w. Eng & Min Jour—Jan. 6, 1900.

**England.**—See **British.**

**Europe.**—Continental Coal-Producing Countries—Their Progress and Prospects. Part first discusses the production and consumption in France. Serial. Ir & Coal Trds Rev—July 9, 1897.

The Coal and Coke Industries of Continental Europe. Part first begins the review of these industries in Germany. Serial. Ir & Coal Trds Rev—Oct. 21, 1898.

The Present Coal Crisis in Europe. Abstract of an article in the latest monthly summary of the Commerce and Finance of the United States. Discusses the scarcity and price of coal and the causes. 3400 w. Ir & Coal Trds Rev—July 20, 1900.

**Famine.**—The Coal Famine and the Public. From the London "Times." Discusses the causes of the recent scarcity and high cost of fuel all over the world. 4000 w. Jour Gas Lgt—April 24, 1900. See also **Europe; Russia.**

**German.**—The German Coal Industry. A review of the condition of the German coal industry during the past few months, when scarcity and high prices have prevailed. 2500 w. Col Guard—Sept. 14, 1900.

See also **IRON TRADE—Germany.**

**Germany, 1896.**—The Coal Industry of Germany in 1896. Review of economic conditions, production, etc. 1000 w. Ir & Coal Tr Rev—Jan. 1, 1897.

**Great Britain**—See **British.**

**Index of Progress.**—The Coal Industry as an Index of National Progress. A method of testing the industrial life of the nation in comparison with other countries, based on the use of coal for power purposes. Serial. Col Guard—Oct. 28, 1898.

**India.**—The Coal Supply of India. Wyndham R. Dunstan. An exhaustive report on the occurrence, distribution, mode of working, production, imports and exports, chemical examination and results. 4500 w. Col Guard—July 22, 1898.

The Coal Supply of India. A brief résumé of the coal mining industry in India. From the "Pioneer." 1800 w. Ind & East Eng—March 28, 1896.

The Production of Coal in British India in 1896. Shows the encouraging prospects for this growing industry. 1300 w. Ind & East Engr—Oct., 1897.

**Literature, 1897.**—The Technical Literature of the Year. H. G. Graves. Review of the year's literature of the coal and iron industries, aiming to show the general trend thought has taken. 3000 w. Col Guard—Dec. 31, 1897.

**Natal.**—The Coal Industry in Natal. Reviews the history of the industry, and considers the future prospects most promising. 1200 w. Col Guard—April 20, 1900.

**New Zealand.**—Coal Mining in New Zealand. From the annual statement of the Minister of Mines giving the output of the mines, earnings of the mines, etc. The production was 719,546 tons, employing 1899 men at an average pay per week of £2. 3s. 9d. 1000 w. Aust Min Stand—Oct. 19, 1895.

**Ohio.**—Ohio Coal and the Railroads. Editorial on the importance of the Ohio coalfield from the railroad point of view, the present condition of the industry. 1400 w. R R Gaz—April 16, 1897.

**Output Control.**—End of the Control of the Output Scheme. Editorial comment on the proposal of the associated coal owners of South Wales to limit the output in order to obtain better prices. 1300 w. Engr, Lond—June 25, 1897.

**Output Regulation.**—The Regulation of Coal Output and Prices. Part first considers the cases of the Westphalian coal trade syndicate, the New South Wales, the scheme of Sir George Elliot, of D. A. Thomas, and Sir W. T. Lewis, with further proposals. Serial. Ir & Coal Trds Rev—Sept. 17, 1897.

The Regulation of the Output of Coal in South Wales. Report of the owners' representatives on the Sliding Scale Joint Committee upon the question of the undue competition in the coal trade. 2800 w. Col Guard—Dec. 4, 1896.

See also **Westphalia.**

**Pennsylvania.**—The Pennsylvania Coal Investigation. Editorial on the report of the committee appointed to investigate the condition of the coal trade in the bituminous districts of Pennsylvania. 1200 w. Eng & Min Jour—June 12. 1897.

**Pennsylvania, 1897.**—Pennsylvania Coal Statistics for 1897. Authentic and reliable data, given in tabulated form. 1000 w. Mines & Min—March, 1898.

**Poland.**—The Production of Coal in the Dombrowa Region, Poland, for 1899 (L'Extraction Houillère du Bassin de Dombrowa, Pologne, en 1899). Official tables, taken from the "Torgovo-Promychlénaiä Gazeta," giving figures for 1898 and 1899. 800 w. Moniteur Industriel—July 28, 1900.

**Production.**—Coal Production in 1896. Statistics as recently published by Messrs. Adler & Ruley, of Philadelphia, are given, with remarks. 800 w. R R Gaz—May 28, 1897.

Coal Production of the Principal Countries of the World. Statistics from the third annual statement of Sir R. Giffen of the Board of Trade. Tables are given showing the quantity and value of coal produced in the principal countries of Europe, and in Japan and the United States in each year from 1883 to 1895 inclusive. 2000 w. Col Guard—March 5, 1897.

**Retail.**—Coal Cell Trade. George Johnson. An explanation of the manner of working coal cells provided for retail sale of coal. 1000 w. Col Guard—May 11, 1900.

**Rhenish-Westphalian Syndicate.**—See **Westphalia.**

**Russia.**—Coal and Iron in Russia. From a Consular Report. Reports concerning these industries, giving production. 1500 w. Col Guard—July 1, 1898.

Russia's Lack of Coal (Crise Houillère en Russie). An account of the scarcity of coal in Russia, the lowering of the customs duties, discussion of ways and means to increase the domestic supply and tables showing imports in recent years. 1000 w. Moniteur Ind—April 14, 1900.

The Coal Crisis in Russia and the Main Sources of Native Supply. H. Cooke. A Foreign Office report. Discusses the present scarcity and high price of coal, and the causes, and remedies. 2500 w. Col Guard—March 23, 1900.

See also **IRON INDUSTRY.**

**Scotland West.**—See **IRON INDUSTRY.**

**South Africa.**—South African Coal. The steady development of coal-mining in the Cape of Good Hope and Natal as shown in the history of coal for the railways. 2000 w. Engng—April 9, 1897.

**South America.**—See **BROWN COAL—South America.**

**Spain.**—Coal Production in Spain. Statistics for the past year, giving an idea of the condition of the mining industry in 1898. 400 w. Col Guard—Feb. 10, 1899.

**Sweden.**—See **IRON INDUSTRY.**

**United Kingdom.**—See **British.**

**United States.**—The Coal Trade of the United States and the World's Coal Supply and Trade. Abstract from the Summary for Commerce and Statistics of U. S. Bureau of Statistics for April, 1900, with diagram. 5000 w. Sci Am Sup—Sept. 22, 1900.

United States Coal Production in 1896. Tables giving statistics of the total production of coal and coke in the United States for 1896, as collected for "The Mineral Industry," with comments. 1800 w. Eng & Min Jour—June 19, 1897.

United States Coal Production in 1899. Completed tables of production showing that for the first time Great Britain has taken second place and the United States leads. 1000 w. Eng & Min Jour—June 2, 1900.

**U. S. Export.**—American Coal in Great Britain. Reprints of articles appearing in the British papers, in reference to the introduction of American coal. 1500 w. U. S. Cons Repts, No. 850—Oct. 4, 1900.

American Coal in Marseilles. A report giving information concerning a market for this product, most favorable to its introduction. 500 w. U. S. Cons Repts, No. 336—Jan. 28, 1899.

American Coal in Foreign Countries. Articles from the "London Morning Leader," and from the British "Coal and Iron Trades Review," on the possibilities of American coal competition. 1500 w. U. S. Cons Repts—Nov., 1898.

American Coal for Belgium. A translation from "The Industrial Review," of Charleroi, is quoted, which shows, by calculations, that the shipping of coal from America to Europe can be accomplished at a profit. The consul agrees, suggesting Ghent as the best port for cotton vessels, with coal ballast. 1600 w. Con Rept—Jan., 1896.

Coal Exports. Editorial on the present situation and the American coal question. 1700 w. Eng & Min Jour—Oct. 6, 1900.

Coal Owners, Gas Companies, and the Coal Question. Concerning the scarcity of coal and high prices in England and on the Continent, and the importation of American coal. 1800 w. Jour Gas Lgt—Aug. 28, 1900.

Exports of American Coal. The possibilities of the upbuilding of an immense trade pointed out by F. E. Saward, special U. S. Commissioner at Paris. 5000 w. Marine Rev—Sept. 20, 1900.

The World's Need of Coal and the United States' Supplies. F. E. Saward. A review of the changing conditions in the coal production of the world, showing the assured supply from the United States. 3500 w. Eng Mag—Oct., 1900.

United States Coal in Nantes. Consular report concerning this place as a market for American coal. 1200 w. U. S. Cons Repts, No. 850—Oct. 4, 1900.

United States Coal in Marseilles. Extracts from the annual report of the consul, concerning the coal exported from America and other countries. 1500 w. U. S. Cons Repts, No. 850—Oct. 4, 1900.

**U. S., Southern.**—The Coal Interests of the South. J. J. Ormsbee. Historical and statistical review of the work of the past year. 4500 w. Tradesman—Jan. 1, 1897.

The Coal Interests of the South. Jesse T. Hill. A review of the mining operations in each of the

Southern States. 1800 w. Tradesman—Jan. : 1897.

The Expansion of the American Coal Trade. Extracts from a pamphlet written by Joseph W. Burke, under the title of "A Great National Question," dealing with this subject, and showing the extent and value of the Great Warrior coal fields in Alabama, with comments. 1500 w. Mfrs Rec—Oct. 15, 1897.

The Coal Interests of the South. J. J. Ormsbee. A review of the coal operations in each of the Southern States, with description of a typical coal mine. Ill. 6000 w. Tradesman—Jan. 1, 1896.

Southern Coal and Coke. Review of one year's operations in the principal fields of the Southern United States. 1700 w. Mfrs Rec—Sept. 2, 1898.

**Victorian Age.**—A Reign of Coal and Iron. Progress achieved in these industries during the reign of Queen Victoria. Serial. Ir & Coal Trds Rev—Sept. 25, 1896.

**Wales.**—The Coal and Iron Industries of South Wales. Details of the chief coal and iron industries. Part first deals largely with the coal trade. Information of the docks, the resources, output, characteristics, methods of working, winding, etc. Ill. Serial. Ir & Coal Trds Rev—July 23, 1897.

The Control of the Output of Coal in South Wales. A suggested scheme for the adjustment of the output to meet the demand. 3200 w. Col Guard—March 5, 1897.

The Recovery in South Wales. On the remarkable recuperative power of the coal and iron trades. 1200 w. Engr, Lond—Jan. 13, 1899.

**Westphalia.**—The Report of the Rhenish Westphalian Coal Syndicate for the Year 1899 (Vorstandsbericht des Rheinish-Westfälischen Kohlensyndikats übber das Jahr 1899). Giving tabulated results of the year's operations, showing the increased output over the preceding year. 2000 w. Glückauf—Feb. 3, 1900.

The Coal Industry of the Rhenish Westphalian Provinces. T. R. Mulvany. From the British Consular Repts. Shows the benefits from a combination of a number of collieries, thus doing way with reckless competition, and reports the conditions in detail. 8300 w. Ir & Coal Trds Rev—April 29, 1898.

The Rhenish-Westphalian Fuel Syndicates. Brief summary of information concerning these combinations which have so largely contributed to the prosperity of the German coal trade. 1200 w. Col Guard—Jan. 20, 1899.

The Rhenish-Westphalian Coal Syndicate. George Blake Walker. Abstract of paper read at meeting of the Midland Inst. of Min., Civil and Mech. Engs., with discussion. Reports the continued success of this combination, and the conditions affecting it. 2200 w. Col Guard—Feb. 3, 1899.

**West Va. vs. Ohio.**—The Competition of West Virginia with Ohio Coal. E. H. Coxe. A statement of some of the conditions governing this competition. 1200 w. Eng & Min Jour—Oct. 8, 1898.

## COALING AT SEA.

**Miller System.**—An Apparatus for Coaling at Sea. T. Spencer Miller. Lecture before the Worcester Co. Mech. Assn. An illustrated description of the cableway for coaling at sea, invented by the author. 6000 w. Jour of Worcester Poly Inst—May, 1900.

Coaling Vessels at Sea. Spencer Miller. Reviews various plans that have been suggested and describes the author's experiments with the Miller conveyor on the U. S. S. "Marcellus." Ill. 8000 w. Soc of Nav Archts & Marine Engs, No. 1—Nov., 1899.

The Miller Cableway for Coaling Vessels at Sea. Illustrated description of the device and its operation, with remarks. 2000 w. Eng News—April 5, 1900.

The Problem of Coaling Warships at Sea. Spencer Miller. Illustrating very fully the apparatus which has been successfully tested and favorably reported upon by the United States Government, fully solving this much discussed problem. 3000 w. Eng Mag—Feb., 1900.

## COALING STATION.

See also **COAL BIN; COAL HANDLING; COAL STORAGE.**

**Jersey City.**—The Jersey City Coaling Station of the Erie Railroad. Illustrated description of a plant that has proved efficient and economical. 1600 w. R R Gaz—April 14, 1899.

**New London, Conn.**—The First Coaling Station for the United States Navy. Illustrates and describes the plant at New London, Conn., for the storage and protection of coal, and for handling from store to vessel with rapidity. 900 w. Ir Age—Jan. 18, 1900.

**South Plainfield, N. J.**—The 600-Ton Coaling Station of the Lehigh Valley Railroad. An illustrated detailed description of a recently completed station at South Plainfield, N. J. 1200 w. R R Gaz—Jan. 5, 1900.

**U. S. Foreign.**—The United States Foreign Coaling Stations. Information from the recent report of Admiral Bradford, of the U. S. Navy, showing the importance of the coal trade and coaling stations in naval matters. 2000 w. Ir & Coal Trds Rev—Feb. 2, 1900.

## COAL MINE.

See also **COAL MINING; COAL REGION; ELECTRIC EQUIPMENT—Coal Mine.**

**Accounts.**—A Colliery Audit. George Johnson. An outline of an auditor's duty. 1700 w. Col Guard—Oct. 6, 1899.

Colliery Invoices and the Purchase of Colliery Stores and Materials. George Johnson. On the outward and inward invoices of colliery companies, showing the position of storekeeper to be one of responsibility and importance. 2700 w. Col Guard—Sept. 1, 1899.

The Application of the Double-Acting System to Collieries. George Johnson. Gives an illustration of colliery accounts drawn up on the single and double account systems, with comment. 1200 w. Col Guard—April 7, 1899.

The Redemption of Capital Expenditure Upon Collieries and the Valuation of Mining Capital, etc. George Johnson. Discusses the different ways and means which may be employed to attain this object. 2200 w. Col Guard—Jan. 12, 1900.

See also **COAL MINE MANAGEMENT.**

**Arkansas.**—The Bonanza Arkansas Coal Mines. H. Foster Bain. Notes gathered during a recent visit. A semi-anthracite coal of high steaming value. The means of working are described. 1500 w. Eng & Min Jour—Nov. 12; 1898.

**Ashington, Northumberland.**—Ashington Colliery, Northumberland. Detailed description of the three pits. 2700 w. Col Guard—Nov. 20, 1896.

**Ayrshire.**—The Ayrshire Coal Feld. M. E. The geology, method of working, ventilation, pumping, boilers, screening, etc. 1500 w. Col Guard—April 15, 1897.

**Bannockburn, Sterlingshire.**—The Sterlingshire Coal Field. Part first is a description of Bannockburn Colliery, which is laid out on the most approved principles for the saving of labor, separation and easy handling of coal, and dressing it for the markets. 2800 w. Col Guard—Oct. 9, 1896.

**Belgium.**—Neuville Pit of the Grand-Mambourg-Sablonniere Colliery, Belgium. Notes of a visit, describing the Reumaux safety appliance for the prevention of overwinding, and other interesting equipments. Ill. 1600 w. Col Guard—June 1, 1900.

**Birley, Eng.**—Birley Collieries. A general description of the plants at East and West Birley, Derbyshire, with illustration of the picking bands. 1000 w. Col Guard—Sept. 9, 1898.

**Bowie, Texas.**—The Bowie Coal Mine, Texas. Illustrated article, which says two Texas coal mines are now in operation, one working on a vein 22 to 26 in., and delivering about 300 tons per day, and the other where about 1800 tons a day are mined. Coal lies 401 ft. below the surface, contains 47 per cent. carbon, and costs from 70 to 80 cents per ton to mine. 1000 w. Eng & Min Jour—Nov. 9, 1895.

**British Columbia.**—Coal Mining in British Columbia. Harrison F. Bulman. Describes the collieries of Crow's Nest Pass and Vancouver Island. 3500 w. Col Guard—June 30, 1899.

**Broomhill, Northumberland.**—New Plant at Broomhill Colliery. John E. O'Keefe. From the "Journal of the British Society of Mining Students." Brief description. 800 w. Col Guard—May 18, 1900.

**Bruay, France.**—The New Works of the Mines of Bruay (La Fosse No. 5, des Mines de Bruay) Describes the plant installed in the new pit of the Bruay coal mines in the Pas-de Calais district, with plate of pumping engines. 2500 w. 1 plate. La Rev Tech—Aug. 25, 1897.

**California.**—A California Coal Mine. R. H. Norton. Brief account of the mine at Tesla. 800 w. Eng & Min Jour—Feb. 4, 1899.

Tesla Coal Mines. F. J. Horsewill. A large coal property in Alameda Co., California, which has recently been developed. Particulars as to its location, the position of the seams, the methods employed in working them and the plant for preparing and handling the coal. Ill. 3300 w. Mines & Min—Nov., 1898.

**Cape Bréton.**—See **Nova Scotia.**

**Cape Colony.**—At a Cape Colonial Coal Mine. A statement of the conditions found by the writer at Indwe, in the northeastern portion of the colony. 2300 w. Col Guard—July 7, 1899.

**Chesterfield, England.**—The Langwith and Clapwell Collieries. A general illustrated description of works near Chesterfield. 1700 w. Col Guard—Sept. 7, 1900.

**China.**—Tong Colliery, Kaiping, North China. Thomas Webster. Read before the South Wales Inst. of Engs. Describes this colliery, the method of working, ventilation, haulage, etc. 3500 w. Col Guard—Oct. 5, 1900.

**Chopwell, Durham.**—Chopwell Colliery, Durham. J. R. Gilchrist. From the "Journal of the British Society of Mining Students." Describes buildings and plant, boilers, shaft guides, headgear, screening, waterworks railway and inclines. 2000 w. Col Guard—Nov. 27, 1896.

**Colorado.**—Coal Mines of Pictou. Frank Meade. A description of the mines of the Colorado Fuel & Iron Co., the methods of operation, and the geological formation. Ill. 2800 w. Mines & Min—Aug., 1900.

The Newcastle Mines. R. M. Hosea. One of the Colorado Fuel Iron Co.'s most extensive coal mining plants is described and illustrated. The peculiar geological features of the coal measures, methods of working, drainage, ventilation, etc. Serial. Col Eng—April, 1897.

**Commentry-Fourchambault Co., France.**—See **COAL MINING; IRON WORKS.**

**Co-Ownership.**—Co-Ownership of Coal Mines. Leading aspects and essential points of the question. 2400 w. Col Guard—Oct. 16, 1896.

**Corral Hollow.**—The Corral Hollow Coal Mines. Well illustrated description. 200 w. Min & Sci Pr—Feb. 29, 1896.

**Deep Pits.**—See **COAL MINING.**

**Dortmund, Germany.**—New Shaft Installation at the Preussen I. Pit, near Dortmund. Description of improved machinery. 1100 w. Col Guard—Nov. 15, 1895.

**English Northern.**—The Great Northern Coal Field —Its Rise and Progress. Reviews the history of the collieries in the north of England. Maps. 8700 w. Ir & Coal Trds Rev—July 14, 1899.

**Eureka, Pa.**—The Largest Collieries in the United States. Burcham Harding. Illustrated account of the Eureka Mines, near the center of Pennsylvania. Serial. Eng & Min Jour—Feb. 17, 1900.

**Explosions.**—See **COAL MINE EXPLOSIONS.**

**Explosives.**—See **EXPLOSIVE—Coal Mines.**

**Fifeshire.**—A Visit to Fifeshire Collieries. Notes on features of interest observed at Dalbeath, Mossbeath, Kirkwood Pit and Aitken Pit. 2000 w. Col Guard—Oct. 7, 1898.

**Flooded.**—The Reopening of a Flooded Colliery. Charles Cooke. Extract from a paper in "The Journal of the British Society of Mining Students." An account of a mine in the Lancashire coalfield, once reopened but again flooded, and with the water flowing after seventeen years. 1500 w. Col Guard—July 6, 1900.

**France.**—The Hard Coal Mines of Northern France (Der Nord Französische Stein Kohlenbergbau). F. Drobniak. With some account of the methods of mining and timbering. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 25, 1900.

**Head Gears.**—See **WINDING.**

**Hungary.**—Mines and Metallurgy in Hungary. Antoine Kerpely. Condensed translation from an article in the catalogue of the Section Hongroise, Brussels Exposition, giving information of the mining industry. working and quantity of coal. Serial. Col Guard—July 16, 1897.

**Illinois.**—An Illinois Machine Coal Mine. Illustrated description of the mine, shaking screens, haulage plant, main entries, rooms, roof and machines. 2000 w. Eng & Min Jour—Feb. 6, 1897.

**India.**—The Indian Railway Coal Supply and Indian Collieries. Brief account of the collieries which chiefly supply the Indian railways, their outputs, and the quantity of coal raised per person employed. 1800 w. Ir & Coal Trds Rev—Oct. 14, 1898.

Umaria Colliery. Description with plan and information concerning output, earnings, etc. Serial. Ind Engng—Feb. 12, 1898.

Warora Colliery. An account of the working of this colliery during the year 1897-98. 700 w. Ind Engng—Jan. 14, 1899.

Warora Colliery. Report of this colliery for the past year; the output, accidents, etc. 1000 w. Ind Engng—March 26, 1898.

**Kent.**—See **COAL MINING—Borehole, Ropersole, Kent.**

**Kirkby.**—The Surface Plant at Kirkby Colliery. Thomas Gillott. Read before the Inst. of Civ. Engs., England. Illustrated detailed description. 2800 w. Col Guard—May 14, 1897.

**Lanarkshire.**—The Lanarkshire Coalfield. M. E. Describes the Newton collieries, method of working, haulage, pumping, boilers, screening, etc. 2700 w. Col Guard—March 19, 1897.

The Mineral Seams of New Monkland, Lanarkshire. James Prentice. Abstract of a paper read before the Mining Inst. of Scotland. Description of the seams which have been or are being worked, from which in recent years upwards to 1½ million tons annually have been raised. 3000 w. Col Guard—April 2, 1897.

**Leith.**—See **COKE—Connellsville, Leith Mine.**

**Limburg, Holland.**—The Hard-Coal Basins in the Holland Province of Limburg (Das Steinkohlenbecken in der Holländischen Provinz Limburg). Franz Büttgenbach. A brief description of the Limburg mines, and the influence which their development will have upon the German coal trade. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen —Feb. 17, 1900.

**Maps.**—See **MAP.**

**Maryland.**—The Mines of the Consolidation Coal Company. Illustrated description of the mines of this company of Baltimore, Md., and its transportation facilities. 2000 w. Ir & Coal Trds Rev—June 10, 1898.

**Michigan.**—Pere Marquette Mines. R. A. Randall. Illustrated description of one of the largest and best equipped coal mines in the State of Michigan. 700 w. Mines & Min—Oct., 1900.

**Missouri.**—Mine No. 15, Rich Hill, Missouri. Charles Evans. A description of its equipment, including a new electric haulage plant, by which the output has been increased. 1000 w. Mines & Min—April, 1900.

**Montana.**—The Cottonwood Mine at Stockett, Montana. J. E. Stockett. Describes the mine and the haulage arrangements used. 1500 w. Mines & Min—Jan., 1899.

**New South Wales.**—The Coal Mines of New South Wales. Extracts from a very complete report by A. A. Atkinson, discussing ventilation, methods of working, haulage, lighting of mines, and methods of signalling. 1800 w. Ir & Coal Trds Rev—Sept. 30, 1898.

**Nova Scotia.**—A Nova Scotia Coal Mine. An illustrated account of the mines of the Cumberland Railway and Coal Company. 5000 w. Ir & Coal Trds Rev—July 8, 1898.

The Pictou Coalfield, Nova Scotia. Harrison F. Bulman. An account of the collieries, the methods of working, equipment, management, etc. 3000 w. Col Guard—June 16, 1899.

The Sydney Coalfield, Cape Bréton. Harrison F. Bulman. An account of the collieries of the Dominion Coal Company and of the General Mining Association. 3800 w. Col Guard—June 2, 1899.

**Nova Scotia, Drummond.**—The Drummond Colliery. Charles Fergie. An illustrated description of an extensive coal mine, giving the nature of the coal, methods of working and preparing it, the drainage and ventilating machinery used, and a description of the coke plant. 3000 w. Col Eng —March, 1897.

**Ohio.**—Jackson County Coal Mines. Andrew Roy. The development of a high-grade Ohio coalfield and a history of its exploitation. 1000 w. Mines & Min—Jan., 1899.

The Congo Coal Mine in Ohio. Description of the working of this noted mine, which is 60 miles southeast of Columbus. 1100 w. Eng & Min Jour—March 13, 1897.

**Paris Exhibition.**—Blanzy Colliery at the Paris Exhibition. A description of the extensiive exhibit of a half-size model of winding drum with tangential arms. 2200 w. Col Guard—Aug. 17, 1900.

**Paris Exposition.**—Anzin Colliery at the Paris Exhibition. Describes the very interesting exhibit of this important French colliery. 3000 w. Col Guard—Oct. 19, 1900.

Bruay Colliery at the Paris Exhibition. Illustrated description of a complete working model exhibited. 4300 w. Col Guard—Aug. 31, 1900.

Dourges Colliery at the Paris Exhibition. An illustrated description of a variety of colliery apparatus exhibited by the Société des Mines de Dourges, in the department of Pas-de-Calais. 4000 w. Col Guard—Sept. 7, 1900.

Vicoique et Noeux Collieries at the Paris Exhibition. Illustrated description of an electric locomotive and a compressed air hauling engine, with an account of the conditions they were made to satisfy. 3800 w. Col Guard—Oct. 12, 1900.

**Portugal.**—Buaraco's Colliery, Cabo Mondego, Portugal. From a communication by M. Sylva Cattier to the Charleroi Committee of the Society of Hainaut Engineers. Information of the structure of the seam, quality of the coal, method of working, etc. 1200 w. Col Guard—Dec. 31, 1897.

**Prospectus.**—The Preparation of a Colliery Prospectus. George Johnson. Considers points which occur in negotiations for the acquirement of mining propery, and in the preparation of the prospectus when the business takes the form of a limited liability company. 2000 w. Col Guard —April 20, 1900.

**Roof Pressure.**—Location of Roof Pressure in Longwall Working. The conditions which determine whether or not the system is practicable. 1800 w. Mines & Min—Feb., 1899.

**Rotherham, Eng.**—Rotherham Main Colliery, Yorkshire. A general description, with photograph of headgear and plans of working, haulage, shafts, etc. 2500 w. Col Guard—Sept. 2, 1898.

**Saint-Eloy, France.**—Incline for Large Output at the Saint-Eloy Colliery. M. H. de Lachapelle. Communicated to the Société de l'Industrie Minérale. Illustrates and describes a new incline with carrying truck of special type. 2000 w. Col Guard—Dec. 23, 1898.

Saint-Eloy Collieries, Allier, France. From notes of a visit by members of the Société de l'Industrie Minérale attending the Montluçon Congress, communicated to the "Comptes Rendus Mensuels" of the society. Describes deposit, method of working, shafts, boilers, haulage, etc. 1500 w. Col Guard—Feb. 11, 1898.

**Saxony.**—A Saxon Coal Mine. E. R. Schoch. Brief description of mine, method of coal getting, etc. 900 w. Eng & Min Jour—Dec. 26, 1896.

**Silesia.**—The Witkowitz Coal Mines at Petrzkowitz, in Prussian Silesia (Die Witkowitzer Steinkohlengruben in Petrzkowitz. Preussisch-Schlesien). A descriptive account of these important coal mines, with map. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 17, 1897.

**South Africa.**—The Vereeniging Collieries. An illustrated description of this important industry of South Africa. 2800 w. Ir & Coal Trds Rev—Jan. 5, 1900.

**South Wilkesbarre, Pa.**—See **SHAFT SINKING—Coal Mine.**

**Spring Valley.**—Improvements of the Spring Valley Coal Mines. J. A. Ede. A fire having destroyed the shaft of their mines and set fire to the mines, it became necessary to sink a new shaft. The conditions are explained and the improvements described and illustrated. 5700 w. Trans Am Inst of Min Engs—Feb., 1899.

**Subsidence.**—Subsidence Caused by Colliery Workings. Joseph Dickinson. A discussion of this paper, read at the June meeting of the Manchester (Eng.) Geological Society. 2200 w. Col Guard—Nov. 11, 1898.

Subsidence Caused by Colliery Workings. Joseph Dickinson. Read before the Manchester (Eng.) Geological Soc. Explains the methods for computing the extent of subsidence, the areas for support, and other details of the subject. 3200 w. Col Guard—Oct. 28. 1898.

Subsidence Due to Coal Workings. Abstract of a paper by S. R. Kay, read at meeting of the Inst. of Civ. Engs., England. In designing works for mining districts the importance of knowing the principles of subsidence, the approximation to the area necessary to be left unworked, and how the design may be suited to the possibility of the coal being worked without leaving solid pillars for support. 1400 w. Col Guard—Dec. 2, 1898.

The Effect of Subsidence Due to Coal Workings Upon Bridges and Other Structures. Stanley Robert Kay. Read before the British Inst. of Civ. Engs. The conditions in England which necessitate the construction of the expensive structures often where mines have been worked, or exist and the information necessary in designing works in such situations. Full paper and part of discussion. Ill. Serial. Col Guard—Aug. 4, 1899.

**Surveying.**—See **SURVEYING.**

**Taxation.**—The Rating of Collieries. Summary of British law and decisions. 3800 w. Col Guard—Nov. 3, 1899.

The Rating of Coal Mines. Edward Boyle. Read at meeting of the Surveyors' Inst., London. Discusses the methods used in England to arrive at a ratable value of a colliery. 4800 w. Col Guard—Jan. 27, 1899.

**Temperature.**—The Temperature of the Strata of the Ruhr Coal Basin (Ueber die Temperatur der Gebirgsschichten des Ruhrsteinkohlenbeckens). H. Kette. With diagrams and tables based on numerous observations, showing the relation of temperature and depth. 4000 w. 2 plates. Glückauf—Sept. 1, 1900.

**Tonking.**—The Collieries of Kebao, Tonking. Brief account of this island and its coal deposits. Map. 1800 w. Ir & Coal Trds Rev—Aug. 3, 1900.

**Transvaal.**—Notes on the Coal Seams of the Transvaal, and Description of a Modern Pit-Head Plant. W. T. Hallimond. Describes the conditions under which the seams are found, and the plant erected at the Rand Collieries. 1600 w. Ir & Coal Trds Rev—June 18, 1897.

**Treveskyn, Pa.**—Treveskyn Mine. Illustrated description of the surface and haulage arrangements at this new mine of the Vulcan Coal Co., in the Pittsburg district. 1200 w. Mines & Min—Sept., 1898.

**Utah.**—Coal Mines of Utah and Coal Mining in Utah Fields. Don Maguire. Information in regard to the deposits and their quality, with a history of the early use of coal in the State, and a description of the present development of the industry at the mines of Scofield, Castle Gate, etc. Ill. 2700 w. Mines & Min—May, 1899.

**Venezuela.**—Lease of Coal Mines in Venezuela. Translated copy of a contract between the Government of Venezuela and an Italian firm, providing for the working of the Guanta coal mines. 900 w. U S Cons Repts, No. 345—Feb., 8, 1899.

**Ventilation.**—See **MINE VENTILATION.**

**Virden, Illinois.**—An Illinois "Solid-Shooting" Mine; The Virden Shaft. Illustrated description of the property of the Chicago-Virden Coal Co. 1000 w. Eng & Min Jour—Dec. 26, 1896.

**Wales.**—The Collieries of the Ebbw-Vale Company. Describes the characteristics of this coalfield, and gives illustrated description of its various collieries. 3000 w. Ir & Coal Trds Rev—July 27, 1900.

The Ocean Coal Company's Deep Navigation Pits at Treharris. An illustrated account of these Welsh collieries, and of recent improvements. 5000 w. Ir & Coal Trds Rev—Jan. 19, 1900.

**Wallsend, Eng.**—The Wallsend Colliery. Abstracted from the "Newcastle Chronicle." An account of a visit to this colliery which has been idle for a generation on account of being flooded, and is now being put in order for further working. 2000 w. Col Guard—Aug. 27, 1897.

Historical Notes on Wallsend Colliery, England. T. E. Forster. The Re-opening of Wallsend Colliery. Henry Ayton. Two papers read at meeting of Fed. Inst. of Min. Engs., at Newcastle-on-Tyne, concerning an interesting and valuable colliery. 3800 w. Col Guard—Feb. 25, 1898.

Wallsend Coal. Account of work being resumed in collieries that have not yielded for nearly fifty years. Work was stopped, as the pumping appliances of that day were not adequate. Improved machinery has made working again possible. 700 w. Col Guard—Oct. 6, 1896.

**Washington.**—Coal Mines of Washington. A description of the mines at Carbonado, Wilkeson and Burnett, in Pierce County. The peculiarities of the formation in which the coal is found and some instances in which advantage has been taken of them in mining the coal. Ill. 2200 w. Mines & Min—Jan., 1899.

**Coal Mines of Washington.** A description of the various mines and an account of their development and prospects. 1600 w. Mines & Min—Oct., 1899.

**West Virginia.**—The Kelly's Creek Coal Mines, West Virginia. Edward H. Coxe. Describes the mines and manner of working. 1100 w. Eng & Min Jour—Feb. 10, 1900.

**Witkowitz, Austria.**—The Plant at the Witkowitz Coal Mine at Dombrau (Die Anlagen der Witkowitzer Steinkohlgruben in Dombrau). A. Fillunger. A fully illustrated account of an important mining plant in Moravia. Three articles. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept 23, 30, Oct. 7, 1899.

Winding and Pumping Installations at the Witkowitz Colliery (Dombrau). A. Fillunger, in "Oesterreichische Zeitschrift für Berg und Hüttenwesen." An illustrated description of the electrical power plant. 2400 w. Col Guard—Oct. 20, 1899.

See also **COAL PREPARATION.**

**Wyoming.**—Coal Mine Plant at Diamondville, Wyo. W. P. Hardesty. Brief description of a substantial plant recently built. 700 w. Eng News—Dec. 30, 1897.

### COAL MINE ACCIDENT.

See also **COAL MINE EXPLOSION; COAL MINE FIRE; FIREDAMP; MINE ACCIDENT.**

Accidents in Coal Mines. Thomas K. Adams. A comparison between the coal production and number of accidents and their causes in different states and countries. 3800 w. Mines & Min—Sept., 1900.

Accidents from Falls of Roof and Sides. H. W. Holbaum. Considers the ways of most effectively dealing with this evil, discussing various opinions. 4200 w. Col Guard—Nov. 17, 1899.

**Air Compression.**—Some Effects Produced by the Sudden Compression of the Ventilating Air Current in Mines. James Ashworth. Illustrated account of a mine accident caused by a creep of the strata, which suddenly filled the passages, expelling the air with sufficient force to kill some miners. 5400 w. Col Guard—Nov. 22, 1895.

See also **COAL MINE EXPLOSION—Pressure.**

**Devon.**—Report on the Devon Colliery Accident. Official report concerning this accident which occurred March 26, 1897. 3000 w. Col Guard—Aug. 27, 1897.

**Grisounite Cartridges.**—Hanging Fire of Grisounite Cartridges. M. Sarrau. From a report to the French Firedamp Commission. Accidents resulting from slow or partial explosions, or from explosions after detonations were heard. 1300 w. Col Guard—Sept. 4, 1896.

**Inundation, Abernant.**—The River Level Colliery Inundation. Official reports of J. T. Robson and Robert Woodfall on the circumstances attending the inundation which took place at Abernant, Dec. 9, 1896. 2400 w. Col Guard—June 11, 1897.

**Mine Passes.**—Prevention of Accidents in Connection with Mine Passes. Victor Watteyne. From a communication to the "Annales des Mines de Belgique." Part first considers accidents that occurred while the pass was being cleared of obstruction from below and from above. Ill. Serial. Col Guard—May 11, 1900.

**New Zealand.**—Terrible Colliery Catastrophe in New Zealand. Brief account of accident in the Brunner coal mine in the Greymouth district of New Zealand in which 60 miners were killed. Illustration of the scene of the disaster. 1000 w. Aust Min Stand—April 2, 1896.

**North America.**—Fatal Accidents in Coal Mining in North America. Frederick L. Hoffman. Data for the year 1898 and explanatory information for the previous nine years. 1300 w. Eng & Min Jour—Jan. 27, 1900.

**Pennsylvania.**—Causes of Accidents. Extracts from the reports of the several mine inspectors of the State of Pennsylvania regarding the causes of accidents in mines. Also some recommendations by which the number of injuries may be reduced. 4000 w. Mines & Min—Oct., 1898.

**Pot Holes.**—See **COAL GEOLOGY.**

**Prussian and British.**—Fatal Disasters in the Prussian and British Coal Mines in 1897 (Die Tödtlichen Unfälle im Preussischen und Britischen Steinkohlen Bergbau wahrend des Jahres 1897). With comparative tables for preceding years, and various districts. 3000 w. Glückauf—Nov. 12, 1898.

**Roof and Sides.**—Accidents from Falls of Roof and Side. Statement issued by Sir Kenelm E. Digby, giving precautions recommended for general adoption. 1000 w. Col Guard—Aug. 11, 1899.

**Safeguards.**—Safeguards Against Danger from Gases and Falls of Coal and Roof Accidents. William Jenkins. Read at meeting of W. Penna. Central Min. Inst. Points and some safeguards as they appear to the writer. 3000 w. Am Mfg & Ir Wld—Jan. 15, 1897.

**Scofield, Utah.**—Scofield Mine Disaster. Don Maguire. Describes the disaster in the mines of the Pleasant Valley Coal Co., Scofield, Utah. 1800 w. Mines & Min—June, 1900.

**Statistics.**—Suggestions for Improved Coal Mining Accident Statistics. F. L. Hoffman. Also editorial. A discussion of needed improvements in methods of compiling, with suggestions of value. 3500 w. Serial. 1st part. Eng & Min Jour—June 2, 1900.

**Twin Shaft, Pa.**—The Report on the Twin Shaft Disaster. Extracts from report to Gov. Hastings, of Pennsylvania, by the mine inspectors, appointed to investigate the disaster. 1100 w. Eng & Min Jour—Oct. 3, 1896.

The Twin Shaft Disaster. Description of the mine, its geological features, and the method of mining employed. 3300 w. Col Eng—Aug., 1896.

### COAL MINE EXPLOSION.

See also **COAL DUST; COAL MINE ACCIDENT; COAL MINE FIRE; FIREDAMP.**

Coal and Explosions (Les Explosions dans les Mines de Houille et les Conséquences d'un Excès d'Aérage Artificial). Franz Büttgenbach. A short résumé of theories on this subject. 1500 w. Rev Univ des Mines—Dec., 1898.

Explosions in Coal Mines. John Hayes. Part first considers the gases exuded in coal mines and those causing explosions, giving examples, with review of experiments recorded. Serial. N Zeal Mines Rec—Dec. 16, 1897.

**Afterdamp.**—Afterdamp. T. Getrych Davies. Read before the So. Wales Inst. of Engs. The writer's experience in dealing with the gases met with after colliery explosions. 2000 w. Col Guard—July 17, 1896.

"Afterdamp." T. Getrych Davies. A description of its effects and some peculiar experiences with it at several explosions. From "Proceedings of South Wales Inst. of Min. Engs." 2000 w. Col Eng—Dec., 1896.

**Blackwell.**—Reports on the Blackwell Colliery Explosion. An investigation into the method of working the mine, and the cause of the explosion. Coal dust caused the disaster, being ignited by a blast. 3200 w. Col Guard—March 13, 1896.

**Brancepeth.**—The Brancepeth Colliery Explosion. Interesting particulars of the accident. 5000 w. Col Guard—Sept. 25, 1896.

**Brownsville, Pa.**—Umpire Mine Disaster. William Seddon. A description of the work of rescue; also the report to the governor by Robert Brownlee, Chief of Bureau of Mines. 3000 w. Mines & Min—Dec., 1898.

**Camerton and Timsbury.**—The Phenomena of Colliery Explosions. Donald M. D. Stewart. A paper read at the meeting of the Federated Institution of Mining Engineers at Cardiff. Account of investigations of the disasters at the Camerton and Timsbury collieries—two explosions not complicated by the presence of firedamp. 2000 w. Ind & Ir—Sept. 18, 1896.

**Causes.**—Experiments Bearing on the Causes of Explosions. J. Coquillion. Explanation of phenomenon produced by the uniting of oxygen and hydrogen. 900 w. Col Guard—Nov. 6, 1896.

**Causes of Death.**—Dr. Haldane on Carbon Monoxide Poisoning. Reference made by Frank Clowes to the work of Dr. John Haldane, with extracts from his report on "The Causes of Death in Colliery Explosions," etc. 2200 w. Jour of Gas Lgt—July 14, 1896.

**The Causes of Death in Colliery Explosions.** Extract from a parliamentary paper with special reference to Tylorstown, Brancepeth and Micklefield explosions. The report was prepared by Dr. John Haldane. Serial. Col Guard—June 19, 1896.

**Coal Dust.**—Coal Dust as an Explosive Agent. Donald M. D. Stuart. Reply to criticisms made in discussion of the theory advanced by the writer, with further statement of his views formed from further investigations. 9500 w. Trans Am Inst of Min Engs—July, 1896.

The Position of the Coal Dust Question. Review of the question, experiments and investigations, especially the investigations of Mr. Donald Stuart of the explosion in Camerton Colliery. 3500 w. Col Guard—June 5, 1896.

The Chemistry of Colliery Explosions Due to Gas Derived from Coal Dust. Donald M. D. Stuart. Read before the Phys. & Chem. Section of the Bristol (Eng.) Naturalists' Society. Reviews what has been learned by investigation and observation, with conclusions. 6500 w. Col Guard—March 18, 1898.

Notes on the Explosion of Coal Dust. W. J. Orsman. From a paper recently read before the Federated Inst. of Min. Engs. A review of demonstrated facts with other information. 1500 w. Min Jour—Aug. 1, 1896.

Coal Dust and Colliery Explosions. Epitome of a paper entitled "The Rationale of Colliery Explosions from Coal Dust," read by Donald M. D. Stuart before the Bristol Assn. of Engrs. 1700 w. Jour Gas Lgt—Dec. 29, 1896.

Colliery Explosions Produced by Coal Dust. Donald M. D. Stuart. The author advances the theory of intermittent subsidiary explosions. 1600 w. Ir & Coal Trds Rev—Nov. 29, 1895.

Coal Dust Explosions. John Verner. Argues, as necessary accompaniments of the blown out shot, intense heat and considerable flame, a rapidly moving current of pure air, and coal dust of special fineness and composition floating in the air. 2500 w. Col Eng—Aug., 1896.

Colliery Explosions and Coal Dust. James Ashworth. Examination into the occluded combustible gases, the ignition point of coal dust, and the afterdamp in British mines. 2600 w. Col Guard—Feb. 14, 1896.

An Unrecognized Danger in Dusty Coal Mines. James Ashworth. Showing that bonneted and other safety lamps are not a safe means of lighting coal mines where coal dust as well as firedamp is present, and the way in which such risks may be practically obviated. Ill. 7000 w. Col Guard—Sept. 3, 1897.

See also Gases Occluded.

**Coal Dust Electric Ignition.**—The Ignition of Coal Dust by Electricity. Sydney F. Walker. Discusses the possibility of an arc lamp, or a glowing wire, igniting an atmosphere of coal dust, and the safety of electrical supply in coal mines. 2000 w. Col Guard—Jan. 26, 1900.

**Colorado.**—The Sunshine Coal Mine Explosion. An extract from a special report made to the governor of Colorado by the inspector of mines, David Griffiths. Ill. 2000 w. Mines & Min—Feb., 1898.

**Dayton, Tenn.**—The Dayton Mine Explosion. F. P. Clute. A brief description of the mine and existing conditions, and of the disastrous explosion of Dec. 20, 1895, with the cause. 4500 w. Eng Assn of the South—April, 1896.

The Dayton, Tenn., Disaster. W. M. Gibson. Full particulars and description of the mine previous and subsequent to the explosion of the 20th of December last whereby 28 men and boys lost their lives. 3000 w. Col Eng—May, 1896.

**Gases Occluded.**—Gas Enclosed in Coal and Its Effect on Coal Dust Explosions. Dr. Broockmann, in "Glückauf." What the gases are and the amount of them in various coals. 4000 w. Mines and Min—Sept., 1899.

Measuring the Pressure of Gas in Coal. M. A. Simon. Abstracted from the "Annales des Mines." Experiments made in a French colliery to determine under what pressure the gas was held enclosed by the coal. The maximum pressure was observed at the bottom of a bore-hole 39 feet deep, as being 105 lbs. per sq. in. 2600 w. Col Guard—Dec. 20, 1895.

The Gases Occluded in Hard Coal (Ueber die in Steinkohlen Eingeschlossenen Gase). Dr. Broockman. A review of the various investigations which have been made, together with analyses, and a discussion of the relation of occluded gases to coal-dust explosions. 2500 w. Glückauf—April 1, 1899.

**Hungary.**—Remarkable Firedamp Explosion and Its Lesson. From a communication to "Glückauf," by Berg Ingenieur Lamprecht, Anina-Steierdorf, South Hungary. An account of the disaster and a study of the cause. 2200 w. Col Guard—June 18, 1897.

**Localization.**—The Limitation or Localization of Colliery Explosions. James Ashworth. Discussion with examples of the apparent preference of some areas to others in mine explosions. 2500 w. Col Guard—Dec. 13, 1895.

**Ostrawa, Moravia.**—The Firedamp Explosion at the Heinrich Shaft at Ostrawa, Moravia (Die Schlagwetter-Explosion am Heinrich Schachte in Mähr.-Ostrau). J. Mayer. A detailed account of the disaster, together with a description of the experiments made upon safety lamps. 1 plate. Serial. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 3, 1900.

**Pressure.**—Some Pressure Effects Shown by Colliery Explosions. James Ashworth. Comment on Dr. Haldane's paper, with especial reference to his statement that the pressure exerted by a colliery explosion is not excessive. 2200 w. Col Guard—Oct. 23, 1896.

See also **COAL MINE ACCIDENT—Air Compression.**

**Recovery.**—The Recovery of Coal Mines after Explosions. Mr. Garforth. Read before the Federated Institution of Mining Engineers. Submits a number of rules suggesting precautions to be taken by the manager before an accident, and rules for guidance after an explosion. 3200 w. Col Guard—June 11, 1897.

**Red Ash, W. Va.**—The Red Ash Mine Disaster. James W. Paul. A description of the mine and conditions existing before the accident. 3200 w. Mines & Min—July, 1900.

The Red Ash Mine Explosion in West Virginia. Report of J. W. Paul on the explosion that occurred last March, killing 46 men. 2000 w. Eng & Min Jour—June 9, 1900.

**Rescue Appliances.**—The Charging of Oxygen Cylinders for Life-Saving Apparatus (Vorrichtungen zum Nachfüllen der Sauerstoff-Flaschen bei den Rettungsapparaten). Joh. Mayer. Describing methods of charging the oxygen reservoirs of portable devices for use in gaseous mines. Two articles. 4000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 19, 26, 1899.

Apparatus for Re-charging Rescue Appliances with Oxygen. J. Mayer in "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrates and describes an apparatus for re-charging the oxygen bottles by compressing the oxygen, so as to obtain the gas under maximum pressure even when the cylinder pressure has diminished. 1000 w. Col Guard—Sept. 1, 1899.

Sanitary and Life Saving Appliances of the Shamrock Mine at Herne (Sanitäts und Rettungseinrichtungen auf der Zeche Shamrock bei Herne). A very excellent account of the life-saving appliances and system as used in the collieries of Westphalia; being an address before the society of mine superintendents at Herne, by G. A. Meyer. 5000 w. Glückauf—Jan. 1, 1899.

Rescue Appliances in Mines. G. A. Meyer. From a lecture delivered before the Verein der Technischen Grubenbeamten at Herne. Illustrates and describes the system in use at Shamrock Colliery. 3400 w. Ir & Coal Trds Rev—April 14, 1899.

New Rescue-Appliances and Their Use in Mines. M. L. Denoël, in the "Annales des Mines de Belgique." Discusses the appliances, giving some reasons why they have not come into general use. 1800 w. Col Guard—Aug. 19, 1898.

See also **RESPIRATOR.**

**Rescue Work.**—Methods of Life Saving in Mining (Das Rettungswesen im Bergbaubetriebe). H. Rössner. Especially devoted to the systematic method used in the Ostrau-Karwin coal district, describing apparatus, precautions and the very complete system of signals. 6000 w. Glückauf—Dec. 10, 1898.

Life Saving in Mines, with Special Reference to the Coal Mining District at Ostrau-Karwin, Austria. A paper read by Mining Engineer H. Rössner, manager of the Archducal Shaft of Hohenegger, before a meeting of German engineers in Munich. Ill. 3600 w. Mines & Min—June, 1899.

Rescue Work in Mines. Hugo Rössner, in

"Oesterreichische Zeitschrift für Berg und Huttenwesen." An account of the drill given in the use of the apparatus and appliances. 1100 w. Col Guard—Nov. 3, 1899.

Saving Life in Colliery Explosions. Ernest J. Bailey. The writer's suggestions to meet life-saving requirements from afterdamp after explosions. A scheme for supplying fresh air by means of a compressed air plant. 1800 w. Col Guard—April 9, 1897.

See also **MINE ACCIDENT.**

**Scofield, Utah.**—The Mine Explosion at Scofield, Utah. An account of one of the most serious disasters of modern times, causing the loss of over 250 lives. 1500 w. Eng & Min Jour—May 12, 1900.

**Vulcan Mine.**—The Vulcan Explosion. David Griffiths. A description of the mine and the conditions existing therein. The work of rescue and an investigation of the probable cause of the disaster. 6000 w. Col Eng—June, 1896.

**West Virginia.**—See **Red Ash.**

### COAL MINE FIRE.

See also **COAL MINE ACCIDENT; COAL MINE EXPLOSION; FIRE DAMP.**

**Bridgewater.**—Underground Fire at Bridgewater Colliery. A. Dury Mitton. Read before the Federated Institution of Mining Engineers. Describes the conditions and the mode of conquering the fire, with the difficulties. 2800 w. Col Guard—June 11, 1897.

**Electric Wires.**—Underground Fire Attributed to Electric Conductors. From a communication to the "Annales des Mines" by M. L. Champy, after a report by Bergrat J. Mayer. The special cause to which experts attributed the fire in the Hermenegilde pit of the Kaiser Ferdinand Nordbahn Collieries, the difficulties of the rescue, recommendations of precautionary measures, etc. 2000 w. Col Guard—Aug. 13, 1897.

**Extinguishing.**—Extinguishing Mine Fires. Frank Pardee. Describes two successful methods employed in dealing with mine fires in anthracite coal mines. 1600 w. Mines & Min—July, 1899.

**Gob.**—Gob-Fires. A Review of Some Recent Theories. H. W. Halbaum. Considers their causes and means to prevent or extinguish them. Discusses whether Mr. Stoker's theories are really new and sound. 3000 w. Col Guard—March 23, 1900.

The Origin of Gob Fires. H. Stokes. Abstract of address delivered at Mansfield, England. Explains the new theory that the combustion is brought about by the physico-chemical actions and reactions of gases, liquids, and solids in old gobs. 900 w. Col Guard—Jan. 27, 1899.

The Standard Theory of Gob-Fires. H. W. Halbaum. A statement of what mining engineers believe in regard to such phenomena as gob-fires. Attributes them to spontaneous combustion, explaining the manner, and discussing the prevention and extinction. 6700 w. Col Guard—April 27, 1900.

Water and Coal Dust vs. Water and Spontaneous Combustion (Gob Fire). James Ashworth. A discussion of the advisability of treating with water, mines subject to spontaneous combustion, showing that the treatment is the worst possible, and discussing the safest treatment. 2800 w. Col Guard—Feb. 10, 1899.

**Pictou, Nova Scotia.**—A Review of the Report of the Commission on Fires in Pictou Mines. H. S. Poole. Read before the Mining Soc. of Nova Scotia. An explanation and criticism of this report. 4700 w. Can Min Rev—March, 1897.

**Summit Hill, Pa.**—The Burning Mines of Summit, Hill. W. C. Morganroth. The origin of the fire and the conditions which have rendered efforts to extinguish it ineffectual. 3500 w. Mines & Min—May, 1899.

**Sunday Creek, Pa.**—The Fire in the Sunday Creek Coal Company's Mine No. 10. Edward H. Coxe and C. H. Thompson. An account of the cause, and manner of fighting a fire. 3200 w. Eng & Min Jour—May 22, 1897.

**Whitwick, Eng.**—Reports on the Whitwick Colliery Accident. Report on the circumstances attending an underground fire and which resulted in the loss of thirty-five lives. 6600 w. Col Guard—Sept. 23, 1898.

### COAL MINE HAULAGE.

**Electric vs. Compressed Air.**—See **COAL MINE—Paris Exposition; MINE HAULAGE.**

### COAL MINE MANAGEMENT.

See also **COAL MINING—Cost.**

The Relation of the Head and Colliery Offices. George Johnson. Brief description of methods and forms used in making reports. 800 w. Col Guard—Oct. 5, 1900.

**Co-operative, Queensland.**—Co-operative Coal Mining in Queensland. Harrison F. Bulman. Explains the manner of conducting the Aberdare Colliery at Blackstone. Also describes method of working. 1500 w. Col Guard—June 15, 1900.

**Pay Bills.**—A Colliery Pay. George Johnson. Describes the principal sections of labor included, the form of the bill, etc. 3000 w. Col Guard—Sept. 29, 1899.

**West Virginia.**—Mine Management in the Kanawha Valley. Carl Scholz. Read before the West Virginia Coal Exchange. Discusses particularly economical methods of working. 2000 w. Mines & Min—Dec., 1898.

### COAL MINE MANAGER.

**Association, England.**—The National Association of Colliery Managers. An account of the annual meeting at Sheffield, Eng., and the presidential address of John Knowles, reviewing the coal mining industry of Great Britain. 3000 w. Col Guard—Sept. 14, 1900.

### COAL MINE PUMPING.

**Silted Pipes.**—Cleaning Silted Pipes. J. R. Wilkinson. Read before the Col. Mgrs. Assn. Deals with deposits more or less plastic, usually deposited from cold water in the rising mains of pumps or pipes. Ill. 1800 w. Ir & Coal Trds Rev—Aug. 31, 1900.

See also **PUMP; PUMPING MACHINERY.**

### COAL MINER.

See also **MINER.**

Coal Miners and Their Work. Treats of the difficulties arising from mining disputes, and the increased safety of working. 1800 w. Ir & Coal Tr Rev—June 26, 1896.

**Anthracite.**—Anthracite Mine Laborers. G. O. Virtue. Shows that their lot in the Pennsylvania region has never been an easy one, and that at present it is even harder than ever. 22000 w. Bul Dept of Labor—Nov., 1897.

Miners' Wages in the Pennsylvania Anthracite Mines. Concerning the changed conditions, explaining why many mines have been operated at a loss, and features of the wage scale. 1500 w. Eng & Min Jour—Aug. 25, 1900.

The Anthracite Coal Case. A discussion of the relative positions of miners and operators, with statistics. 2200 w. Eng & Min Jour—Sept. 29, 1900.

**Cavilling System.**—The Cavilling System. M. I. M. E. An explanation of this system and a discussion of whether it pays. 4000 w. Col Guard—March 30, 1899.

**Compensation Act.**—The Workmen's Compensation Act in Relation to Collieries. Statements based upon information gathered from leading insurance officials and other authorities, respecting the operation of this act as regards collieries. 1400 w. Col Guard—Jan. 12, 1900.

**Education.**—Technical Education for Miners in the Wigan District. C. M. Percy. Describes the endeavors to provide education appertaining to mining, in the Wigan coal field. 2300 w. Col Guard—Nov. 3, 1899.

**Health Conditions.**—The Health Conditions of Coal Mining. James Barrowman. A paper read before the Min. Inst. of Scotland, and printed in the Transactions of the Federated Inst. of Min. Engs. Statistics proving that even after including deaths from accident, the mortality among coal miners is less than that of most manual occupations. 2600 w. Col Guard—Sept. 25, 1896.

**Shifts.**—The Length of Shifts in the Ostrawa-Karwin Coal District (Ueber die Schichtdauer im Ostrau-Karwiner Kohlenrevier). Max von Gutmann. Paper before the Austrian Ingenieur-und Architekten-Vereines, giving a full discussion of the subject of the hours of labor in coal mines, with many tables. Two articles. 6000 w. 2 plates. Oesterr Zeitschr f Berg u Hüttenwesen—March 24, 31, 1900.

**Wages.**—Wages in the Coal Mining Industry during 1895. From the third annual report on changes in wages and hours of labor in the United Kingdom during 1895, by H. Llewllyn Smith of the Labor Dept. of the Board of Trade. 1200 w. Col Guard—March 26, 1897.

See also **Anthracite.**

## COAL-MINE VENTILATION.

See MINE VENTILATION.

## COAL MINE VILLAGE.

**Pennsylvania.**—A Pennsylvania Colliery Village. I. A Polyglot Community, by Henry Edward Rood. II. An Artist's Impressions by the Colliery Region. J. Hambridge. Descriptive. Ill. 9500 w. Century Mag—April, 1898.

## COAL MINING.

See also COAL INDUSTRY; COAL MINE; COAL REGION.

Papers read at the Engineering Conference in London. "Dealing with water in Pits during Sinking and in Permanent Work," by John Bell Simpson; "Water in Deep Shafts," by Henry Davey; "On Deep Levels in Mining Practice in the United Kingdom," by Bennett H. Brough; and "The Kent Coalfield," by Robert Ethridge. 5500 w. Col Guard—May 28, 1897.

Systems of Working Coal. J. T. Beard. Conditions which determine the system by which a field should be worked. Modifications of the two general systems of extraction, making these systems applicable to all conditions of roof, floor, coal, depth, inclinations, clearage, gas, etc. Ill. Serial. Mines & Min—Jan., 1899.

The Rise and Progress of Coal Mining. J. B. Simpson. Address delivered before the Newcastle Assn. of Students connected with the Inst. of Civ. Engs. A history of the progress made in the engineering of mines. 6000 w. Col Guard Dec. 4, 1896.

**Across vs. Up.**—Across the Pitch versus Up the Pitch. O. E. S. Whiteside. Read before the Canadian Mining Inst. A comparison of the two methods. 1200 w. Can Min Rev—Feb. 28, 1899.

**Ancient.**—Ancient Coal Mining. Walter H. Mungall. Paper read before the British Soc. of Min. Students on some interesting facts from the historical records of Scotch coal mining. 1500 w. Eng & Min Jour—Feb. 15, 1896.

**Anthracite.**—Anthracite Mining. Improvements proposed by G. M. Williams, inspector of the 4th Anthracite Dist. A review of old methods and a plan offered for future workings, which he thinks will result in increased economy and safety. 1800 w. Col Eng—May, 1897.

Anthracite Mining at the South Wilkes-Barre Colliery. W. W. Jones. Geological features, methods of mining, ventilating and drainage, etc. at an anthracite colliery of large capacity. Numerous cuts illustrate the geological formation, method of mining, ventilation, transportation, cars, and cages. It is a description of a typical plant. 8600 w. Col Eng—March, 1896.

Anthracite Mining During 1898. A history of the progress in Pennsylvania and of the efforts to overcome trade difficulties. 2200 w. Mines & Min—Jan., 1899.

A Successful Experiment in Anthracite Mining. William Tate. A method of obtaining 90 per cent. of the coal in pitching veins. Report of a visit to the Richards mine of the Union Coal Co., near Mount Carmel, Pa., and an account of the experiences from which the method originated. Ill. 3000 w. Mines & Min—April, 1898.

A Successful Experiment in Anthracite Mining. William Tate. Reports a visit to the Richards Mine of the Union Coal Co., near Mt. Carmel, Pa., giving an account of the method of obtaining 90 per cent. of the coal in pitching veins. Serial. Mines & Min—March, 1898.

Early Anthracite Coal Mining in Pennsylvania. John D. Estabrook. Extracts from a paper read before the Civil Engs., Society of St. Paul. An account of early work in Schuylkill Co., Penn. 1400 w. Ry & Engng Rev—March 26, 1898.

Little Things at Anthracite Collieries. Lee C. Morganroth. Calls attention to ingenious devices for making use of materials which would otherwise be wasted. 1700 w. Mines & Min—July, 1900.

Mining Anthracite. A letter from W. S. Gresley containing suggestion for improved method of taking out all the coal on heavy pitches. Ill. 900 w. Mines & Min—Jan., 1899.

Mining and Ventilating Anthracite Mines with Increasing Depths. H. O. Prytherich. Suggestions as to improved methods. 3000 w. Mines & Min—June, 1899.

**Asturias, Spain.**—Mining in Asturias, Spain. The Cinnabar Zone. Description of work in this most important of the coal fields of Spain. 1100 w. Min Jour—July 18, 1896.

**Belgium.**—Coal Mining in the Liège District of Belgium. From a Foreign Office report by Vice-Consul Menzies. 1200 w. Col Guard—Dec. 24, 1897.

**Blasting.**—See BLASTING.

**Bord-and-Pillar.**—Some Notes on the Bord-and-Pillar System of Work. Attention is called to some details of bord-and-pillar working of importance where economy is needed and commercial success desired. Serial. Col Guard—July 29, 1898.

**Borehole.**—Tubed Cylinder Stemming for Boreholes. W. Wilson Barnes. Illustrates and describes methods of using these cylinders, and the success and advantages. 1200 w. Col Guard—July 22, 1898.

**Borehole, Ropersole, Kent.**—The Recovery of the Ropersole Borehole, Kent Coalfields. W. J. Cousins. An illustrated account of overcoming a difficulty arising during deep boring. 1300 w. Ir & Coal Trds Rev—Oct. 13, 1899.

**Bosnia.**—Coal Mining in Bosnia. F. Poech. From "Oesterrische Zeitschrift für Berg-und-Hüttenwesen, describes the quality of the coal, method of working, the deposits, and gives information of general interest. Ill. 2000 w. Col Guard—Aug. 4, 1899.

Coal Mining in Bosnia (Mittheilungen über den Kohlenbergbau in Bosnien). F. Poech. A general review of mining conditions in Bosnia, with illustrations of the arrangements of machinery, and profiles and sections of the workings. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 29, 1899.

**British Colonies.**—Coal Mining in the Colonies. Harrison F. Bulman. A summary of the present condition and extent of coal mining in Canada, Australia and New Zealand. 3000 w. Col Guard—April 28, 1899.

**Brown Coal.**—See BROWN COAL.

**Checks.**—Checks for Sharp Curves on Engine Planes. Idris Thomas, in the "Journal of the British Soc. of Min Students." Illustrates and describes a check used at the Caerau Colliery, Maesteg. 350 w. Col Guard—April 6, 1900.

**Commentry, France.**—Early Working in the Commentry Coal-field. M. Martinet. From a communication to the Société de l'Industrie Minérale. Describes the deposits and various phases of working. 3500 w. Col Guard—Feb. 24, 1899.

Working by Panels and Intermediate Stages of Three Stopes at the Commentry Colliery. M. Martinet. From a communication to the Société l'Industrie Minérale. Illustrated description of the system named. 3000 w. Col Guard—Feb. 2, 1900.

**Cost.**—Colliery Costs. Present and Prospective. A discussion of English mining costs. 3200 w. June 1, 1900.

The Cost of Producing Coal in Different Countries. The countries discussed are the United States, England, or Great Britain, Germany and Belgium. 1400 w. Ir & Coal Trds Rev—June 5, 1896.

See also COAL COST.

**Covering Up-Cast Pits.**—The Covering of Up-Cast Pits. George H. Hollingworth. Describes some of the means devised for the covering of up-cast pits, where used for winding purposes, with the object of so closing the top as to prevent loss or leakage of air without materially interfering with the banking operations. 1600 w. Prac Eng—Nov. 13, 1896.

**Creeps.**—The Control of Creeps. Edward Jones. Methods of working coal seams in Northern Illinois which control creeps and avoid crushes. Describes some of the requirements for a successful system, and the precautions necessary in laying out and carrying on the work. Ill. 2000 w. Col Eng—Oct., 1897.

**Culm Flushing.**—See CULM FLUSHING.

**Deep.**—A New Method for Working Deep Coal Beds. H. H. Chance. Describes a new system, illustrating by plate, and gives suggestions for its operation. 2000 w. Trans Am Inst of Min Engs—Feb., 1900.

Some Problems in Deep Coal Mining. H. M. Chance. Discusses the difficulties encountered and the systems for overcoming them. 1800 w. Jour Fr Inst—Aug., 1900.

I. On the Working Conditions in Mines of Great Depth in Belgium. Simon Stassart. II. On the Working of Deep Mines. Joseph Hrabak. Two papers read at Min. & Met. Cong. in Paris. The first considers five of the deepest collieries in Belgium. The second considers winding arrangements. 2400 w. Ir & Coal Trds Rev—June 29, 1900.

The Installation of Very Deep Pits (Installation des Puits à Grande Profondeur). E. Tomson. Devoted to the equipment of deep pits, including the winding machinery, headworks, cages, rails, etc.; especially in respect to the practice of the Dortmund district. 15000 w. Revue Universelle des Mines—Feb., 1898.

**Dortmund.**—Various Methods of Winning Coal in the Dortmund District. From a communication to "Glückauf" by Bergassessor Trainer. Observations on the various systems of working, and the terms used to distinguish them. Ill. 3300 w. Col Guard—Jan. 27, 1899.

Winning the Seams in the Dortmund Coalfield. From a communication to "Glückauf." Illustrates and describes a method of working out the coal with gobbing the spaces. 1700 w. Coal Guard—Jan. 12, 1900.

**Durham.**—Impressions of Durham Coal Mining on a Lancashire Man. Arthur Mort. Notes on the mining practice in this district, the result of a recent visit. 2800 w. Col Guard—May 27, 1898.

**Economy.**—Economy in Mining. G. C. Mitchell. Excerpt from presidential address to the members of the Mining Institute of Scotland. The necessity of attention to details and of making the most careful preliminary calculations in connection with colliery management. 3800 w. Can Min Rev—July, 1897.

Possible Economies in Coal Working. Discussing how far it is possible to introduce further economies and thus enable profits and wages to be improved. 2400 w. Ir & Coal Tr Rev—June 26, 1896.

**Engineer.**—The Relation of the Mining Engineer to the Economic Operation of Coal Mines. S. A. Taylor. Read before the Central Mining Inst. of Western Pennsylvania, at Pittsburg. Showing how well it pays to employ an engineer to conduct the mining operations. 2000 w. Am Mfr & Ir Wld—Jan. 7, 1898.

**England.**—The Economics of Coal Mining. Henry Louis. States the economic problem of the coal trade in England and reviews available data. 3300 w. Ir & Coal Trds Rev—Jan. 29, 1897.

**Entries.**—Gob Entry vs. Narrow Entry. Joseph Cain. The methods of working at the Thomas mines, Whitwell, Tenn. A description of the two methods and the conditions under which the gob entry method is more economical than the narrow. Ill. 3000 w. Mines & Min—Sept., 1898.

**Face.**—Mining Coal at the Face. J. T. Beard. Points in regard to working which must be carefully considered to secure economy and safety. Ill. 4500 w. Mines & Min—March, 1900.

**Fiery Seams.**—Methods of Working in Fiery Brown-Coal Seams. H. Winklehner. From "Allegemeine Bergmännische Zeitschrift." Illustrates and describes special methods of working introduced in a mine in Hungary. 2000 w. Col Guard—Jan. 26, 1900.

**Fifeshire.**—The Methods of Working Minerals, Secondary Haulage, and Ventilation in Fifeshire. Andrew Burt. Abstract of a paper read before the Federated Inst. of Min Engs. Early history of the mines, the present system of longwall working, the stoop and room working, etc. 5000 w. Ind & Ir—Aug. 27, 1897.

**Formulæ.**—Notes on Some Faulty Formulae. H. W. Haulbaum. The paper draws the attention of mining men to some new formulae in current use which are either unnecessarily clumsy or misleading in many circumstances to which they are constantly applied. 5500 w. Col Guard—Aug. 13, 1897.

**France, Grand 'Combe.**—New Method of Working at the Grand 'Combe Colliery. M. Destiral. From a communication to the Société de l'Industrie Minérale, St. Etienne. Illustrates and describes the method, discussing the cases in which it is applicable and its advantages. 3300 w. Col Guard—Dec. 8, 1899.

**France, Loire.**—Colliery Working in the Loire, France. M. Tauzin. From an official report by the government inspector. Deals with production, methods of working, wages, ventilation, explosives, pumping, etc. 1500 w. Col Guard—Feb. 19, 1897.

**France, Pas-de-Calais.**—Colliery Development in the North of France. F. Colomber, in "La Revue Technique." Describes the sinking of a new shaft in the Pas-de-Calais district, which has greatly increased the output, and the development of the working area. 1500 w. Col Guard—Oct. 8, 1897.

Colliery Working in the Pas-de-Calais. M. E. Duporcq. From the official report. Economical and technical observations, with description. 1700 w. Col Guard—Nov. 27, 1896.

**India.**—Coal Mining in India. From the report of James Grundy, inspector of mines. Interesting information with description of four of the principal collieries. 4000 w. Col Guard—Aug. 28, 1896.

Coal Mining in India. Myles Brown. From a paper contributed to the British Soc. of Mining Students. The manner of working, appliances used, conditions of the coal trade, etc. 1800 w. Col Guard—March 4, 1898.

**Indiana.**—Coal Mining in Indiana. George H. Ashley. Abstract from the annual report of the Dept. of Geol. and Nat. Resources of the State of Indiana. Describes the geological features and methods of working. 4500 w. Mines & Min—Dec., 1899.

Coal Mining in Indiana. George H. Ashley. Abstracted from the annual report of the Dept. of Geol. and Nat. Resources of the State of Indiana. Illustrated description of the methods used for haulage and ventilation and for preparing the coal for market. 3800 w. Mines & Min—Jan., 1900.

Mining Indiana Coal. P. J. Mooney. Read before the Indiana Mining Ist. at Terre Haute, Indiana. Discusses the profitable amount to mine from the "L" seams, how to mine it and prevent creeps and squeezes. 1700 w. Mines & Min—May, 1898.

**Indiana, Illinois, Iowa.**—Indiana, Illinois, and Iowa Coal Mining in 1898. Hugh Murray. The condition of the business and the arrangement of scale of wages with the miners. 2000 w. Mines & Min—Jan., 1899.

**Iowa.**—Iowa Coal-Mining Methods. J. T. Beard. An account of the character of the coal, its influence on the methods of mining, and the systems in use. Ill. 1500 w. Mines & Min—Oct., 1900.

**Irruptions.**—Irruptions of Coal in Mine Workings. F. G. Meachem. Notes on irruptions of Hamstead Colliery, South Staffordshire, read at meeting of Manchester Geol. Soc. Suggestions as to the causes. 1800 w. Col Guard—Dec. 11, 1896.

**Leicestershire, Ibstock.**—The Leicestershire Coalfield. Description of Ibstock colliery. Two plants are in operation, and the method of working, underground haulage, underground pumps, boilers, winding, screwing, etc., are described. 2400 w. Col Guard—Sept. 18, 1896.

**Michigan.**—Coal Mining in Michigan. Charles Holmes. Describes the quality of the coal and the extent of the coal field as shown by exploration and development, and gives a brief description of the mines which have been opened and some of the causes of their successes and failures. 5800 w. Mines & Min—Sept., 1899.

**New South Wales.**—Coal Mining in New South Wales. Harrison F. Bulman. Part first gives the history and geology, with maps. Serial. Col Guard—Feb. 23, 1900.

**New Zealand.**—Coal Mining in New Zealand. Harrison F. Bulman. Information concerning the deposits, quality of the coal and manner of working. Ill. 1500 w. Col Guard—Aug. 18, 1899.

Coal Mining in New Zealand. Harrison F. Bulman. Illustrates and describes the property of the Westport Coal Co., Ltd., the method of working, haulage, etc. 3000 w. Col Guard—Sept. 29, 1899.

Coal Mining in New Zealand. Harrison F. Bulman. Information concerning the deposits, working, and coal mines act. 2400 w. Col Guard—July 21, 1899.

Coal Mining in New Zealand. Harrison F. Bulman. On the explosions in the mines, describing the most serious accidents, and giving other information. 1500 w. Col Guard—Nov. 17, 1899.

**Output.**—Is There an Economic Limit to the Output of a Coal Mine? William Blackmore. Read at meeting of the Min. Soc. of Nova Scotia. The subject is discussed and suggestions indicated which seem to have a bearing upon the decision in respect to every mine. 2500 w. Can Min Rev—Jan., 1897.

**Panel System.**—See **MINE VENTILATION—Panel System.**

**Paris Exposition.**—Coal Mining at the Paris Exhibition of 1900. Illustrated description of the mining exhibits of the different countries. 14000 w. Ir & Coal Trds Rev—June 29, 1900.

Notes on the Exposition of 1900 (A Propos de l'Exposition de 1900). Giving some account of the progress in coal mining during the century, as it will be shown at the coming exposition. 2000 w. Le Revue Technique—Feb. 10, 1898.

**Pillar.**—Pillar Drawing. Jas. B. Davis. Illustrated description of the method used for taking out pillars when the workings have been flushed with culm. 1000 w. Mines & Min—Feb., 1900.

Robbing Pillars. Correction of popular error as to meaning of expression and very clear explanation of coal mining methods. 800 w. Col Eng—Aug., 1896.

See also **Bord-and-Pillar.**

**Props.**—See **TIMBERING.**

**Prussia.**—Improvements in Prussian Mining Methods. From an official report published by the "Zeitschrift für Berg- Hütten- und Salinenwesen," and reproduced by Glückauf. Part first deals with getting coal; the hand boring, rock drilling, explosives, wedging, laying-out and conduct of workings, timbering, pumping, hauling, etc. Ill. Serial. Col Guard—Oct. 22, 1897.

Improvements in Prussian Mining Methods. Experimental trials in wedging are explained and illustrated, with improvements in other methods of mining work. Serial. Col Guard—Oct. 16, 1896.

Improved Methods of Working Coal in Prussia. After extracts by Glückauf from the official report for 1898. Illustrates and describes several methods. 1200 w. Col Guard—Nov. 10, 1899.

Improved Methods of Bringing Down Coal in Prussia. After extracts by Glückauf, from the official report. Discusses blasting by mechanical rock-boring, explosives, igniters, etc.; also wedging. 1600 w. Col Guard—Nov. 3, 1899.

**Queensland.**—Coal Mining in Queensland. The great extent of the deposits, present output, legislation, etc. 1400 w. Col Guard—June 8, 1900.

**Rib Drawing.**—Rib Drawing with Machines. W. S. Gresley. Illustrates and describes a proposed new method of mining coal by the use of longwall undercutting machines for taking out the rib. 2200 w. Mines & Min—Sept., 1900.

Some Practical Remarks on Ribs and Rib-Drawing. W. S. Gresley. Considers the uneconomical and undesirable features attending taking out ribs and pillars. 4000 w. Eng & Min Jour—Sept. 1, 1900.

See also **Pillar.**

**Scotland.**—Past and Present Working of Coal in Scotland. James Barrowman. Historical account. 3000 w. Ir & Coal Trds Rev—Jan. 29, 1897.

**Shaft Sinking.**—See **SHAFT SINKING.**

**Shaft Widening.**—Widening a Shaft at the Anzin Colliery. M. J. Prud'homme. From a letter to the northern section of the Société de l'Industrie Minérale. Gives the main lines of the project, with the principles of the methods used. 3000 w. Col Guard—Jan. 8, 1897.

**Small Mines.**—Small Coal Mines. J. T. Beard. How they may be economically worked where the seams are thin and shallow and the field limited. Methods pertaining to their location, and the sinking and timbering of shafts, slopes, drifts, etc., in small operations which do not warrant a large outlay of capital. 4500 w. Mines & Min—Aug., 1898.

**Submarine, Bridgeness.**—Submarine Coal Mining at Bridgeness, N. B. Henry M. Cadell. Read before the Federated Inst. of Min Engs. Describes the formation, the difficulties met and conquered, etc. 2000 w. Col Guard—Sept. 17, 1897.

**Submarine, England.**—The Working of Coal Mines Under Sea. Thomas Bell. Read before the Manchester Geol. Soc. Concerning the depth and extent to which the coal mines have been worked under the sea off the coast of Durham and Northampton; also under the permian feeder of water, in the county Durham. Serial. Col Guard May 4, 1900.

**Submarine, Spain.**—Filling Worked Seams with Mining Waste Arnao Colliery (Asturias), Spain. Describes a method made necessary in working a seam with a thin cover rock under the sea, the circumstances being complicated by the strong tendency of this coal to ignite spontaneously. 1500 w. Col Guard—Nov. 20, 1896.

Submarine Coal Workings in the North of Spain. Dach, in "Zeitschrift für das Berg-Hütten und Salinen-Wesen." The method of working is described. 1100 w. Col Guard—July 30, 1897.

**Subsidence.**—See **COAL MINE.**

**Thin Seams.**—Economical Results of Working Thin Seams. From a communication to the Société de l'Industrie Minérale on the working of thin seams in the Franco-Belgian coalfield, by M. F. Cambessédés, professor of Mine Working at the Douai School of Master Miners. Influence of methods of working upon economical results. 1400 w. Col Guard—Aug 14, 1896.

Is It Profitable to Mine Thin Seams of Coal by any of the Types of Electrical Mining Machines Now in Use? George Gould. Concludes that it is not profitable unless conditions are favorable, and gives experience. 1200 w. Am Mfr & Ir Wld—Jan. 1, 1897.

Is it Profitable to Mine Thin Seams of Coal by Any of the Types of Electrical Mining Machines Now in Use? Giving the advantages of a compressed-air plant and claiming good results. 1000 w. Am Mfr & Ir Wld—Jan. 8, 1897.

The Winning of Thin Flat Coal Seams (Abbau Minder Mächtiger Flachliegender Flötze). Describing a system of long wall mining to obtain the coal with a minimum of waste. 3000 w and 1 plate. Oesterr Zeitschr f. Berg u Hüttenwesen—Jan. 30, 1897.

The Working of Thin Horisontal Seams in England (Abbau Minder Mächtiger, Flachliegender Flötze in England). Hans Gutmann. Describing the "board and pillar," and "long wall" systems of coal mining as seen by a German engineer. Two articles, 1 plate. 7500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 4, 11, 1897.

Working the Highly-Inclined and Reversed Portions of a Thin Seam at the Escarpelle Colliery. M. F. Cambessédès. From a communication to the Société de l'Industrie Minérale, Saint-Etienne. Details of the method of working. 1200 w. Col Guard—Aug. 21, 1896.

Working Thin Seams in the Franco-Belgian Coalfield. M. F. Cambessédès. From a communication to the Société de l'Industrie Minérale. Describes working by shoots, and the working of very thin seams near ordinary seams and by forward stalls. Serial. Col Guard—June 26, 1896.

**Timbering.**—See **TIMBERING.**

**Twin Seams.**—Working Twin Seams of Coal. W. S. Gresley. Descriptions of methods which have come within the writer's observation. Ill. Serial. Eng & Min Jour—May 12, 1900.

**Victoria.**—Systems of Coal Mining in Victoria. James Stirling. From the annual report of the Secretary for Mines, Victoria. The different systems used are described. 1100 w. Am Mfr & Ir Wld—Aug. 27, 1897.

Notes on the South Wales Coalfield. M. E. Description of measures, method of working, ventilation, hauling, pumping and coking. 1200 w. Col Guard—May 29, 1896.

**Washington.**—Coal Mining in Washington. The situation and particulars in relation to the history and methods of working of the mines of the Northern Pacific Coal Co. at Roslyn and the mines of Kittitas County. Ill. 3000 w. Mines & Min—Dec., 1898.

**Wedge.**—A New Wedge Process as a Substitute for Explosives (Eine Neue Keilvorrichtung zum Ersatze der Schiessarbeit). Describing the use of a combined screw and wedge tool for use in breaking down coal in mines in which explosives cannot be permitted. 1000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 5, 1898.

Coal Getting without Blasting. Edwin Cottam. Read before the South Wales Institute of Engineers. A description of the construction and method of working of a machine which the writer calls the "up wedge" intended for wedging down coal, shale or soft stratified rock. Ill. 1800 w. Ir & Coal Trds Rev—Dec. 10, 1897.

New Wedge for Coal-Getting. From "Oesterreische Zeitscrift für Berg- und Hüttenwesen." Describes an improved wedge and its manner of working. Ill. 900 w. Col Guard—Nov. 11, 1898.

**Winding Engine.**—See **WINDING ENGINE—Llanbradach Colliery.**

**Wyoming, Pa.**—See **COAL GEOLOGY—Quicksand.**

**COAL-MINING MACHINERY.**

See also **COAL-CUTTING MACHINERY; ELECTRIC EQUIPMENT—Coal Mine.**

On the Comparative Advantages and Disadvantages of Steam, Compressed Air and Electricity for Power Purposes in Coal Working with Special Reference to Coal-Cutting and Haulage. G. E. J. McMurtrie. After extended consideration the writer's conclusions favor electricity. 7500 w. Ir & Coal Trds Rev—Jan. 29, 1897.

The Engineering Equipment of Collieries. Calls attention to the number of industries engaged in providing for the engineering equipment. 1000 w. Ir & Coal Trds Rev—Jan. 29, 1897.

**Belgium.**—Special Features at the Aiseau-Presles Colliery, Belgium. M. J. Collin. Particulars from the paper presented to the Assn. des Ingenieurs de Liege. Describes the breakage, overhead haulage by wire tramway, the adoption of sheer legs for the principal winding shaft, and the emergency hauling engine. 1800 w. Col Guard—May 5, 1899.

Underground Mechanical Installations at a Belgian Colliery. Edm. Briart. Describes and illustrates the installations made at St. Catherine Pit of the Bascoup Colliery, in Belgium. 2000 w. Col Guard—Sept. 24, 1897.

**Cambria, Wyoming.**—Coal Mining by Mechanical Appliances. James Warne Chenhall. Describes the working of the Cambria Mining Co.'s Plant at Cambria, Wyoming, U. S. A. 3500 w. Col Guard—May 11, 1900.

**Drills.**—New Methods of Cutting Roads in Mines. Jules Collin. Translated from "Revue Universelle des Mines." An endeavor to discover the most rapid way of accomplishing the work when blasting is not possible. Ill. 1200 w. Col Guard—Sept. 17, 1897.

The New Perforators. Léon Thiriart. A paper read before the Assn. of Min. Engs. at the Liége School, and translated from "La Revue Universelle des Mines, de la Métallurgie," etc. These screw-feed drills are intended to displace power drilling and blasting in firedamp coal mines. Ill. 2500 w. Col Guard—Jan. 17, 1896.

Thomas Drill with Regulating Ratchet. Jules Collin. Communication made to the Association des Ingénieurs sortis des l'Ecole de Liège. Gives particulars of this new apparatus, with illustrations. 1000 w. Col Guard—July 30, 1897.

See also **MINING MACHINERY—Boring; Drills; Electric Drills.**

**Electric.** — See **COAL-CUTTING MACHINERY; ELECTRIC EQUIPMENT—Coal Mine.**

**Gob Material.**—Gobbin Quarry and Railway at the Saint-Etienne Collieries. M. Perrin. From a communication to the Société de l'Industrie Minérales. Describes the arrangements made to provide a supply in all weathers, and to deliver it to all the points needed. Ill. 3000 w. Col Guard—April 7, 1898.

Gob-Lowering Balance with Water-Brake. From a communication by the Management of the Saint-Eloy Collieries, Puy de, Dôme, France, to the Société de l'Industrie Minérale, Saint-Etienne. 1200 w. Illustrated description. Col Guard—April 24, 1896.

Utilising for Power the Descent of Gob Material. M. Berne. From a communication to the Société de l'Industrie Minérale. Describes the installation of the Saint-Etienne collieries, in which compressed air is used as a vehicle of the power. Ill. 3000 w. Col Guard—March 2, 1900.

**Hocking Valley.**—Job's Mine. in the Hocking Valley, Ohio. Illustrates and describes the machines in use at this mine, which is one of the largest producers of bituminous coal in the United States. 800 w. Eng & Min Jour—April 17, 1897.

**Pennsylvania Anthracite.**—Labor-Saving Devices in Use at a Pennsylvanio Anthracite Mine. L. C. Morgenroth. Calls attention to the importance of the details in mining, giving examples of ingenious devices used in a mine recently visited. Ill. Serial. Eng & Min Jour—May 13, 1899.

**Steam, Compressed Air and Electricity.**—Steam, Compressed Air, and Electricity for Haulage, Coal-Cutting, etc. Ernest Kilburn Scott. Essay submitted in competition for special prize. A few of the points which should receive consideration when deciding what system of working is likely to give the greatest economy and the maximum amount of convenience. Serial. Ir & Coal Trds Rev—April 2, 1897.

**Winding.**—See **WINDING.**

**COAL MUSEUM.**

**Belgium.**—Belgian Coal Measure Museum. From a brochure issued, in connection with the Brussels International Exhibition, by G. Schmitz. Information of the coal formation, and stating the object of the museum, and the arrangement of the specimens. 3000 w. Col Guard—Oct. 15, 1897.

**COAL PREPARATION.**

See also **COAL HANDLING; COAL WASHING.**

Coal Cleaning Machinery at Aberamman Colliery. Illustrated description. Serial. Eng, Lond—Oct. 23, 1896.

Colliery Surface Arrangements. Ernest H. Thomas. A Lewis prize essay, 1899, printed in the Pro. of the So. Wales Inst. of Engs. Illustrated description of some of the recent improvements for the delivery of coal from the pit cage to the railway wagon. 5500 w. Col Guard—March 30, 1900.

Colliery Surface Arrangements. S. A. Everett. A Lewis prize essay. Printed in Pro. of the So. Wales Inst. of Engs. (First Prize). Describes typical conditions and the method of handling coal with as little breakage as possible, sorting and cleaning with minimum labor. Ill. 7000 w. Col Guard—April 6, 1900.

Combined Coal Screen and Disintegrator. Illustrates and describes an appliance for cleaning coal by a dry method. 1800 w. Col Guard—Aug. 5, 1898.

Improvements in Preparation (Neuerungen in den Aufbereitungen). V. Waltl. Describing and illustrating recent improvements in machines for washing and preparing coal. 1500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 22, 1898.

Novelties in Coal-Preparing Machinery. V. Waltl in "Oesterreischische Zeitschrift für Berg- und Hüttenwesen. Illustrated description of washers and draining grid. 1200 w. Col Guard—Oct. 28, 1898.

The Development of Separating Apparatus (Ueber die Entwickelung der Separations Apparate). Describing and illustrating the improvements in apparatus for separating and screening coal. 2500 w. Glückauf—Aug. 28, 1897.

The Mechanical Treatment of Coal. Horace J. Greaves. Read before the Derbyshire Metallurgical and Engineering Assn. The different methods are discussed, and the means of treating the various kinds of coal and their value. 3800 w. Col Guard—Feb. 4, 1898.

The Mining and Treatment of Coal. The first part treats of the washing of coal. Serial. Ir and Coal Trds Rev—Oct. 2, 1896.

The Treatment of Coal at the Pitt Bank. Two papers read before the Inst. of Civ. Engs. The first, "Screening and Tipping Coal," by James Bigg; the second, "The Surface Plant at Kirkby Colliery," by Thomas Gillott. Abstracts. 1200 w. Col Guard—Dec. 11, 1896.

The Treatment of Coal. Summary of an interesting discussion on two papers read at meeting of Inst. of Civ. Engs. "Tipping and Screening Coal" by James Bigg and "The Surface Plant at Kirkby Colliery" by Thomas Gillott. Ill. 6500 w. Col Guard—May 21, 1897.

The Treatment of Coal. Continuation of the discussion of the papers read before the Inst. of Civ. Engs. by Mr. James Bigg, on "Tipping and Screening Coal," and Mr. Thomas Gillott, on "The Surface Plant at Kirkby Colliery." A summary of the discussion by correspondence. 9800 w. Col Guard—May 28, 1897.

Tipping and Screening Coal. James Bigg. Read before the Inst. of Civ. Engs. These processes are considered separately and the methods illustrated. 5000 w. Col Guard—April 30, 1897.

**Breaker.**—Anthracite Coal Breaking and Sizing Plant, at Glyncastle Colliery. W. D. Wight. Read at the meeting of the Federated Soc. of Min. Engs. at Cardiff. Illustrated description. 2200 w. Ind & Ir—Oct. 16, 1896.

A Welsh Coal Breaker. Illustrated description of the anthracite coal breaker at the Glyncastle colliery, South Wales. 1100 w. Col Eng—May, 1897.

The New Breaker at Cranberry Coal-Mine, Hasleton, Pa. W. S. Ayres. A detailed description of the new breaker, made necessary by a destructive fire, considering the foundations, frame of structure, machinery, chutes and connections, with a statement of results. Ill. 10,500 w. Am Inst of Min Engs—Oct., 1898.

**Jigging.**—The Oberegger System of Double-Acting Coal Jigs, with Reciprocating and Oscillating Piston. Translated from "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrated description, with some of their advantages. 2000 w. Mines & Min—Feb., 1899.

The Separation of Coal and Other Light Minerals. Walter J. May. Describes an arrangement for water separation, and the use of jigging machines. 2000 w. Col Guard—Oct. 27, 1899.

The Use of Jigging Machines in Wet Separation Processes. Walter J. May. The importance of sizing in all jigging operations, the amount of grinding necessary and other things needed to make jigging satisfactory. 1800 w. Col Guard—Jan. 27, 1899.

**Saint Eloy, France.**—Mechanical Preparation at the Saint-Eloy Collieries, France. An abstract of a paper by M. de Margues before the Société de l'Industrie Minérale, describing the French methods of screening, cleaning, and washing coal. 2500 w. Col Guard—Sept. 9, 1898.

The Mechanical Preparation Works at the St. Eloy Collieries (Atelier de Préparation Mécanique aux Houillères de Saint Eloy, Puy-de-Dôme). A fully illustrated account of the conveyors, traveling belts, washing apparatus, etc., with plans of the general installation of the plant. 1800 w. Le Génie Civil—Sept. 17, 1898.

**Screening.**—Screening Plant at Mossbeath Colliery. Walter H. Mungall. Read before the Mining Inst. of Scotland. Illustrated descriptions. 1300 w. Col Guard—July 2, 1897.

The Development of Screening Apparatus. G. Schwidtal. From a communication to Glückauf. Illustrated description of the advances made, and explanations of the causes that led to them. 600 w. Col Guard—Nov. 26, 1897.

**Westphalia.**—Coal Preparation and Washing Plant at a Westphalian Colliery. E. Tomson. From a communication to the jubilee meeting of the Liége Engs'. Assn. Illustrates and describes a double picking and screening plant, and a washing plant for the nuts and slack, capable of dealing with 100 tons per hour. 1500 w. Col Guard—July 1, 1898.

**Witkowitz, Austria.**—The New Screening Plant at the Witkowitz Colliery (Dombrau). A. Fillunger, in "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Illustrated description. 1200 w. Col Guard—Oct. 13, 1899.

The New Plant of the Witkowitz Company at Dombrau, Austria (Les Nouvelles Installations de la Cie de Witkowitz aux Mines de Dombrau, Autriche). H. Schmerber. A general description, with plate, showing the electric plant in the picking and sorting department of these important Austrian coal mines. 2000 w. 1 plate. Génie Civil—Jan. 20, 1900.

See also **COAL MINE.**

**COAL PRODUCTION.**

See **COAL INDUSTRY.**

**COAL REGION.**

See also **COAL GEOLOGY; COAL INDUSTRY; COAL MINE; COAL MINING; MINERAL REGION.**

**Alabama.**—The Alabama Coal Field. On the importance of this field and the effect it is destined to have upon the foreign as well as the domestic supply. 3500 w. Engng—June 8, 1900.

See also **U. S. Southern; COAL INDUSTRY—U. S. Southern.**

**Alaska.**—Alaskan Coal Fields and Mines. An account of mines already known and the quality of the coal. Ills. & Map. 1800 w. Ir & Coal Trds Rev—Feb. 25, 1898.

**Arkansas.**—The Coal Measures of Arkansas. Charles R. Keyes, in the "Journal of Geology," Chicago. Facts ascertained recently which make possible a comparison of the enormous thickness of the coal measures of this region, with the more northern districts. 2800 w. Col Guard—Aug. 5, 1898.

**Austria.**—The Austrian Cannel Seam. R. Danilof, in "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." An account of the location, thickness, quality, etc. 900 w. Col Guard—Sept. 24, 1897.

**Bavaria.**—The Development of the Coal Fields of Upper Bavaria (Das Oberbayrische Kohlenvorkommen und Seine Ausbeute). L. Hertle. A discussion of the geological conditions and practical workings of the coal fields of upper Bavaria, with data of the industrial and commercial results. 4500 w. 1 plate. Glückauf—Oct. 29, 1898.

**Bear Island.**—The Coal Deposits of Bear Island (Die Kohlenlager der Bäreninsel). H. Möllman. A brief account of the important coal deposits of the island, which lies in the Arctic Ocean, between Norway and Spitsbergen. 1200 w. Glückauf—March 10, 1900.

**Blossburg, Pa.**—The Blossburg Coal Region. Anton Hardt. Its location and geology, the mining methods and machinery used, also analyses of the coals from different mines. 1500 w. Mines & Min—Oct., 1898.

**British.**—Notes on British Coal Fields. Part first is devoted to the Great Northern Coal Field, dealing principally with the geological features. Serial. Ir & Coal Trds Rev—June 25, 1897.

The British Coal Fields and Their Exhaustion (Die Britischen Kohlenlager und ihre Erschöpfung). Dr. Tübben. An abstract of a French book by Ed. Lazé, in which it is estimated that the British coal fields will be exhausted in the not very distant future. With an estimate of the coal supply of the other countries of the world. 4200 w. 3 plates. Glückauf—July 21, 1900.

The Lower Carboniferous Rocks of England and Scotland. William Gunn. From the "Geological Magazine." The object of the paper is to show the relation of the beds in England and Scotland. 2500 w. Col Guard—Aug. 19, 1898.

See also **England.**

**British Colonial.**—Colonial Coal Fields. Part first is confined to the fields of British Columbia, giving production, value, importance of export trade, etc. Serial. Ir & Coal Trds Rev—Aug. 27, 1897.

**Calais, France.**—Continuation of the Pas-de-Calais Coal Field. M. A. Simon. From a communication to the Soc. Ind. Min. An illustrated account of exploring works recently carried out with the object of proving that the coal measures extend beyond the conceded portion and at a depth that can be reached by present methods of working. 3000 w. Col Guard—Feb. 16, 1900.

**California.**—The Coal Beds of California. Harold W. Fairbanks. Notes stating briefly the occurrence of coal in this state and what the prospects are for the development of the industry. 1100 w. Eng & Min Jour—July 4, 1896.

**Canada.**—The Coal Supply of Canada. A brief summary of hints as to Canada's undeveloped resources. 700 w. Can Min Rev—Aug., 1896.

**Cape Breton.**—Notes on the Deposition and Development of the Glace Bay Coal Seams. S. F. Kirkpatrick. From a paper read before the Applied Science Soc. of McGill Univ. Describes the deposits and method of mining. 2000 w. Can Engr—March, 1900.

Notes on the Recent Discovery of Coal near Cochrane's Lake, C. B. E. T. Moseley. An address before the Mining Society of Nova Scotia. An estimated addition of one thousand millions tons of coal. 1800 w. Can Min Rev—May, 1898.

**China.**—Coal and Iron in Eastern China. C. D. Jameson. An illustrated account of this region, with its geology, and the remarkable coal and iron field. 2800 w. Eng & Min Jour—Sept. 24, 1898.

The Coal and Iron Deposits of Eastern China. Andrei Kurita. These deposits, which have been examined by the writer, are of great importance and the exclusive right to work them has been granted to an English syndicate. The coal field is the largest known in the world. 1000 w. Eng & Min Jour—April 23, 1898.

The Coal and Iron Deposits of Shansi and Honan, China. J. G. H. Glass. Summary of a paper before the British Association, giving a description of the bituminous and anthracite coal fields of Shansi and Honan, existing means of communication, etc. 800 w. Col. Guard—Sept. 14, 1900.

The Coal Fields Around Tsê Chou, Shansi, China. Noah Fields Drake. Information concerning this famous region, the manner of working and transporting the coal, and matters of related interest. Ill. 3500 w. Trans Am Inst of Min Engs—Feb., 1900.

The Coal Fields of China. From the London "Times." Giving information and claiming that China belongs in the front rank of coal producing countries. 2000 w. Col Guard—March 18, 1898.

The Coal Fields of Schantung. Baron von Richthofen. Brief account of the deposits of this district. 800 w. Col Guard—March 11, 1898.

**Colombia.**—A New Field for the Development of Coal and Petroleum. C. F. Zellinger. Information concerning the extent and character of the coal and petroleum resources of Colombia, S. A., from one who resided in the country more than seven years. Ill. 1700 w. Ir & Coal Trds Rev—Aug. 26, 1898.

Coal in Colombia. Short description of the various localities where coal is found. 1000 w. Eng & Min Jour—Dec. 28, 1895.

**Colombia and Zululand.**—New Coal Fields. Notes on the importance of the fields in Zululand and in the United States of Colombia. 1100 w. Bd of Trd Jour—Sept., 1897.

**Colorado.**—Coal Fields of Colorado. Arthur Lakes. A description of the different deposits and a consideration of the causes which operated to vary the qualities in different areas. 3300 w. Mines & Min—July, 1899.

Colorado's Oil and Coal Fields. C. L. Hall. Description of the region about Florence, Col. 3500 w. Min Ind & Rev—May 20, 1897.

Grand River Coal Field of Colorado. Arthur Lakes. A description of the geological phenomena found and their effects upon the coal. Ill. 2700 w. Mines & Min—Oct., 1899.

The El Paso Coal Field. Arthur Lakes. Report on a new and valuable coal field near Colorado Springs, Colorado. Ill. 1400 w. Mines & Min—June, 1898.

**Cumberland, Md.**—Georges Creek—Cumberland Coal Region. Beverley S. Randolph. Describes the geological peculiarities, the qualities of coal, and methods of working. Ill. 2000 w. Mines & Min—April, 1899.

**Dakota.**—Coal in North Dakota. E. J. Babcock. A description of the extent and location of the formations and the various qualities of the coal. 1000 w. Mines & Min—Jan., 1899.

**East.**—Coal in the East. From the "Statist." Calls attention to the new coal seams being opened in China, Chili, Siberia, etc., and the changes being wrought by their discovery. 1600 w. Engr, Lond—June 10, 1898.

**England.**—The Permo-Carboniferous Boundary. C. E. De Rance. Read before the Manchester Geological Society. A study of the coal measures in England. 4800 w. Col Guard—Oct. 1, 1897.
See also British.

**English Midland.**—Probable Continuity of the Shropshire, South Staffordshire, and Forest of Wyre Coal Fields. W. J. Clarke. Read before the Dudley and Midland Geological and Scientific Soc. at Coalbrookdale. Information concerning this region, explaining difficulties that do not seem likely to be overcome, hence the probabilities are not promising. 2500 w. Col Guard—May 15, 1896.

**English Southeast.**—The Southeastern Coal Field. Papers by R. Ethridge and Prof. Boyd-Dawkins, read at Dover meeting of the British Assn. The first dealt with the relation between the Dover and the Franco-Belgian basis; the second discussed the value of this field. Abstracts. 1500 w. Col Guard—Sept. 22, 1899.

**France.**—Coal Find and Mining Operations Between Boulogne and Calais. Abstract of report of M. Olry. Favorable to the sinking of a shaft in this district giving information of the deposit. 2300 w. Col Guard—July 1, 1898.

Results of Recent Borings for Coal in the North of France (Resultats des Récents Sondages pous la Recherche de la Houille dans le Nord de la France). J. Gosselet. The results show only coal measures of inferior quality, probably prolongations of the Franco-Belgian basin. 1200 w. Comptes Rendus—July 18, 1898.

The Coal Basin of Gard and the Phenomena of Drift (Le Bassin Houiller du Gard et les Phénomènes de Charriage). Marcel Bertrand. A study of the geology of this important coal basin of Southern France, showing the causes of some hitherto unexplained peculiarities. 3000 w. Comptes Rendus—Jan. 29, 1900.

The Loire, Gard, and Creusot Blanzy Coal Fields of France. From the "Atlas" of the Comité Central des Houillères de France. General description of coal fields, composition of coals and economic conditions. 2600 w. Col Guard—Feb. 27, 1896.

**Germany.**—The Coal Fields and Mine Administration of Germany. E. Gruner. From the general technical description accompanying the Atlas of the Comité des Houillères de France. A brief account of the German coal and lignite deposits with the official organization in mine administration. 2200 w. Col Guard—Nov. 8, 1896.

**Hocking Valley, Ohio.**—The Hocking Valley Coal Region in Ohio. Describes the character of the coal, methods of mining, ventilation, etc. 800 w. Eng & Min Jour—Feb. 27, 1897.

**Hudson Bay.**—On the Occurrence of Lignite and Anthracite Around Hudson Bay, Canada. Robert Bell. A paper read before the General Mining Association of Quebec. The characteristics of the coal are given with notes on previous observations. 2000 w. Col Guard—Dec. 27, 1895.

**Illinois.**—An Illinois Coal Field. A. Dinsmore. Particulars in regard to the formation of the country, a history of the development of the mines, and a description of the methods of working them. 3500 w. Mines & Min—Oct., 1899.

The Long Wall Coal Mining Region of Grundy County, Illinois. Illustrated description. 1500 w. Eng & Min Jour—Nov. 21, 1896.

**India.**—Indian Coal Deposits. Perry F. Nursey. Articles giving information of the important deposits in India, the methods of working and labor conditions. Serial. Ind & Ir—July 29, 1898.

On the Makum Coal Field, Assam. George E. Harris. Read before the Manchester (Eng.) Geol. Soc. Describes these deposits, and reports the coal to compare favorably with best English coals. Also describes mining methods. 4000 w. Col Guard—Oct. 5, 1900.

The Coal and Iron Making Resources of India. From the report of R. H. Mahon. Deals with coal and coal fields, giving sketch maps of the chief mineral districts. Serial. Ir & Coal Trds Rev—Oct. 13, 1899.

**Indiana, Block.**—The Block Coal Region of Indiana. Brief description of location, appearance, manner of working, etc. 800 w. Eng & Min Jour—Feb. 13, 1897.

**Ireland.**—The Coal Fields of Ireland. An outline of the general character of these coal fields, and of the conditions under which they occur. Ill. Serial. 1st part. 2600 w. Col Guard—June 15, 1900.

The Coal Fields of Ireland. Illustrates and describes the coal fields of Kilkenny and Tipperary, and the Connaught coal field. 3200 w. Col Guard—June 29, 1900.

**Italy.**—Coal in Italy. Information concerning the sources of supply, and the amount of coal consumed. 900 w. U. S. Cons Repts, No. 850—Oct. 4, 1900.

**Japan.**—The Miike Coal Field and the Largest Collieries in the East. States the general conditions existing in Japan, and considers the more important coal fields. 7500 w. Ir & Coal Trds Rev—Jan. 6, 1899.

**Kansas.**—Correlative Relations of Certain Sub-Divisions of the Coal Measures of Kansas. Charles R. Keyes. Calls attention to similarity of results obtained 40 years ago and conclusions arrived at by recent workers. 2800 w. Am Geol—June, 1900.

**Kent, Eng.**—The Coal Fields of Kent. Illustrated description of the coal bed now being opened, which, it is calculated, will be capable of supplying 3000 tons a day for seventy years. 3500 w. Mach, Lond—June 15, 1896.

The Kent Coal Field. F. Brady, G. P. Simpson, and N. R. Griffith. From the results of the investigations made it appears that there is enough coal to supply 30,000,000 tons per annum for the next 100 years. 1100 w. Coal Guard—July 17, 1896.

The Kentish Coal Fields. Explains the views of geologists which have led to a search for coal deposits, and describes the Dover workings. 3500 w. Engr, Lond—May 26, 1899.

**Kentucky.**—The Coalton Coal Field. Andrew Roy. Description of an interesting Kentucky coal field and its development. 600 w. Mines & Min—Oct., 1899.

The Eastern Coal Regions of Kentucky. Graham Macfarlane. Description with a number of geological sections. 3500 w. Trans Am Inst of Min Eng—Nov., 1895.

The Kentucky Coal Fields. Capt. C. C. Longridge. A general account of the fields, the character of coal, the markets and transportation. 2000 w. Col Guard—Sept. 7, 1900.

**Labuan.**—The Coal Fields of Labuan. A short description of this island in the China seas and its coal field, of interest because of the important part it would play in any naval operations which Great Britain may undertake in the East. 900 w. Ind Engng—April 18, 1896.

**Lanarkshire.**—The Douglas Coal Field, Lanarkshire. Robert Weir. Abstract of a paper presented at meeting of the Mining Inst. of Scotland. The location is given, the deposits described, and the working condition discussed. 1500 w. Col Guard—Feb. 10, 1899.

**Michigan.**—The Coal Basin of Michigan. A. C. Lane. Gives a sketch map showing the approximate extent of the coal basin, information concerning its deposits, characteristics and development. 1st part. Serial. 1800 w. Eng & Min Jour—June 30, 1900.

**Natal.**—Coal in Natal. Extracts from the report of a commission appointed to investigate the coal industry of Natal. 1200 w. U. S. Cons Repts. No. 879—March 21, 1899.

The Coal Deposits of Natal. An account of the character and quality of the deposits, with map. 900 w. Col Guard—June 22, 1900.

**Nevada.**—The Coal Fields of Esmeralda County, Nev. M. A. Knapp. A description of this coal field and its interesting statigraphical relations. 1400 w. Min & Sci Pr—Feb. 13, 1897.

**New Brunswick.**—Notes on the Grand Lake Coal Field of New Brunswick. R. G. E. Leckie. Map with sections of surface seam, and description of location, area, analysis, cost of mining, etc. 1800 w. Can Min Rev—April, 1896.

The Coal Deposits of the Province of New Brunswick. Describes the Grand Lake coal mines mainly. 1400 w. Ir & Coal Trds Rev—Sept. 15, 1899.

The Grand Lake Coal Field of New Brunswick. R. G. E. Leckie. Its location and distribution, quality and quantity. 1500 w. Col Guard—Oct. 16, 1896.

**New Mexico.**—Notes on the Cerrillos Coal Field. John P. Stevenson. Abstract of a paper read before the N. Y. Academy of Sciences. Interesting description of a coal field in New Mexico, about 25 miles south from Santa Fé. 1800 w. Science—March 13, 1896.

**New Zealand.**—Notes on the Coal Fields of New Zealand. James Park. Read before the Inst. of Min. and Met., London. Concerning the quality and quantity of coal available. 2200 w. N Z Mines Rec—April 16, 1900.

Coal in the Cape Colville Peninsula. Describes the deposits, which are of more interest from a geological than from an economic point of view. 2500 w. N Z Mines Rec—Jan. 16, 1900.

Coal Outcrops at the Tangarakau River. Alexander McKay. Report on the district between Stratford and the river named. 1500 w. N Z Mines Rec—May 16, 1899.

Notes on the Coal Fields of New Zealand. James Park. Read before the Inst. of Min. and Met., London. Concerning the physical character and composition, and an estimate of quantity. 2000 w. Col Guard—Dec. 29, 1899.

The Puponga and Pakawau Coal Fields, Collingwood County, N. Z. Alexander McKay. From the reports of the government geologist, giving an account of the coal-seams and analysis. 4000 w. N Z Mines Rec—Sept. 17, 1900.

The West Wanganui Coal Field. James Park. An account of the general geological structure and mineral resources. 3200 w. N Z Mines Rec—Sept. 17, 1900.

**North Carolina.**—Coal in Western North Carolina. William B. Phillips. An unexpected discovery of coal and mineral oil. The find is of considerable geological interest. 1400 w. Eng & Min Jour—Dec. 28, 1895.

**Northwest Territory.**—The Coal Deposits of the Northwest Territories of Canada. W. Henry. Describing particularly the lignite deposit of the Souris Valley. 2500 w. Min Jour—May 23, 1896.

**Peru.**—Anthracite Coal in Peru. William Griffith. Reports concerning the topography and climate, geology, coal fields, etc. Maps and sections. 6000 w. Jour Fr Inst—March, 1899.

Anthracite Coal in Peru. William Griffith. The geology and extent of the deposits and the qualities of the coal found in them. 1500 w. Mines & Min—Oct., 1898.

**Philippines.**—The Coal Fields of the Philippines. G. D. Rice. An account of extensive coal mines, some of which have been worked since 1827. The outlook for the establishment of gas works in the islands is favorably discussed. Ill. 3000 w. Am Gas Lgt Jour—Oct. 22, 1900.

**Puget Sound.**—Some Coal Fields of Puget Sound. Bailey Willis. From the annual report of the U. S. Geol. Survey. Part first considers the location and formation. Serial. Ind & Ir—July 7, 1899.

**Queensland.**—The Coal Beds of Queensland. T. Pearson Moody. From a paper read before the South Wales Inst. of Engs. Describes the deposits. 1600 w. Col Guard—Dec. 15, 1899.

**Rhodesia.**—Rhodesia's Coal Supply. A brief account of the Wankie coal field. 300 w. Ir & Coal Trds Rev—Sept. 14, 1900.

**Rocky Mountains.**—Anthracite in the Rockies. R. M. Hosea. The causes which produced it and the methods used in mining and preparing it. A geographical and geological description of the region in which it is found and some of the peculiar difficulties met with in exploiting the properties. Ill. Serial. Mines & Minerals—July, 1898.

**Ruhr, Germany.**—The Ruhr Coal Field. M. E. Gruner. A report of the Comite Centrale des Houillières de France on the nature of the coals, importance of the deposits, political division of the field and the production. 1800 w. Col Guard—Nov. 15, 1895.

**Russia.**—Notes of a Trip in the Northwestern Portion of the Basin of the Donez (Mitteilungen von einem Ausfluge nach dem Nordwestlichen Teile des Donez-Beckens). G. Franke. An excellent account of this important coal field of Southern Russia, with geological map. 5000 w. 1 plate. Glückauf—March 18, 1899.

The Coal and Iron Resources of Russia. Part first gives particulars, hitherto unpublished, relating to the coal and mineral deposits of the Caucasus. Serial. Ir & Coal Trd Rev—Feb. 17, 1899.

The Geology of the Donetz Coal Field. M. Tschernyschew and L. Loutouguin. Abstract of an article describing this most important coal-producing district of Russia. 1500 w. Col Guard—Sept. 3, 1897.

**Servia.**—Coal in Servia. E. Heguer and J. François. From a communication to the Société des Ingénieurs des Mines du Hainaut. Descriptive account of the coal fields and their working. 1100 w. Col Guard—Nov. 17, 1899.

**Siberia.**—Recent Explorations for Coal in Siberia. Gen. Venukoff. Translated from "L'Echo des mines." An account of the principal groups of coal mines already discovered in those districts of Siberia through which the railway runs. 1800 w. Col Guard—Oct. 30, 1896.

See also **MINERAL REGION; RAILWAY.**

**Silesia.**—The Principal Coal Deposits of Upper Silesia (Die Hauptstörung des Oberschlesischen Steinkohlenbeckens). C Gaebler. With an extensive map and geological section and a review of the development of the region. 5000. w. Glückauf—May 27, 1899.

**South Africa.**—Expedition in Search of Coal in the Districts Immediately South of the Zambesi. Charles J. Alvord. An interesting account of the expedition giving the principal features and resources of the region. Serial. Min Jour—Feb. 22, 1896.

South African Coal. The Transvaal coal occurs in the Karoo formation at depths from the surface to 100 ft.; the largest has 40 ft. of workable coal, the others up to 22 ft. in thickness. The coal contains about 15 per cent. of ash, which also contains as much as 9 dwt. of gold per ton of coal. The production of the three principal mines has been 561,422 tons in 1894, employing 124 whites and 2005 natives. Its evaporative efficiency varies from 43 to 81 per cent. of that of British coal. 800 w. Col Guard—Nov. 1, 1895.

The Coal Fields of South Africa. Reports concerning the increased activity and competition in this district, mentioning individual collieries. Serial. Col Guard—July 8, 1898.

The Coal Fields of South Africa. Illustrates and describes the Natal Navigation collieries in part first. Serial. Ir & Coal Trds Rev—Oct. 27, 1899.

The Karoo Formation of South Africa. L. de Launay. Extract from a paper on "The Gold Mines of the Transvaal," read before the Federated Institution of Mining Engineers. Information regarding this formation, which frequently contains workable coal. 900 w. Col Guard—March 19, 1897.

The Middelburg Coal Fields (South Africa). Herbert Lloyd. Describes the region, formations, quality, etc.; also other minerals to be found in this district. 1100 w. Col Guard—Nov. 12, 1897.

The South Rand Coal Field. A. R. Sawyer. Extract from a paper read before the Federated Inst. of Mining Engs. Describes this portion of the South African formation, which the writer explored personally and in which he discovered a very valuable coal-seam. 2400 w. Col Guard—Sept. 24, 1897.

See also **Colombia; Natal; Rhodesia; Transvaal.**

**South Wales.**—The Re-Survey of the South Wales Coal Field. A. Strahan. An account of the progress made during the last year by the officers of the Geological Survey in the re-survey of the South Wales coal field, as given in the annual report. 5500 w. Col Guard—July 22, 1898.

The Re-Survey of the South Wales Coal Field. From the Summary of Progress of the Geological Survey of the United Kingdom for 1898. Serial. Col Guard—Aug. 18, 1899.

The Geological Survey of the South Wales Coal Field. From the Summary of Progress of the Geological Survey of the United Kingdom for 1899. 5000 w. Col Guard—Sept. 7, 1900.

**Spain.**—A New Spanish Coal Basin. Francis Laur. Translated from "L'Echo des Mines de la Métallurgie." Interesting particulars regarding a new coal basin in Old Castille, in the north of Spain. Serial. Col Guard—Feb. 28, 1896.

The Coal and Iron Resources of Spain, with Notices of the Principal Works. The first part consists of historical notes, and account of the coal and iron resources of the north of Spain. 4000 w. Ir & Coal Trd Rev—Aug 21, 1896.

**Staffordshire.**—The Geological Survey of the North Staffordshire Coal Field. Report of recent work, showing progress made. 3300 w. Col Guard—Aug. 31, 1900.

The Re-Survey of the North Staffordshire Coal Field. Concerning the progress made, and information gained. 4500 w. Col Guard—Sept. 1, 1899.

The Thickness and Character of the Coal Measures of North Staffordshire. W. Gibson. Summary of a paper before the British Association. 500 w. Col Guard—Sept. 14, 1900.

**Texas.**—Texas Coal Fields. R. S. Weitzell. Brief description of the bituminous coal fields. 500 w. Eng & Min Jour—May 16, 1896.

**Tonkin.**—The Hougay and Hatou Coal Field (Tonkin). F. Brard. Describes the coal and method of mining. 1200 w. Col Guard—April 30, 1897.

**Trans-Mississippi.**—The Geological Position of Trans-Mississippian Coal. Charles R. Keyes. Information obtained during recent investigations concerning the stratigraphical position of seams, and other features. 1900 w. Eng & Min Jour—May 5, 1900.

**Transvaal.**—The Heidelberg Coal Field, Transvaal. Thomas B. Shipley. Descriptive account. 1400 w. Col Guard—Nov. 27, 1896.

The Transvaal Coal Field. William Piele. Abstract of paper read before the North of England Inst. of Min. & Mech. Engs. Describes the deposits, quality, and some points relating to the mining. 1500 w. Ir & Coal Trds Rev—Aug. 12, 1898.

The Transvaal Coal Deposits. Extract from the London "Times." Particulars of the mineral resources of the Transvaal. 1300 w. Col Guard—Sept. 18, 1896.

The Transvaal Coal Field. W. Forster Brown. Read before the South Wales Inst. of Engs. Review of the physical and geological features, quality, system of working, markets, etc. 3000 w. Col Guard—Oct. 30, 1896.

See also **South Africa.**

**U. S. Southern.**—The Coal Fields of the Southern State of America. Reports the exceptional development in this area, extending from the Virginias through southeastern Kentucky and Tennessee into northwest Georgia and Alabama. 1800 w. Col Guard—July 28, 1899.

**Valenciennes, France.**—Constitution of the Southern Portion of the Valenciennes Coal Field. M. Shapuy. From a communication to the "Annales des Mines." Fresh information as to measures in the south of the coal field and a comparison of acquired facts with the various hypotheses put forward. 4600 w. Col Guard—May 22, 1896.

**Victoria.**—Notes on the Geology of the Victorian Coal Fields and Output. James Stirling. Describes the existing conditions of these coal fields. 1st part. Serial. 1400 w. Aust Min Strand—March 18, 1897.

The Coal Fields. On the fields of Victoria and their reliability. 1700 w. Aust Min Stand (special)—June 1, 1899.

The Coal Fields of Victoria. An account of the deposits and recent discoveries. 1300 w. Col Guard—Oct. 6, 1899.

The Coal Resources of Victoria. Perry F. Nursey. Shows the progress and satisfactory position of the industry and the remarkable development since 1890. 1800 w. Ind & Ir—Sept. 16, 1898.

**Vladivostok.**—The Vladivostok Coal Field in Siberia. Russell L. Dunn. Describes this field and the kinds and quality of coal found. Also the favorable transportation facilities. Ill. 1300 w. Eng & Min Jour—March 11, 1899.

**Wales.**—See also **South Wales.**

**Western Australia.**—Coal in Western Australia. Report of H. P. Woodward, government geologist, on the carboniferous areas of the Irwin River basin. 1600 w. Col Guard—Feb. 5, 1897.

**Westphalia.**—The Westphalian Coal Field in Germany. A. Kowatsch. Descriptive account. 1100 w. Eng & Min Jour—Dec. 19, 1896.

**West Virginia.**—The Loop Creek, West Virginia, Coal Field. Daniel W. Langdon. Its history, nature of the coal, how mined, its analyses, physical features. 1000 w. Col Eng—Jan., 1896.

The Thacker Coal Field of West Virginia. Andrew Roy. A description of the formation and the extent and manner of their development. 1200 w. Mines & Min—May, 1899.

### COAL SCREENING.

See **COAL PREPARATION.**

### COAL STAMPING.

See **COKE MANUFACTURE—Stamping Machinery.**

### COAL STORAGE.

See also **COAL BIN; COAL HANDLING; COALING STATION.**

A Unique Bituminous Coal Storage Plant. Illustrated description. 1000 w. Ry Rev—Oct. 10, 1896.

Coal Storage. Charles Pies. The different methods of storing and handling the steam sizes of anthracite coal. The reasons for storage, describing the advantages and disadvantages of the various systems in use, and the cost of operating and constructing them. Ill. 3500 w. Mines & Min—June, 1898.

**Battersea, Eng.**—Storage of Coal in Hoppers at Battersea. A detailed description of hoppers and steam crane with drawings. 1100 w. Eng, Lond—Feb. 14, 1896.

**Bins.**—See **COAL BINS.**

**Manufactory.**—Coal Pockets for a Manufacture. Illustrated detailed description. 700 w. Eng Rec—Feb. 15, 1896.

**New York Electric Power Station.**—The Design of Coal Pockets. Illustrated outline of the method of design adopted for the large power station of the Metropolitan Street Ry. in New York. 800 w. Eng Rec—Sept. 1, 1900.

**Rochester, N. Y.**—A Steel Coal Trestle and Pockets. Illustrated description of a steel structure, recently constructed in Rochester, N. Y., designed to receive coal from a train, store it in pockets or yard bins, and rapidly deliver it by gravity, automatically screened, to the retail wagons. 500 w. Eng Rec—Aug. 1, 1896.

**St. Pancras, London.**—The New Midland Coal Depot at St. Pancras. Notes on the progress of the work since April, 1896, with a plan of the high and low level of the depot. 700 w. Col Guard—Sept. 10, 1897.

**Tamarack Mining Co., Mich.**—Coal Storage Plant of the Tamarack Mining Co., Dollar Bay, Mich. Illustrated description of the principal structural features of this plant. 1000 w. Eng News—Dec. 30, 1897.

**West Superior, Wis.**—The West Superior Coal-Storage Plant of the Lehigh Valley Coal Co. William R. Davis. Illustrates and describes a plant having several features of novelty and interest. 1600 w. Eng News—Aug. 18, 1898.

## COAL SUPPLY.

See **COAL INDUSTRY.**

## COAL TAR.

See also **GAS MANUFACTURE—By-Products, Tar.**

Notes on Coal Tar and the Preparation of Its Products. Ernest F. Hooper. Read before the North of England Gas Managers' Assn. Considers coal tar and its constituents, giving a brief historical summary, and how the products are prepared. 4500 w. Jour Gas Lgt—May 2, 1899.

**American Gas Works.**—The Composition of Some Coal Tars from American Gas Works. Alfred H. White and H. W. Hess. Read before the N. Y. section of the Soc. of Chem. Ind. Explains the reasons for the feeble condition of the coal-tar industry in America, giving results of analyses. 1800 w. Jour Gas Lgt—July 17, 1900.

**Derivatives.**—The Manufacture of Coal Tar Derivatives (Fabrication des Dérivés du Goudron de Houille). A long illustrated article on a variety of coal tar products. Serial. Rev Tech—April 25, 1900.

## COAL TESTS.

See also **CALORIFIC VALUE; CALORIMETER; CALORIMETRY; COAL ANALYSIS.**

Notes on Coal. Charles F. White. Read before the Western Soc. of Engs. Data. and observations on the water measurement in coal tests, variations in repeated tests, and notes on on the relations of high grade and low grade coals. With discussions. 3500 w. Sta Eng—Nov., 1896.

The Testing of Coals. Arthur Winslow. A plan to conduct a study of North American coals to furnish information of uniform reliability is outlined. 2400 w. Jour Assn of Eng Soc—Sept., 1896.

Apparatus for Testing Coal Samples. M. A. Dory. From a communication to the Société des Ingénieurs des Mines du Hainaut. Illustrated description of apparatus and its operation. 1800 w. Col Guard—Nov. 12, 1897.

**Gas Coal.**—Commercial Testing of Gas Coal. T. Glover. Read before the Midland Assn. of Gas Managers, Eng. Advises the frequent testing of well-known coals and accurate tests of all suitable coals offered, and gives suggestions for test plant, its working and comparison of results. Discussion folls. 3800 w. Jour of Gas Lgts—Nov. 3, 1896.

Laboratory Apparatus for Testing Gas Coals. G. Jouanne. Describes an apparatus that at each charge distils one kilogram of coal, collecting all products, thus enabling a complete analysis of the coal to be made. 900 w. Am Gas Lgt Jour—March 16, 1896.

**Hygrometric Properties.**—Hygrometric Properties of Coals. R. C. Carpenter. Describes investigations undertaken to ascertain the relative qualities of various coals with reference to absorbing moisture from the atmosphere. 800 w. Trans Am Soc of Mech Engs, Vol. XVIII.—May, 1897.

**Locomotives.**—Tests of Coal for Locomotives. William Garstang. Extracts from a paper read at the December meeting of the Western Ry. Club. On the mode of procedure and results obtained from road tests on Big Four Ry., and from laboratory tests conducted at Purdue Univ. 2300 w. Ry & Engng Rev—Jan. 14, 1899.

**Moisture.**—Determining Moisture in Coal. B. S. Hale. Read before the A. S. M. E. An account of work done for the Steam Users' Assn. of Boston, and of methods employed in the quantitative determination of moisture in coal. 3000 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

See also **Hygrometric.**

**Omaha Railway Shops.**—See **RAILWAY SHOP—Omaha.**

**Rapid.**—Rapid Coal Tests and Check on Coal Washing. M. Maurice. Describes the method used by the writer, his manner of operating, and of determining the water constant, composition of the shale and coal, and perhaps the ash content. 3800 w. Col Guard—April 6, 1900.

**Röntgen Rays.**—Examination and Analysis of Mineral Fuel by Röntgen Rays. Henry Couriot. From a communication to the Société de l'Industrie Minérale. Describes the method and apparatus used, and examination of specimens. 3700 w. Col Guard—May 26, 1899.

Examinations of Coal by Röntgen Rays. Investigations of F. Kotte as published in "Stahl und Eisen. Ill. 400 w. Sci Am—June 23, 1900.

Fuel Examination by X-Rays. M. Couriot. Gives the principles of this method for determining the impurities in mineral fuels, describing the apparatus and manner of preparing the samples, giving illustrations showing the results from various fuels. 3000 w. Mines & Min—Sept., 1899.

Testing Coal by Means of Röntgen Rays (Untersuchung von Kohlen mittels Röntgenstrahlen). F. Kotte. Short account, with good illustrations, of Röentgen ray tests of powdered coal. 400 w. Stahl und Eisen—April 4, 1900.

The Analysis of Coal by Röntgen Rays. Radiographs with description of apparatus used. 1500 w. Ir & Coal Trds Rev—Oct. 13, 1899.

The Application of Röntgen Rays for the Determination of Ash in Fossil Minerals (Ueber die Anwendbarkeit der Röntgen Strahlen sur Ermittelung der Aschengehalte Fossiled Mineralien). With reproductions of photographs showing the manner in which siliceous matter contained in coal is revealed. 1500 w. 1 plate Glückauf—Sept. 16, 1899.

The Examination of Combustibles by the Röntgen Rays (Untersuchung von Brennstoffen Mittels Röntgenstrahlen). F. Kotte. With reproductions of radiographs, showing the manner in which siliceous matter in the carbon is revealed. 1800 w. 2 plates. Stahl und Eisen—Nov. 1, 1899.

The Examination of Combustible Minerals by X Rays (Examen d'un Combustible Minéral au Moyen des Rayons de Röntgen). A note by M. Cauriol, showing that combustible materials are transparent, and non-combustible, opaque to X-rays, and that the purity of a fuel can be determined instantly in this manner. 800 w. Comptes Rendus—May 31, 1898.

X-Rays in Examination of Coal. An account of the investigations made by Prof. Henri Couriot, by radiometric analysis. 1100 w. Eng & Min Jour—March 17, 1900.

**Scotch.**—Chemical Notes on Scotch Coals. W. C. Anderson. Abstracted from the Proceedings of the Glasgow Philosophical Soc. Describes the varieties, gives an estimate of the coking power, oxidation, and the effect of heat. 2400 w. Gas Wld—Jan. 14, 1899.

**U. S. Western.**—Data as to the Value of Western Coal. Tabulated statement of the principal results of government tests, with analyses of a number of coals. 500 w. R R Gaz—Jan. 13, 1899.

**West Virginia.**—The Comparative Efficiency of West Virginia Coals. James W. Paul. The composition of 17 varieties of coal with their thermal efficiency and other characteristics are given. 800 w. Eng & Min Jour—March 7, 1896.

## COAL TRADE.

See **COAL INDUSTRY.**

## COAL TRANSPORTATION.

See also **HARBOR—Cardiff; RAILWAY RATES—Coal.**

**British Railways.**—See also **RAILWAY LEGISLATION—British Coal.**

**Demurrage.**—Demurrage in Relation to the Shipment of Coal and Coke. States briefly the leading principles on demurrage applicable to the subject of this article, and mentions cases that have come before the British courts, and the decisions. Serial. Col Guard—April 7, 1898.

**England.**—Coal Sales and Contracts. George Johnson. Gives the form of declaration and method of charging for coal conveyed by rail in England. 2000 w. Col Guard—June 23, 1899.

Coal Shipping. George Johnson. Information relating to business methods, charges, etc., in England. 2800 w. Col Guard—July 21, 1899.

Coal Wagon Estimates and Costs. George Johnson. Suggestions to colliery owners who are to build their own wagons. 2000 w. Col Guard—July 7, 1899.

The Carriage of Coal on Railways and Canals. The essential statutory provisions on the question in England, including a brief account of the special tribunals which have been established to determine disputes respecting the carriage of coal on railways and canals, followed by the leading points of cases which have been adjudicated by the Supreme and Appeal Courts, and the Railway and Canal Commissioners. Serial. Col Guard—July 3, 1896.

The Great Central New Coal Traffic Arrangements. An account of the special arrangements for dealing with the universal traffic from the Midlands and North of England since the opening of this line to London. Ill. 1100 w. Ir & Coal Trds Rev—May 5, 1899.

**Germany.**—See **RAILWAY TRAFFIC—Freight Tariffs.**

**Ohio and Mississippi Rivers.**—The Transport of Coal on the Ohio and the Lower Mississippi. James H. Bartlett. A description of transportation, overcoming difficulties due to the intermittent character of the navigation, and the magnitude of the undertaking. 6500 w. Col Guard—June 2, 1899.

**Sidings.**—Colliery Sidings and Agreements. George Johnson. A discussion of the chief factors to be considered. 2200 w. Col Guard—May 18, 1900.

### COAL TREATMENT.

See **COAL PREPARATION.**

### COAL WASHING.

See also **COAL PREPARATION.**

A Large Coal Screening and Washing Plant. Description illustrated by plans and sections of plant. 1400 w. Col Guard—Feb. 14, 1896.

Arrangement of Coal Washing Plant for Treating Bituminous Coals. Edgar G. Tuttle. Description, specifications and drawings for a plant capable of handling 300 tons per diem. 9000 w. Sch of Mines Jour—July, 1896.

Coal Efficiency and Coal Washing. On the improvement effected in the constitutents of the coal and its general character by washing. 1000 w. Col Guard—Feb. 10, 1899.

Coal Washing and Coke Making Plant. A coal washer whose principal feature is a settling chamber which allows the fine coal to settle and the water to be used again immediately. The banks of coke ovens in connection are of the Coppée type. 1600 w. Ill. Eng, Lond—Dec. 6, 1895.

Historical Notes on Early Plans for Coal Washing. F. J. Rowan. From the Transactions of the Mining Institute of Scotland. Description of some systems the completeness of which are surprising because of their early date. 1100 w. Am Mfr & Ir Wld—May 1, 1896.

Notes on Coal and Coke. C. A. Meissner. Read before the Mining Society of Nova Scotia. Deals with coal and coke for blast furnace use, especially with reference to the comparative benefits of washing. 1200 w. Can Min Rev—Aug., 1898.

The Screening and Washing of Coal. The importance of the mechanical preparation of coal, with description of screens in use. Serial. Ir & Coal Trds Rev—June 5, 1896.

Brookwood Coal Washer. F. M. Jackson. Read before the annual meeting of the Alabama Industrial and Scientific Society. Describes and illustrates the washer in successful operation by the Standard Coal Co., of Brookwood, Ala. 1200 w. Am Mfr & Ir Wld—Aug. 7, 1896.

Coal Washing. William B. Phillips. From advance sheets of second edition of "Iron Making in Alabama." Reviews the history of the industry in this state and gives information of changes effected by washing, and results obtained. 3300 w. Am Mfr & Ir Wld—March 25, 1898.

Notes on a Southern Coal Washing Plant. William B. Phillips. Discussion of the paper of J. J. Ormsbee. Showing the relation between specific gravity and composition of some Birmingham coal. 1000 w. Trans Am Inst of Min Eng—Nov., 1895.

Washing Alabama Coal. A description of some of the results obtained by washing coal for coke making. The advantages gained are indicated and also the kinds of coal with which the different appliances give the most favorable results. 2300 w. Mines & Min—April, 1898.

**Anzin, France.**—Separation of Dusty Coals. M. Parent. From a communication to the "Annales des Mines." Describes appliances constructed at Anzin, on the German principle of forcing air into the mass of small coal to be washed, so as to draw off the dust by current. 1100 w. Col Guard—July 16, 1897.

**Baum.**—The Baum Coal Washing Apparatus. Illustrated description. 2500 w. Col Guard—Nov. 6, 1896.

**Blanzy, France.**—New Washing Plant at the Blanzy Colliery. M. Graillot. From a communication to the Burgundy section of the Socéité de l'Iudustrie Minérale. Gives particulars and illustrations of a new plant capable of washing 800 tons of coal in ten hours. 2600 w. Col Guard—March 3, 1899.

**Cadeby.**—New Coal-Washing Plant at the Cadeby Colliery. Illustrated detailed description. 1800 w. Ir & Coal Trds Rev—March 23, 1900.

**Colorado.**—Coal Washing. R. H. Hosea. A description of the Colorado Fuel and Iron Co.'s Washing at Sopris, Colo. The character of the coal, the advantages accruing from washing it, and the experiments which led up to the adoption of the present plant. Serial. Col Eng—June, 1897.

**France.**—A New Coal Washer. A new form of coal jig used in France. Ill. 1800 w. Engr, Lond—Dec. 20, 1895.

**Luhrig.**—The Washing of Bituminous Coal by the Luhrig Process. J. V. Schaefer. A detailed description of the latest plant built on the Luhrig system, with a brief consideration of the nature of the impurities, the means to remove them and the advantages of cleaned coal. 4200 w. Am Soc of Mech Engs—Dec., 1896.

**New Soddy Coal Co.**—New Soddy Coal Co.'s Coal-Washing Plant. Illustrated description. 700 w. Tradesman—Aug. 15, 1896.

**Rhymney, Eng.**—The Rhymney Coal-Washing Plant. Illustrates and describes a large washing plant recently erected in England. 2700 w. Ir & Coal Trds Rev—June 23, 1899.

**Sizing.**—The Effect of Sizing on the Removal of Sulphur from Coal by Washing. Charles C. Upham. Calls attention to an element in the preliminary treatment, which is very generally neglected in the washing of coal, and of importance in coke-making. 1400 w. Trans of Am Inst of Min Engs—Dec., 1898.

The Effect of Sizing on the Removal of Sulphur from Coal by Washing. Charles C. Upham. On the importance of the finer crushing of coal before washing, with suggestions, observations and experiments. 1400 w. Am Gas Lgt Jour—May 8, 1899.

Washing and Sizing Coal. F. W. Hardwick. A lecture delivered at Mansfield, Eng.. Various methods employed in the mechanical separation and removal of impurities. Descriptions of leading types of washing appliances, their construction and the principles of their action in washing and sizing. 5000 w. Col Eng—Nov., 1896.

**Spain.**—Coal-Washing Installation at the Baltavara Mines (Asturias), Spain. Emilio Jimenez. Description with longitudinal and transverse sections. 1800 w. Col Guard—May 28, 1897.

**Tests.**—See **COAL TESTS—Rapid.**

**Tracy City, Tenn.**—Coal Washing. Charles E. Bowron. A description of the coal-washing and coking plant at Tracy City, Tennessee. 1000 w. Col Eng—Sept. 1897.

**Wunderlich.**—The Wunderlich Coal-Washing Apparatus (Stromwäsche; Patent Wunderlich). Describing an improved apparatus for washing coal as used at the mines in Kladno, Bohemia. 1500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—June 26, 1897.

Wunderlich Coal-Washer. From "Glückauf." Gives vertical section and describes a washer by which the mineral, uniformly fed in, is separated into clean coal, shaly coal, and stone, according to the specific gravity. 900 w. Col Guard—April 30, 1897.

### COAL WEIGHING.

See also **SCALES; WEIGHING MACHINE.**

**English Law.**—The Law Relating to Truck and Checkweighing. An official memorandum drawn up by the direction of the Secretary of State for the Home Department. The checkweighing clauses in the Coal Mines Acts are considered at length. 10000 w. Col Guard—April 24, 1896.

### COAST DEFENCE.

See also **ARTILLERY; GUN.**

Coast and Harbor Defence, with Some Notes on the Spanish War. Caryl D. Haskins. Discusses the problem of defending a coast city under present conditions. 4500 w. Jour of Worcester Poly Inst—May, 1900.

The Bombardment of Coasts (Les Bombardments de Côtes). Léo Dex. A discussion of the relative advantages of vessels and fortifications in connection with the attack and defence of coasts showing the importance of mortar fire with high trajectory against modern war ships. 2000 w. La Rev Tech—Sept. 25, 1898.

**Gibraltar.**—Defensive Works in Progress at Gibraltar. Works for the extension of moles and dock accommodation, and strengthening of the land defences are in progress. Notes on these and other works are given. 1400 w. Engr, Lond—Dec. 2, 1898.

**Iron Fortifications.**—Iron Fortifications. Illustrates a system of iron fortifications invented by James Acton Miller of New Haven, Conn. 1500 w. Ir Age—May 20, 1897.

**Sandy Hook Batteries.**—The Sandy Hook Mortar Batteries. Illustrated description of the strongest fortifications on the American continent, for the defence of New York Harbor. 1500 w. Sci Am—April 16, 1898.

**United Kingdom.**—Our Coast Defences. On the coast defences of the United Kingdom, describing some recent work and criticising the patchwork character. Ill. 1500 w. Engr, Lond—Jan. 20, 1899.

### COAST TELEGRAPH.

**Space Telegraphy.**—See **SPACE TELEGRAPHY—Coast Telegraph.**

### COBALT.

See also **NICKEL.**

The Treatment of Cobalt and Other Similar Ores. Walter J. May. The importance of classifying the material, and the need of securing the ore in the best condition possible. Gives suggestions for economical treatment. 1600 w. Col Guard—Nov. 25, 1898.

**New South Wales.**—Cobalt at Port Macquarie, New South Wales. J. B. Jaquet. Report on the cobalt deposits, considering them well worth further attention by the mining community. 2000 w. Aust Min Stand—Feb. 17, 1898.

**Westerwald. Rhenish Prussia.**—The Cobalt Deposits in the Westerwald (Das Kobalt-Vorkommen im Westerwalde). Giving an account of the manganiferous cobalt deposits in Rhenish Prussia, and suggesting possible uses of the metal and its compounds. 2500 w. Glückauf—October 2, 1897.

### COFFER DAM.

See also **BRIDGE FOUNDATION; DRY DOCK; FOUNDATION.**

Practical Points on Coffer-Dam Work. J. B. Gordon. The writer's experience in stopping leaks, with some of the difficulties he met in the work on the bridge between Staten Island and New Jersey. 1200 w. Stone—May, 1898.

**Bridge Piers.**—Deep Coffer-Dam Construction for Bridge Piers, Portland and Rumford Falls R. R. Illustrated description of two coffer-dams built against an unusual head of water and possessing structural features of interest. 800 w. Eng News—May 27, 1897.

**Piers.**—The Coffer-Dam Process for Piers. Charles Evan Fowler. Historical account of the development, with discussion of why the coffer-dam has gotten into disfavor, with directions that success instead of failure may result. Ill. 4000 w. Stone—Aug., 1897.

### COHERER.

See also **ELECTRO-PHYSICS; SPACE TELEGRAPHY.**

A Self-Recovering Coherer and the Study of the Cohering Action of Different Metals. J. Chunder Bose. Read before the Royal Soc. Account of researches on the cohering properties of various metals when exposed to electric radiation. 4000 w. Elect'n, Lond—July 21, 1899.

Discontinuous Electrical Conductors (Conductibilité des Radioconducteurs ou Conductbilité Electrique Discontinue). Edouard Branly. A study of a number of substances suitable for use in coherers, and a comparison between their action and that of nerve sensation. 1500 w. Comptes Rendus—Dec. 27, 1897.

I. The History of the Coherer Principle. Oliver Lodge. II. The practical Applications of the Coherer. A. C. Brown. III. On Compressional Electric or Magnetic Waves. Oliver Heaviside. IV. A Carbon Detector or Receiver for Hertz Waves. Frederick J. Jervis-Smith. A series of articles dealing with the theory and applications of the coherer to wireless telegraphy. 14300 w. Elect'n—Nov. 12, 1897.

The Increase in Resistance of Some Radio-Conductors (Accroissements de Résistance des Radioconducteurs). Ed. Branly. A short account of some experiments tending to confirm the opinion that the phenomenon is due to the physical state of the insulating layers between the conducting particles. 700 w. Comptes Rendus—April 17, 1900.

The Maximum Sensitiveness of Coherers in Practical Use in Wireless Telegraphy (Sur la Sensibilité Maxima des Cohéreurs Employés Pratiquement dans la Télégraphie sans Fils). A. Blondel and G. Dobkévitch. A short account of a method of controlling the sensitiveness of a coherer by altering the pressure on the filings by increasing their amount. 600 w. Comptes Rendus—April 23, 1900.

**Branly's Experiments.**—Radioconductors with Metallic Balls (Radioconducteurs à Billes Metalliques). E. Branly. A note to the French Academy describing M. Branly's early and more recent experiments with various forms of coherers. 1200 w. Comptes Rendus—May 1, 1899.

**Carbon.**—See Tommasina.

**Conductivity.**—The Electrical Conductivity of Interrupted Conductors (Sur la Conductibilité Electrique des Substances Conductrices Discontinus). M. E. Branly. An account of experiments made in 1891-92 with coherers similar to those used by Marconi in wireless telegraphy. 1000 w. Comtes Rendus—Dec. 6, 1897.

**Experiments.**—Experiments on Coherers. Alfred G. Dell. Describes laboratory experiments made to determine something concerning the action of coherers, giving results. 1200 w. Elec Eng, N Y—Feb. 16, 1899.

**Inventor.**—The Invention of the Coherer. Camillo Olivetti. The object of the article is to show the real inventor to be Dr. Temistocle Calzecchi Onesti. Ill. 1000 w. Elec Wld & Eng'r—Dec. 2, 1899.

**Investigation.**—A Quantitative Investigation of the Coherer. A. Trowbridge. Deals with the lowering of the resistance as a function of the quantity of electricity discharged through and the difference of potential on opposite sides of the coherer. 2200 w. Am Jour of Sci—Sept., 1899.

**Magnetic.**—The Substitution of Magnetic for Mechanical Action in a Coherer (Sur la Substitution de l'Action Mágnétique a l'Action Méchanique du Trembleur). Th. Tommasina. A communication to the French Academy showing how the mechanical tapping for decohering may be advantageously replaced by the action of a magnet. 500 w. L'Electricien—June 10, 1899.

**Microscopical Investigation.**—Investigations Into the Method of Operation of the Coherer (Untersuchungen über die Wirkungsweise des Fritters). J. Härdén. An examination of coherers under the microscope, to determine how the resistance is lowered. 1000 w. Elektrotech Zeitschr—April 5, 1900.

**Nature of Phenomena.**—The Nature and Cause of the Phenomena in Coherers (Sur la Nature et la Cause du Phénomèna des Cohèreurs). Thomas Tommasina. A note to the French Academy giving the results of the writer's investigations at the laboratory of the University at Geneva. 1200 w. Comptes Rendus—July 3, 1899.

**Phenomena.**—Some New Coherer Phenomena. F. Companile and G. di Ciommo. Abstract translation of article in "L'Elettricita," describing experiments undertaken to obtain information as to the nature of coherer action. Ill. 900 w. Elec Rev, N Y—April 4, 1900.

**Tommasina.**—A Very Sensitive Coherer (Sur un Cohéreur Très Sensible). T. Tommasina. A communication to the French Academy describing a very sensitive coherer composed of granules of carbon between carbon points. 1000 w. Comptes Rendus—March 18, 1899.

The Auto-Decohering of Carbon and Its Application in a Telephonic Receiver for Wireless Telegraphy Signals (Sur l'Auto-Decohération du Charbon, et sur l'Application de cette Découcerte aux Appariels Téléphoniques pour Recevoir les

Signaux de la Télégraphie sans Fils). Thomas Tommasina. A carbon powder receiver. 600 w. Comptes Rendus—April 2, 1900.

**COINAGE.**

See also **MINT.**

**Alloys.**—To Experiment with Different Alloys for Coinage. Brief account of experiments being conducted at the Mint in Philadelphia. 600 w. Sci Am Sup—Jan. 9, 1897.

"Trial of the Pyx."—See **ASSAYING—Coinage.**

**COIN-CONTROLLED MACHINERY.**

See **SLOT MACHINERY.**

**COKE.**—See also **COAL—Coking Power; CHARCOAL.**

The Requirements of a Good Coke. Information from an article by O. Simmersbach, published in the "Revue des Mines de Liege." The constituents are considered in detail. 1800 w. Ir & Coal Trds Rev—Jan. 27, 1899.

**Analysis.**—The Analysis of Coke. George C. Davis. Read before the Foundrymen's Assn. Means for determining its suitability for use in blast furnace or cupola. Describes the proximate analysis of coke. 1200 w. Am Mfr & Ir Wld—Dec. 4, 1896.

The Analysis of Coke. George C. Davis. Describes methods for determining the percentage of sulphur and the amount and composition of the ash. 1200 w. Col Guard—Oct. 30, 1896.

**Blast Furnace.**—See also **COAL WASHING.**

**Breaking.**—The Breaking and Classifying of Coke. M. Hoyer. Translated from "Le Gaz." Read before the Société Technique Belge de l'Industrie du Gaz, as a continuation of a similar paper read in 1896. Describes a new coke breaker, giving results obtained during a year's operation. 800 w. Pro Age—May 2, 1898.

**Coals.**—See **COAL—Coking Power.**

**Connellsville.**—Development of the Connellsville Coke Region. W. G. Irwin. A brief historical account of the industry. 1100 w. Eng & Min Jour—March 24, 1900.

The Connellsville Coking Region. F. C. Keighley. Read before the Cent. Min. Inst. of W. Penn. A history of the development and an account of the wonderful production. 4500 w. Mines & Min—Feb., 1900.

History of Connellsville Coke. F. C. Keighley. Read before the Cent. Min. Inst. of W. Penna. 3200 w. Foundry—Sept., 1900.

The Method in the Connellsville Coke Region. F. C. Keighley. A fully illustrated account of the Pennsylvania coke industry, showing its importance as a factor in the production of iron. 4000 w. Eng Mag—Oct., 1900.

The Coke Country. H. P. Snyder. Gives the history of the coke industry, and especially of the Connellsville (Pa.) region. 3000 w. Chau—April, 1898.

The Future of the Connellsville Coke Region. A review of conditions there and a discussion of length of time before the coal is exhausted. 800 w. Eng & Min Jour—Sept. 22, 1900.

**Connellsville, Leith Mine.**—The Leith Mine. H. L. Auchmuty. A description of a modern mine and coke works in the Connellsville region. The geological features of the tract worked, the system of mining employed, and the method of timbering, ventilating and drainage, together with a description of the surface improvements. Two articles. 14000 w. Col Eng—Aug.-Sept., 1896.

**Desulphurization.**—See **Sulphur.**

**Domestic.**—Domestic Coke and Briquettes from Retort Coke Ovens. R. M. Atwater. Read at meeting of the Ohio Inst. of Min. Engs. Discusses the prospect of using Ohio coals for blast furnace coke; the effect of fine grinding, the retort oven coke, with details of the operation, and the making of briquettes. 3300 w. Ir Trd Rev—Jan. 26, 1899.

**Foundry.**—Coke Consumption in Iron Foundries. Walter J. May. Considers things affecting the quantity consumed. 1500 w. Prac Engr—Oct. 27, 1899.

Foundry Coke. Walter J. May. Discusses the question of good foundry coke. 1000 w. Prac Engr—May 5, 1899.

**Gas.**—See **GAS COKE.**

**Handling.**—See **COKE HANDLING.**

**Indian Coal.**—See **COAL—Indian.**

**Locomotive.**—Coke for Locomotive Fuel. George L. Fowler. Reviews European practice and the results accomplished, and gives details of its use in America. Ill. 3500 w. R R Gaz—June 22, 1900.

Coke as Locomotive Fuel. Discusses its use on the Boston & Maine R. R. Also editorial. Ill. 300 w. Am Engr & R R Jour—Oct., 1899.

See also **LOCOMOTIVE—Coke Burning.**

**Locomotives, France.**—Coke Burning in France. George L. Fowler. Facts regarding the work done in burning coke on foreign railroads. 700 w. R R Gaz—July 20, 1900.

**Quenching.**—A Dry Quenching Process for Coke. Illustrated description. 900 w. Ir & Coal Trds Rev—Nov. 3, 1899.

**Sonora, Mexico.**—Natural Coke of the Santa Clara Coal Field, Sonora, Mexico. E. T. Dumble. A description of deposits of interest and value. 1400 w. Trans Am Inst of Min Engs—Sept., 1899.

**Steam Generation.**—Advantages of Coke Over Coal as a Fuel for Generating Steam. Arthur C. Freeman. Read at Montreal meeting of the New England Cotton Mfrs. Assn. States its advantages and gives suggestions for its management. 1200 w. Am Mfr & Ir Wld—Nov. 9, 1899.

**Sulphur.**—The Desulphurization of Coke. A general review of attempts to devise a satisfactory treatment. 1700 w. Engr, Lond—Sept. 7, 1900.

Concerning Sulphur in Coke (Ueber den Schwefelgehalt des Koks). Giving analyses of cokes from various parts of Europe, and discussing the effect of the presence of sulphur upon the iron smelted with such fuel. 2500 w. Stahl und Eisen—Jan. 1, 1898.

The Sulphur Contents of Coke in their Relation to Blast Furnace and Cupola Practice. Oscar Simmersbach. Translated from "Stahl und Eisen." States on what the sulphur contents in coke depends, why sulphur in coke is injurious in the blast furnace, and in the cupola, and suggests how lower sulphur contents may possibly be obtained. 1800 w. Am Mfr & Ir Wld—Jan. 28, 1898.

**COKE ANALYSIS.**

**Volatile Combustibles.**—See **COAL ANALYSIS—Volatile Combustibles.**

**COKE CONSUMPTION.**

**Europe.**—See **COAL CONSUMPTION; COAL INDUSTRY.**

**COKE CONVEYER.**

**Brouwer-Rouget.**—See **GAS RETORT—Charger.**

**COKE HANDLING.**

See also **COAL HANDLING.**

The Automatic Manipulation of Coke. Gilbert Little. Read at meeting of North British Assn. of Gas Managers. Descriptive comments on some of the latest methods of conveying, elevating, screening, sorting and stacking coke. Ill. 1100 w. Gas Wld—Aug. 6, 1898.

The Mechanical Handling of Coke (Manutention Mécanique du Coke). J. Laverchère. Giving numerous illustrations of devices for handling gas works coke, as installed in the United States and in France. 2000 w. 1 plate. Génie Civil—Oct. 14, 1899.

**Halifax.**—Coke Handling Plant. T. Holgate. Read before the British Inst. of Gas Engs. A report of the officers' experience, and information gathered in connection with the introduction of a coke handling plant at Halifax. Detailed description of the plant and appliances. Discussion. Ill. 15400 w. Gas Wld—May 6, 1899.

See also **COKE OVEN GAS—Lighting.**

**Paris Gas Co.**—Mechanical Handling of Coke in the Paris Gas Company's Works. Abstract translation of paper by M. Louvel, giving illustrated detailed description of the plant. 3200 w. Gas Wld—Sept. 22, 1900.

See also **COAL HANDLING.**

**COKE INDUSTRY.**

Relation of Coke Producers to Consumers. E. M. Peters. Read before the Cent. Min. Inst. of W. Penn. The importance of the industry is considered and how to produce what the consumer requires. 2000 w. Mines & Min—Feb., 1900.

The Coke Industry. Reviews the industry of coking and the idea of utilizing the chemical constitutents given off in the processes of coking, with references to ovens for saving these products. Ill. 2700 w. Sci Am Sup—March 27, 1897.

**British, 1897.**—See **COAL INDUSTRY.**

**Europe.**—See **COAL INDUSTRY.**

**Germany.**—Commercial and Technical Progress of the German Coke Industry. F. Simmersbach. Condensed translation from "Stahl und Eisen." Information relating to the Ruhr district, the progress made, the ovens used, by-products, etc. 2200 w. Am Mfr & Ir Wld—Aug. 12, 1896.

The Recent Development of the German Coke Industry (Neue Ergebnisse der Deutschen Koksindustrie). F. Simmersbach. A statistical paper, reviewing the production by districts, from 1890 to 1897, during which period increase of 55 per cent. occurred. The Otto oven is illustrated and described. 5000 w. Stahl und Eisen—July 15, 1898.

See also Westphalia; COKE OVEN—Otto.

**U. S.**—Coke Production in 1895. Jos. D. Weeks. Extract from report made to the United States Geological Survey. Shows the production outside of the Appalachian region is a growing one. 1500 w. Am Mfr & Ir Wld—July 17, 1896.

Some considerations as to Coke. Editorial review of the present situation of the coke supply. 1200 w. Ir Tr Rev—April 23, 1896.

**U. S. Southern.**—See also COAL INDUSTRY—U. S. Southern.

**Westphalia.**—Report of the Westphalia Coke Syndicate for 1896 (Geschäftsbericht des Westfälischen Kokssyndikats für das Jahr 1896). A very full tabular report of the coke industry in its German headquarters with graphical diagrams of the relative production in Germany and the rest of the world. 7500 w. 2 plates. Glückauf—April 17, 1897.

The Ten Years' Work of the Westphalia Coke Syndicate (Zehnjähriges Bestehen der Aktien-Gesellschaft "Westfälisches Kokssyndikät" zu Bochum). Reviewing the development of the coke industry in Westphalia with instructive diagrams. 1200 w. 3 plates. Glückauf—Oct. 13, 1900.

## COKE MANUFACTURE.

See also COKE OVEN.

Coke Making. Historical account, with a study of the economical problems connected with the industry. Serial. Eng, Lond—Aug. 28, 1896.

Coke Making for Profit. Fred C. Keighley. Part first discusses the most profitable plant, giving facts of interest to those in the coke business. Serial. Am Mfr & Ir Wld—Sept. 30, 1898.

Half a Century of Coke and Coking Processes. Part first gives statistics of recent progress, and the economy possible from the utilization of by-products and waste gases. Serial. Ir & Coal Trds Rev—Nov. 12, 1897.

Notes on Improved Methods of Cokeing. John S. Kennedy. Description of the bee-hive, Otto-Hoffman and Semet-Solvay ovens, with a statement of the qualifications of a good coke for metallurgical purposes. Serial. Tradesman—Dec. 15, 1895.

The Vast Importance of the Coke Industry. John Fulton. Showing the value of coke for metallurgical and domestic uses, and describing the various types of coke ovens, with their advantages and disadvantages. Ill. 5000 w. Eng Mag—May 5, 1896.

The Yield of Coal in Coking. Duncan Anderson, Jr. Considers the yield and character of coke as obtained from the beehive oven, retort oven, and platinum crucible respectively. 1400 w. Ir Age—Sept. 28, 1899.

Time in Coke Making. William Gilbert Irwin. Brief account of experiments along this line. 900 w. Eng & Min Jour—March 3, 1900.

**Alabama Coal.**—Alabama Coal in By-Product Ovens. William B. Phillips. An account of the testing of 54000 lbs. of this coal, with the view of ascertaining to what extent it would lend itself to the recovery of by-products and the production of coke suitable for use in the blast furnace. 1400 w. Am Mfr & Ir Wld—April 1, 1898.

**American.**—The Manufacture of American Coke in 1895. Extract from report by Mr. Joseph D. Weeks. Production, extent of the industry, prices, etc. 1700 w. Col Guard—Sept. 18, 1896.

**Benzol.**—The Recovery of Benzol from Coke-Oven Gases. Particulars on benzol recovery obtained chiefly from a paper by Dr. C. Heinzerling. 1500 w. Jour Gas Lgt—June 29, 1897.

**Bilbao, Spain.**—The Manufacture of Coke at Bilbao. Describes the plant of the Viscaya Company at Bilbao, the retorts, breaking and distributing of the coal, extractors, pumps, gas-washing plant, distillation of bensol and manufacture of sulphate of ammonia. 2000 w. Col Guard—March 12, 1897.

**Briquetting.**—The Coke Works and Briquetting of Mineral Coal in Austria. R. Helmhacker. Some particulars of a successful industry. 900 w. Eng & Min Jour—Nov. 7, 1896.

See also BRIQUETTE.

**By-Products.**—See also AMMONIA; COKE OVEN.

**England.**—The Manufacture of Coke. A detailed consideration of the systems of importance now used in England, dealing with the results obtained. This article presents the Otto system. Ill. Serial. Col Guard—Jan. 13, 1899.

**Foundry.**—Coke for the Foundry. Thomas D. West. Its characteristics, methods of manufacture and a founder's experience with it. Illustrated by sections of coke ovens. Serial. Ir Tr Rev—Feb. 13, 1896.

The Manufacture of Coke and Its Selection for the Foundry. W. T. Rainey. Read before the Foundrymen's Assn. Abstract. The process of coking and method of charging the ovens in the Connellsville district is described, and brief reference made to another process, used a great deal in Europe. 1600 w. Ir Age—June 11, 1896.

**Hemingway.**—The Hemingway Coking Process. Illustrates and describes a process for coking low-grade Western coal. 1400 w. Ir Age—Jan. 18, 1900.

**Iron Industry.**—The Use and Manufacture of Coke in the Iron and Steel Industries. Discusses the economic value of coke and the method of its preparation, referring to the experiments of M. Louis Campredon, and his conclusions. Describes the fuel which has been employed in the blast furnace, and the changes, cost and economy. 2000 w. Col Guard—Aug. 26, 1898.

**Lancaster, Eng.**—Coal Carbonizing in Bulk at Lancaster. Treats of the system of coal carbonizing in bulk, with recovery of all products and with special reference to a plant installed at Lancaster, a view of the works being also given. An instructive and interesting article. 2500 w. Jour Gas Lgt—Dec. 31, 1895.

**Lean Coals.**—See Stamping Machinery.

**Pressing Machinery.**—See Stamping Machinery.

**Retorts.**—Retort Coking. John S. Kennedy. The utilization and the value of the by-products. Different systems of retort coking are also discussed. 2000 w. Tradesman—Aug. 15, 1896.

**Short.**—The Manufacturing of Short Coke. States some of its advantages and the principles on which its formation depends. 1300 w. Mines & Min—May, 1899.

**Silesia.**—Coking in Upper Silesia. M. Gouvy. A paper communicated to the Soc. of Mineral Industry, St. Etienne, France, giving general description of the several plants, with statistics. 1500 w. Am Mfr & Ir Wld—Feb. 21, 1896.

**Southern U. S.**—Coke Making and Southern Coals. John S. Kennedy. The salient points of difference between the old and the new practice. 2000 w. Tradesman—Jan. 1, 1897.

**Stamping Machinery.**—An Electrically-Driven Coal-Stamping Machine. From "Glückauf." Illustrated description of a machine used in preparing inferior coal for coking. 1300 w. Ir & Coal Trds Rev—Dec. 1, 1899.

Coal Stamping Machinery (Ueber Kohlenstampfmaschinen). A description of machinery used for consolidating soft coal preparatory to coking; with especial reference to the electrically driven machines now used in Silesia and in the Saar district. 1500 w. 1 plate. Glückauf—Nov. 25, 1899.

Coking Lean Coals with the Aid of Mechanical Stamping Appliances. Oscar Simmersbach, in "Stahl und Eisen." An interesting review of the mechanical appliances used in Germany, with the aim of hardening coals relatively low in bituminous matter. Ill. 2800 w. Ir Age—Dec. 29, 1898.

The Coking of Inferior Coals with the Aid of Pressing Machines. Partly translated from "Stahl und Eisen" and partly gathered from the records of the English Patent Office. Briefly notes the methods tried, and the degree of success, with illustrated description of various machines. 4000 w. Ir & Coal Trds Rev—Dec. 16, 1898.

The Coking of Lean Coals (Ueber die Verkokung Magerer Steinkohlen). O. Simmersbach. A description of a method of compressing coal slack into coherent masses for coking in special ovens. 2500 w. Stahl und Eisen—Dec. 1, 1898.

**COKE OVEN.**

See also **COAL WASHING; COKE MANUFACTURE.**

Some Systems of Coking and Coke Ovens. Brief accounts of the various systems, with illustrations. 3500 w. Ir & Coal Trds Rev—Dec. 1, 1899.

**Bauer.**—The Bauser By-Product Coke Oven. From "Stahl und Eisen." Illustrated description of a new form of retort coke oven. 1600 w. Am Mfr & Ir Wld—Sept. 28, 1899.

The Bauer By-Product Coke Oven. Illustrated description of ovens claiming the advantages of surplus of gas unconsumed, smaller space, low working expenses, and absence of smoke. 1400 w. Eng & Min Jour—Sept. 9, 1899.

The Von Bauer Coke Oven (Koksöfen von Dr. von Bauer). Julius Elsner. A fully illustrated description of the von Bauer ovens as installed in the Krupp works at Hannover. 2500 w. Stahl und Eisen—April 15, 1899.

The Von Bauer Coking Plant. Julius Elsner in "Stahl und Eisen." Illustrates and describes the system and method of working, giving a comparison of results. 1600 w. Col Guard—April 28, 1899.

**Bee-Hive.**—Coking on a Bee-Hive Oven. William B. Phillips. Reports personal observations of the progressive changes that take place in a bee-hive oven from the moment of charging the coal to the withdrawal of the coke. Serial. Eng & Min Jour—Dec. 18, 1897.

**Beehive, West Va.**—The Coking, in Beehive Ovens, of the Coals of the New River District, West Virginia. Charles Catlett. Gives observations made of the burning of a set of eight ovens by means of the draft-boxes, the observations extending over a period of about two weeks. 3000 w. Trans Am Inst of Min Engs—Feb., 1899.

**Brunck.**—The Brunck Coke Oven System (Ueber Koksöfen System Brunck). Dr. R. Brunck. An illustrated description of the Brunck system, in which the heating of the two halves of the oven is entirely independent, the air is heated before reaching the coal, and provisions is made for securing the by-products, tar, ammonia, benzol and illuminating gas. 1500 w. 1 plate. Stahl und Eisen—July 1, 1900.

The Brunck Coke Oven. R. Brunck, in "Stahl und Eisen." Describes this system and illustrates the newest large installation. 1700 w. Col Guard—July 13, 1900.

The Brunck Coke Ovens. R. Brunck, in "Stahl und Eisen." Illustrated description, showing the method of packing in coal, and improvements in the recovery of gases and by-products. 1800 w. Am Mfr & Ir Wld—Sept. 6, 1900.

**By-Products.**—By-Product Coke-Making in Germany. From a British Consular Report by T. R. Mulvany. Stating the advantages of coke-ovens with the recovery of by-products, the decrease in the number of round ovens and increase in by-product ovens, with particulars relating to the system used. 1200 w. Col Guard—April 29, 1898.

By-Product Cove Ovens. Evence Coppée. Read before the Engineering Conference of the Inst. of Civ. Engs., England. Gives results obtained in the Coppée recovery system. Discussion. 2500 w. Col Guard—June 16, 1899.

By-Product Coking in Western Pennsylvania. William Gilbert Irwin. Considers the advantages of the by-product ovens over the best hive oven, and the economic superiority of the system. Ill. 1200 w. Eng & Min Jour—June 16, 1900.

Coke Ovens and By-Products in Germany. Abstract from a Foreign Office Report by Kurt Seebohm. Reports the abandoning of the old round coke ovens and describes the systems adopted in the new by-product ovens. 1600 w. Ir & Coal Trds Rev—April 29, 1898.

Development of By-Product Coke Making. From advance sheets of the report on the "Manufacture of Coke in 1897," by Edward W. Parker of the U. S. Geological Survey. Discusses the change in methods, the change made in moving the industry from the mining regions to the centers of industrial activity, the use of gas for fuel, and related subjects. 3500 w. Am Mfr & Ir Wld—Aug. 26, 1898.

Modern Appliances for Recovery of By-Products from Coking Coal. A translation from the German, dealing with Westphalian practice. Summarises the conditions affecting quantity and quality of distillation products and describes recovery apparatus. 1100 w. Am Gas Lgt Jour—Sept. 19, 1898.

Modern Appliances for the Recovery of By-Products from Coking Coal. From "Stahl und Eisen." Describes a German plant and the manner of recovering the products. 1500 w. Gas Wld—Oct. 15, 1898.

On Coking in By-Product Ovens. John H. Darby. Read before the Iron & Steel Inst., London. The manufacture of coke, with special attention to the recovery of by-products. Many points of practice in the working of the Semet-Solvay oven are noticed. 2500 w. Ind & Ir—May 13, 1898.

On Coking in By-Product Ovens. John H. Darby. Read before the Iron and Steel Inst. Data showing that well-made retort coke is economical in the blast-furnace, and that some fuels that will not coke satisfactorily in the bee-hive ovens, will produce a marketable coke in the retort oven. 2500 w. Engng—July 1, 1898.

Possible Economies in the Manufacture of Coke. Editorial urging the adoption of by-product coke ovens in England, and showing their economy. 1700 w. Ir & Coal Trds Rev—Nov. 19, 1897.

Recovery of By-Products and Utilization of Waste Gases in Coke Ovens. Practice in England and on the continent. 2000 w. Ir & Coal Trds Rev—Jan. 31, 1896.

Some Notes on Recovery Plant in By-Product Coking. Rudolph Terhaerst in "Stahl und Eisen." General remarks on by-product plants, with description of ovens and condensing apparatus. 1800 w. Ir & Coal Trds Rev—Sept. 23, 1898.

The Recovery of By-Products in Coke Making (Anlagen zur Gewinnung der Nebenproducte im Kokereibetrieb). Rudolf Terhaerst. Notes on the construction of the ovens and the condensing apparatus for the recovery of tar, ammonia, and benzol. 2500 w. Stahl und Eisen—Aug. 15, 1898.

See also **Bauer; Brunck; Newton-Chambers; Otto; Semet-Solvay; COKE-OVEN GAS.**

**Collin.**—The Collin Coke Oven. Notes the particular features and describes how the ovens are used. Ill. 1600 w. Col Guard—Jan. 7, 1898.

**Georgia.**—Coking Plant of the Durham Coal & Coke Co. A. W. Evans. Illustrated description of a plant on Lookout Mountain, Georgia. 1300 w. Mines & Min—Sept., 1900.

**Mechanical Drawer.**—A Mechanical Coke-Drawer. Robert A. Cook. Illustrated description of a device by which the coke from bee-hive ovens is extracted with a minimum of manual labor. 1000 w. Trans Am Inst of Min Engs—July, 1896.

**Neinhaus.**—Modern Systems of Coking (Die Heutigen Koksöfensysteme). A discussion of the various methods of coking with ovens intended to save the by-products; with especial reference to the Neinhaus oven. 4000 w. Glückauf—July 9, 1898.

**Newton-Chambers.**—The Newton-Chambers System of Saving the By-Products of Coke-Manufacture in Bee-Hive Ovens. Robert A. Cook. A brief history of the development of Sheffield, Eng., of a most successful system of the utilization of by-products in connection with an already existing plant of bee-hive ovens. 1200 w. Trans Am Inst of Min Engs—July, 1896.

**Otto.**—The Improved Otto System of Coke-Making. From "Stahl und Eisen." Concerning the improved type of the Otto ovens, in which the regenerative principle has been abandoned, and the cause of the alteration. 1200 w. Col Guard—Dec. 8, 1899.

The Otto Coke Oven and the German Coke Industry. A compilation from two papers recently published in Germany, showing the enormous advance in by-product saving recently made in the Ruhr district, and the part played therein by the Otto Oven, the structure and working of which are described. 4400 w. Ill. Ir & Coal Tr Rev—Sept. 9, 1898.

The Otto Coke Oven in Germany. Translated from "Glückauf." Illustrates the new type of Otto oven, heated from below, stating the advantages, and giving analyses. 3300 w. Ir & Coal Trds Rev—Dec. 8, 1899.

Underfired Coke Ovens (Koksöfen mit Unterfeuerung). K. Hilgenstock. Especially describing the improved Otto by-product coke oven, with sectional details showing the construction. 3500 w. 1 plate. Glückauf—Dec. 2, 1899.

**Otto-Hoffman.**—The Otto-Hoffman Coke Oven Plant at Glassport, Pa. Illustrated description. 1800 w. Ir Age—Nov. 11, 1897.

**Semet-Solvay.**—A Description of the Semet-Solvay By-Product Coke Oven Plant at Ensley, Alabama. William Hutton Blauvelt. Illustrates and describes a new plant recently put in operation, and compares the by-product oven and its operation, with the beehive oven. 3500 w. Trans Am Inst of Min Engs—Oct., 1898.

Coke Oven Construction. R. M. Atwater. Its effect on coke, with special reference to Semet-Solvay ovens. The object of the paper is to offer methods of coking the Pittsburg coal, which will enlarge the boundaries of the standard coking coal to all the Pittsburg coal fields that bear coal of standard chemical composition. Read before the Soc. of Engs. of Western Penna. 2500 w. Col Eng—June, 1896.

Semet-Solvay By-Product Coke Ovens. Brief paper read before the Brit. Inst. of Min. Engs. Illustrates and describes the plant at Wheeling, W. Va. 1200 w. Col Guard—June 22, 1900.

Semet-Solvay Retort Coke Ovens, with Recovery of By-Products. R. M. Atwater. From a paper read before the meeting of the Ohio Inst. of Min. Engs. Comparison of the Beehive coke oven with the Semet-Solvay product, with results of working. 5000 w. Ir Tr Rev—Jan. 30, 1896.

The Effect of Coke Oven Construction on Coke. R. M. Atwater. A paper read before the Society of Engineers of Western Penna., setting forth the advantages of the Semet-Solvay retort coke oven. 2500 w. Ir Tr Rev—March 26, 1896.

The Manufacture of Coke by the Semet-Solvay Process. A consideration of this process, the extent to which it is used, the results of working, etc. Ill. 2200 w. Col Guard—Sept. 15, 1899.

The Semet-Solvay Coke Oven. An illustrated description. 1000 w. Eng & Min Jour—Nov. 30, 1895.

**Semet-Solvay, Dunbar, Pa.**—The Semet-Solvay Coke Plant at Dunbar, Pa. William L. Affelder. Illustrated description of the coke ovens and the apparatus for the recovery of the by-products. 2200 w. Mines & Min—Feb., 1900.

**Simon-Carves.**—The Improved Simon-Carves Coke Oven. Illustrated description of this well-known oven in its improved form. 900 w. Eng & Min Jour—Nov. 13, 1897.

The Simon-Carves Coke Oven. Interesting particulars in regard to this coke oven system for the manufacture of coke and recovery of by-products. The coal is converted into coke by heat transmitted through the oven walls. 1800 w. Col Guard—Sept. 17, 1897.

**Solvay.**—Some Remarks on Coke Ovens and Their Products. S. J. Fowler. Description of the Semet-Solvay Oven, located at the works of the Solvay Process Co., of Syracuse, N. Y., with drawing. The illuminating coal gas plant and the retort coke oven plants are compared, and related matters examined. Discussion follows. 4000 w. Am Gas Lgt Jour—March 8, 1897.

**Uniontown, Pa.**—A Model Coke Plant. Illustrated description of coke plant No. 2, of the Oliver Coke and Furnace Company, near Uniontown, Pa. 700 w. Mines & Min—Nov., 1807.

**Von Bauer.**—See **Bauer.**

**Waste Heat Utilization.**—See **COKE OVEN GAS.**

**Welsh.**—Welsh Coke Ovens. A brief description of a form of oven used in West Virginia in place of beehive ovens. 500 w. Mines & Min—Aug., 1900.

### COKE OVEN GAS.

See also **BLAST FURNACE GAS.**

**Everett Plant.**—The Everett Coke Oven Gas Plant. Dr. F. Schniewind. Describes and illustrates the works, their location, transportation facilities, coal handling plant, coke ovens, etc. Serial. Pro Age—Aug. 15, 1899.

**Illuminating.**—Illuminating Gas from Coke Ovens. Carl Schmidt, in 'Jour. für Gasbeleuchtung." On tests made in the German coal regions with the conclusion that by using the proper kind of oven and coal and luminating gas can be made much more cheaply than from retort furnaces and scarcely inferior in quality. 1800 w. Pro Age—Sept. 15, 1899.

**Lighting.**—By-Product Coke Ovens as a Source of Gas Supply. Peter Young. Compares the cost of oven and retort plants, and gives information concerning the two coke oven plants on the American continent supplying illuminating gas. Discussion. 3300 w. Am Gas Lgt Jour—April 16, 1900.

Producing Illuminating Gas and Coke in By-Product Coke Ovens. H. O. Hofman. An outline of the work done at Halifax, N. S., by the People's Light and Heat Co., and of the preliminary large scale experiments made for the New England Gas & Coke Co., at Glassport, Pa., with the coal that is to be used in the new Boston plant. Serial. Eng & Min Jour—Oct. 8, 1898.

The Application of Coke Oven Gas for Illuminating Purposes (Verwendung von Koksofengas zu Beleuchtungszwecken). With analyses of gases produced by various ovens, showing that a valuable excess of gas remains even after a portion is used for heating the ovens. 2000 w. Stahl und Eisen—July 1, 1899.

The By-Product Coke Oven for the Manufacture of Illuminating Gas. Henry W. True. Reports the manufacture of illuminating gas in a block of 10 by-product coke ovens at Halifax, N. S. 2000 w. Am Gas Lgt Jour—June 5, 1899.

The Utilization of Coke Oven Gas for Lighting. From "Stahl und Eisen." Considers the causes of contamination in coke oven gases, and the consequent inferior quality, and other subjects related which affect the economy. 1700 w. Col Guard—July 14, 1899.

The Utilization of Coke Oven Gases for Lighting. Abstract from "Stahl und Eisen." Discusses various methods tried and their results, giving suggestions to obtain the best results. 1800 w. Ir & Coal Trds Rev—Sept. 22, 1899.

**Motive Power.**—Utilizing Coke Oven Gases for Motive Power. A. von Ihering, in "Stahl und Eisen." A comparison of the relative efficiency of motors actuated by blast furnace gas and coke oven gases. 1700 w. Col Guard—Sept. 22, 1899.

The Application of Coke Oven Gas for Motive Power (Die Verwendung der Koksofengase zum Motorischen Betriebe). A. von Thering. A review of Disdier's paper before the Iron and Steel Institute, giving analyses of many samples of gases. 2500 w. Stahl und Eisen—Sept. 1, 1899.

**Waste Heat Utilization.**—Utilization of the Waste Heat from Coke Ovens. M. Soulary. From a communication to the Société de l'Industrie Minerale. A record of results obtained in current working. Concludes that a well-designed water-tube boiler gives as good a yield as one of multitubular type, without the many disadvantages, and that it affords a greater measure of safety. Ill. 7500 w. Col Guard—Jan. 6, 1899.

Waste Heat and Gases from Coke Ovens. Charles E. Bowron. Describes how they are successfully utilized in the generation of steam by the Tennessee Coal, Iron and Railroad Company. Ill. 800 w. Col Eng—Sept., 1897.

### COKE TRADE.

See **COAL INDUSTRY; COKE INDUSTRY.**

### COLD STORAGE.

See **REFRIGERATION.**

### COLISEUM.

**St. Louis.**—Structural Work of the St. Louis Coliseum. The structural design is based upon the three-hinged arch system. Sectional plans are given and interior view. 1500 w. Eng News—Aug. 10, 1899.

### COLLEGE.

See also **EDUCATION; SCHOOL; UNIVERSITY.**

**Bradford Technical.**—The Bradford Technical College. Interesting description of a now famous English school. Serial. Engng—Jan. 3, 1896.

**Colombo, Ceylon.**—St. Joseph's College, Colombo. Illustrated description of the Roman Catholic College in Ceylon. 1500 w. Ind Engng—Dec. 5, 1896.

**Earl's Court London.**—The Electrical and General Engineering College and School of Science, Earl's Court, London, S. W. Illustrated description. 2000 w. Elec, Lond—July 17, 1896.

The Penywern House Technical College. Earl's Court. Description of buildings, course of study, physical laboratory, and machine shops, with illustrations. 1700 w. Engng.—June 5, 1896.

**Penywern House.**—See **Earl's Court, London.**

### COLLIERS.

Twenty Years' Progress in Coal Carrying Steamers. J. F. Walliker. Abstract of a paper before the Institute of Marine Engineers, reviewing the progress made in boilers and engines. 2200 w. Ir & Coal Trds Rev—Sept. 7, 1900.

See also **COALING AT SEA.**

**COLLIERY.**

See **COAL MINE.**

**COLOMBO.**

Old and New Colombo. John Ferguson. Gives the history, industries, minerals, gems, etc.; describes the railways, harbor works, sanitation, and other matters of interest in this capital city of Ceylon. Discussion. 16500 w. Jour Soc of Arts—Dec. 15, 1899.

**COLOR.**

**Contrast.**—Note on the Analysis of Contrast Colors by Viewing, Through a Reflecting Tube, a Graded Series of Gray Discs, or Rings, on Colored Surfaces. Prof. Alfred M. Mayer. Important as relating to color contrasts in articles of manufacture of high grade, in which choice and arrangement of colors is involved. 1200 w. Am Jour of Sci—Jan., 1896.

**Country Buildings.**—Colors for Country Buildings. A. Ashmun Kelly. Considers the relation of the color of building to the environment, and also to the character of the architecture. 1000 w. Pl & Dec—Aug. 1, 1896.

**COLORADO.**

Notes of an Engineer in Colorado. W. P. H. A letter containing information of interest about the railroads, mines, water-works, and other engineering works in the vicinity of Leadville. 4200 w. Eng News—Nov. 24, 1898.

Notes of an Engineer in Colorado. W. P. H. A review of the engineering features of Colorado Springs and vicinity, of Pueblo, Florence and Cripple Creek, with some related matters of interest. 5500 w. Eng News—Sept. 1, 1898.

**COLOR BLINDNESS.**

**Testing.**—Color Testing. Charles H. Williams. Read before the Boston Soc. for Medical Improvement. Experience with different methods examining a large number of men on the Burlington system of railroads. Description of a modification of Thomson's stick, employed for testing color vision, with other interesting and instructive particulars. 3800 w. R R Gaz—July 31, 1896.

**COLUMBARIUM.**

**San Francisco.**—The New Columbarium of the Odd Fellows Cemetery Association of San Francisco. Alex. F. Oakey. Illustrated detailed description of a beautiful building designed for the permanent disposition of incinerated remains, as well as for cremation. 700 w. Cal Arch't—Sept., 1898.

**COLUMN.**

**Buckling.**—See also **BUCKLING—Columns.**

**Cast-Iron.**—A Straight Line Formula for Cast-Iron Columns. Samuel Osgood Miller. Gives diagram made from data obtained in tests made at Phoenixville, Pa., and Watertown, Mass. 900 w. Sch of Mines Quar—Jan., 1898.

Calculation of Cast-Iron Columns. J. B. Nau. Gives diagrams for the rapid and correct calculation of cast-iron columns, explaining their use. 600 w. Eng News—Aug. 31, 1899.

Tests of Full-Sized Cast-Iron Columns. Wm. H. Burr. Table giving results of tests made, also a graphical representation of results, with explanatory notes and comments. 1600 w. Sch of Mines Quar—April, 1898.

The Present Status of the Cast-Iron Column. A review of the changes in old methods of computation caused by recent full-size tests. 1100 w. Eng Rec—June 11, 1898.

The Strength of Cast-Iron Columns. Editorial on the importance of the experiments made by the New York Building Department upon the large testing machine at Phoenixville, Pa. The results show the worthlessness of Gordon's formula as applied to cast-iron columns. 2300 w. Eng News—Jan. 20, 1898.

The Strength and the Safe Load for Cast-Iron Columns (Die Bruchlasten und die Zülassigen Belastungen Gusseiserner Säulen). F. v. Emperger. A general review of the experiments recently made in New York, together with a comparison of the various formulas for the strength of columns with the actual results obtained. The injurious effect of eccentric loading is emphasized. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 1, 1898.

**Cast-Iron Tests.**—Official Tests of Cast-Iron Columns and Brackets. Part first gives illustrated description of breaking columns through the body. Serial. Eng Rec—Jan. 8, 1898.

Tests of the Strength of Brackets on Cast-Iron Columns. Summary of the results of bracket tests from the report of W. W. Ewing, with notes concerning the character of the fractures. 2800 w. Eng News—Jan. 20, 1898.

**Eccentric Load.**—Computation of a Column Subjected to an Eccentric Load (Berechnung eines auf Excentrischen Druck Beanspruchten Stabes). René Koechlin. With computations, based upon the elastic theory, for wrought-iron, low steel, cast-iron and wood. Two articles. 3000 w. Schweizerische Bauzeitung—May 6, 13, 1899.

**Formulas.**—An investigation of the Strength of Columns, Leading to Some New Formulas. Carl G. Barth. Submits a new and purely rational formula for the proper working load on a column, and the arguments sustaining it. 4800 w. Jour Assn of Engng Socs—April, 1898.

Formulas for Long Columns. Letters from J. B. Johnson, and A. J. DuBois closing the discussion of the subject, and making an analysis of the points in dispute and of their positions concerning them. 3800 w. Eng News—April 30, 1896.

**Framed Structures.**—See **FRAMED STRUCTURE—Columns.**

**Johnson's Formula.**—Diagrams of Johnson's Straight Line Formula for Determining the Strength of Columns. John S. Fielding. Diagrams of interest to engineers with critical letter from Thomas H. Johnson. 800 w. Eng News—Sept. 22, 1898.

**Loads.**—The Practical Column Under Central or Eccentric Loads. J. M. Moncrieff. Deduction of new formulae and development of a theory of column resistance. Diagrams. 2500 w. Pro Am Soc of Civ Engs—March, 1900.

The Practical Column Under Central or Eccentric Loads. Continued discussion of paper by J. M. Moncrieff. 2000 w. Prom Am Soc of Civ Engs—Aug., 1900.

**Sheds.**—The Designing of Columns for Freight and Passenger Sheds Exposed to Wind. J. J. Pensoff. A mathematical study of the effect of the wind. 700 w. Engs News—Oct. 5, 1899.

The Design of Columns for Sheds Exposed to Wind and of Concrete Bases for Columns. Leopold Meusch. Computations for concrete bases, and calculations of structures like freight and passenger sheds. 900 w. Eng News—Feb. 1, 1900.

**Square Cast-Iron.**—The Danger of Square Cast-Iron Columns. John F. Ward. Condemning the use of square columns and giving reasons for so doing. 700 w. Eng News—April 16, 1896.

**Stone.**—The Resistance of Built-Up Stone Pillars to Buckling (Zur Berechnung der Knickfestigkeit Gegliederter Steinpfeiler). Deriving a general formula for practical use in proportioning stone pillars, and showing the application of the method by examples. 1200 w. Deutsche Bauzeitung—Nov. 25, 1899.

**Strength.**—The Strength of Columns. J. B. W. Stokes. Brief abstract of paper read at meeting of the Glasgow and West of Scotland Technical College Scientific Soc., with list of tables giving information on the subject. 500 w. Prac Eng—Dec. 18, 1896.

The Strength of Pillars—An analysis. Leopold Eidlitz. The question examined in this paper is mainly what is the maximum strain in pillars compressed endwise in the center of resistance by weights less than the breaking weights, or by weights not applied in the center of resistance. Diagrams and tables are presented and formulae deduced and discussed. 8500 w. Am Soc of Civ Eng—Feb., 1896.

**Theory.**—The Theory of the Ideal Column. Papers by Messrs. Merriman, Dubois, and Johnson, prepared as comments upon the paper with the above title by Henry S. Prichard. 6400 w. Eng News—May 20, 1897.

The Theory of the Ideal Column. Henry S. Prichard. An analysis of the theory resulting from the application of the ordinary assumptions of flexture to the case of straight columns, with constant cross-section, centrally loaded. The conclusions favor the use of the ordinary empirical formulas. 3000 w. Eng News—May 6, 1897.

Theory of the Ideal Column. William Cain. Analysis, also giving an expression for the maximum deflection for a load very slightly exceeding that given by Euler's formula, and confirming that formula as a practical one within the usual limits. 3400 w. Pro Am Soc of Civ Engs—Oct., 1897.

### COMBING MACHINE.

Combing Machines. Illustrated description of an interesting improvement in this class of machinery. 900 w. Bos Jour of Com—Aug. 20, 1898.

### COMBUSTION.

See also **BOILER; COAL TEST; CALORIFIC VALUE; FIRING; FUEL; FURNACE; GRATE; MECHANICAL DRAFT; MECHANICAL STOKING; SMOKE PREVENTION; STEAM ENGINEERING; STEAM GENERATION.**

Chemistry in the Boiler-Room. William Thompson. Shows the actual need of at least a rudimentary chemical education, and follows with a discussion of the reactions constantly taking place during combustions. Serial. Can Elec News—Jan., 1897.

Grate Surface Chimney Sections and Height for Various Fuels (Rostflächen, Querschnitte und Höhen der Schornsteine für Verschiedene Brennstoffe). Max Knorr. A discussion with formulas and tables from which the dimensions of parts may be obtained for hard and soft coal, lignite, coke, peat and wood. 3000 w. Gesundheits-Ingenieur—June 30, 1898.

The Correct Method of Coal Combustion. W. H. Booth. Discusses the present practice in England, America and Germany, considering favorably the German system of mechanical stoking and presenting its advantages. 2000 w. Am Mach—May 26, 1898.

**Anthracite.**—The Heat-Value of Anthracite Small Sizes, and the Best Methods of Burning Them. Albert C. Leiseuring. Read at a meeting of the Anthracite Coal Operators' Assn., New York. Practice favors an under-grate forced blast, usually by fan or steam jet. A large grate area is essential. 1200 w. Col Guard—Nov. 26, 1897.

See also **CALORIFIC VALUE.**

**Bituminous Coal.**—Combustion of Bitminous Coal in Boilers. Difficulties in obtaining smokeless combustion referred to varying composition of coal which renders necessary a variable supply of air for combustion. 600 w. Engr, Lond—Oct. 9, 1896.

**Boiler Performance.**—The Performance of Boilers, Judged from a Chemical Standpoint (Zur Beurteilung der Leistung von Dampfkesseln vom Chemischen Standpunkt aus). H. Bunte. A very thorough review of the chemical and calorific power of fuels, and the composition and temperature of chimney gases, with full tables. 5000 w. Zeitschr d Ver Deutscher Ing—May 26, 1900.

**Coal Selection.**—Adapting the Coal to the Grates, Draught, etc., and Vice Versa. H. H. Kelley. Considers the economy and advantages of selecting coal suited to the type of boiler, draught, and grate-bars used. 2700 w. Engr, Cleveland, O—May 15, 1899.

**Econometer.**—See **ECONOMETER.**

**Economic.**—The Economic Combustion of Fuel. Frederick Grover. The volumes of air needed for economical combustion are indicated graphically, and losses of heat are indicated in the same way. 1800 w. Prac Eng—Oct. 23, 1896.

**Economy.**—See also **SMOKE PREVENTION.**

**Furnace Design.**—The Computation of Furnaces (Die Berechnung der Feuerungen). Ed. Braus. A discussion of the best proportions for furnaces, flues, and chimneys for steam boilers, in order to obtain perfect combustion and absence of smoke production. 3000 w. Gesundheits-Ingeneiur—Jan. 31, 1900.

**Gas Analysis.**—Gas Analysis and Furnace Economy. A. Bement. Showing the value of an accurate knowledge of the state of combustion. 2000 w. Mod Mach—May, 1899.

**House Fires.**—The Combustion of Coal and Gas in House Fires. J. B. Cohen and G. H. Russell. Read before the Yorkshire Section of the Society of Chemical Industry. An exceedingly able and valuable discussion of the subject from both scientific and practical standpoints. 3000 w. Gas Wld—April 11, 1896.

**Schlicht.**—The Schlicht Method of Combustion. P. J. Schlicht. Describes the plan and reports practical results of this system. Ill. 1800 w. Elec Engr, N Y—March 17, 1898.

**Schlicht Process.**—A New Process of Combustion. Paul J. Schlicht. An explanation of the writer's process with illustrated description of the invention. 3300 w. Jour Fr Inst—Nov., 1898.

**Smokeless.**—See **SMOKE PREVENTION.**

**Steam Jet.**—The Economical Uses of Coal. John L. Howard. Read at meeting of Pacific Coast Gas Assn. Describes a method of promoting combustion by use of a steam jet of super-heated steam delivered through a peculiar nozzle in the ash-pit door, by which an increase in economy is claimed. Also discussion. 5500 w. Am Gas Lgt Jour—Aug. 17, 1896.

**Water-Tube Boilers.**—The Problem of Combustion in Water-Tube Boilers, and a Means of Its Solution. James Weir. Paper read at meeting of Inst. of Engs. and Shipbuilders in Scotland. Analyzes the phenomena of combustion, showing why it is defective and giving a solution. An important paper. Discussion. Ill. 5500 w. Steamship—July, 1898.

### COMMERCE DESTROYER.

See also **CRUISER.**

**Confederate.**—Confederate Commerce-Destroyers. I. The "Tallahassee's" Dash into New York Waters. John Taylor Wood. An account of the cruise of this vessel by her commander. II. The Eventful Cruise of the "Florida." G. Terry Sinclair. A former midshipman's account. Ill. 12200 w. Century Mag—July, 1898.

**French.**—The Commerce Destroyers (Les Croiseurs Corsaires). A short description of the new French 23-knot, 8000-ton cruisers, with a discussion of their advantages and disadvantages. 1000 w. Le Yacht—March 17, 1900.

**"Guichen."**—The French Commerce Destroyer, "Guichen." Gives details of the American vessels of this class, and describes this vessel and the official trials. Ill. 1500 w. Engr, Lond—June 15, 1900.

### COMMUTATION.

**Ironclad Armatures.**—Commutation in Ironclad Armatures. An illustrated explanation of self-induction, and of how commutation is effected. 1800 w. Engr, Cleveland, O.—Sept. 1, 1899.

### COMMUTATOR.

Commutator Design and Construction. Alton D. Adams. Discussion, with illustrations of the proper design and construction, and the importance to satisfactory operation. 3000 w. Am Elect'n—Dec., 1899.

Experiments in Commutation in Dynamos and Motors. W. H. Everett, and A. H. Peake. A short account of work in this field carried out in the electrotechnical laboratory of University College, Nottingham. Ill. 1500 w. Elect'n, Lond—April 22, 1898.

**Care.**—The Care of Commutators. Charles Wirt. The tendency of commutators to develop flat spots, similar to wear of car wheels, and showing that this is not necessarily due to faulty construction, with suggestions for treatment. 1000 w. Am Mach—June 25, 1896.

**Car Motors.**—Commntator Segments for Electric Traction Apparatus. Frank X. Cicott. Presents the difficulties in this field and the improvements made, giving the accepted use of the largest consumers. Ill. 1500 w. Ry Wld—March, 1898.

Care of Commutators of Street Railway Motors. Walter C. Smith. Methods of cleaning and treatment to avoid sparking. 700 w. St Ry Rev—May 15, 1896.

**Construction.**—A few Points in Relation to the Construction of Commutators. F. J. Turner. Directions illustrated by diagrams. Serial. Am Mach—Sept. 3, 1896.

Machine Shop Practice in the Manufacture of Commutators. M. L. Hayward. The object of the article is to suggest a few methods which have stood the test of practice in commutator building, and to describe the simple tools employed. Serial. Am Mach—July 2, 1896.

Modern Commutator Construction. Illustrated description of various types. 2200 w. Am Elect'n—July, 1896.

**Design.**—Notes on Commutator Design. F. J. A. Matthews. Considers faults in construction, bad connections, and the using too small a commutator. 2800 w. Elec Rev, Lond—Oct. 21, 1898.

**Potential Measurement.**—Devices for Exploring the Potential Around Commutators. George D. Shepardson. Describes methods and simple devices for various investigations. 1600 w. Am Elect'n—Oct., 1898.

**Railway Motors.**—See **Car Motors.**

**Repair.**—Making and Repairing Commutators. L. C. Sharpe. Drawing and explanation of how to put up a commutator repair shop. 1800 w. Am Mach—June 24, 1897.

Repairing a "Burnt Out" Commutator. Norman H. Crowell. Describes the location of the trouble and the treatment. 1400 w. Am Elect'n—Jan., 1898.

**Resistance.**—Phenomena of Commutator Resistance. H. J. Edsall and M. C. Rorty. Experimental study of brush contact resistance with summary of results. 1100 w. Sib Jour of Engng—June, 1896.

Table for Determining Sizes of Commutator Segments. A table constructed by W. B. Cleveland intended for use in calculating the angular thickness of commutator segments. Elec Ry Gas—Feb. 8, 1896.

**Sparking.**—A Discussion of Sparking in the Continous Current Dynamo (Beurtheilung der Gleichstrommaschinen in Bezug auf die Funkenbildung). Heinrich Isler. A mathematical treatment reviewing especially the recent theories of Dr. Fischer-Hinnen. Two articles. 6000 w. Elektrotech Zeitschr—Oct. 12, 19, 1899.

Commutation and the Prevention of Sparking. Describes how commutation is effected, and gives methods of preventing sparkling. Ill. 1400 w. Engr, U. S. A.—Oct. 1, 1899.

Sparking in Dynamos. Eustace Thomas. Briefly explains the causes of sparking, and shows the inadequacy of the commonly-accepted theories. Discusses the mathematical equations, and the practical conditions which give a minimum of sparking. The advantages of multipolar construction are especially emphasized. 2000 w. Elect'n, Lond—Feb. 18, 1898.

Sparking, Its Cause and Effects. Thorburn Reid. Shows that the real injury is done before the segment leaves the brush, and discusses some of the ways in which imperfect commutation causes injury to the commutator, and how sparkless commutation may be insured. Discussion. 10000 w. Trans Am Inst of Elec Engs—Jan., 1898.

The Causes of Sparking at the Commutators and Brushes of Continuous Current Dynamos (Ueber die Ursachen der Funkenbildung an Kollektor und Bürsten bei Gleichstrom Dynamos). Emil Dick. A discussion in which formulas are derived for fields of various strengths and brushes of different materials, enabling the best dimensions to be computed for any given case. 3500 w. Elektrotech Zeitschr—Dec. 1, 1898.

The Limit of Sparking for Continuous Current Dynamos (Die Funkengrenze bei Gleichstrommaschinen). Gisbert Kapp. A mathematical derivation of a formula for the proportions which will prevent sparking in continuous current dynamos. 3000 w. Elektrotech Zeitschr—Jan. 5, 1899.

The Short Circuiting of the Bobbins and the Commutation of the Current of a Continuous Current Armature (Ueber den Kurzschluss der Spulen and die Kommutation des Stromes eines Gleichstromankers). E. Arnold and G. Mie. A highly mathematical discussion deriving equations for various conditions, with especial relations to the reduction of sparking. Serial. Elektrotech Zeitschr—Feb. 2, 1899.

The Sparking of Continuous Current Dynamos (Ueber die Funkenbildung an Gleichstrommaschinen). J. Fischer-Hinnen. An elaborate mathematical analysis of the phenomena of sparking from a theoretical standpoint, deriving formulae adapted for practical use. Two articles. 10000 w. Elektrotech Zeitschr—Dec. 22, 29, 1898.

**Tools.**—The Construction of Some Handy Commutator Tools. Alton D. Adams. Describes simple and inexpensive tools of great service, and states requirements and methods used. 1800 w. Am Elect'n—Oct., 1899.

## COMPASS.

See also **DRAWING INSTRUMENT.**

The Mariner's Compass. Ernest K. Roden. Reviews what is known of the invention; describes Sir William Thompson's compass, the best one in use at the present time, discusses variations, etc. Ill. 8000 w. Home Study—Jan., 1899.

**Deviation.**—See **MAGNETISM**—Terrestial.

**Evoy Jumper Stay.**—The Evoy Compass. Illustrates and describes a compass so constructed as to enable it to be hoisted aloft to remove it from the effects of magnetic material, and enable its reading to be correctly taken on the bridge or deck. 500 w. Engr, Lond—Feb. 16, 1900.

The "Evoy Jumper Stay" Compass. Describes a new ship's compass, so rigged that it can be hoisted aloft out of reach of local influences, the needle locked in that position, and the compass lowered to the deck again for reading. Ill. 600 w. Marine Eng—Dec. 1, 1895.

**Iron Ore Prospecting.**—See **MAGNETIC PROSPECTING.**

**Langer Suspension.**—The Langer Compass Suspension for Use in the Vicinity of Iron (Das Langer'sche Hängezeug zur Verwendung des Compasses in Gegenwart von Eisen). H. Brathuhn. Illustrating and describing a form of suspension for a mining compass by which the relative deflection due to neighboring masses of iron may be determined. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 28, 1899.

**Ship's Magnetism.**—The Magnetism of Ships (Il Magnetismo Navale). Pof. E. Gelcich. An elaborate study of the variations of compasses on ships and the theory of compensation. It is prefaced by an interesting and valuable historical study of the subject. Serial. Rivista Marittima—Nov., 1898.

## COMPASS BEARINGS.

**Watch Dial.**—The Determination of Compass Bearings by the Dial of a Watch (Comment on Peut s'Orienter dans la Campagne en Faisant Usage de sa Montre). An astronomical explanation of the method with tables showing the exact method for various months for any hour of the day. 1500 w. La Rev Tech—Aug. 25, 1898.

## COMPETITION.

See **ENGINEERING COMPETITION.**

## COMPOUND LOCOMOTIVE.

Compound Locomotives (Les Locomotives Compound). E. Sauvage. A classified historical discussion of compound locomotives in Europe and America, with details of proportions and account of tests. Fur articles, many illustrations. 30000 w. Rev de Mecan—Jan., March, May, Aug., 1897.

Four Cylinder Express Locomotives (Viercylindrige Schnellzugs-Lokomotiven). Rolf Sanzin. A review of the various types of four cylinder engines which have been made since 1852, with a tabulated scheme of those which are at present in use. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 21, 1898.

The Development of the Four-Cylinder Compound. Statement made by R. H. Soule, at meeting of the Western Railroad Club, of the changes which have been made in the four-cylinder compound. 700 w. R R Gaz—April 28, 1899.

The Present Status of the Compound Locomotive. Reviews the opinions of railroad officers with regard to the value of this type, showing the wide differences and concluding that with light loads there is nothing to be gained by compounding. 1400 w. Am Eng & R R Jour—Dec., 1898.

**A., T. & S. F. Ry.**—Ten-Wheel Tandem Compound Passenger Locomotive of the Atchison, Topeka & Sante Fé Ry. Illustrated detailed description. 1100 w. R R Gaz—Jan. 12, 1900.

**American Railways.**—Results of the Working of Two Cylinder Compound Locomotives on American Railways. John H. Cooper. Presents in detail results obtained during the year 1896. The data relates exclusively to comparison of performances between two cylinder compounds and simple engines when alike in every respect except the compounding devices, and working under similar conditions. 900 w. Jour Fr Inst—Jan., 1897.

**Am. Ry. Master Mechs. Report.**—Report of Committee on Compound Locomotives. Abstract of a report presented by a committee of the Am. Ry. Mas. Mechs'. Assn. 2800 w. Eng News—July 5, 1900.

**Articulated.**—See **LOCOMOTIVE.**

**Austria.**—Express Compound Locomotive. Imperial Royal Austrian State Railways. Illustrated description of the most advanced type of express locomotive in Austria. Serial. Eng, Lond—Oct. 23, 1896.

New Compound Locomotives for the Austrian State Railways (Les Nouvelles Locomotives Compound de la Compagnie des Chemins-de-Fer de l'Etat Autrichien). With illustrations and specifications of the various types of engines, all of the two-cylinder compound design. 1200 w. Génie Civil—Feb. 4, 1899.

Six-Coupled Compound Express Engine. Illustrates and describes a new type lately put into service on the Austrian State Railways. 700 w. Engr, Lond—March 31, 1899.

**Auxiliary Gear.**—Express Compound Locomotive with Auxiliary Gear. Illustrated description of compound locomotive with a single pair of driving wheels, and with various constructive peculiarities. To be used on the Bavarian State Railway. 4000 w. Engng—May 21, 1897.

**Baldwin.**—Baldwin Two Cylinder Compound Locomotives—Norfolk and Western Railway. Describes heavy two cylinder compound consolidation locomotives, having interesting features. Drawings. 1500 w. Am Eng & R R Jour—June, 1898.

**Bavaria.**—See Auxiliary Gear; LOCOMOTIVE—Articulated.

**Belgium.**—Compound Freight Locomotive (Locomotive Compound à Marchandises). Description and illustrations of heavy compound goods engine constructed for the Belgian State Railways. The weight is supported entirely on the drivers and the engines are to work on a grade of 3.12 per cent. 2000 w. Revue Technique—Nov. 10, 1899.

**Blows.**—Blows in Baldwin Compounds. Alonso B. Kinyou. Illustrates and describes action of the Vauclain compound locomotive and explains the cause of blows and the remedy. 1500 w. Loc Engng—April, 1900.

**Bousquet.**—See France Northern.

**Chicago and Eastern Illinois.**—Twelve-Wheel Compound for the Chicago & Eastern Illinois Railroad. Illustration and description of the latest heavy freight locomotive of the named road. 600 w. R R Gas—Feb. 23, 1900.

**China.**—Locomotive for the Eastern Railway of China (Locomotive des Chemins de Fer de l'Est Chinois). Illustrated description of two-cylinder compound engine built by the Fives-Lille Company for the Manchurian section of the Siberian Railway. 1000 w. Génie Civil—Sept. 15, 1900.

**Consolidation.**—Compound Consolidation Locomotives for the Baltimore & Ohio. Illustrations and description of engines, interesting because of the large number built from a single design. 600 w. R R Gas—June 15, 1900.

Compound and Consolidation Locomotives for the Ogdensburg & Lake Champlain. Engraving with detailed description of the parts. 500 w. R R Gaz—Feb. 11, 1898.

Compound Consolidation Locomotives for the South Carolina & Georgia Railroad. Illustrated description of heavy two-cylinder compounds built by the Richmond Locomotive Works. 500 w. R R Gaz—April 22, 1898.

Compound Consolidation Locomotives for the Southern Pacific. Descriptive specification with engraving. 500 w. R R Gaz—May 5, 1899.

Compound Consolidation Pusher Engine; Lehigh Valley R. R. Illustrates and describes an engine with a guaranteed hauling capacity of a 1000 tons of train load behind the tender at an average speed of 17 miles per hour, on a mountain cut-off. 400 w. Eng News—Nov. 24, 1898.

Consolidation and Mogul Locomotives. General dimensions and illustrated descriptions of compound consolidation, and simple mogul locomotives. 1000 w. Am Eng & R R Jour—May, 1899.

See also LOCOMOTIVE—Consolidation A. T. & S. F.

**Cylinder Power.**—Cylinder Power of Compound Locomotives. G. R. Henderson. Discusses the ratio of tractive power to weight, showing the simple locomotive to have an advantage over the compound. 700 w. Am Engr & R R Jour—Dec., 1899.

**Decapod.**—Compound Decapod—Minneapolis, St. Paul & Sault Ste. Marie Ry. Illustrated description. 800 w. R R Gas—June 22, 1900.

Decapod Compound Locomotive for the Minneapolis, St. Paul & Sault Ste. Marie Ry. An illustrated description of a locomotive with five pairs of driving wheels, guaranteed to haul a train load of 2000 tons, built by Baldwin Locomotive Works. 1000 w. Eng News—Sept. 20, 1900.

**Drummond.**—Four Cylinder Express Locomotive. Illustrated description of a powerful English engine, designed by Dugald Drummond, of the London & South-Western Ry., with profile graphically recording its performance, and a set of indicator diagrams. 450 w. Engr, Lond—Aug. 26, 1898.

**Duplex.**—Compound Duplex Locomotive for the McCloud River R. R. Engine for a California road with grades of 2 per cent. to 4 per cent. and curves of 15 per cent. 350 w. Eng News—June 28, 1900.

Duplex Compound Locomotive for Seven Per Cent. Grades. Brief illustrated description. 250 w. Am Engr & R R Jour—June, 1900.

**English.**—A Run on a Four-Cylinder Engine. Describes the performance of an English locomotive, known as No. 720. 1200 w. Engr, Lond—Nov. 4, 1898.

**Expansion Ratio.**—Four-Cylinder Locomotives, and the Expansion Ratio for Compound Engines (Viercylindrige Lokomotiven und die Füllungsverhältnisse bei Verbunddampfmaschinen). Inspector Leitsman. With many diagrams, and a general analytical investigation of the conditions of expansion in compound locomotives. 3500 w. Zeitschr d Ver Deutscher Ing—Feb. 19, 1898.

Four-Cylinder Compound Locomotives in France. Abstract of a paper by Edouard Sauvage, before the Institute of Mechanical Engineers, on "Recent Locomotive Practice in France," giving descriptions of different types of four-cylinder compound locomotives, with tables and illustrations. 3600 w. R R Gaz—Sept. 28, 1900.

French Four-Cylinder Compounds. An editorial discussion of the compound type of locomotive. 1800 w. R R Gaz—Sept. 28, 1900.

Recent Locomotive Practice in France. M. Edouard Sauvage. Information concerning the seven great railway lines of France. Considers compound locomotives with four cylinders, other locomotives, and various details of construction. Ill. 6400 w. Inst of Mech Engs—1900.

The Present Status of the Compound Locomotive in France. The first part reviews the recent rapid development of the compound locomotive in France and describes standard types, with measurements, and records of comparative tests. Illustrated with sectional and detail drawings. Serial. R R Gaz—May 22, 1896.

**France, Central.**—The New Compound Locomotives of the Central Railway of France (Les Nouvelles Locomotives Compound de la Compagnie du Midi). With outline diagrams of these new compound locomotives, and a comparison with the engines of the Northern Railway of France. 2000 w. Revue Technique—Feb. 25, 1899.

**France, Eastern.**—Institutions of the Eastern Railroad of France as to Compound Locomotives. Abstract of directions given in the July Bulletin of the International Railroad Congress for the management of compound locomotives. 600 w. R R Gaz—Aug. 4, 1899.

See also LOCOMOTIVE TEST—Compound.

**France, Northern.**—Compound Express Locomotive for the Northern Railway of France. Illustrates and describes this latest type of the compound express locomotive of this company, which are characterised by exceptional boiler capacity. Serial. Engng—June 3, 1898.

Compound High Speed Locomotives of the Northern Railway of France (Locomotives Compound à Grand Vitesse des Chemins de Fer du Nord Française). F. Barbier. Illustrating and describing in detail the powerful four-cylinder compound express locomotives of M. de Bousquet for the Northern Railway of France. 2000 w. 1 plate. Génie Civil—Aug. 25, 1900.

Experiments upon a Compound Express Locomotive (Expériences Faites an Chemin de Fer du Nord sur une Locomotive Compound à Grande Vitesse). F. Barbier. Discussion, with reproductions of indicator diagrams, of experiments lately made, with conclusions. 3000 w. Le Génie Civil—Oct. 15, 1898.

French High Speed Compound Locomotives. From "La Nature." Illustrates the locomotives of recent type, used on the Railway of the North, and gives the results realized in their operation. 1200 w. Sci Am Sup—Jan. 21, 1899.

New High-Speed Compound Locomotives (Les Nouvelles Locomotives Compound à Grand Vitesse). An illustrated account of the fine new-four-cylinder compound engines, constructed for the Northern Railway of France. 1 plate. 2500 w. Génie Civil—July 9, 1898.

The New High-Speed Locomotives for the Northern Railway of France (Nouvelles Machines à Grande Vitesse de la Compagnie du Nord). The specifications of the new four-cylinder compound express locomotives designed by M. du Bousquet for the Northern Railway of France, with plate of details and photographic elevation. 2000 w. 1 plate. La Revue Technique—March 25, 1898.

Tests on Four-Cylinder Locomotives (Versuche mit Viercylindrigen Lokomotiven). F. Leitzmann. A review of the tests on the high-speed four-cylinder compounds made by M. Barbier on the Northern Railway of France. Serial. Zeitschr d Ver Deutschr Ing—Oct. 22, 1898.

The Four-Cylinder Compound Locomotives of the Northern Railway of France. Illustrated description of the engines designed for special service on this road. 2200 w. Sci Am—Feb. 17, 1900.

**France Western.**—Compound Locomotive for the Western Railway of France. Illustrated description of this new type for a railway leading to Paris. 700 w. Engng—Feb. 2, 1900.

**Glasgow and Southwestern.**—Glasgow and Southwestern Four-Cylinder Locomotive. Illustration and particulars. 600 w. Loc Eng—Feb., 1898.

**Great Southern and Western.**—Compound Express Engine, Great Southern and Western Railway. Description and dimensions with drawing of change valve. No accurate data of performance or economy. 500 w. Eng, Lond—April 24, 1896.

**Heating Surface.**—A Ride on a Compound Locomotive and Other Matters. F. W. Deane. A communication devoted chiefly to comment on the relative value of fire box and boiler-tube heating surface. 600 w. R R Gaz—April 24, 1896.

**High Speed.**—High Speed Compounds Comparison between simple and compound locomotives, especially at high speed. 1500 w. R R Gaz—Jan. 3, 1896.

**Hungary.**—Compound Express Locomotive (Locomotive Compound à Grande Vitesse). F. Barbier. A detailed examination of the powerful two-cylinder compound locomotive of the Hungarian State Railways, exhibited at Paris. 2000 w. 1 plate. Génie Civil—Oct. 6, 1900.

**Ireland.**—Compound Express Engine. Illustrates and describes a Northern Counties of Ireland express engine, giving the running time. 600 w. Engr, Lond—Jan. 5, 1900.

**Italian.**—Italian Locomotive at the Paris Exhibition. An illustrated description of a six-coupled compound locomotive of the Mediterranean Railway Co. 700 w. Engng—Sept. 14, 1900.

**Jura-Simplon.**—See **Three Cylinder.**

**Krauss.**—Compound Express Locomotive (Locomotive Compound Express). F. Barbier. An illustrated account of the Krauss locomotive exhibited at Paris, with auxiliary driving mechanism on the forward truck. 2000 w. 1 plate. Génie Civil—Aug. 11, 1900.

**Light Loads.**—Compounds and Light Loads. Editorial discussion of the operation of compounds with light loads, and suggestions for making the engines better adapted for all kinds of service. 600 w. Loc Engng—Oct., 1900.

**London and Northwestern.**—See **Webb.**

**Northern Pacific.**—Compound Locomotives on the Northern Pacific Ry. Edwin M. Herr. Abstract of a paper read before the Western Ry Club. An interesting account of the different systems of compounding employed, and the types and other particulars. 3800 w. Eng News—April 27, 1899.

Compound Locomotives on the N. P. Ry. Data from the paper of E. M. Herr, presented at the March meeting of the Western Ry Club. 2000 w. Ry & Engng Rev—April 22, 1899.

Details of the Compound Mastodon Locomotives for the Northern Pacific Railroad. Detail drawings, with description. 2000 w. Am Eng & R R Jour—April, 1897.

Ten-Wheel Compound Freight Locomotives. Illustrated description of engines with piston valves on high-pressure cylinders, for use on the Northern Pacific Ry. 1200 w. Am Engr & R R Jour—Dec., 1899.

Ten-Wheel Compound Passenger Locomotive—Northern Pacific Railway. General dimensions and description of the third design of some noteworthy locomotives recently built. Ill. 800 w. Am Eng & R R Jour—June, 1897.

Twelve-Wheel Compound Locomotive—Northern Pacific Railway. Dimensions, with description of an interesting design recently built by the Schenectady Locomotive Works for the Northern Pacific. 1500 w. Ry Rev—Feb. 20, 1897.

**Paris-Lyons Mediterranean.**—Compound Freight Locomotives for the Paris-Lyons Mediterranean Ry. (Locomotives Compound à Marchandises de la Cie. P.—L.—M). Description of a four-coupled compound, illustrated by elevations. The high pressure cylinders are outside, while the low-pressure cylinders are mounted close together inside the frame and operate cranks on the second axle. 1200 w. Le Génie Civil—Nov. 19, 1898.

The New Four-Cylinder Compound Locomotives of the Paris-Lyons and Mediterranean. Locomotives with new features such as an air cutting front and having cylinders in same horizontal plane. Full particulars are shown on drawings. 900 w. R R Gaz—Nov. 22, 1895.

See also **LOCOMOTIVE TEST—Compound.**

**Passenger.**—Compound Passenger Locomotives. Editorial discussion of the value of the compound locomotive in handling fast passenger traffic. 1200 w. Ry Rev—Jan. 30, 1897.

**Performance.**—See **LOCOMOTIVE PERFORMANCE—Compound.**

**Pittsburg.**—Ten-Wheel Pittsburgh Compound for the Vandalia. Illustrated brief description. 400 w. Loc Engng—Feb., 1896.

**Player Tandem.**—Player Tandem Compound Ten-Wheel Passenger Locomotive. Illustration, with description, of a locomotive for high-class passenger service. 1300 w. Ry & Engng Rev—Dec. 9, 1899.

**Prussia.**—Compound Locomotives of the Prussian State Railway (Die Verbund-Lokomotiven der Preussischen Staatseisenbahn). Discussing a great variety of starting valves and mechanism for compound locomotives. 1 plate. 8000 w. Glaser's Annalen—Aug. 1, 1897.

**Prussian Express.**—Compound Express Passenger Locomotive for the Prussian State Railways. Two page plate and other engravings with dimensions. 250 w. Engng—Nov. 4, 1898.

**Richmond.**—Handling the Richmond Compound. Robert Rennie. Calls attention to the operation of the valves and the care and lubrication needed. 1200 w. Loc Engng—July, 1899.

See also **LOCOMOTIVE PERFORMANCE.—Compound vs. Simple.**

**Riekie.**—A New Compound Locomotive. John Riekie. Describes an improved system of using steam expansively, appliable to all engines, but especially suitable to locomotive, electric light, and other engines which have to deal with variable loads. 2300 w. Engr, Lond—July 20, 1900.

**Rogers.**—Rogers Locomotive Company Compound System. Illustrated description of this system of compounding locomotives. 1300 w. Loc Engng—Sept., 1898.

**Schenectady.**—See **Northern Pacific.**

**Steam Consumption.**—Computations for Compound Locomotives and their Steam Consumption (Berechnung der Verbundlokomotive und ihres Damf-Verbrauches). A comparison of the compound and simple engine based upon indicator diagrams. A valuable mathematical paper by Inspector Leitzmann. Two articles. 8000 w. Zeitschr d Ver Deutscher Ing—Nov. 27, Dec. 4, 1897.

**Strong Balanced.**—A Balanced Locomotive. Illustrated description of the Strong balanced locomotive, formerly the A. G. Darwin. 1200 w. Sci Am—Nov. 14, 1896.

The Strong Compound Balanced Locomotive. Illustrated description with dimensions. 1700 w. Eng News—Aug. 19, 1897.

See also **LOCOMOTIVE TEST.**

**Suburban Service.**—A Compound Locomotive in Suburban Service. Interesting comparative statement of simple and compound locomotives, identical in everything except front end. 500 w. R R Gaz—May 22, 1896.

**Switching.**—Compound Switching Locomotive. Engravings and specifications, illustrative and descriptive of six-wheel connected compound locomotive for making up trains in the Grand Central Station at New York. 1000 w. R R Gaz—April 24, 1896.

**Switzerland.**—The New Compound Express Locomotive for the Northeastern Railway of Switzerland (Die Neue Verbund-Schnellzugs-Lokomotive der Schweizerischen Nordostbahn). A general specification of this two-cylinder compound, with sectional view, and indicator diagrams taken at speeds from 36 to 48 miles per hour. 1800 w. 1 plate. Schweizerische Bauzeitung—Dec. 30, 1899.

**Tests.**—See **LOCOMOTIVE TEST.**

**Three Cylinder.**—Three-Cylinder Compound Locomotive for the Jura-Simplon Railway (Die Dreicylindrige Verbundlokomotive der Jura-Simplon Bahn). This engine is constructed with a single high-pressure cylinder between the frames, and two outside low-pressure cylinders. Twenty-five of this type are now under construction for this road. 1 plate. 2000 w. Schweizerische Bauzeitung—Feb. 12, 1898.

**Three-Cylinder American.**—Triple Cylinder Locomotives. A glance at our American compound locomotives from an English standpoint. 2000 w. Eng, Lond—March 13, 1896.

**Tractive Power.**—Tractive Power of Two-Cylinder Compounds. C. J. Mellin. Describes the development of the tractive power of compound locomotives. 1000 w. Am Engr & R R Jour—May, 1900.

**Valves.**—See **LOCOMOTIVE VALVE—Compound.**

**Vauclain.**—Vauclain Fast Passenger Compound Locomotives. Engraving, with the chief characteristics of the design of the design. 700 w. Am Eng & R R Jour—May, 1899.

See also **Blows; LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE.**

**Von Borries.**—Compound Locomotive with Four Cylinders (Verbund-Locomotive mit Vier Dampfcylindern). An illustrated description of von Borries latest design of compound locomotive. Four cylinders with separate cranks, but combined valve gear, give excellent distribution. 2500 w. Glaser's Annalen—Aug. 15, 1897.

Von Borries Four-Cylinder Compound Locomotive. Translated from an article by Herr Von Borries in Glaser's Annalen. A general description with comparison of the new locomotives with those previously built, stating the advantages. Also editorial. 8000 w. Am Eng & R R Jour—Oct., 1897.

**Webb.**—An English Four-Cylinder Compound Locomotive with a Two-Compartment Smoke Box. An engine of the four cylinder compound type, designed by F. W. Webb, is illustrated and described. 700 w. Eng News—Jan. 6, 1898.

Compound Locomotives. Francis William Webb. Read before the Engng. Conference of the British Inst. of Civ. Engs. An explanation of the system of compounding used by the author, reporting the economy of pull due to compounding to be 19 to 20 per cent. 1800 w. Engng—June 9, 1899.

Compound Locomotives on the London and Northwestern Railway. Gives particulars of two experiments from the investigations made by F. W. Webb, of the performance of compound goods engines. Data supplied by the indicator and the tracometer. Also editorial. 2300 w. Eng, Lond—May 7, 1897.

Four-Cylinder Compounds. Illustrates the principal features in the construction of the designs of F. W. Webb, of the London & North Western Ry. 800 w. Am Engr & R R Jour—May, 1900.

Four-Cylinder Compound Locomotive for the London and Northwestern Railway. Illustrated description with leading particulars of a new type of engine possessing features of interest. 800 w. Engng—Dec. 3, 1897.

Four Cylinder Compound Passenger Engine, London and Northwestern Railway. Illustrated detailed description. 900 w. Engr, Lond—May 6, 1898.

See also **FAST TRAIN—London-Crewe.**

**COMPRESSED AIR.**—See also **AIR COMPRESSOR; CAISSON; PNEUMATIC; POWER TRANSMISSION; RAILWAY SIGNALS; RAILWAY SWITCH.**

Advantages of Compressed Air. Jas. F. Lewis. A very complete history of the progress of this power from the earliest recorded experiments to the present day, giving its numerous uses. Ill. 7000 w. Can Min Rev—Feb., 1897.

Compressed Air. Henry T. Hulst. Noting its increased use and diverse application. 1600 w. Yale Sci M—Jan., 1897.

Compressed Air: Its Production, Transmission and Use. William Prellwitz. Address delivered at Lafayette College, Easton, Pa. Discussion of the subjects named. 5500 w. Compressed Air—Sept., 1897.

Compressed Air. J. J. Swann. Discusses the production, transmission and use. 5000 w. Sib Jour of Engng—Nov., 1899.

Compressed Air. Some of the uses to which it is being put in different ways. 1300 w. Bos Jour of Com—Feb. 20, 1897.

Compressed Air. W. L. Saunders. The subject will be treated under three heads.—production,—transmission,—and use. The first number treats of the relation between heat produced in the act of compression and the mechanical energy expended in the act. Serial. Compressed Air—March, 1896.

Some Compressed Air Queries. Frank Richards. An explanation of some points in the writer's book on "Compressed Air," called out by a letter from Ireland. 1400 w. Am Mach—Dec. 7, 1899.

Some of the Uses of Compressed Air. Discussion at the Western Railway Club, December meeting, of Mr. McConnell's paper read at the Nov. meeting. 6500 w. R R Gaz—Jan. 15, 1897.

The Growing Field of Compressed Air. Howard A. Pedrick. A discussion and description of applications of compressed air in machine shop and foundry practice, for the purpose of driving tools and implements. 2700 w. Ir Tr Rev—Jan. 2, 1896.

The Rise of the Young Giant. Compressed Air. Ill. Curtis W. Shields. Reviewing the ever-increasing applications of compressed air as a motive power. 4300 w. Eng Mag—Jan., 1897.

Uses of Compressed Air. J. C. Ransom. Reviews the development of the past few years, and the future possibilities. 2200 w. Tradesman—July 5, 1897.

**Air-Lift Pump.**—See **AIR-LIFT.**

**Bell Ringing.**—Compressed Air to Ring the Bells of St. Patrick's. Brief description of the mechanism being installed to ring this chime of nineteen bells. 700 w. Am Mach—June 8, 1899.

**Blast Furnace Plant.**—The Use of Compressed Air at a Blast Furnace Plant. Ralph H. Sweetser. Illustrated description of the plant of a furnace of the Maryland Steel Co., Sparrow's Point, Md., which has been used with much success during the past year. 1000 w. Compressed Air—Dec., 1896.

**Boiler Shops.**—Pneumatic Equipment for Boiler Shops. E. A. Rix, in the "Boiler Maker." On the numerous applications of pneumatic tools to work in these shops, and the economy secured by their use. 2000 w. Ir Trd Rev—April 20, 1899.

**Boiler-Tube Cutter.**—See **Cutter.**

**Car Journal Turner.**—A Pneumatic Car Journal Turner. Illustrates and describes a machine that enables car journals to be turned on the repair tracks. 400 w. R R Gaz—Oct. 14, 1898.

**Car Painting.**—See **PAINTING—Compressed Air.**

**Cost.**—The Cost of Air Compression. Frank Richards. How it should be reckoned for the most improved compressed. 1000 w. Am Mach—Oct. 22, 1896.

**Cutter.**—A Pneumatic Boiler-Tube Cutter. Illustrates and describes a special tool operated by compressed air. 350 w. Am Mach—April 19, 1900.

**Diagram.**—A Diagram for Solving Compressed Air Problems. J. A. Brown.. Explanatory. 900 w. Am Mach—June 26, 1900.

Diagrams for Compressed Air.—Horse-Power and Temperature. J. E. Johnson, Jr. Diagrams platted to supply a quick and convenient means of obtaining fairly accurate solutions of these two questions in connection with compressed air. 2000 w. Am Mach—June 23, 1898.

**Discharge from Pipe.**—Discharge of Air from Pipes under Heavy Losses of Pressure. William Cox. A valuable mathematical discussion, with numerous examples showing the practical applications of the methods of computation, also useful tables. Serial. Compressed Air—Jan., 1900.

**Drill.**—Boyer's Pneumatic Drill. Illustrated description of a light, easily handled machine, very powerful for its size, and not liable to get out of order. 4000 w. Engng—Sept. 23, 1898.

**Efficiency.**—Doubling the Efficiency of Compressed Air. Frank Richards. Presents a scheme for the more economical use of compressed air. 1800 w. Am Mach—March 24, 1898.

Relative Efficiencies of a Compressed Air Plant Due to Difference of Level Above and Below Sea Level. F. C. Weber. Formula and chart by use of which one may select an air compressor of sufficient capacity to supply a motor with equivalent volume of air, no matter where it may be located. 700 w. Com Air—May, 1897.

**Electricity Compared.**—Compressed Air vs. Electricity. Fredk. S. Watkins. Briefly compares the first cost, efficiency, cost of operation, reliability and difficulties. 1000 w. Compressed Air—Feb., 1897.

Fairness in Comparing Air and Electric Power. Editorial advising the partisians of each power to devote their energies to the selection of the legitimate field and the development of the power in which they are interested. 1000 w. Ry Rev—Feb. 27, 1897.

Is Compressed Air Destined to Become the Rival of Electricity? Joseph W. Buell, in Inventive Age. Discusses the changes brought about by electricity, gives history of the early attempts to use compressed air, and a brief account of the power yielded and applications. 2400 w. Compressed Air—Feb., 1897.

**Engineering.**—Pneumatic Engineering. Editorial review of the various applications of compressed air. 1600 w. Engng—Feb. 9, 1900.

**Explosions.**—See **AIR COMPRESSOR EXPLOSIONS.**

**Flow in Pipes.**—A Compressed Air Paradox. Frank Richards. Effect of velocity upon friction of air in pipes is well discussed and a formula for computing the head for forcing air through pipes at different velocities is given. 900 w. Am Mach—April 16, 1896.

Conveyance of Compressed Air in Pipes. Robert Peele. Concerning the principles governing the losses, and the effects of size of pipes upon transmission losses. 2200 w. Mines & Min—Oct., 1899.

Flow of Compressed Air in Pipes. William Cox. An adaptation of D'Arcy's formula for flow of water in pipes, to make it applicable to any other fluid, is thought preferable for compressed air. The modified formula is presented and discussed. 800 w. Am Mach—Aug. 20, 1896.

Flow of Compressed Air in Pipes. F. A. Halsey. A determination of the value of the constant in Cox's fluid flow computer, and a comparison of results with those obtained by D'Arcy's formula, showing that the computer is sufficiently accurate for most practical purposes. 1000 w. Am Mach—Aug. 27, 1896.

Loss of Load in Air Pipes. Paul Petit. From a paper prepared for the International Cong. of Min. & Met. at Paris. Describes the mode of experimenting and gives the conclusions reached. Ill. 3500 w. Col Guard—Aug. 3, 1900.

The Friction of Compressed Air in Pipes. J. E. Johnson, Jr. Gives diagrams for facitating calculations, and explains the cause of inaccuracy in formulas. 2500 w. Am Mach—July 27, 1899.

The Variable Coefficient in Formulas for Friction of Air-Determination of the Coefficient. J. E. Johnson, Jr. Discusses a possible origin of the variable coefficient. Supplementary to an article published July 27, which considered the constant coefficient only. 1700 w. Am Mach—Aug. 3, 1899.

**Formulas.**—Useful Compressed Air Formulas. W. L. Saunders. Gives rules and formulas used by the writer in the application of compressed air. 1000 w. Compressed Air—Feb., 1898.

**Foundry.**—A Model Compressed Air Foundry Plant. H. M. Perry. Illustrated description of a foundry crane in the works of John J. Radley & Co., New York. 600 w. Compressed Air—Dec., 1897.

Compressed Air and its Economies in the Foundries. Curtis W. Shields. Full text of paper read before the Sept. meeting of the Western Foundrymen's Assn. The various applications of compressed air in foundry work and the advantages resulting are set forth. 3300 w. Foundry—Sept., 1896.

Compressed Air as a Hoisting Power in the Foundry. George A. True. Read before the Western Foundrymen's Assn. Description of plant required for a foundry of thirty tons daily output,—details illustrated,—and a general review of the advantages of such an installment in foundry work. 3600 w. Ir Age—Sept. 24, 1896.

Compressed Air in the Foundry. Curtis W. Shields. The many uses to which compressed air can be advantageously applied in the foundry are set forth in this paper. 2400 w. Ir Age—May 14, 1896.

Improved Pneumatic Tools for Foundry Use. George H. Robbins. Read at meeting of Foundrymen's Assn., Philadelphia. Mentions defects in the old style of tools, faults in operating, the amount of work, etc. 1800 w. Ir Age—Jan. 13, 1898.

The Cost and Profit of Compressed Air. Quotations from papers of G. A. True and C. W. Shields, read before the Western Foundrymen's Assn., which are strong arguments for the use of compressed air. 2500 w. Ry Mas Mech—Dec., 1896.

**Freight Yard.**—The Use of Compressed Air in the Freight Yard of the Lake Shore and Michigan Southern Ry. at West Seneca, N. Y. Illustrated description of this plant, and the uses to which it is applied. 3300 w. R R Car Jour—Feb., 1900.

**Hammer.**—The Boyer Hammer. Illustrated description of a pneumatic hammer, used for caulking, chipping, beading tubes, and other purposes. 4000 w. Engng—Feb. 25, 1898.

**Harthan Tool.**—The Harthan Pneumatic Tool. Describes a chipping tool, or a combined hammer and chisel. Ill. 1000 w. Am Mach—Jan. 13, 1898.

**High Altitudes.**—The Use of Compressed Air at High Altitudes. W. W. Pullen. A few notes on the results of the application of the air compressor at high altitudes. 1200 w. Prac Eng—May 28, 1897.

**Hoist.**—See **AIR HOIST.**

**Hydrocarbons.**—See **AIR COMPRESSOR EXPLOSION.**

**Locomotive Works.**—The Compressed-Air Plant in the Locomotive Works at Leinhausen near Hanover (Die Pressluft-Einrichtungen der Lokomotiv-Werkstatt Leinhausen b. Hannover). With plan of the works and numerous illustrations of pneumatic lifts, hammers, drills, and other tools. An extensive and interesting plant. 3000 w. Glaser's Annalen—Aug. 1, 1898.

**Machine Shop.**—Compressed Air in the Shop. Illustrated description of air compressors and compressed air appliances. 5500 w. Mach, N. Y.—Dec., 1899.

Some Practical Examples of the Use of Compressed Air in Machine Shops, a Belt Shifter, Centre Grinder, Bolt Cutter. Illustrated descriptions of applications named in the title. 800 w. Am Mach—Oct. 15, 1896.
See also **Railway Shop.**

**Machine Tools.**—Machine Tools Operated by Means of Compressed Air. Describes in detail a device in use on planing machines, the invention of Mr. Alexander Gordon, of Hamilton, O. Sectional views. 1000 w. R R Gaz—April 30, 1897.

Shop Tools Driven by Compressed Air. Aiming to show the number and variety of tools which are now driven by compressed air. Serial. Am Mach—March 24, 1898.

**Mechanical Applications.**—Mechanical Applications of Compressed Air. W. L. Saunders. Considers some of the practical applications, its importance in bridge construction, its applications in connection with railroads, etc. Ill. Serial. Jour Fr Inst—July, 1899.

**Metering.**—Metering Compressed Air. F. Schmerber. On the method of determining the amount of compressed air use, meters, tables of multipliers to be used for transforming volumes of compressed air at various pressures into corresponding volumes of free air atmospheric pressure, etc. 1500 w. Compressed Air—March, 1899.

**Mining.**—Advantages of Compressed Air over Other Sources of Power in Deep Mining—Great Developments Predicted. R. P. Whitelaw. Read before the Mech. Engs' Assn. of S. Africa. Suggestions regarding the suction-valve chamber; how intercooling might be improved, etc. 4000 w. Compressed Air—Feb., 1899.

Economies in the Use of Compressed Air. R. P. Whitelaw. Read before the Mech. Engs'. Assn. of S. Africa. Presents the advantages of compressed air over other sources of power in deep mining, with suggestions for use. 3800 w. Mod Mach—Nov., 1898.

The Use of Compressed Air for Mining Purposes. Edward A. Rix. A lecture delivered to the engineering students of the Leland Stanford, Junior, University. Considers the proper conditions under which to compress and use air, and the requirements of a modern air compressor, and the compressed air motor. Thinks this the only system which is alone sufficient to supply all the power needs of an average mine. 8500 w. Elec Engng—June 15, 1897.

The Use of Compressed Air for Mining Purposes. Edward A. Rix. A lecture to the engineering students of Leland Stanford Jr. University. Considers compressed air the only power which is alone sufficient to supply all the power needs of an average mine. Serial. Min & Sci Pr—May 15, 1897.

The Use of Compressed Air in Canadian Mines. R. H. Brown and Charles Fergie contribute brief papers on this subject to the Canadian Mining Inst. Describing pumping by compressed air in Nova Scotia mines. 2200 w. Col Guard—Oct. 30, 1896.

Use of Compressed Air in Mines. M. Mortier. From a communication to the Société de l'Industrie Minerale, Saint-Etienne. A review of the question whether compressed air has been turned to its fullest account as regards useful effect, or whether variations may be introduced with advantage into the method of its utilization. A summing up of the principles of this branch of mechanics. 4000 w. Col Guard—Jan. 22, 1897.

See also Power Transmission.

**Mining and Metallurgy.**—The Use of Compressed Air in Mining and Metallurgical Operations. A brief estimate of the position of compressed air at the present time. Ill. 1000 w. Ir and Coal Trds Rev—Oct. 23, 1896.

See also COAL CUTTING MACHINERY; COMPRESSED AIR HAULAGE; COMPRESSED AIR PLANT; POWER TRANSMISSION.

**Monitor "Terror."**—See Warship.

**New York.**—See AUTOMOBILE—Still.

**Painting Cars.**—See PAINTING—Compressed Air.

**Paris.**—Compressed Air and Its Distribution for Power Purposes in Paris. V. Popp. Deals with how it is produced, its numerous applications and its cost. Ill. Serial. Compressed Air—Sept., 1899.

**Percussive Tool.**—An Inertia Valve Percussive Tool. Chester B. Albree. States the advantageous qualities of compressed air over steam, gives an outline of the development of percussive engines, and a description of the type named in the subject, with a discussion of some of the features in its design. Ill. 7000 w. Pro Engs' Soc of W Penna —May, 1900.

**Physiological Experiments.**—Compressed Air at Seventy-seven Pounds Per Square Inch. Experiments by Mr. Hersent, a French engineer, demonstrating the fact that men may work safely in caissons at a depth of 164 ft., or about 5.4 atmospheres per square inch pressure. 500 w. R R Gaz—Dec. 27, 1895.

**Pipes.**—See Flow in Pipes.

**Pneumatic Press.**—See PNEUMATIC PRESS.

**Portable.**—Power of Portable Compressed Air. Frank Richards. Inquiry and reply concerning the use and cost of compressed air as a motive power. 1700 w. Am Mach—July 29, 1897.

**Portable Tool.**—Portable Pneumatic Tools. Ewart C. Amos. Read before the Inst. of Mech. Engs. Describes the mechanism for utilizing compressed air, and the various tools to which it is applied. Ill. Serial. Engng—March 2, 1900.

**Power.**—Compressed Air as Used for Power Purposes. Frederick C. Weber. Lecture delivered before the Engineering Society of Columbia College. The first part deals with the principal uses, production, compression and sources of loss. 2000 w. Compressed Air—May, 1896.

**Power Transmission.**—A Compressed Air Power Transmission Plant in California. The water, which is conveyed about five miles in a 20-in. steel pipe, with a maximum head of 775 ft., drives an 18 ft. 6 in. diameter Pelton wheel. The wheel is built on the bicycle plan and makes 110 revolutions per minute; it is direct-connected with two air compressors which deliver air at 90 lbs. per sq. in. pressure to the drills, 1000 ft. away. Ill. 800 w. Eng News—Dec. 19, 1895.

Advantages of Compressed Air for Transmitting Power. J. W. Pearse. Extracts and conclusions from a paper to the Société de l'Industrie Minerale of France, by M. Mortier, who has made a critica' study of the subject. 1500 w. Compressed Air—Jan., 1897.

A Water Power and Compressed Air Transmission Plant for the North Star Mining Company, Grass Valley, Cal. Arthur De Wint Foote. A concise description of the whole plant is first submitted, followed by the detailed presentation of its several parts, and finally the results obtained after careful tests during three months of actual working. Ill. 6500 w. Am Soc of Civ Engs—May, 1896.

Compressed Air for the Transmission of Power. J. H. Ronaldson. A paper before the New South Wales Chamber of Mines, giving a general discussion of compressed air, compressors and methods of use. 3400 w. Col Guard—Sept. 14, 1900.

Compressed Air for Transmission of Power. J. H. Ronaldson. An account of the principles and the machinery employed. 2800 w. Aust Min Stand—July 26, 1900.

Economy of Compressed Air Power Transmission. William O. Webber. Considers the possibilities of this method of storing and converting energy. 1200 w. Am Mach—April 13, 1899.

Economy of Compressed Air Power Transmission. William O. Webber. On the possibilities of this method of storing and converting energy, and the cost of development. 1100 w. Compressed Air—May, 1899.

Practical Application of High Range Compressed Air Power Transmission. Frank Richards. Describes the machine and the system by which the compressor receives the air returning from whatever it is employed to drive, and compresses it to a still higher pressure, sending it out again to do more work. Ill. 1800 w. Am Mach—April 28, 1898.

Transmission of Power by Compressed Air. Richard Hirsch. From a paper read before the Eng's Soc of W. Penn. Describes a proposed plant capable of transmitting 1100 indicated horse power, developed in the motors where used, with the cost of building and operating the same. 1700 w. Am Mfr & Ir Wld—May 14, 1897.

Transmission of Power by Compressed Air at the North Star Mine, California. P. R. Robert. Read before the Inst. of Min. & Met. The first part is descriptive of the plant and its workings. Serial. Min Jour—May 2, 1896.

Transmission of Power by Compressed Air. John Garvas. Advocates compression by stages to lessen the difficulties and losses in the direct compression of air. 2000 w. Aust Min Stand—Aug. 27, 1896.

See also Mining; POWER TRANSMISSION.

**Public Supply.**—The Uses and Advantages of a Public Supply of Compressed Air. Frank Richards. The many applications to which compressed air, kept in store in cities, to be drawn upon by consumers, could be made useful, is the subject to be considered. The first number appears to be chiefly introductory to the main purpose. 1000 w. Am Mach—Feb. 13, 1896.

Uses and Advantages of a Public Supply of Compressed Air. Frank Richards. The use of compressed air for giving the needed pressure in a water distributing system, in lieu of the present standpipe or elevated tank is advocated. 1100 w. Am Mach—May 28, 1896.

Uses and Advantages of a Public Supply of Compressed Air. Frank Richards. Explanation of a way whereby water motors may be used in connection with a supply of compressed air. 1200 w. Am Mach—July 30, 1896.

See also ELEVATOR—Compressed Air; PUMP—Compressed Air.

**Pump Driving.**—Driving Pumps by Compressed Air. William Cox. Explains how to determine in a simple manner the number of cubic feet of free air at a certain pressure necessary to pump a given quantity of water to a required height. Also means of ascertaining power cost, and other desirable information. 2000 w. Compressed Air—Feb., 1899.

**Railway Shops.**—Air Compressors on the Santa Fé Ry. A list of tools operated by air at the shops of this road. 400 w. Ry Rev—April 25, 1896.

Applications of Compressed Air in Railroad Shop Practice. Edward C. Schmidt. From an address before the St. Louis Ry. Club. Gives figures relating to saving in time and labor, and describes uses to which it is applied. 1800 w. Compressed Air—July, 1900.

Applications of Compressed Air in Railroad Shop Practice. Edward C. Schmidt. Extract from an address before the St. Louis Ry. Club. Notes some of the applications and the saving effected. 1800 w. R R Gaz—March 30, 1900.

Compressed Air in Car Shops. William Apps. A discussion of compresser efficiency, with table of cost per lift according to cylinder, area and maximum weight. 1600 w. R R Car Jour—June, 1896.

Compressed Air at the Shops of the Atchison, Topeka and Santa Fe. Illustrated description of the plant. Serial. R R Gaz—Jan. 15, 1897.

Compressed Air in the Shops of the Union Pacific Railroad at Omaha. H. N. Latey. Illustrated description of what the writer considers an ideal system. 2000 w. R R Gaz—Dec. 4, 1896.

Compressed Air in the Shops of the Missouri Pacific Railroad. H. N. Latey. Description of practice and illustration of devices. 1600 w. R. R Gaz—Sept. 25, 1896.

Compressed Air in Railroad Shops. J. J. Flather. Extracts from paper presented before the Western Ry. Club. The adaptation of compressed air to various requirements. 1800 w. R R Gaz—Jan. 22, 1897.

Compressed Air in Railway Shops. An illustrated article giving answers to a series of questions on the use of compressed air, sent out to one hundred of the principal railway shops in the United States. Serial. Ry Age—Nov. 8, 1895.

Compressed Air; Its Generation, Transmission and Application, with Special Reference to Its Use in Railroad Shops. Curtis W. Shields. Presents in a brief form some of the more important facts concerning the methods of generating compressed air, laws governing air compressing, etc. Illustrations and discussion. 15500 w. New York R R Club—Nov. 19, 1896.

Economical Uses of Compressed Air. J. H. McConnell, at Western Railway Club. The many uses of air in machine shops, with special notice of certain uses and comment on the progress. 1000 w. Loc Engng—Jan., 1897.

Pneumatic Power Applied to Workshops. John Davis Barnett. Records the present position of air power as part of a craft, illustrated more especially by railway shop works. 5800 w. Trans Can Soc of Civ Engs—June, 1896.

Pneumatic Power in Workshops. John Davis Barnett. A paper read before the Canadian Soc of Civ. Engs., Toronto. Qualitative rather than quantitative results are dealt with; the author stating that reliable data for quantitative results are, in his opinion, not at present obtainable. Discussion. 6000 w. Can Eng—July, 1896.

Pneumatic Power Applied to Workshops. John Davis Barnett. From the Trans. of the Can. Soc. of Civ. Engs. The present position of air power, as part of a craft, illustrated more especially by railway shop work. 4800 w. Prac Eng—Feb. 5, 1897.

Pumps vs. Compressors for Shop Use. An exhibition of the great wastefulness in operation of pumps for this service. 1200 w. Am Eng & R R Jour—June, 1896.

Some Convenient Pneumatic Appliances. These appliances for railroad shops, quite fully explained by illustrations, are a mud ring riveter, steam pipe ring chuck, crown bar bolt-facer, and painter for painting freight cars. 800 w. Ry Rev—May 2, 1896.

Some of the Uses and Advantages of Compressed Air. J. H. McConnell. Read before the Western Ry. Club. Shows the rapid progress made in the application of compressed air to railway shop work. 2300 w. Ry Rev—Dec. 19, 1896.

See also TOOL.

**Railway Use.**—The Uses of Compressed Air on Railways. J. H. McConnell. Calls attention to the many uses in train service and shop, and the large extent to which it has replaced hand labor and steam. 1400 w. Railway Mag—March, 1897.

**Recoil Cylinders**—See **ARTILLERY.**

**Reheating.**—A New Device for Reheating Compressed Air for Use in Pumps. E. A. Rix. Illustrates and describes this device for increasing efficiency. 1000 w. Compressed Air—July, 1900.

Device for Reheating Compressed Air in Pumps. Edward A. Rix, in "Modern Machinery." Illustrated description of apparatus. 1000 w. Col Guard—Aug. 26, 1898.

**Reheating Tests, Magog.**—Report on Trials Made at Magog, Quebec, to Test the Economy Effected by Reheating Compressed Air. J. T. Nicholson. 1800 w. Compressed Air—Oct, 1899.

**Reservoir Construction.**—Use of Compressed Air on a Great Work. Describes the service to which this power is put in the construction of the Jerome Park Reservoir for the water supply of New York City. 1500 w. Mfrs Record—Jan. 15, 1897.

**Rock Drill.**—See **ROCK DRILL.**

**Rolling Mill.**—Compressed Air in a Rolling Mill. Harry M. Perry. Illustrated description of some of the applications at the Passaic Rolling Mill Co., of Paterson, N. J. 1000 w. Compressed Air March, 1898.

**Ship Raising.**—Compressed Air to Save Ships. Frank Richards. Suggesting the use of air compressors to save the steamship "Paris," and for universal service in like emergencies. 1200 w. Am Mach—June 1, 1899.

**Ship-Yard Work.**—Experience with Compressed Air in Ship-building and Ship-yard Work. William Burlingham. Interesting particulars of work done by pneumatic machines, with illustrations. 2500 w. Marine Engng—Sept., 1898.

**Snow-Flanger.**—See **SNOW-FLANGER.**

**Steering.**—See **STEERING—Compressed Air.**

**Submarine Boat.**—Compressed Air on the Holland Torpedo Boat. G. Wilfred Pearce. Reviews the previous attempts at submarine boat construction, describes the Holland boat, and the various applications of compressed air. Ill. 1800 w. Compressed Air—April, 1898.

**Taylor System.**—See **POWER TRANSMISSION—Air v. Electricity.**

**Tools.**—See **Boiler Shop; Car Journal Turner; Cutter; Drill; Foundry; Hammer; Harthan; Locomotive Works; Machine Shop; Machine Tools; Percussive Tool; Railway Shops; Shipyard;**

**Transfer Table.**—See **TRANSFER TABLE—Compressed Air.**

**Volumes.**—Air Volumes Used in Engines. Formulae and data. 400 w. Com Air—Oct., 1896.

**Warships.**—High Range Compressed Air for Warships. Frank Richards. Explains a modification of the compressed air system, which is an improvement on the present practice. 1000 w. Am Mach—March 31, 1898.

Proposed Extension of the Use of Compressed Air on Men-of-War. F. W. Bartlett. Suggests ways of using air and states why it is better for many purposes than either steam or electricity. 1700 w. Am Mach—Feb. 18, 1897.

A Warship Run by Air Reprinted from "N. Y. Evening Post." Description of compressed air machinery for steering, turning turrets, working guns, etc., of the U. S. Monitor "Terror." 1300 w. Com Air—Oct., 1898.

Compressed Air System on the United States Monitor "Terror." Engravings and description of duties performed by compressed air. 2000 w. Sci Am—March 20, 1897.

The U. S. S. "Terror" and the Pneumatic System as Applied to the Gun, Turrets and Rudder. T. W. Kinkaid. General data of the ship and machinery, with illustrated description of the pneumatic system. 3000 w. Jour Am Soc of Nav Engs—Feb., 1897.

**Water-Raiser.**—See **AIR LIFT; WATER-RAISER—Lansell's Pneumatic.**

**Water Works.**—Compressed Air for Water Works. Oscar Darling. Illustrated description of the application of compressed air to the operation of water supply systems, with a statement of the advantages claimed. 800 w. Fire & Water—June 11, 1898.

**Windmills.**—Windmills and Compressed Air. Frank Richards. Considers a proposition to pump air and store it for power, showing that the scheme is not practical. 1200 w. Am Mach—May 18, 1899.

**Workshops.**—See **Machine Shop; Railway Shop.**

**COMPRESSED AIR HAULAGE.**

**Mine.**—Compressed Air Haulage at Buck Mountain Colliery. T. D. Jones. Read at annual meeting of the Assn. Describes the plant and its operation, giving comparative costs. 1500 w. Anth Coal Op Assn—May, 1898.

Compressed Air Haulage. A description of the haulage ways, the grades, the construction of the locomotives and charging apparatus, and some figures as to economies of the plant at the Coal Brook mines near Carbondale, Pa. Ill. 2500 w. Mines & Min—Dec., 1898.

Compressed Air Haulage. Description of the plant at the Susquehanna Coal Co.'s No. 6 Colliery. Some novel features peculiar to this plant which successfully meet conditions existing in many coal mines are illustrated and described. Editorial also reviews compressed air as a motive power. 5000 w. Col Eng—May, 1896.

Mechanical Haulage by Compressed Air. E. P. Lord. Abstract of a paper read at a meeting of the Anthracite Coal Operators' Assn., New York. Presents its advantages over other classes of haulage, and gives information relating to the installation and operation of the plant. 4500 w. Col Guard—Nov. 26, 1897.

See also **COMPRESSED AIR TRAMWAY; MINE HAULAGE.**

### COMPRESSED AIR LOCOMOTIVE.

Compressed Air Locomotives. General description and photographs of those in use on cotton wharves of New Orleans & Western R. R. 400 w. Ry Age—April 25, 1896.

Pneumatic Locomotives. A. E. Kyffin. Explains the main features of pneumatic locomotives and their working, the cost, and advantages. 1900 w. Prac Engr—Sept. 15, 1899.

**Hardie.**—Compressed Air Locomotive for the Manhattan Elevated Railroad. Brief illustrated description. 350 w. Am Mach—May 6, 1897.

Compressed Air Motor on the Elevated Railroads, New York. Illustrated description of the experimental motor soon to be placed on the elevated roads, with comments and explanation of system. 1200 w. Sci Am—Jan. 30, 1897.

High-Pressure Air Compressor and Receiver for the Hardie Locomotive. Views and description of the air-compressor and the receiver or storage reservoir which provide and maintain the supply of compressed air. 800 w. Am Mach—June 10, 1897.

The Hardie Compressed Air Locomotive for the Manhattan Elevated Railroad. Illustrated description. 800 w. R R Gas—May 21, 1897.

The Hardie Compressed Air Locomotive for the Manhattan Elevated Ry. Illustrated detailed description. 1080 w. Eng News—June 24, 1897.

**Mine.**—New Compressed Air Mining Locomotive. Illustration, with brief description of an air motor made by the Dickson Manufacturing Co., for the D. & H. Canal Co. 750 w. R R Gas—Oct. 29, 1897.

Test of a Compressed Air Locomotive for the Anaconda Copper Mining Company. Description, illustration and data of tests, as obtained from H. K. Porter & Co., of Pittsburg. 1200 w. Ry Rev—March 27, 1897.

The Compressed Air Mine Locomotive. Part first gives a brief statement of the advantages urged by those in favor of compressed air haulage, and describes various types of locomotives used. Serial. Ir & Coal Trds Rev—Aug. 5, 1898.

### COMPRESSED AIR MOTOR.

Compressed Air Motors. Car Snyder. Illustrated description of different uses of compressed air, with details of development. Harper's Weekly—Dec. 5, 1896.

**Electric, Compared.**—Compressed Air v. Electric Motors. Letters from Edward W. Serrell and Ira Harris, reviewing the comparative advantages and defects with conclusions favorable to compressed air. 2800 w. R R Gas—Oct. 2, 1896.

**Elevated Railway.**—See **COMPRESSED AIR LOCOMOTIVE, Hardie; COMPRESSED AIR TRAMWAY.**

### COMPRESSED AIR PLANT.

See also **AIR COMPRESSOR.**

**Coal Mine.**—Notes on the Compressed Air Haulage Plant at No. 6 Colliery of the Susquehanna Coal Company, Glen Lyon, Pennsylvania. J. H. Bowden. Descriptive. 1600 w. Trans Am Inst of Min Engs—Aug., 1900.

Compressed Air at Sydney Mines, Cape Breton. R. H. Brown. The results of experience in a coal mine are given with description of plant employed. 1000 w. Can Min Rev—March, 1896.

Experience with Air Compressing at Drummond Colliery, N. S. Charles Fergie. The underground pumps were driven by compressed air from a compressor located at the surface. The advantages are discussed. 1500 w. Can Min Rev—March, 1896.

See also **COAL CUTTING MACHINERY; COAL MINING MACHINERY; POWER TRANSMISSION.**

**Delaware Breakwater.**—The Use of Compressed Air in Building the Delaware Breakwater. C. Weber. Illustrated description. 1400 w. Com Air—Nov., 1897.

**Goldfield, Colo.**—See **ELECTRIC STATION.**

**Gold Mine, Victoria.**—A High Grade Australian Air Compressor. Illustrates and describes an air compressor installed at the Long Tunnel gold mine of Walhalla, Victoria. 1500 w. Am Mach—Aug. 31, 1899.

Test of a Modern Air-Compressing Plant at the Long Tunnel Gold Mine, Walhalla. E. J. Rigby. Gives results of a test for economy and efficiency, and shows that large savings may be effected by a proper use of the air after compression. Ill. 4400 w. Trans of Aust Inst of Min Engs—Vol. V.

**Hydraulic.**—See **AIR COMPRESSOR—Hydraulic.**

**Jerome Park, N. Y.**—Abstract of Thesis Test of Compressed Air Power Plant at Jerome Park, N. Y. George W. Vreeland and Charles M. Younglove. The purpose of the test was to determine the various efficiencies of a central power plant and point out any line of improvement that may be necessary. 1500 w. Com Air—Nov., 1897.

The Compressed Air Power Plant at Jerome Park, N. Y. Illustrated description. 1400 w. Com Air—Sept., 1896.

**Light-Ship.**—A Light-Ship Compressed Air Plant. Illustrated description of plant upon lightship No. 42. 1200 w. Am Mach—Dec. 17, 1896.

**Mine.**—An Economical Air Plant Now Being Installed at the North Star Mine. Edward A. Rix. An illustrated description of a very complete system for the transmission and use of compressed air. 1800 w. Jour of Elec—Nov., 1895.

Compressed Air at the Gwin Mine. E. A. Rix. From the Golden Jubilee edition of "The Mineral Resources of Calaveras County," California. Illustrates and describes an interesting and economic installation. 1700 w. Jour of Elec—Feb., 1898.

**Tramway, N. Y.**—Mammoth Air Compressor for Street Railroad Motors. Illustrated description of the plant for supplying the air motors in the cars of the Metropolitan Street Railway Co., New York. 1200 w. Ir Age—June 8, 1899.

### COMPRESSED AIR TRAMWAY.

See also **COMPRESSED AIR LOCOMOTIVE; COMPRESSED AIR MOTOR.**

Compressed Air Applied to Traveling Motors by a New Method. W. M. Farrat. Calls attention to a recently invented method of applying compressed air to moving motors, which it is believed will obviate most of the difficulties. Ill. 1600 w. Com Air—Dec., 1898.

Compressed Air Enterprises. George C. Densmore, in "Municipal and Railway Record." Reviews various applications, especially as a motive power for railway traction, noting the undertaking on the 28th and 29th street railway in New York. 2500 w. Com Air—April, 1899.

Compressed Air in Railway Work. William S. Aldrich. Reviews its application to street railway work, mine haulage, motive power, etc. Considers a combined system for street railway work desirable. 2800 w. Am Elect'n—Dec., 1896.

Compressed Air in Traction Service. C. D. Wood, Jr. On the applications to street railway work especially in New York. 1200 w. Yale Sci M—Oct., 1899.

Compressed Air for City and Suburban Traction. Herman Haupt. Presents the subjects of air motors, briefly stating some of the properties of air and the laws that govern its compression, expansion and distribution; also such properties of steam as enter into the consideration of the questions at issue. Serial. Jour Fr Inst—Jan., 1897.

Compressed Air for Street Railway Service. Experience A criticism of General Haupt's assertions as published in the N. Y. "Sun." 1200 w. Elec Rev, Lond—April 7, 1897.

Notes on Propulsion by Compressed Air (Mittheilungen über Pressluftbetrieb). A paper, chiefly historical, read before the German Society of Railway Engineers by Herr Henning. Comparisons of cost between propulsion by compressed air and by electricity are given. 4500 w. Glaser's Annalen—Oct. 15, 1897.

Reports of Experience with Compressed Air Motors on Elevated and Street Railways. Papers bearing on the economical results obtained with compressed air motors on street railways. A statement from Hermann Haupt, and reports of engineers employed by the Commissioners of the Dist. of Columbia, U. S. A., to examine the system of traction which should be adopted in Washington. Also editorial. 12000 w. Eng News—Oct. 7, 1897.

**Boston.**—Compressed Air Motors in Boston. Gives Mayor Quincy's views on the use of compressed air for a motive power, and states some advantages of liquid fuel over compressed air. 1700 w. Bos Jour of Com—April 1, 1899.

**Efficiency.**—The Efficiency of Compressed Air for Street Car Motors. Robert Lundell, with editorial. The object of the paper is to correct erroneous impressions, and deals only with efficiency. 2000 w. Elec Eng—June 10, 1896.

**Electric, Compared.**—A Right Way and a Wrong Way to Place Compressed Air in Competition with Electric Power for Street Railways. R. A. Parke. Discusses economy in compressing and criticises strongly the effort to secure long mileage between chargings, by using very high storage pressures. 1400 w. W Elec—Aug. 1, 1896.

Compressed Air for Street Cars. Editorial, reviewing the failures and defects of compressed air, and contrasting it unfavorably with electricity. 1800 w. St Ry Rev—Aug. 15, 1896.

Electric and Compressed Air Street Cars. R. D. Williams. A discussion of mechanical efficiency, showing that while this is an important factor, it is not the most important factor in street railway practice. 500 w. Am Mach—Aug. 27.

**Failures.**—Some Compressed Air Victims. Frank Richards. Past failures in air propelled street cars, and their causes. 1800 w. Am Mach—June 18, 1896.

**Hardie.**—Compressed Air Traction. A letter from Robert Hardie, objecting to an editorial published in this paper, with remarks from the editor. 1300 w. Elec Wld—Sept. 12, 1896.

Street Cars Operated by Compressed Air. Statement of the important features of the Hardie system. 1300 w. Loc Eng—Sept., 1896.

The Hardie Compressed Air Motor for Street Cars. A descriptive account with some results of tests. 1200 w. R R Gaz—May 29, 1896.

The Hardie Compressed Air Motors. Hermann Haupt. An effort to answer some prominent objections. Also test of a compressed air reservoir taken from a Hardie motor after having been in use two years. 3500 w. Sci Am Sup—Feb. 20, 1897.

The Hardie Compressed Air Street Car Motors in New York. A review of the system and operation, with conclusions unfavorable to its economy and its mechanical perfection. No actual figures of cost are given. 1000 w. Elec Eng—Sept. 9, 1896.

The Hardie Compressed Air System. Description with quite full data of the plant at Rome, N. Y., and compressed air car, with a few notes of speed and traction performance. 2000 w. Elec Wld—Aug. 1, 1896.

See also **New York.**

**Hoadley-Knight.**—Compressed Air Motors. Describes in detail the distinctive features of the Hoadley-Knight system of street railway operation. Ill. 2800 w. Com Air—May, June, 1898.

Compressed Air Motors. Illustrated detailed description of the Hoadley-Knight motors, their construction and working. 3500 w. St Ry Jour—Aug., 1897.

Experience with Hoadley-Knight Air Motor Cars in Washington, D. C. Reports, giving particulars of tests made in the Eckington & Soldiers' Home Railway, generally favorable to the system. 2800 w. Eng News—Nov. 4, 1897.

The Hoadley-Knight Compressed Air Motor. An illustrated description of the motor and its operation. 1000 w. Sci Am—Feb. 4, 1899.

The Hoadley-Knight Compressed Air Motors. Describes and illustrates this type of car, giving details of construction. 2300 w. R R Gaz—Dec. 31, 1897.

**New York.**—Compressed Air Cars in New York. An account of the change being made in the motors of the Twenty-eighth and Twenty-ninth street lines in New York City, explaining the reason of the change. Ill. 2500 w. St Ry Jour—Aug. 4, 1900.

Compressed Air Motors in New York. An illustrated detailed description of the air power system as in use in New York, which differs in many respects from that used in Europe. 3500 w. St Ry Jour—June, 1899.

Compressed Air Surface Cars in New York. Favorable comment on the trials of the system recently made in New York. 1200 w. Safety V—Nov., 1896.

Compressed Air Surface Cars in New York. Present status of this system of car propulsion. 1400 w. Am Mach—Oct. 22, 1896.

Compressed Air Traction in New York City. Illustrates and describes the compressing engine, which is of interest on account of its size and power, and the high working pressure. 1800 w. Sci Am—Sept. 16, 1899.

Compressed Air Traction. A résumé of the present state of the equipment on 125th St., New York, taken from a recent publication by the American Air Power Company, with editorial. 900 w. Am Eng & R R Jour—Sept., 1897.

Cost of Operating Air Cars in New York City. Edward E. Pettee. A statement of the actual operating expenses for seven months, through extreme ranges of temperature. Ill. 2300 w. Com Air—March, 1897.

Trial of the Compressed Air Motor by the Third Avenue Railroad Company, New York. Description of motor, with cuts, and an account of some experiments. 1000 w. Sci Am—Aug. 15, 1896.

See also **Hardie.**

**Paris.**—The New Tramway. Charles Chincholle. Translated from "The Figaro," showing how compressed air is utilized in street car service in Paris. 700 w. Com Air—March, 1896.

Traction by Compressed Air at Paris. Brief account of the lines and their operation. 1000 w. R R Gaz—April 6, 1900.

Traction With Compressed Air (La Traction à Air Comprimé). M. A. Monmerqué. A general account of the Mekarski system as employed in Paris since 1876. 5000 w. Rev Gen de Chemins de Fer—March, 1900.

See also **Popp.**

**Popp, Paris.**—Pneumatic Tramways (Tramways Pneumatiques). An illustrated description of the Popp system of compressed air motors, as used in Paris. 2000 w. Rev Tech—Sept. 10, 1899.

Popp Compressed Air Motors for Tramway Traction. Illustrated description of this system, with a statement of its advantages. 2000 w. Com Air—Aug., 1899.

**Popp-Conti.**—Compressed Air Tramways. Describes the Popp-Conti system for the propulsion of cars on tramways. 3200 w. Engng—May 29, 1896.

**COMPRESSOR.**

**Railway Shop.**—See **COMPRESSED AIR.**

**COMPUTER.**

See also **CALCULAGRAPH; CALCULATING MACHINE; ELECTRIC WIRING—Computer; GEAR; MEASUREMENT; PLANIMETER.**

**Gear Strength.**—Some Special Forms of Computers. F. A. Halsey. Describes a type of computer for solving mechanical problems. Cox's Strength of Gear Computer. 1100 w. Am Soc of Mech Engs—Dec., 1896.

**Street Improvement Charges.**—A Rapid Method of Apportioning Cost of Private Street Works. Thomas Caink. A simple method with the use of an instrument devised by the writer, whereby the computation of cost of street improvements to be charged abutting owners, can be made with practically no calculation and in a fraction of the time needed in the ordinary methods. 600 w. Pav & Mun Engng—May, 1896.

**COMSTOCK LODE.**

See **SILVER MINING—Nevada.**

**CONCENTRIC WIRING.**

See **ELECTRIC WIRING.**

**CONCRETE.**

See also **CEMENT; CONCRETE REINFORCED; LIME; MASONRY; RESERVOIR.**

Notes on Cement Mortar and Concrete (Betrachtungen über Cementmörtel und Beton). Prof. A. Martens. An investigation of the relation between the sizes of the particles and the binding power in concretes of various composition; with tables of tests and other data. 10000 w. 1 plate. Mit a d Kgl Tech Versuchsanstalt—Part II., 1897.

The Theory and Practice of Concrete. Discussion of the features of concrete making which are still matters of dispute. 1200 w. Eng Rec—Dec. 23, 1899.

**Beams.**—The Computation of Béton Beams (Zur Berechnung der Betonbalken). Records of tests of beams of béton after different times of setting; sustaining the correctness of Navier's theory. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—March 12, 1897.

**Bridge Construction.**—Concrete in Railway Bridge Construction. H. W. Parkhurst. An illustrated critical review of the bridges on the Illinois Central System, with comment on the economy and usefulness of concrete construction, and a statement of the general principles of good concrete. 5500 w. Bridges—June, 1899.

**Bruges Ship Canal.**—The 3000-Ton Concrete Blocks and Rolling Caissons at the Bruges Ship Canal, Belgium. Abstract from paper of L. V. Vernon-Harcourt, read before the Inst. of Civ. Engs. Describes the method of making these monoliths of concrete, which weigh from 2500 to 3000 tons. 1200 w. Eng News—Nov. 9, 1899.

**Buildings.**—Béton Buildings at the Beocsin Cement Works (Bétonbauten in den Beocsiner Cement Fabriken). An account of various buildings of concrete, including a concrete tunnel for rope transmission; also rows of workmen's houses. 1 plate. 2500 w. Oesterr Monatsch f d Oeffent Baudienst—July, 1897.

**Chicago Track Elevation.**—Concrete Masonry in Chicago Track Elevation. Illustrates and describes what is probably the largest use of concrete work in railway engineering that has ever been attempted. 2800 w. Ry & Engng Rev—Nov. 19, 1898.

**Compression.**—Properties of Concrete Under Compressive Stress. David Molitor. Gives the best available data on this subject, though the number of experiments is rather limited. Ill. 2500 w. Jour Assn of Engng Socs—May, 1898.

**Construction.**—Concrete Construction. Henry A. Gray. Giving the results of observations of English practice, with many figures relating to mixtures, etc., and methods of using. Serial. Can Eng—Nov., 1895.

**Cost.**—See DREDGING—Cost.

**Elasticity.**—Experiments on the Elasticity of Concrete. C. Bach, in "Zeitschrift des Vereines Deutscher Ingenieure." The cement was compressed by varying loads and the contraction noted. This was as much as 1.3 per cent. 800 w. Jour W Soc of Engs—Jan., 1898.

**Electrical Conductivity.**—See ELECTRIC CONDUCTIVITY—Cement and Concrete.

**Facing.**—Concrete Facing on a Sandstone Bluff at St. Paul, Minn. Onward Bates. Describes the conditions and the reasons for using a concrete facing instead of cut-stone masonry, giving illustrated account of the work. 2000 w. Jour W Soc of Engs—Oct., 1898.

**Frozen.**—Experiments to Determine the Effect of Freezing on Concrete. Walter A. Rogers. Describes tests made from which it is concluded that concrete work with cement possessing qualities similar to those tested may be carried on safely during moderately cold weather by using proper precautions. Discussion. 2500 w. Jour W Soc of Engs—June, 1899.

Frozen Concrete Pavement Foundations. A pavement foundation in Des Moines, Ia., was frozen just after it was laid. Twelve months after a sample was examined and its condition is reported, with the reasons of City Engineer L. Higgins for believing that the conditions may be such as not to destroy the value by freezing. 1000 w. Eng Rec—Jan. 1, 1898.

Tests of Frozen Concrete. Report of experiments made by W. A. Rogers on Portland and natural cement concretes made with and without salt and kept under different temperature conditions. 1800 w. Eng Rec—Aug. 26, 1899.

**Locks.**—Concrete Masonry, Illinois & Mississippi Canal. Gives the rules for building large concrete locks by day labor. 2500 w. Eng Rec—May 28, 1898.

**Low Temperature.**—Concrete Masonry Construction at Low Temperatures. A statement of the conditions which must be filled to ensure good work during freezing weather. 900 w. Eng Rec—July 21, 1900.

Construction of Concrete Foundations in Cold Weather. M. Strukel. Abstract from an article in the "Zeitschrift des Oesterreichischen Ingenieur und Architekten-Vereines." Description of successful work accomplished with the thermometer between 14 degrees above and 4 to 40 degrees below zero. 1000 w. Eng Rec—Oct. 17, 1896.

The Manufacture of Concrete. Ross F. Tucker. The importance of mixing considered as essential to success as the materials used. 1000 w. Br Build—Feb., 1896.

**Materials and Manufacture.**—The Choice of Materials for and the Manufacture of Concrete for Engineering Work. Ira O. Baker. Extracts from advance sheets of the ninth edition of "A Treatise on Masonry Construction." 4800 w. Eng News—Sept. 28, 1899.

**Mining Use.**—The Use of Concrete in Mining. Marcel Habets. From a communication to the Liége section of the Société des Ingenieurs de Liége. Its use for shaft lining, underground engine-room, stoppings, lining a fan drift, etc., and the advantages are presented. Ill. 2500 w. Col Guard—June 15, 1900.

**Mixer.**—A Complete Mixer Plant. Illustrated description of the plant used to mix concrete for gun emplacements at a place where labor was difficult to obtain and the machinery had to be as nearly automatic as possible. 1400 w. Eng Rec—Dec. 2, 1899.

**Mixer, Traveling.**—A Traveling Concrete Mixer. Illustrates and describes a novel apparatus for the preparation of concrete. 600 w. Eng News—Sept. 6, 1900.

**Mixing.**—Economical Concrete Mixing. A. McLean Parker. Illustrated description of plant for mixing concrete in a very confined situation. 600 w. Eng Rec—June 30, 1900.

**Proportions.**—The Proportions of Concrete. A paper giving methods of estimating the relative proportions of cement needed for varying proportions and sizes of sand and stone. 1200 w. Eng Rec—Feb. 11, 1899.

**Railway Masonry.**—Concrete as a Railway Masonry. W. A. Rodgers. A brief outline of railway concrete masonry, describing the main features in its construction. 2500 w. Wis Engr—May, 1899.

A Symposium on Concrete and Its Uses. Abstract of information compiled by W. A. Rogers from reports of representatives of over 85000 miles of railways. 2500 w. Eng Rec—Oct. 20, 1900.

Concrete Masonry on the Janesville & Southeastern. Illustrated description of interesting features of this work. 1700 w. Ry & Engng Rev—Oct. 13, 1900.

Concrete Railway Structures. F. G. Jonah. Read before the Canadian Soc. of Civ. Engs. Illustrates and describes designs of concrete culverts and bridge piers. 800 w. Adv Proof.—Dec. 8, 1898.

**Street Work.**—Concrete for Street Work. Describes the construction of concrete curbs, sidewalks and streets in Iowa. 1500 w. Eng Rec—June 3, 1899.

**Strength.**—Strength of Concrete of Various Proportions. R. B. Ketchum and Fred. W. Honens. A summary of results of a series of experiments made in the Cement Laboratory of the Univ. of Illinois, to determine the variation in strength of concrete due to a difference in the proportion of the ingredients. 600 w. Technograph, No. 12—1897-8.

Strength of Concrete with Different Per Cent. of Voids Filled. William A. Hawley and B. F. Krahl. Abstract of a graduation thesis. Report of a series of experiments made. 800 w. Eng News—June 7, 1900.

**Subaqueous.**—Placing Concrete in Ninety Feet of Water. Daniel W. Mead. Describes unusual work at Rockford, Ill. 800 w. Trans of Assn of Civ Engs of Cornell Univ—1898.

**Tests.**—Crushing Strength of Concrete with Various Aggregates. Gives results of tests of concrete made with same mortars but various proportions of stone and gravel. 1000 w. Eng Rec—April 9. 1898.

Some Recent Tests of Concrete Cubes. W. A. Rogers. An account of experiments made in connection with tests of cement furnished for the work on the elevation of tracks in Chicago. 2000 w. Ry & Engng Rev—Feb. 18, 1899.

See also CEMENT TESTS.

**Theory.**—On the Theory of Concrete. George W. Rafter. Results of tests made by the author, with details of the work. 2000 w. Pro Am Soc of Civ Engs—April, 1899.

On the Theory of Concrete. Discussion of the paper of George W. Rafter. 9000 w. Pro Am Soc of Civ Engs—Aug., 1899.

On the Theory of Concrete. Discussion of paper by George W. Rafter. 3800 w. Pro Am Soc of Civ Engs—Sept., 1899.

On the Theory of Concrete. George W. Rafter. explanations condensed from the author's report to the N. Y. State Engineer, on tests made, with tabulated results. 2200 w. Pro Am Soc Civ Engs—April, 1899.

**Trent Canal.**—Concrete as Made on the Trent Canal. H. F. Greenwood. A brief description of the methods used and the precautions taken in constructing some of the works named. Ill. 2500 w. Can Arch—May, 1897.

**U. S. Regulations.**—Rules for Heavy Concrete Work. A summary of the regulations for the extensive U. S. concrete work at Duluth and on the upper Mississippi. 3300 w. Eng Rec—Sept. 29, 1900.

**Wet.**—Water in Concrete. A. S. Cooper. A letter to the editor giving the results of tests tending to show that mixing mortar "wet" gives the best results ultimately though it will not do so on short time tests. 600 w. Eng & Con—Dec. 30, 1896.

### CONCRETE FLOORS.

See also **CONCRETE REINFORCED; FIREPROOF CONSTRUCTION.**

**Stresses.**—The Bending Stresses in Flat Rectangular Concrete Floors. W. Dunn. Explains formulae given in English books on applied mechanics, and gives a diagram for finding approximate maximum stresses on flat rectangular plates uniformly loaded. 2000 w. Jour Roy Inst of Brit Archts—May 26, 1900.

The Bending Stresses on Flat Rectangular Concrete Floors. Frank Caws. A criticism of paper by W. Dunn. 1800 w. Jour Roy Inst of Brit Archts—June 30, 1900.

The Stresses in Stone or Concrete Plates Subjected to Bending (Die Spannungen in auf Biegung Beanspruchten Stein oder Betonplatten). A mathematical investigation by Prof. Hofmann, with application to practical examples. 1000 w. Deutsche Bauzeitung—Dec. 22, 1897.

### CONCRETE FOUNDATION.

**Street Railway Track.**—See **TRACK—Street, Concrete Foundation.**

### CONCRETE IRON.

See **CONCRETE REINFORCED.**

### CONCRETE MACHINERY.

**Chicago Canal.**—Concrete Machinery on the Chicago Drainage Canal. Illustrated description of the machines used on Sections 14 and 15, in building the retaining walls. 1200 w. Eng Rec—May 22, 1897.

### CONCRETE REINFORCED.

Armored Concrete. A résumé of results obtained in recent trials of this material, with discussion of the conclusions reached. 1900 w. Engr, Lond—March 30, 1900.

Construction in Reinforced Cement (Construction en Ciment Armé). N. de Tedesco. A paper before the Societ of Civil Engineers of France, giving the latest advances in reinforced concrete construction, with data of tests. 5000 w. Soc Ing Civ de France—Jan., 1899.

Reinforced Cement Constructions (Constructions en Ciment Armé). Gérard Lavergne. A well illustrated general review of the subject of constructions in concrete with imbedded metals. The first part gives a general description of six systems. Serial. Génie Civil—Nov. 12, 1898.

Steel Concrete Construction. George Hill. Deals with that combination of concrete and steel in which the steel acts entirely in tension, and in which it is distributed through the bottom section of the slab. An account of tests and results. Ill. 5500 w. Pro of Am Soc of Civ Engs—March, 1898.

The Development of Reinforced Cement Construction (Evolutions des Constructions en Ciment Armé). A brief review of the various systems of strengthening cement and concrete work with embedded metal. 2000 w. La Rev Tech—June 10, 1899.

The Influence of Imbedded Metal on the Properties of Mortar and Concrete (Influence des Armatures Métalliques sur les Propriétiés des Mortiers et Bétons). A general discussion, by Chief Engineer Considère, of the behavior of structures of metal and concrete, based upon experiments by the department of Ponts et Chaussées. Serial. Génie Civil—Feb. 4, 1899.

The Influence of Metallic Reënforcement upon Mortars and Cements (Influence des Armatures Métalliques sur les Propriétés des Mortiers et Bétons). M. Considère. An account of some experiments showing unexpected strength in samples of reënforced concrete. 2700 w. Comptes Rendus—Dec. 12, 1898, and Jan. 2, 1899.

Theory and Applications of Concrete-Iron Construction (Anwendung und Theorie der Betoneisen Konstruktionen). Josef Rosshänder. A general examination of the various methods of reinforcing concrete by means of imbedded metal. Serial. Schweizer Bauzeit—Sept. 8, 1900.

Theory and Recent Applications of Reinforced Cement (Théorie et Applications Nouvelles du Ciment Armé). Harel de la Noë. A general discussion of the application of the elastic theory to structures of metal imbedded in concrete, with especial reference to the work of the writer at Le Mans. 5000 w. Ann des Ponts et Chaussées—1 Trimestre, 1899.

**Arch.**—See also **Monier Arch; ARCH—Concrete Reinforced.**

**Balcony.**—See **BALCONY.**

**Bridge.**—See **ARCH—Concrete Reinforced; BRIDGE—Concrete Reinforced.**

**Building.**—A Large Monolithic Factory Building. Illustrated description of a 200x250 feet, 4-story building for a quarter of its area, and 1-story elsewhere, built entirely of concrete in which steel rods are bedded. 2500 w. Eng Rec—July 30, 1898.

A Steel-Concrete Factory Building. Illustrated description of a 125-135-ft., 2-story building, having a steel framework and walls and roof of concrete. 800 w. Eng Rec—Aug. 25, 1900.

Cement and Steel Buildings. Illustrates the construction of small shops and schools having concrete and expanded metal walls and partitions. 700 w. Eng Rec—March 26, 1898.

Constructing a Large Monolithic Concrete Building. Illustrates and describes methods and plant employed on a 200-250-ft. building of concrete reinforced by iron rods. 3800 w. Eng Rec—Aug. 20, 1898.

See also **Paris Exposition; Record Building.**

**Cantilever Sidewalk.**—A Cantilever Concrete Sidewalk. Illustrated description of a 5-ft. sidewalk carried on Hennibique concrete-steel brackets projecting from the face of a retaining wall. 500 w. Eng Rec—Aug. 4, 1900.

**Church.**—A Concrete Church. Illustrated description of a monolithic concrete church built by a wealthy congregation in Brooklyn, N. Y. 1000 w. Eng Rec—May 5, 1900.

**Docks.**—See **DOCK—Concrete-Steel.**

**Elasticity.**—See **ELASTICITY—Compound Structures.**

**Expanded Metal.**—The Use of Expanded Metal in Concrete Construction. From a paper read before the British Association by A. T. Walmisley, giving theoretical considerations and also the results of trials. 1800 w. Gas Wld—Sept. 15, 1900.

The Use of Expanded Metal in Concrete. A. T. Walmisley. Read before the Brit. Assn., at Bradford. Information concerning the use of this material, particulars of tests, etc. 5200 w. Builder—Sept. 15, 1900.

See also **EXPANDED METAL.**

**Floors and Beams.**—Computations for Floors and Beams in Reinforced Cement (Du Calcul des Planchers et Poutres en Ciment Armé). A valuable article by M. Louis Stellet, upon the methods of proportioning constructive details of combined iron and concrete, including the researches of Hennebique, Cottancin, and others. 6000 w. La Rev Tech—Dec. 17, 1897.

See also **FIREPROOF CONSTRUCTION.**

**Hennebique.**—Computations for Ribbed Beams of Iron and Concrete on the Hennebique System (Berechnung der Gerippten Betoneisenträgern, System Hennebique). Max R. v. Thullie. A mathematical treatment of the proportions for concrete girders with imbedded iron rods. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 15, 1899.

The Applications of Reinforced Béton (Les Applications du Béton de Ciment Armé). Describing the Hennebique construction of T beams of concrete, with iron rods imbedded in the lower portion. 3500 w. Rev Tech—June 25, 1897.

The Computation of Concrete-Iron Beams with Upper Ribs (Berechnung der Betoneisenträger mit Oberen Rippen). Max R. von Thullie. The mathematical computations for the particular form of Hennebique beam in which the compression member is above, and the reinforcing metal rods below. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—March 2, 1900.

The Hennebique System (Das System Hennebique). Ed. Ast. An illustrated description of Francois Hennebique's system of construction with structural steel and iron imbedded in concrete, with its application in a variety of cases. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—March 30, 1900.

The Hennebique System of Construction (Die Bauweise Hennebique). Prof. W. Ritter. A full discussion of this simple and effective method of reinforcing concrete with rod and strap iron; showing numerous applications, and the method of computing proportions. Three articles. 6000 w. Schweizer Bauzeit—Feb. 4, 11, 18, 1899.

**Melan.**—Concerning the Computations for Concrete-Iron Construction (Ueber die Berechnung der Béton-Eisenconstructionen). J. Melan. A valuable mathematical treatment, taking into account the relative elasticity of iron and béton, and written by the inventor of this much discussed system of construction. 3500 w. Oesterr Monatschrf f d Oeff Bau—Dec., 1896.

**Monier.**—Calculations for the Monier System of Construction (Zur Berechnung von Monier-Constructionen). A. Ossenfeld. A mathematical treatment of the proportions of structures of the combined iron and concrete, including both beams and arches. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 14, 1898.

Computations for Monier Beams (Berechnungen der Monier-Träger). A discussion by Herr Rappaport of the combined béton and metal construction, showing the importance of considering very carefully the relative elasticity of the materials used. 2500 w. Schweizer Bauzeit—Feb. 27, 1897.

Computations for Monier Floors (Ueber die Berechnung der Monier Platten). A mathematical discussion of the computations for cement floors with the Monier system of wire reinforcement. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—March 26, 1897.

Monier Constructions. E. Lee Heidenreich. Explains the general construction, its principal qualities, and illustrates where it has been successfully applied. Also discussion. 10000 w. Jour W Soc of Engs—June, 1900.

The Theory of the Cement-Iron Construction—Monier Arch (Zur Theorie der Cement-Eisenconstruction—Monier Constructionen). A review of some previous articles, criticising the methods of computation used. By Prof. Josef Anton Spitzer. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 8, 1897.

The Theory of Reinforced Béton Beams (Zur Theorie der Verstärkten Béton Platte). An elaborate mathematical and graphical discussion of the principles involved in the Monier system of concrete reinforced by metal. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—May 28 and June 4, 1897.

**Monier Arch.**—The Computation of Stresses in Monier Arches (Ueber die Berechnung der Spannungen in den Moniergewölben). M. R. v. Thullie. A thorough mathematical discussion of the subject, reviewing the theories of Spitzer and Monier, and giving practical applications of the formulas. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 23, 1898.

**Paris Exposition Buildings.**—The Mining and Metallurgical Building at the Exposition of 1900 (Le Palais des Mines et de la Métallurgie à l'Exposition). Especially illustrating the use of expanded metal in connection with reinforced concrete, on some of the buildings of the Paris Exposition. 1000 w. Rev Tech—March 10, 1899.

**Record Building.**—The Record Storage Building at the Discount Bank of Paris, at Rueil (Les Archives du Comptoir d'Escompte de Paris à Rueil). Illustrated description of an interesting storage building in cement and steel construction, especially arranged for the storage of papers and documents. 1000 w. La Rev Tech—May 10, 1898.

**Reservoir.**—See **RESERVOIR—Reinforced Concrete.**

**Retaining Walls and Bridge.**—Retaining Walls and Bridge in Reinforced Concrete on the Quai Debilly (Murs de Soutènement et Pont en Béton Armé du Quai Debilly). Showing the practical application of the Hennebique system to an important piece of retaining wall construction at the Paris Exposition. 1200 w. Génie Civil—Sept. 30, 1899.

**Sea Water Action.**—Experiments on the Action of Sea Water upon Concrete-Steel (Expériences sur l'Alteration des Ciments Armés par l'Eau de Mer). M. Lidy. Experiments which show that electrolytic actions take place, which cause deterioration of the steel or iron. 2200 w. Ann de Ponts et Chaussées—4th quarter, 1899.

**Strength.**—Strength of Concrete and Steel in Combination. Frank H. Constant. A discussion of this method of construction which has become quite common in laying the foundations for tall buildings, floors of bridges and buildings, arch bridge constructions of the Monier and Melan systems, etc. 2000 w. Engineers' Year Book—Univ of Minn., 1896.

The Ultimate Strength of Concrete-Steel Beams. J. B. Johnson. Abstracted from a paper read before the Detroit meeting of the American Assn. for the Advancement of Science. Gives assumptions and equations derived. 500 w. Eng News—Oct. 21, 1897.

**Temperature Changes.**—The Influence of Temperature Changes on Concrete-Iron Construction (Einfluss von Temperaturschwankungen auf Béton-Eisenconstructionen). J. Hermanek. A mathematical discussion, showing that no injurious stresses are likely to occur from expansion and contraction of the metallic portion of work executed in the Monier system of concrete and iron. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 17, 1897.

**Test.**—Test of a Concrete-Iron Girder (Probebelastung einer Gurtträgerbrücke). M. Möller. Details of tests of reinforced concrete beam of 15 metres span, loaded uniformly to destruction, with photographs of the structure before and after testing. 1200 w. Deutscher Bauzeit—July 5, 1899.

**Theory.**—The Resistance of Materials (Résistance des Materiaux). A theoretical discussion. with particular reference to concrete-iron construction. Serial. Rev Tech—June 25, 1900.

**Washington Bridge.**—See **BRIDGE—Washington Memorial.**

**CONCRETE-STEEL.**

See **CONCRETE REINFORCED.**

**CONCRETE TEST.**—See also **CONCRETE—Test.**

**Budapest.**—See **CEMENT TEST—Budapest.**

**CONDENSATION.**

**Cylinder.**—See **CYLINDER CONDENSATION.**

**CONDENSER.**

See also **COOLING TOWER; FEED WATER; STEAM ENGINE; STEAM ENGINEERING.**

Condensation in Steam Engines. From "La Nature." An improved form of ejector condenser adapted to use the same condensing water repeatedly. 1000 w. Sci Am Sup—May 20, 1899.

Condensers and Air Pumps. Illustrates and describes some of the salient features in the design and construction of a condensing plant. Serial. Prac Engr—Feb. 10, 1899.

Condensers and Economizers. Alton D. Adams. Discusses their advantages and examines the objections. 1700 w. Elec Rev, N Y—Aug. 22, 1900.

Condensers. E. J. Philip. Read before the Canadian Assn. of Stationary Engs. Explains the advantages of their use and describes several types. Also briefly discusses air pumps. 2000 w. Can Eng—Sept., 1897.

The Use of Condensers. P. Boucherot. Abstract of a paper read before the International Elec. Cong., at Paris. Examines the most important applications, and the reasons against their use. 3000 w. Elect'n, Lond—Oct. 12, 1900.

**Central Plant.**—Central Condensers (Ueber Central-Condensation). A description of condensing plant in which a number of engines exhaust into one large condenser: with illustrations of the apparatus at the "Ewald" mine in Westphalia. 4000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Jan. 22, 1897.

Central Condensers (Centralcondensation). Chr. Eberle. A discussion of the construction and use of a main condensing apparatus for the reception of the exhaust steam from a number of engines, with examples from existing plants. Serial. Stahl und Eisen—Feb. 1, 1899.

Central Condensing Plants for Iron Works. W. H. Roy. Read before the West of Scotland Iron and Steel Inst. A discussion of points to be kept in mind, types, etc., illustrating and describing various plants. Serial. Col Guard—Nov. 24, 1899.

Centralization of the Steam Condensing Plant.

H. G. V. Oldham. The first instalment of a very fully illustrated description of modern cooling towers, evaporative condensers and general arrangement of central condensing plant. 4000 w. Eng Mag—Oct., 1900.

Central Steam Condensing Plants. From "Stahl und Eisen." Calls attention to the advantages, and reasons for rapid development of this new branch of steam engineering; and gives an illustrated detailed description of such a plant. 3800 w. Ir & Coal Trds Rev—June 16, 1899.

Central Steam Condensing Plants. Considers the advantages and disadvantages as compared with single condensation, and gives detailed description of such plants. Ill. Serial. Prac Engr—Oct. 27, 1899.

Central Steam Condensing Plants. From "Stahl und Eisen." Illustrates and describes a plant and apparatus for the condensing of the exhaust steam from various engines. 3800 w. Ir Age—April 20, 1899.

The Central Condensing Plant of the Recklinghausen Mine (Die Central Kondensation des Schachtes Recklinghausen). With detailed description of this large surface condensing plant and a record of its performance over a period of six months. 2500 w. Glückauf—June 3, 1899.

The Inertia Effect in Condensers (Beharrungsvermögen von Kondensatoren). F. J. Weiss. An exhaustive discussion of the action of central condensers for steam power plants in maintaining a uniform vacuum with variable steam discharges. 5000 w. Zeitschr d Ver Deutscher Ing—Sept. 23, 1899.

**Coal Mines.**—Condensing Arrangements at Collieries. Hugh Bramwell. Read before the South Wales Inst. of Engs. Classifies the conditions usually existing, discussing each and the particulars of the work. 2800 w. Col Guard—March 17, 1899.

**Cooler.**—A Combined Surface Condenser and Water Cooler. Illustrates and describes a new apparatus designed and patented by Edward F. White. 900 w. Eng News—July 8, 1897.

**Cooling Nozzles.**—Spray Nozzles for Cooling Water of Condensation. Method of using water for condensing steam over and over again in places where water supply is limited. Ill. 200 w. Am Mach—Feb. 6, 1896.

**Cooling Reservoirs.**—Cooling Reservoirs for Condensing Engines. Harold Wood Barker. From excerpt minutes of proceedings of the Institution of Civil Engineers. Illustrates and describes the methods of construction usually adopted when means of storing and cooling are necessary, and considers the size necessary for any given power. Serial. Prac Eng—Sept. 23, 1898.

**Cooling Tower.**—See **COOLING TOWER.**

**Economizer.**—See **ECONOMIZER.**

**Ejector vs. Jet.**—Ejector Condensers vs. Jet Condensers and Air Pumps. Illustrated description of the ejector condenser and a statement of its advantages. 900 w. Prac Engr—Nov. 26, 1897.

**Electric.**—See **ELECTRIC CONDENSER.**

**Electric Station.**—A Condenser System for Electric Power Plants (Ueber ein Kondensator System für Elektrische Anlagen). Describing a form of independent condenser for use in connection with power plants where water is scarce. 2000 w. Deutcher Zeitchr f Electrotech—June 15, 1897.

Condensers and Condensing for Electric Power Stations. S. Payne. Read before the Manchester Soc. of Jun. Elec. Engs. Considers the importance of condensing, describing briefly the types of steam condensers and auxiliaries, and the application to electric power stations. 3800 w. Elec Eng, Lond—Nov. 17, 1899.

Condensers for Electric Light and Power Stations. J. F. C. Snell. Read at the Bristol convention of the Munic. Elec. Assn. Considers the advantages from the adoption of condensers, and the type to be selected, favoring surface condensers as a rule. Discussion. 6000 w. Elec Eng, Lond—June 30, 1899.

See also **Power Station.**

**Electric Station. Brooklyn.**—The Continuous Use of Condensing Water. Illustrated detailed description of a new apparatus for this purpose, installed in the Second District Station of the Edison Electric Illuminating Co., Brooklyn, N. Y. 2200 w. Power—March, 1896.

**Electric Station. Newcastle-on-Tyne.**—On the Surface Condensing Plant at the Newcastle and District Company's Electric Light Works, Fort Banks, Newcastle, on the Tyne. William Cross. Paper read before the Northeast Coast Inst. of Engs. and Shipbuilders. Illustrated detailed description. 2000 w. Ind & Ir—Jan. 24, 1896.

**Ericsson's Surface.**—Official Report on the Operation of Ericsson's Surface Condenser and Evaporator for Marine Engines—1847. Copy of a document interesting to naval engineers. 2500 w. Jour Am Soc of Naval Engs—Feb., 1899.

**Evaporative.**—Cooling Water for Condensing Purposes. W. H. Booth. Description of various methods of cooling water for repeated use, in condensing exhaust steam, with illustrated description of an evaporation condenser. 1200 w. Am Mach—April 2, 1896.

Evaporative Condensers. Harry G. V. Oldham. From a paper read before the Inst. of Mech. Engs., England. Illustrates and describes the methods of Thiesen, Wright, Fraser and Ledward. 5500 w. Col Guard—April 28, 1899.

Evaporative Condensers. Harry G. V. Oldham. An interesting and extended description, with plates, discussion, of advantages, principles, etc., and lengthy general discussion. 23400 w. Inst of Mech Engs—April, 1899.

The Evaporative Condenser for Steam Engines. The first part contains general remarks and illustrated description of appliances. Serial. Mach, Lond—July 15, 1896.

See also **COOLING TOWER.**

**Factories.**—Separate Condensing Plants for Factory Purposes. Alfred Seale Haslam. Read before the Engng. Conference of the Inst. of Civ. Engs., England. Briefly considers the four classes into which the author divides condensers. 2500 w. Engs' Gas—July, 1899.

**Grease Extractor.**—See **FEED WATER.**

**Power Stations.**—A Note on the Use of Condensers in Power Stations. R. C. Carpenter. On the saving as compared with non-condensing engines, and the two kinds of condensers. 700 w. Am Elect'n—Aug., 1900.

**Self-Cooling.**—A New Self-Cooling Condenser. This condenser is designed as a substitute for the hitherto costly and bulkly condensers used in locations where water supply is very expensive. It is thought to be as efficient as former appliances, while at the same time its bulk and cost are less. 900 w. Eng News—March 5, 1896.

A Self-Cooling Condenser. Louis R. Alberger. Read before the A. S. M. E. Describes and illustrates a practical condensing apparatus for use with steam engines, operating without natural water supply and giving results claimed to compare most favorably with those obtained by ordinary condensers. 4800 w. Trns Am Inst of Mech Engs—Vol. XVII., 1896.

**Tie Rods.**—On the Arrangement and Computation of Tie Rods in Condensers. Rudolph Leupold. The purpose of the article is to provide a rule for bracing by means of tie rods, based on the principles of hydrostatics. 800 w. Pro Age—May 1, 1897.

**CONDUCTIVITY.**

See **ELECTRIC CONDUCTIVITY; HEAT CONDUCTIVITY.**

**CONDUCTOR.**

**Electric.**—See **ELECTRIC CONDUCTOR.**

**CONDUIT.**

**Electric.**—See **ELECTRIC CONDUIT: ELECTRIC DISTRIBUTION; ELECTRIC WIRING.**

**Water.**—See **AQUEDUCT: WATER CONDUIT; WATER MAIN; WATER PIPE.**

**CONDUIT ELECTRIC TRAMWAY.**
See **ELECTRIC CONDUIT TRAMWAY.**

**CONE WHEELS.**

**Automobile Gear.**—Transmission by Cone Wheels for Automobiles (Transmission par Cones pour Automobiles). Max Ringelmann. A variable speed gear, using a friction plate between two pressure cones, especially adapted for speed controller on automobiles. 1000 w. La Rev Tech—April 25, 1898.

**CONGRESS.**

See **ELECTRICAL CONGRESS; ENGINEERING CONGRESS.**

**CONNECTING ROD.**

See also **STEAM ENGINE.**

On the Connecting Rod Problem. Prof. Dunkerley. Gives the solution to four stated problems, considering simply the effect of the inertia of the rod. 4700 w. Engng—June 2, 1899.

The Geometric Determination of the Resultant of the External Forces Acting Upon a Connecting Rod (Die Geometrische Bestimmung der Resultate der auf eine Schubstange Wirkenden Auesseren Kräfte). Prof. Mohr. Giving a simple graphical construction and diagrams showing its application. 1000 w. Zeitschr d Ver Deutscher Ing—July 8, 1899.

**Finishing.**—Finishing Large Connecting Rods—De La Vergne Shops. John Randol. The description of method is illustrated by half-tone engravings. 2000 w. Am Mach—Aug. 13, 1896.

### CONTRACT.

A Paper on Contracts. T. M. Clark. Read before the students of the Architectural Department of the University of Pennsylvania. The great principle which underlies the making of contracts is that they must have a consideration. 5800 w. Am Arch—April 11, 1896.

Contract Work Not Always Advisable. A good editorial on the growing tendency to avoid the contract system. 900 w. Eng Rec—Feb. 15, 1896.

**Admiralty.**—Admiralty Contracts. A severe criticism of the business methods of the British admiralty exemplified by some recent transactions. 1700 w. Engng—Nov. 29, 1895.

The Conditions of Building Contracts. A. A. Hudson. Paper read before the Surveyors' Institution. The conditions to be considered are carefully discussed. 3000 w. Builder—Feb. 22, 1896.

**Croton Aqueduct.**—The Claims of the Contractors for the New Croton Aqueduct. An interesting dispute between the contractors and the city, brought about by a change in design after the bids were made. 1700 w. Eng News—April 23, 1896.

**Extra Payments.**—Extra Payments on Contracts. The opinion of the Utah Supreme Court on a contract requiring more work of certain classes than called for in the engineer's estimate. 1200 w. Eng Rec—Nov. 12, 1898.

**Fair Profit.**—The Contractor's Fair Profit. John H. Burnham. Consideration of what is a fair profit, with discussion. 4200 w. Ill Soc of Engs & Surv—11th An Rept., 1896.

The Contractor's Fair Profit. J. H. Burnham. Abstract from address before Illinois Soc. of Surv. & Engs. The fact that contractors often fail to secure a fair profit is noted, and reasons for such failure are given. This is followed by hints intended to help in securing the opposite result. 2300 w. Pav & Mun Eng—March, 1896.

**Letting.**—The Letting of Contracts. Geo. Beaument. Address before the Building Trades Club, of Chicago. Discusses the various difficulties and suggests remedy. 2800 w. In Arch—Oct., 1896.

**Quantity Bids.**—Quantity Bids on Architectural and Engineering Contracts. G. A. Wright. A description of the methods in vogue in many countries and made obligatory by law in some, by which contracting for works is made less of a gamble than under lump sum bids. 3300 w. Eng Rec—Nov. 4, 1899.

**Railway Equipment.**—The Baltimore and Ohio Equipment Contracts. A brief but complete summary of the contracts to be let for various types of engines and cars, and an abstract of specifications for each. 1200 w. R R Gaz—May 1, 1896.

**Rock Work.**—Modern Contracting Methods. Lessons for quarry men from the rock work of the Chicago canal and the New York subway. Gives illustrated description of appliances and methods. 3000 w. Stone—May, 1900.

**Withdrawal.**—The Right to Withdraw Erroneous Bids. Editorial review of decision of U. S. Circuit Court affirming contractor's right to withdraw bids containing manifest errors, before contract is made. 900 w. Eng Rec—April 30, 1898.

### CONTRACTOR.

How to Become a Successful Contractor. Alexander MacLachlan. A few hints from one who has had twenty-five years experience. 2200 w. Builder—Aug. 20, 1898.

**Responsibility.**—The Individual Responsibility of the Contractor. D. B. Garnsey. The importance of considering the conditions existing in the community in connection with individual efforts. 1000 w. Br Build—Sept., 1896.

**Rights.**—The Rochester Conduit Litigation. A review of a suit lasting eight years, just settled by the U. S. Supreme Court in a decision refusing to consider a surety on a bid, or the bidder, bound by the terms of a tender when the bidder's representative announces as soon as his bid has been read and before that of another bidder has been opened, that certain figures in his tender were errors. 2800 w. Eng Rec—July 28, 1900.

### CONTROLLER.

See also **ELECTRIC SWITCH; ELECTRIC ELEVATOR; ELECTRIC RAILWAY—Multiple Unit; RHEOSTAT.**

Controllers for Electric Motors (Die Steuerschalter für Elektrische Motoren). A full discussion of the principles of construction, with numerous diagrams, and photographs of working controllers. 3600 w. Zeitschr d Ver Deutscher Ing—March 3, 1900.

Controlling Devices for Series-Wound, Constant Potential, Electric Motors. William Baxter, Jr. Illustrated description of the principles involved in the construction and operation. 1800 w. Am Mach—Aug. 13, 1896.

Controlling the Speed of Car Motors. William Baxter, Jr. An explanation of the methods used. Serial. Elec Wld—April 10, 1897.

The Elementary Principles of the Rheostat, Commutated Field and Series-Parallel Methods of Controlling Railway Motors. William Baxter, Jr. The general principles will be explained in these articles, and the way in which they are applied by several of the leading manufacturers will be illustrated and described by the aid of the wiring plans they furnish. Serial. Elec Ry Gaz—April 25, 1896.

**Air Motor.**—The Auvert Compressed Air Motor for Controlling Electric Trains (Servo-Moteur Auvert). Ch. Baudry. An illustrated description of a system of operating the individual electric controllers on the cars of an electric train, by a compressed air master motor at one point and secondary motors on the cars. 2200 w. 1 plate. Mem d l Soc d Ing Civils de France—No. 8, 1900.

**Alternating Currents.**—External Regulation of Alternating Current Motors. Albert G. Davis. Describes devices for the speed regulation of alternating current motors in which the speed of the motor is controlled by changing the character of the current delivered. 1700 w. Elec Wld—Dec. 12, 1896.

**Anthony.**—A New Method of Speed Control for Electric Motors. W. A. Anthony. Views of the writer on this subject. Describes a method which he believes will be found valuable in most cases where variable speed is required. 800 w. Elec Eng—Dec. 16, 1896.

**Blondel.**—A New Method of Regulation for Tramway Motors (Ueber eine Neue Regulirung für Bahnmotoren). Prof. Blondel. The system consists in a combination of two electro motors with a storage battery and a special form of series parallel regulator. 3000 w. Elektrictech Zeitschr—Oct. 28, 1897.

**Boston Elevated Tests.**—Electrical Tests of the Boston Elevated Railroad. An account of the tests made to determine what system for controlling the motors from one point was best adapted to the trains. 1600 w. R R Gaz—April 27, 1900.

**Cranes.**—A Series-Motor Controller and Reversing Switch. Illustrated description of a controller designed with particular reference to the requirements of the traveling cranes of the Morgan Engineering Co., of Alliance, O., and produced by them. 1100 w. Am Mach—May 7, 1896.

**Direct Connected Motors.**—Methods of Controlling Direct Connected Motors. William Baxter, Jr. The discussion is confined to the constant potential type, and fully illustrated. 2200 w. Mach, N Y—March, 1900.

**Economical Handling.**—Economy in Controller Handling. J. R. Cravath. Discusses whether a rapid or slow advancement of the controller handle in starting a car is the more economical in practice. Favors slow acceleration. 900 w. St Ry Rev—Aug. 15, 1897.

Economy in Electric Car Control. J. R. Cravath. Read before the Chicago Electrical Assn. Discusses the economy possible by correctly handling the controller, and the need of records being kept that will serve as an incentive to motormen to give attention to the matter. 4000 w. W Elect'n—Oct. 9, 1897.

Saving at the Controller. J. R. Cravath. Considers how current is usually wasted in operating cars and gives suggestions concerning instructions that should be given motormen. 2200 w. St Ry Rev—Jan. 15, 1900.

**Electric Vehicle.**—Electric Automobile Control. An illustrated description of C. J. Coleman's controlling and driving mechanism. 1200 w. Elec Wld and Engr—Sept. 22, 1900.

**Electro-Pneumatic System.**—The Westinghouse Electro-Pneumatic System of Motor Control and the Baldwin New Trucks for Heavy Electric Cars. Illustrated description of a new system of controlling any number of electric motors from one point; also illustrated description of the new trucks. 3700 w. R R Gaz—Oct. 13, 1899.

**Four Motor.**—The General Electric Series-Parallel Controller for Four Motor Equipments. William Baxter. Jr. A description of the action of the controller switch and the commutating switch, with diagram of car wiring and controller constructions. 3000 w. Elec Wld—July 18, 1896.

**General Electric.**—See **Four Motor.**

**Leonard System.**—Volts v. Ohms. H. Ward Leonard. Paper presented at meeting of Am. Inst. of Elec. Engs. Speed regulation of electric motors. 2800 w. Elec—Nov. 25, 1896.

See also **ELEVATOR—Electric.**

**Multiple-Unit.**—See **Boston Elevated Tests; ELECTRIC RAILWAY.**

**Regenerative.**—A Regenerative Controller. John C. Henry. Describes the development of the controller, giving a diagram of connections and tabulated results of comparative tests, and notes the suitability of this method of control for automobiles. 1000 w. Elec Wld & Engr—March 31, 1900.

The Henry "Regenerative" Controller for Electric Cars. John C. Henry. Presents the advantages claimed for this new system. 2000 w. Elec Eng, N Y—July 21, 1898.

**Running Notches.**—Running Notches of Series-Parallel Controllers Compared. S. L. Foster. A tabulation of data with deduction of results, and comparison of present and possible methods. 2000 w. St Ry Jour—Sept., 1896.

**Shunt Motors.**—Electrical Devices for Changing the Speed of Shunt Motors. William Baxter, Jr. Discusses the methods for changing the speed of shunt motors: 1400 w. Am Mach—Dec. 17, 1896.

**Vacuum Tube Lighting.**—Improved Circuit Controller for Vacuum Tube Lighting and Other Purposes. Details of the invention recently patented by Nikola Tesla, with illustrations. 2200 w. Elec Rev, N Y—Oct. 19, 1898.

**Walker.**—The Walker Company's Series-Parallel Controller System. William Baxter, Jr. The controller is said to prevent the destructive sparking upon change from series to parallel connection or vice versa. 2200 w. Elec Wld—Aug. 15, 1896.

### CONVENTION HALL.

**Kansas City.**—The Convention Hall at Kansas City, Missouri. A two-page plate, with description of a building with a seating capacity of 25000, representing an investment of $240,000. 1800 w. Eng News—Nov. 2, 1899.

The Kansas City Convention Hall. Illustrated description of a hall seating 25000 people, in which some of the galleries are suspended from roof trusses of 187 ft. span. 1500 w. Eng Rec—July 22, 1899.

### CONVERTER.

**Electric.**—See **ELECTRIC CURRENT CONVERTER.**

### CONVEYOR.

See also **CABLEWAY; COAL HANDLING; COKE HANDLING; MECHANICAL HANDLING.**

**Belt.**—Notes on Conveying Belts and Their Use. Thomas Robins, Jr. Describes experiments with various compositions of rubber for conveying belts, and then discusses the different ways of supporting such belts, with what the author regards as the best way. 3000 w. Col Guard—May 15, 1896.

Notes on Conveying Belts and Their Use. Thomas Robins, Jr. Experiments and tests of rubber belting to ascertain what particular compound of rubber would make the most durable carrying surface. Also illustrated description of methods of supporting conveying belts, study of proper width for duty to be performed, etc. 4000 w. Trans Am Inst of Min Eng—April, 1896.

Notes on Conveying Belts and Their Use. Thomas Robins, Jr. Read at the Pittsburg meeting of the Amer. Inst. of Min. engs. An excellent paper giving the best practice and also illustrations of conveyor pulleys and feeding arrangements. 2800 w. Ir Age—March 5, 1896.

**Calhoun.**—See **EXCAVATOR.**

**Coal.**—See **COAL HANDLING.**

**Foundation Work.**—A Belt Conveyor for Foundation Work. Illustrated description of the method of excavating the site of a large power house by means of wheel scrapers emptied through chutes on a belt conveyor placed in a trench and discharging outside the lot limits. 900 w. Eng Rec—Jan. 13, 1900.

**Foundry.**—Conveyors in the Foundry. Dr. R. Moldenke. Reviews the uses for which the apparatus is adapted in foundry work. 1500 w. Ir Trd Rev—June 14, 1900.

**Hunt.**—Coal Handling Machinery. F. D. Marshall. A paper before the International Gas Congress at Paris, giving an illustrated account of Hunt conveying machinery used by Danish Gas Company at Copenhagen. 3000 w. Gas Wld—Sept. 8, 1900.

Continental Installations of the Hunt Transporter for Coal and Ore. From a paper by Engineer Aumond, before the German Ironmasters' Association, giving an illustrated account of the installation of this machinery of American design at various Continental works. 2000 w. Col Guard—Sept. 7, 1900.

**King Bridge Co.**—The King Bridge Co.'s Ore Hoists and Conveyors. Illustrated description of a conveyor of simple design used in unloading from boats into cars. 1000 w. R R Gaz—Jan. 3, 1896.

**Phosphate.**—See **MECHANICAL HANDLING—Sfax, Tunis.**

**Rolling Screw.**—Rolling Screw Conveyors. An illustrated discussion of the method of manufacturing spiral conveyors, and recent improvements made. 2000 w. Am Mach—Oct. 25, 1900.

**Wandsworth, Eng.**—Electric Traveling Crane and Conveyor Plant. Illustrated description of the travelling electric crane at the Wandsworth supply station, and the other coal handling mechanism. 1000 w. Engr, Lond—April 6, 1900.

### COOKING.

**Electric**—See **ELECTRIC COOKING.**

**Large Scale.**—Cooking on a Large Scale (Massenkochanlagen). M. Grellert. A very full discussion of the arrangement of plants for cooking food in large quantities by steam. Two articles. 7500 w. Gesundheits-Ingenieur—July 31, Aug. 15, 1899.

### COOLING.

See also **REFRIGERATION.**

**Heating Combination.**—See **HEATING—Cooling Combination.**

### COOLING TOWER.

See also **CONDENSER.**

Operating Engines Without a Natural Supply of Condensing Water, or the Continuous Use of Injection Water. E. J. Philip. The leading points as at the present practiced. 2000 w. Can Elec News—July, 1896.

Water Cooling, as Applied to Condensing. Horace W. Jarvis. Abstract of paper read at Middlesbrough meeting of the Cleveland Inst. of Engs. Remarks on how much condensing saves, with descriptions of various forms of coolers. Short discussion is given. 2000 w. Col Guard—Jan. 20, 1899.

**Balcke.**—Central Condensing (Balcke System). C. Habermann. Describes a system used at several collieries and iron works in Germany, resulting in saving of coal. Ill. 1500 w. Col Guard—March 12, 1897.

The Balcke Tower Condenser (Kaminkühler Anlage, System Balcke). Illustrated description of a surface condenser for 2000 horse-power on the Balcke system, with cooling tower for repeated use of condensing water, as shown at the Leipsig exposition. 2000 w. 1 plate. Glaser's Annalen—Oct. 15, 1897.

**Barnard.**—The Barnard Water Cooling Apparatus. Illustrated detailed description. 1000 w. Power—Nov., 1896.

**Electric Light Station.**—Cooling Tower and Condenser Installation. J. H. Vail. States the existing conditions previous to the installation, describes the plant in detail, and reports the advantage derived. 2000 w. Trans of Am Soc of Mech Engs., No. 804—Nov., 1898.

**Klein.**—Improved Condenser Installations (Neuere Kondensationsanlagen). A fully illustrated article showing existing installations of the Klein surface condensers with colling towers. 1200 w. Glaser's Annalen—Feb. 15, 1898.

**Theory.**—The Theoretical Treatment of Air Cooling Water Towers. William A. Mosscrop. States the problem to be solved and illustrates the possibilities of formulas given. 1200 w. Eng News—July 13, 1899.

**Wheeler.**—A Cooling Tower Operating with Natural Draft. An illustrated description of a cooling tower brought out by the Wheeler Condenser & Engineering Co., which will cool water from 135 degrees F. to 85 degrees or 90 degrees F. 200 w. Eng News—Sept. 27, 1900.

**Worthington.**—The Worthington Cooling Tower for the Continuous Use of Condensing Water. John H. Cooper. Illustrated description and discussion of advantages. 2500 w. Jour Fr Inst—June, 1896.

### COPPER.

See also **COPPER INDUSTRY; COPPER REGION.**

Copper. Nelson Dawson. Read at meeting of Arch. Assn. followed by discussion. History of the metal and its uses. 9000 w. Builder—Feb. 1, 1896.

The Chemistry of Materials of Engineering—Copper. A. H. Sexton. Discusses the physical and chemical properties of the metal, the sources, metallurgy, etc. 2400 w. Prac Engr—Oct. 21, 1898.

**Ancient Egypt.**—Tools and Weapons of the Age of Pure Copper in Egypt (Outils et Armes de l'Age du Cuivre Pur en Egypte). An interesting communication by M. Berthelot concerning the chemical analysis of some very ancient tools, with surmises as to the method of their product. 2500 w. Comptes Rendus—May 24, 1897.

**Arizona, at Paris.**—An Arizona Copper Exhibit at Paris. A description of several Arizona copper mines, their ores and smelters. 1600 w. Eng & Min Jour—Sept. 22, 1900.

**Australia.**—Australian Copper. Editorial comment on the boom in copper and its effect on copper mining, especially considering the deposits in Australia. 2500 w. Engng—July 7, 1899.

**By-Products.**—The Relation of By-Products to Cost of Copper Production. Discusses the margin of profit between cost of production and selling value. Gives information of the Anaconda, the Boston & Montana, and the Rio Tinto. 1200 w. Eng & Min Jour—Jul 9, 1898.

**Chemistry.**—The Chemistry of Copper. Charles Skeele Palmer. A discussion of the subject as viewed from the laboratory. 2500 w. Aust Min Stand—June 14, 1900.

**Colorado.**—Colorado's Copper Output. A report of the yield of mines of the Paradox Valley, in the La Sal Mountains. 2000 w. Min Ind & Rev—March 10, 1898.

**Cost of Production.**—Cost of Copper Production. Ed. E. & M. J. Editorial reply to twenty-two questions on vital points in the copper industry, covering detailed costs and items of interest to those commercially interested in copper. 3900 w. Eng & Min Jour—Jan. 11, 1896.

**Strength, Hot.**—Concerning the Influence of Heat on the Strength of Copper (Ueber den Einfluss der Wärme auf die Festigkeitseigenschaften von Kupfer). M. Rudeloff. A very elaborate account of the exhaustive tests made at the government testing laboratory at Charlottenburg. 12000 w. Mitt aus den Kgl Tech Versuchanstalt—Part IV., 1898.

The Strength of Copper and Copper Alloys at High Temperatures. Extracts from an article by George Charpy describing tests made. 900 w. Prac Engr—Sept. 15, 1899.

**Lake Huron.**—Huronian Copper and Nickel. S. R. Clarke. Statement of the conditions and opportunities in Sudburry District. 1400 w. Am Mfr & Ir Wld—Oct. 4, 1900.

**Oxygen Effect.**—See **BRASS.**

**Specifications.**—Proposed Standards for Copper Specifications. Gives the report of the committee appointed to determine a standard for copper conductors, with editorial comment. 2800 w. Elect'n, Lond—Dec. 22, 1899.

**Tasmania.**—The Tasmania Copper Company and the Phoenix Syndicate. Editorial comment on the history of this company, and cautioning against too much confidence in the promises made. 1700 w. Eng & Min Jour—July 7, 1900.

### COPPER ALLOY.

See also **ALUMINUM ALLOY; BRONZE.**

**Durana.**—Durana Metal, a new Copper Alloy (Ueber Durana—Metall in Vergleich zu den Neueren Schmiedbaren Kupferlegirungen). A new alloy of copper capable of being forged like soft wrought iron, and having a very high tensile strength and elastic limit. 5000 w. Schweiz Bauzeit—March 6, 1897.

**Expansion.**—The Expansion of Metallic Alloys (Sur la Dilatation des Alliages Metalliques). H. Le Chatelier. A communication to the French Academy discussing especially the behaviour of alloys of copper and antimony and copper and aluminum, with curves showing the relation of expansion to the percentage of copper present. 1200 w. Comptes Rendus—June 12, 1899.

**Malleable.**—A New Hot Malleable Alloy of Copper. From a specification for an alloy of copper which may be rolled or otherwise worked at a red heat and have the necessary degree of hardness for general use. The invention of Johannes Catharinus Bull, a Swede, living in London. 450 w. Am Mach—Sept. 21, 1899.

**Metallography.**—See **GOLD ALLOY.**

**Sea Water Action.**—The Action of Sea Water Upon Copper Alloys (Die Beständigkeit der Gebräuchlichsten Kupferlegirungen im Seewasser). A discussion of the experiments made by the German navy, upon the alloys most generally used for sheathing vessels. Two articles. 5000 w. Stahl und Eisen—Feb. 15, March 1, 1899.

**Zinc.**—The Alloys of Copper and Zinc. T. K. Rose. The researches of M. G. Charpy which have notably advanced knowledge of this subject. 1300 w. Nature—Dec. 10, 1896.

### COPPER ANALYSIS.

Improved Methods of Analysis. Titus Ulke. Gives methods for the determination of arsenic and antimony in electrolytic copper, of copper in slimes, and of copper and nickel in ores and furnace products. 1300 w. Eng & Min Jour—April 9, 1898.

**Arsenic.**—Notes on the Estimation of Arsenic in Copper. George L. Heath. Suggestions concerning a method, from the writer's experience found suited to high-grade refined metal. 1000 w. Eng & Min Jour—June 26, 1897.

**Volumetric.**—A New Volumetric Method for the Determination of Copper. Richard K. Meade. Read before the American Chem. Soc. Description for a permanganate method which is said to be rapid and sufficiently accurate. 1300 w. Ind & Ir—Sept. 9, 1898.

Volumetric Method for the Determination of Copper. Richard K. Meade. On the value of permanganate as a help to rapid analysis. 1000 w. Min & Sci Pr—Sept. 22, 1900.

### COPPER ASSAYING.

See also **ASSAYING—Copper.**

Present Commercial Methods of Copper Assaying and Analysis. Titus Ulke. An outline of the daily work of a copper works chemist and assayer at a large refinery. 2700 w. Eng & Min Jour—Dec. 16, 1899.

**Calorimetric.**—The Calorimetric Assay of Copper. J. D. Audley Smith. Abstract of paper read at the Canadian meeting of the American Institute of Mining Engineers, describing a method of making a fresh set of standard colors for each batch of assays in the Heine "blue test" for copper. 1000 w. Eng & Min Jour—Sept. 15, 1900.

The Calorimetric Assay of Copper. J. D. Audley Smith. Gives details of method. 1000 w. Trans Am Inst of Min Engs—Aug., 1900.

**Electrolytic.**—The Electrolytic Assay as Applied to Refined Copper. Discussion of paper of George L. Heath, read at Lake Superior meeting, July, 1897. 3500 w. Trans Am Inst of Min Engs—Nov., 1897.

The Electrolytic Assay as Applied to Refined Copper. Additional discussion of George L. Heath's paper, presented at the Lake Superior meeting. July, 1897. 2800 w. Trans Am Inst of Min Engs—June, 1898.

The Electrolytic Assay Applied to Refined Copper. George L. Heath. Facts that have come under the writer's notice during an extended use of the method. 3500 w. Trans Am Inst of Min Engs—Sept., 1897.

**Gold and Silver.**—The Assay of Copper Materials for Gold and Silver. L. D. Godshall. Discussion of this paper, which was presented at the Washington meeting, Feb., 1900. 1500 w. Trans Am Inst of Min Engs—Aug., 1900.

The Assay of Copper Materials for Gold and Silver. A. R. Ledoux. Criticism of a paper read by L. D. Godshall before the American Institute of Mining Engineers, and a description of the "combination method" used in assaying bar copper for silver. 1000 w. Eng & Min Jour—Sept. 15, 1900.

**Sampling.**—See **COPPER SAMPLING.**

**Sulphide Ores.**—The Rapid Determination of Copper and Nickel in Sulphide Ores and Matte. Titus Ulke. A description of a method of analysis. 1000 w. Eng & Min Jour—Sept. 15, 1900.

## COPPER GEOLOGY.

See also **COPPER ORE; COPPER REGION.**

**Hematite Ore.**—The Occurrence of Copper Minerals in Hematite Ore, Montana Mine, Soudan, Minnesota. Part I., is a description of the occurrence, by J. H. Eby; and Part II., a study of the minerals by Charles P. Berkey. 5000 w. Pro L Sup Min Inst—Aug., 1896.

**Lake Superior.**—The Origin and Mode of Occurrence of the Lake Superior Copper-Deposits. M. E. Wadsworth. A description of the geology of this region, with discussion of the ore deposits, their origin, etc. 12400 w. Trans Am Inst of Min Engs—Feb., 1898.

The Origin and Mode of Occurrence of the Lake Superior Copper-Deposits. M. E. Wadsworth. A general idea of the geology of this region and the writer's explanation of the facts observed. 13000 w. Trans Am Inst of Min Engs —July, 1897.

The Origin of the Native Copper in the Michigan Deposits. John F. Blandy. The writer's views as to the origin, and information relating to these deposits. 2000 w. Eng & Min Jour—Sept. 8, 1900.

**Malachite.**—The Origin of Malachite. Edgar Hall. Observations in an abandoned copper mine leading to a theory of formation of copper carbonates. 1300 w. Aust Min Stand—Dec. 21, 1895.

**Texas.**—Copper Ores in the Permian of Texas. E. J. Schmitz. Paper read before the Am. Inst. of Min. Engs. Discusses the occurrence, and refers it to somewhat similar agencies as those producing the Kupferischiefer of Germany. 2000 w. Min Jour—Aug. 15, 1896.

Copper Ores in the Permian of Texas. E. J. Schmitz. Report of the territory examined, description of ore, and its deposition. 2800 w. Trans Am Inst of Min Engs—July, 1896.

## COPPER INDUSTRY.

Copper. The prices, production, supplies and consumption are discussed. 1600 w. Eng and Min Jour—March 11, 1899.

Copper Production and Consumption. Discusses the production, prices and consumption. 1600 w. Eng & Min Jour—July 21, 1900.

Copper Supplies and Consumption. Editorial comment on copper prospects. 1400 w. Engng —Aug. 10, 1900.

The Copper Industry. Reviews the developments of 1899 and the future outlook. 2300 w. Ir Age—Jan. 4, 1900.

The Copper Market and Copper Mining Finance in 1899. John B. C. Kershaw. A review of the year and the causes of anxiety to those interested in copper production. 1500 w. Elec Rev, Lond—Feb. 2, 1900.

The Copper Supply. Editorial review of the copper situation. 1500 w. Ir Age—July 20, 1899.

**Boom.**—Boom in Copper Market. On the present condition of the copper market, giving articles reprinted from the "N. Y. Sun" and "N. Y. Tribune." 2000 w. W Elect'n—Jan. 14, 1899.

**Prices.**—The Position of Copper and Tin. Editorial on the rise in prices of these metals owing to growing consumption and limit of visible supplies. 1600 w. Engr, Lond—March 3, 1899.

**Production.**—Copper Production and Values. Editorial review of the copper situation. 1800 w. Engng—Jan. 19, 1900.

Copper Production in 1897. The output in the United States, reached the highest point ever attained. 900 w. Eng & Min Jour—June 25, 1898.

Copper in 1899. Information concerning the production, with reports of the New York and London copper markets. 7000 w. Eng & Min Jour—Jan. 6, 1900.

The World's Copper Production in 1898. Table showing the production from 1894-1898 with comment on the growth, and the important position of the United States as a producer. 1000 w. Eng & Min Jour—Aug. 12, 1899.

**Production and Prices.**—Copper Production and Prices. Discusses the production, consumption, available supply and conditions that have affected prices. 2200 w. Engng—March 24, 1899.

**Russia.**—The Copper Industry in Russia (L'Industrie du Cuivre en Russia). Discussing the falling off in Russian copper production, and the possible means for its revival. 3500 w. Génie Civil—June 12, 1897.

**United States.**—American Copper Mining. Editorial on the various sources of the American supply, and some comments on the copper combine. 2500 w. Engng—May 5, 1899.

Copper Resources of the United States. Henderson Gilbert. A review of the mines and their output. 1600 w. Yale Sci M—Feb., 1900.

The Copper Industry of the United States. James Douglas. The article contains a résumé of the early history of copper production and its subsequent development. A large amount of valuable information is given. 4500 w. Ir Age—Jan. 2, 1896.

**World's Supply.**—The World's Copper Supply. H. J. Stevens. A review of the copper industry. 1500 w. Mines & Min—April, 1900.

The World's Supply of Copper. Frederick H. Hatch. A very comprehensive review of the output and consumption, with numerous tables and statistics, and illustrated description of important mines and smelting works. 5000 w. Eng Mag—March, 1900.

The World's Supply of Copper. Frederick H. Hatch. The second portion of Dr. Hatches paper is devoted to the production of all the districts not included in the United States, Portugal, and Japan; these having been treated in the previous part. 6000 w. Eng Mag—April, 1900.

## COPPER MATTE.

See **COPPER METALLURGY—Matte.**

## COPPER METALLURGY.

See also **COPPER REFINING.**

Copper from the Ore to the Wire Bar. Albert R. Ledoux. Synopsis of a lecture before the N. Y. Elec. Soc. Describes the deposits, the furnaces and various steps in detail. 3200 w. Elec Rev, N Y—April 11, 1900.

Some Recent Developments in Copper Manufacture. Harold P. Brown. Analysis, tests and experiments with what is known as M. B. copper, proving its value to electrical engineers on account of high conductivity. 2000 w. Elec Rev—March 3, 1897.

Something About Copper Ore. Albert R. Ledoux. Extract from a lecture delivered before the N. Y. Elec. Soc. An account of the deposits and the steps through which the ore passes. 1200 w. Am Mfr & Ir Wld—April 26, 1900.

The Metallurgy of Copper. H. Van F. Furman. Describes its chemical and physical properties and the various methods of extracting the metal from the ore. 3300 w. Mines & Min—Aug., 1899.

**Bessemerizing.**—See **Converter.**

**Bolton & Sons' Works.**—The Copper Works of Messrs. Bolton & Sons. Illustrated account of works solely devoted to the refining and production of copper, preceded by general remarks. 4000 w. Elec Rev, Lond—March 19, 1897.

**Butte, Mont.**—Problems in the Treatment of Butte Ores. A. H. Wethey. Experiments led to the decision to put in a Chilson mill, and grind the jig tailings, treating the reground material on Wilfley machines. These machines are illustrated. 1200 w. Eng & Min Jour—July 1. 1899.

See also **COPPER MINE; COPPER MINING.**

**Concentration by Petroleum.**—Concentration of Ores by Petroleum. Charles M. Rolker. Read before the Mining Inst. Describes the important features of the Elmore process as practiced on copper rock, at Glasdir, Wales. 1800 w. Am Mfr & Ir Wld—June 28, 1900.

**Converter.**—Standard Practice in Bessemerizing Copper Mattes. C. W. Parsons. The article is limited to the practical details of converter work with particular reference to a 5-ft.x8-ft. upright converter. 2500 w. Eng & Min Jour—May 15, 1897.

The Converter in Copper Manufacture. P. L. Barthe, in the "Annales des Mines." Illustrates and describes an apparatus devised by Paul David, called the "selecteur," and its working. 1800 w. Ir & Coal Trds Rev—Nov. 11, 1898.

The Paul David "Selecteur" or Converter. Paul Louis Barthe. Abstract of article in the "Annales de Mines." Illustrates and describes improved apparatus used in the metallurgy of copper, its working, and advantages. 2200 w. Eng & Min Jour—Oct. 22, 1898.

See also **Matte.**

**Direct Method.**—The Direct Method Considered as the Future Metallurgical Treatment of Copper Ores, Argentiferous or Otherwise. Christopher James. Full paper read before the Inst. of Min. & Met., London. A complete account of the new process, with a condensed view of the old Welsh method of copper smelting, together with the variations which Continental practice and American practice have superimposed upon the old method. 19000 w. Inst of Min & Met, Lond—Oct., 1896.

**Dumoulin Depositing Process.**—See **COPPER TUBES—Electrolytic.**

**Electrolytic.**—See **COPPER REFINING; COPPER TUBES; ELECTRO-METALLURGY.**

**Matte.**—A Study of the Elimination of Impurities from Copper Mattes in the Reverberatory and the Converter. Edward Keller. A comparison of the two methods, working on the same material on an extensive scale. 7200 w. Trans Am Inst of Min Eng—Feb., 1898.

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**Pyrite Residues.**—The Extraction of Copper from Residues of Pyrites Burners. R. Helmhacker. Describes the Hoepfner method, this being the most used process, and gives particulars of the plant of the Vitkovice Copper Extracting and Electrolytic Works in Austria. 1400 w. Min & Sci Pr—April 16, 1898.

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**Slimes.**—Present Method of Treating Slimes from the Copper Refineries. Titus Ulke. The three ways in which slimes are refined when lead works are run in connection with the copper refinery are briefly stated: 1700 w. Eng & Min Jour—Nov. 28, 1896.

**Smelting.**—See also **SMELTING.**

**Smelting, Chili.**—Copper Matte Smelting in Chili. Henry Watson. Some information concerning the furnaces of Panulcillo. 800 w. Aus Min Stand—Oct. 6, 1898.

**Smelting, Garretson Furnace.**—The Garretson Copper Smelting Furnace. Illustrated description, with letter from E. D. Peters, Jr., explaining the theories and methods involved in the construction and operation. 1700 w. Eng & Min Jour—Feb. 5, 1898.

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**Arizona.**—The Copper Queen Mine, Arizona. James Douglas. An illustrated description of the deposits and their working, with account of the discovery of the mine and other information. 8500 w. Trans Am Inst of Min Engs—Feb., 1899.

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**Butte, Mont.**—The Mines of Butte. Arthur Lakes. A description of the Gagnon mine, the Original mine and the Stewart mine; the ores as they are found and the formations of the veins; the plants for hoisting and handling them and for preparing the mine timber. Ill. 2500 w. Mines & Min—May, 1900.

The Mines of Butte. Arthur Lakes. An account of the large bodies of copper ore and the crushing of timbers from the swellings of the walls; and a description of the formation and mines of the silver belt. Ill. 2500 w. Mines & Min—July, 1900.

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**Cuba.**—El Cobre Mines, Cuba. Illustrations and brief account of these copper mines, located 12 miles west of Santiago. 450 w. Eng & Min Jour—May 19, 1900.

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The Panuco Copper Mine Deal. An account of a mine in Mexico, floated by a London company, which has proved of little value. 1200 w. Eng & Min Jour—April 21, 1900.

See also MINERAL REGION—Mexico.

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**Sweden.**—The Stora Kopperberg's Great Copper Mines at Falun. Illustrated detailed description of one of the oldest mines in the world. 3000 w. Ir & Coal Trds Rev—July 15, 1898.

**United States.**—The Great Copper Mines of the United States. From the "N. Y. Sun." Interesting information concerning the great copper producing districts and their output. 800 w. Elec Rev, N Y—Aug. 22, 1900.

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**Vermont.**—Copper Mines in Vermont. Brief account of the mines, ores, etc. 1100 w. Eng & Min Jour—May 20, 1899.

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See also COPPER METALLURGY; COPPER MINE.

**California.**—Copper Mining in California. H. A. Brainard describes the Copperopolis properties in Calaveras Co., and reports of deposits in other parts of the state are given. 1500 w. Min & Sci Pro—May 21, 1898.

**Lake Superior.**—Copper Mining at Lake Superior. John Stanton. A general description. 3000 w. Ir Age—Jan. 2, 1896.

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See also COPPER INDUSTRY; COPPER MINE; IRON MINING—Lake Superior.

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**Spain.**—Mining and Treatment of Copper Ore at Tharsis, Spain. C. F. Courtney. A paper read before the Inst. of Civ. Engs., in which the method of mining and treatment are briefly described. 1200 w. Ind & Ir—March 20, 1896.

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America, considering the mode of occurrence and the peculiarities of the ores of different mines. 2800 w. Mines & Min—July, 1899.

## COPPER REFINING.

**Electrolytic.**—Copper Refining by Electricity. A brief review of the main difference between the two classes of copper refining processes, with remarks on the lack of wisdom of copper refiners in not publishing results and comparing notes. 1200 w. Min & Sci Pr—Dec. 19, 1896.

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The Electrolytic and Mechanical Refining of Copper. J. Ohly. Reviews the history of the application of electrolysis, and its extensive use in the industries. Serial. Min Rept—Dec. 14, 1899.

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## COPPER REGION.

See also **COPPER; COPPER GEOLOGY COPPER MINE; MINERAL REGION.**

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**Alaska.**—See **Yukon.**

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**New Mexico.**—Copper Deposits of Mora County, New Mexico. W. L. Austin. Abstract of a paper read before the Colorado Scientific Soc., in Denver. Describes these deposits and gives the writer's explanation of their probable origin. Not of commercial value. 900 w. Eng & Min Jour—March 26, 1898.

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The Sampling of Argentiferous and Auriferous Copper. Albert R. Ledoux. Read at meeting of the Can. Min. Inst. Describes the three methods now in use, boring, taking dip samples and by sawing. Ill. 3000 w. Can Min Rev—March 31, 1899.

**COPPER TUBES.**

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**COPPER WIRE.**

See **ELECTRIC CONDUCTOR.**

**CORDITE.**

See **EXPLOSIVE—Cordite.**

**COREA.**

Corea and the Siberian Railway. Descriptive of the country, people, towns, and interesting features. 6000 w. Fortnightly Rev—Dec., 1895.

**COREMAKERS.**

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**CORN OIL.**

Corn Oil. Harry W. Allen. An investigation of the physical and chemical properties of corn-oil now used as an adulterant, but which is produced in large quantites, and if practical uses could be found might become a more important article of commerce. 1200 w. Engineers' Year Book—Univ of Minn—1896.

**CORUNDUM.**

See also **ABRASIVE; EMERY WHEEL.**

**Appalachian.**—Corundum of the Appalachian Crystalline Belt. J. Volney Lewis. Principally the result of work of the N. C. Geol. Surv. The paper treats of the geology, associated rocks, mineralogical occurrence, mining methods and literature of corundum. 20000 w. Trans Am Inst of Min Engs—Feb., 1896.

**Efficiency.**—The Abrasive Efficiency of Corundum. W. H. Emerson. Discusses, I. The relation between the "effective hardness" of corundum and its content of water; II. Smith's test as a means of determining the abrasive efficiency of corundum. 6500 w. Trans Am Inst of Min Engs—Feb., 1899.

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**North Carolina.**—Corundum Mining in North Carolina. A. M. Stone. Some of the peculiar conditions under which this mineral is found, with brief review of the methods of mining and milling. 1000 w. Eng & Min Jour—April 23, 1898.

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**COST-KEEPING.**

See also **ACCOUNTING; WORKS MANAGEMENT.**

A Method of Determining Selling Price. H. M. Lane. A method is proposed by which the conditions affecting the final result of a year's business may be shown in a simple manner at the end of each month or week. 1700 w. Am Soc of Mech Engs—Dec., 1896.

Cost-Keeping Methods in Machine-Shop and Foundry. Henry Roland. Dealing with the elements of cost and the influence of wage systems. 8700 w. Eng Mag—Oct., 1897.

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Effective Methods of Finding and Keeping Shop Costs. Henry Roland. A description of the system used by the Hyatt Roller Bearing Company, with copies of blank forms, books, etc., and all working details. 4000 w. Engineering Magazine—Aug., 1898.

Effective Methods of Finding and Keeping Shop Costs. Henry Roland. A very full exposition of the system adopted in the works of an extensive electrical-manufacturing company, with forms and details of application. 4500 w. Engineering Magazine—Sept., 1898.

Effective Methods of Finding and Keeping Shop Costs. Henry Roland. A complete account of the minutely-divided accounts of a signal manufacturing company, showing the precision with which costs estimated from previous records agreed with the results on the completion of work. 5000 w. Engineering Magazine—Oct., 1898.

Effective Systems of Finding and Keeping Shop Costs. Henry Roland. A discussion of the various methods of determining and apportioning the expense account, including the relations of productive labor to general expense. 8500 w. Engineering Magazine—Nov., 1898.

A Simple and Effective System of Shop Cost-Keeping. H. M. Norris. Describes fully a simple and effective system of gauging the cost of work in process of manufacture, with many blank forms found useful in experience. A practical and valuable article. 4500 w. Engineering Magazine—Dec., 1898.

Cost Keeping and Accounting. W. S. Rogers. A paper, with discussion, before the N. Y. R. R. Club, giving methods used by the writer. 7500 w. N Y R R Club—Sept. 15, 1898.

Method of Keeping Weekly Shop Costs. W. N. Moore. Gives a plan of recording labor and material costs which has been in use for some years and found to be accurate, direct, and inexpensive. 1300 w. Ry & Engng Rev—Dec. 18, 1897.

Shop and General Establishment Charges in Engineering Works and Their Relation to Costs and Estimates. William Edward Cowens. Read before the Brit. Inst. of Engs. and Shipbuilders. Illustrates the method of dealing with these charges. 2200 w. Engs' Gaz—June, 1899.

Shop and General Establishment Charges in Engineering Works and Their Relation to Cost and Estimates. William Edward Cowens. Read before the Northeast Coast Inst. of Engs. and Shipbuilders. A suggestive paper written from the works manager's standpoint. 2800 w. Ind & Ir—May 5, 1899.

**Appraisement.**—Valuation of Manufactories. Oberlin Smith. A discussion of the appraiser's work and advocating the rating of things a little too low, rather than too high. 3300 w. Am Mach—Dec., 1896.

**Automatic Plan.**—An Automatic Cost Distributing and Accounting Plan. W. S. Rogers. Describes the plan as worked out and applied. 3000 w. Ir & Coal Trds Rev—Nov. 10, 1899.

**Card Index.**—The Card-Index System of Cost Keeping. Illustrated description of the methods used by the Bullard Machine Tool Co., of Bridgeport, Conn. 2500 w. Am Mach—Sept. 15, 1898.

**Coal Mine.**—A Colliery Cost Sheet. G. Johnson. Illustrations of bank and underground pay-bills are given, with remarks on the importance of the cost sheet. 1100 w. Col Guard—March 3, 1899.

See also **COAL MINE—Accounts; COAL MINE MANAGEMENT.**

**Cross Section Paper.**—Some Uses of Cross-Section Paper in the Machine Shop. William O. Webber. Containing practical suggestions relative to the use of cross-section paper, in keeping the run of shop expenses and estimating cost of jobs. 1100 w. Am Mach—Nov. 21, 1895.

**Depreciation.**—Depreciation as an Element of Machine-Shop Cost-Keeping. H. M. Norris. A discussion of the relation of depreciation to general expense, showing the various methods adopted in writing off plant and the use of cost diagrams. 4500 w. Engineering Magazine—April, 1899.

Machine Tool Depreciation as an Element of Manufacturing Cost. H. M. Norris. Discussing the practice of various establishments, and suggesting a solution of the problem from the author's experience, with forms and tables. 4500 w. Engineering Magazine—March, 1899.

The Depreciation of Plant and its Relation to General Expense. H. M. Norris. A consideration of the practice of a number of metal working establishments in cost-keeping, with reference to charges for depreciation of machines. 4300 w. Engineering Magazine—Feb., 1899.

**Electric Station.**—See **ELECTRIC STATION MANAGEMENT—Cost-Keeping.**

**Foundry.**—See **CASTING—Cost.**

**Mining and Manufacturing.**—The Balance Sheet of a Mining and Manufacturing Company. George Johnson. Describes in some detail the various assets and liabilities of the balance-sheet. 3800 w. Ir & Coal Trds Rev—Sept. 1, 1899. Serial. 1st part.

**Pattern Shop.**—See **PATTERN SHOP—Cost-Keeping.**

**Railway.**—See also **RAILWAY ACCOUNTS.**

**Railway Paint-Shop.**—How Can the Elementary Rate-Fixing Be Best Attained for Use in Establishing Piece-Work Prices in the Railway Paint-Shop? Papers by Messrs. Ball and Lanfersiek read before the American Master Car and Locomotive Painters' Assn. 2400 w. R R Car Jour—Oct., 1897.

**Time-Saving.**—Time-Saving and Its Relation to Profits. Henry Hess. An analysis of methods for reducing costs, with consideration of an example under each method, and diagrams. 4200 w. Am Mach—Dec. 16, 1897.

### COTTAGE.

Notes on Cottage Architecture. Ralph Neville. Discusses the subject under the heads of accommodation, style, plan and material. 7000 w. Jour Roy Inst of Brit Archts—Dec. 31, 1896.

Cottage Design. Ill. Arthur M. Reed. A few of the qualities desirable to obtain are set forth for cottages in town, village and country, with general remarks. 4800 w. Ill Car & Build—Feb. 28, 1896.

### COTTON.

**Baling Faults.**—Germany's Importation of United States Cotton. Importance of Germany as a consumer of American cotton. Faults in baling illustrated. 1000 w. U S Cons Repts—Sept., 1896.

**Inventions.**—The Invention Epoch in the Cotton Trade. Joseph Nasmith. An interesting address, upon some world famous inventions, delivered before the Manchester Assn. of Engs. Serial. Bos Jour of Com—Feb. 8, 1896.

### COTTON INDUSTRY.

See also **TEXTILE INDUSTRY.**

**China vs. India.**—Effect of the Cotton Spinning Industry in China upon the Kindred Industry in India. Walter C. Wood. A comparison of the basis upon which this industry is conducted in both countries; also comparing climates, mills, machinery, people, etc. 4800 w. Jour Soc of Arts—June 24, 1898.

**Depression.**—The Depression in the Cotton Industry: A Remedy. Luther F. McKinney. Considers the depression of the cotton industry to be due to over production, and that the remedy is a wider market. Thinks a large share of the trade of South America should be secured and suggests means. 2400 w. Forum—July, 1898.

**Japan and China.**—Profits on Cotton Spinning in Japan and China. A statement of the conditions of this industry which is likely to come into competition with British products. 1500 w. Engng—July 1, 1898.

The Progress of the Cotton Industry in Japan and China. Discussing points relating to progress being made in this industry. 2000 w. Ind & East Engr—June, 1898.

**Mexico.**—The Cotton Manufacturing Industry in Mexico. Editorial review of this industry in Mexico, and its recent rapid development, showing that the conditions render it very hard for English cottons to compete with them. 2000 w. Engng—July 15, 1898.

### COTTON MACHINERY.

One Hundred Years of Ginning and Baling Cotton. George A. Lowry. History of the progress of mechanical invention in this field, giving much information. Ill. 3300 w. Am Soc of Mech Engs, No. 780—June, 1898.

### COTTON MANUFACTURING.

**U. S. Southern.**—The Future of Cotton Manufacturing in the South. D. A. Tompkins. Paper read before the annual meeting of the New England Cotton Manufacturers' Association. Reviews the changed conditions since the war, and their effect on manufactures, and considers the subject in relation to raw material, labor, climate, markets and transportation facilities. 5400 w. Mfrs Rec—May 1, 1896.

**COTTON MILLS.**

**Japan.**—Cotton Mills of Japan. Tabulated statistics obtained from the Japanese consulate. 1000 w. U S. Cons Rept—March, 1896.

**United States.**—Increase of Cotton Mills. Editorial. The great increase in the number of spindles in cotton manufacturing during the past year having given rise to a doubt that the business may have been overdone, the article attempts, with some success, to demonstrate that cotton manufacturing has not been overdone, that there is no present danger that it will be, and that it is yet a favorable and inviting field for investment. 1200 w. Bos Jour of Com—Feb. 22, 1896.

**U. S. Southern.**—Cotton Mills in the Southern States. Described by an English tourist, who appears to be a practical cotton manufacturer and able to take in the full significance of the southern cotton manufacturing industry. 1800 w. Mach, Eng—Nov. 15, 1895.

**COUNTERSINKING.**

**Shipyard.**—See **SHIPBUILDING—Countersinking.**

**COUNTRY ESTATE.**

See also **COTTAGE; HOUSE; STABLE; VILLA.**

The Development of a Country Residence and Stable. Illustrated account of the water supply, sewage, lighting and stable accommodations. 2400 w. Eng Rec—Jan. 28, 1899.

**Biltmore.**—Mr. Vanderbilt's Estate, Biltmore. A description of this interesting estate, with two views of the residence, which was designed by the late R. M. Hunt. 1700 w. Sci Am—Feb. 1, 1896.

See also **FORESTRY.**

**Twombley.**—The Twombley Estate. Some architectural, engineering and structural features of the improvement, arrangement and equipment of a park and model farm and buildings. Ill. 1500 w. Eng Rec—Feb. 6, 1897.

**COUPLER.**

**Car.**—See **CAR COUPLER.**

**Magnetic.**—The de Bovet Magnetic Coupling (Magnetische Kupplungen, System de Bovet). The device consists of a cone coupling drawn into engagement by a powerful annular electro-magnet. Various modified arrangements are shown. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 11, 1898.

See also **CLUTCH.**

**Rolling Mill.**—The Vivies Automatic Safety Coupling (Selbstthätige Sichereitskupplung von Vivies). An automatic coupling for rolling mill use, which will release the connection under excessive strains before breakage can occur. 600 w. Zeitschr d Ver Deutscher Ing—Nov. 13, 1897.

**Shaft.**—A Shaft Coupling. W. P. Anthony. Describes a very useful simple coupling that has not been widely used though it appears to be superior to many now in use. 650 w. Am Mach—Dec. 19, 1895.

**Wedge.**—The Relations Between Forces and Stresses in Wedge Couplings (Kraft und- Spannungsverhältnisse in Schubkeilkupplungen). H. Bethmann. An analysis of that form of friction coupling in which a cut ring is expanded by a wedge. 1800 w. Zeitschr d Ver Deutscher Ing—May 7, 1898.

**COURT BUILDING.**

**Austria.**—The Construction of Courthouse Buildings (Ueber den Bau von Gerichtsgebäuden). A. von Wielemans. With especial reference to public buildings in Austria, including plans of the court houses at Graz and at Olmutz. 5000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—July 15, 1898.

**Budapest.**—The New Palace of Justice at Budapest (Der Neue Justiz-palast in Budapest). A brief description, with plate and plans of the rather showy design of Prof. Haussmann, commenced in 1893 and finished last August. 500 w. Arch. Rundschau.—Nov. 2, 1897.

**Leipa, Bohemia.**—Court Buildings and Prison at Leipa, Bohemia (Gerichtsgebäude und Gefangenhaus in Böhm-Leipa). General description, with elevation and plans of these important civil buildings. 5000 w. 5 plates. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1897.

**Leipsic.**—The New Imperial Supreme Law Courts at Leipsic. With the new Houses of Parliament these buildings are said to be the most important structures erected since the foundation of the new German Empire twenty-five years ago. Descriptive and historical. 2000 w. Builder—Jan. 4, 1896.

**Munich.**—The New Court Buildings in Munich (Das Neue Justizgebäude in München). General description, with plans, sections and photographs of this fine new government building. Three articles, three plates. 3500 w. Schweizerische Bauzeitung—Jan. 22, 29, Feb. 5, 1898.

**New York.**—The Appellate Court Building. Charles H. Coffin. Illustration with brief description of a beautiful building in process of construction at the corner of Madison Ave. and 25th Street, New York City. 600 w. Harper's Wk—April 2, 1898.

The New Home of the New York Supreme Court of Appeals. Illustrated description of an elaborated building in New York, particularly planned to expedite judicial procedure. 1500 w. Eng Rec—Jan. 6, 1900.

**COW SHEDS.**

Construction of Cow Sheds. Sidney Villar. Extract. On the sanitary arrangements to secure freedom from tuberculosis and health of the animals. Suggestions for floors, ventilation, drains, etc. 2600 w. Arch, Lond—Sept. 8, 1899.

**COXE.**

Biographical Notes of Eckley B. Coxe. R. W. Raymond. The life of an active, useful man in mining profession. The list of his inventions, literary works, and of the societies to which he belonged is given in full. 12800 w. Trans Am Inst of Min Eng—Nov., 1895.

**CRANE.**

See also **DERRICK.**

Some Recent Improvements in Cranes and Lifting Machinery. Edward C. R. Marks. Part first deals with rope and chain pulley blocks, giving illustrations. Serial. Prac Engr—April 21, 1899.

**Algeria.**—The Recovery of a Titan Crane at Mostaganem (Repêchage d'un Titan à Mostaganem). I. Pronteau. An account of the recovery of a powerful crane which had been blown into the sea from a breakwater at Mostaganem, Algeria. 1200 w. Revue Technique—March 25, 1899.

**Altoona (Pa.) Shops.**—See **Hydraulic.**

**Bremerhaven.**—See **Electric.**

**Cantilever.**—Cantilever Cranes. Waldon Fawcett. Illustrated account showing the development and the great saving of time and money. Also notes the principal uses of these cranes. 2000 w. Sci Am—Feb. 10, 1900.

See also **Electric.**

**Compressed Air.**—The Application of Compressed Air to Cranes and Hoists. William Prellwitz. Illustrated description of a 20-ton traveling crane driven by compressed air. 1200 w. Com Air—Oct., 1896.

See **COMPRESSED AIR—Foundry Plant.**

**Electric.**—Cranes with Electric Motive Power (Ueber einige Hebe-Apparate mit Elektrischem Antrieb). Describing and illustrating the electric traveling and locomotive cranes and hoists built by the Oerlikon Works. 5000 w. Schweizerische Bauzeitung—Aug. 7, 1897.

Electric Crane used with the Hydraulic Riveter at the Kolomna Machine Works, Russia (Elektrischer Kran zur Bedienung des Hydraulischen Nieters der Kolomnaer Maschinenbaufabrik). A. Muller. A special form of bridge crane with two trolleys operated by electric motors, and used in connection with a large Tweddell hydraulic riveter. 1200 w. Zeitschr d Ver Deutscher Ing—March 5, 1898.

Electrical Travelling Cranes. C. W. Hill. A general review, with a short illustrated description of a multiple-motor crane. 1200 w. Elec Rev, Lond—Sept. 7, 1900.

Electric Cranes (Elektrisch Betriebene Krane). Chr. Eberle. Many details of electric traveling cranes, with a plate of single-motor crane of 12-tons capacity, and illustrations of a 65-ton Oerlikon crane. 5000 w. 1 plate. Zeitschr d Ver Deutscher Ing—July 23, 1898.

Electric Cranes. Illustrates both movable and stationary cranes to which electric power has been applied. Serial. Elec Rev, Lond—Nov. 17, 1899.

Electric Cranes. J. G. Statter. Abstract of paper before the Northern Society of Electrical

Engineers. Discussing the best forms of motors for use on cranes, especially in view of the frequent starting and stopping. Switchless cranes are described, in which the control is effected by changing the position of the brushes. 2000 w. Elec Engr, Lond—April 8, 1898.

Electric Cranes. J. G. Statter. Abstract of a paper read before the Northern Soc. of Elec. Engs., England. Considers the lifting and transportation of loads by electrical energy, and the belt system. Also editorial. Ill. 6000 w. Elect'n, Lond—April 22, 1898.

Electric Cranes for Continuous Currents (Appareils de Levage Electrique à Courants Continus). Illustrating and describing a variety of electric cranes, principally for harbor service. Two articles. 6000 w. Génie Civil—May 22, 29, 1897.

Electric Lifts and Cranes. Abstract of the discussion of a paper by H. W. Ravenshaw, read at meeting of British Inst. of Civ. Engs. Serial. Col Guard—Jan. 21, 1898.

Electric Lifts and Cranes. H. W. Ravenshaw. Read before the Institute of Civil Engineers, England. The object is to direct attention to electrical and mechanical problems which present themselves in the application of electric motors to lifts and cranes, and to describe methods by which they have been solved in particular cases. Ill. Serial. Elect'n—Nov. 19, 1897.

Electric Lifts and Cranes. H. W. Ravenshaw. Read before the Institution of Civil Engineers, (England), March 30, 1897. Considers the electrical and mechanical problems in the application of electric motors to working lifts and cranes, and describes some methods by which they have been solved. Ill. 3000 w. Col Guard—Jan. 14, 1898.

Electric Travellers. Joseph Horner. Discusses the development and designs of electric travellers in England and America. Serial. Mech Wld—Sept. 29, 1899.

Electric Traveling Crane of 35 Tons Capacity Elektrisch Betriebener Laufkran von 35 t Tragkraft). Paul Uellner. An illustrated description with numerous details, of a powerful crane recently constructed by the Compagnie Internationale" d'Electricité, of Liége. 2500 w. Zeitsch d Ver Deutscher Ing—July 15, 1899.

Electric Traveling Crane of 35 Tons Capacity (Pont Roulant Electrique de 35 Tonnes). A powerful 3-motor crane of 16 metres span, the details of which are fully shown in the illustrations. 1000 w. 1 plate. Génie Civil—Oct. 21, 1899.

New Electric Cranes (Neuere Elektrische Hebezeuge). An illustrated account of some new electric cranes and their details. 1500 w. Zeitschr d Ver Deutscher Ing—March 31, 1900.

Notes on Electric Cranes. E. W. Anderson. Read before the British Assn. Experience that the writer has had with electric cranes in practical use in the Erith Iron Works. Considers the system the very best method that has yet been devised. 5000 w. Elec Eng, Lond—Sept. 25, 1896.

Notes on the Traveling Crane. Charles L. Griffin. Deals with electric traveling cranes, and is a very thorough, practical discussion covering all parts of the mechanism. 3000 w. Am Mach—Dec. 12, 1895.

The Operating of Continuous Current Electric Cranes (Ueber die Steuerung Elektrischer Gleichstromkrahne). Max Vogelgesang. An illustrated article describing controllers for electric cranes, with the theory of crane operation. 4000 w. Elektrotech Zeitschr—Aug. 2, 1900.

See also Flohr; Paris Exposition; **OVERHEAD TRAMRAIL.**

**Electric, Bremerhaven.**—Electric Radial Crane of 150 Tons Capacity at the Harbour of Bremerhaven (Grue Pivotante Electrique de 150 Tonnes, du Port de Bremerhaven). A full detailed description of this powerful electric crane, of 72 feet maximum radius, and electric movements throughout. 2000 w. 1 plate. Génie Civil—Feb. 3, 1900.

Modern Electric Cranes (Neuere Elektrische Betriebene Hebezeuge). With illustrations of the construction and method of erection of the 150 ton electric crane recently built by the Benrath Machine Works for the port of Bremerhaven. 3000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Dec. 2, 1899.

150-Ton Electric Crane at the Imperial Dock in Bremerhaven, Germany. Translated from the "Zeitschrift des Vereines Deutscher Ingenieure." Illustrated detailed description of the largest crane in the world. 2700 w. Eng News—Feb. 8, 1900.

**Electric, England.**—Electric Traveling Cranes. Illustrated detailed description of cranes manufactured in England. 2500 w. Engng—Jan. 5, 1900.

**Electric, Foundry.**—Electric Traveling Cranes in the Foundry. A. D. Williams. Read before the Foundry Men's Assn. Considers the multimotor electric crane from the user's standpoint, its desirable and undesirable features. 3500 w. Ir Trd Rev—Oct. 4, 1900.

**Electric, Germany.**—Electrically Driven Cranes (Elektrisch Betriebene Krane). C. Eberle. The first of a series upon electric cranes built in Germany. This article contains description of a single-motor traveling crane by Collet and Engelhard, and a traveling jib crane by Scholten. Serial. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 1, 1898.

**Electric, Havre.**—The Electric Cranes at the Port of Havre (Les Grues Electriques du Port du Havre). Illustrated description of four radial electric cranes mounted on gantries on the Quai Colbert at Havre, with an account of the tests to which they were subjected. 3500 w. Le Génie Civil—Sept. 18, 1897.

**Electric, Newport News.**—A Giant Electric Crane. Illustrated description of a high-speed electric hoisting and conveying machine used in shipbuilding. The Brown balanced cantilever electric ship-building crane at Newport News, Va., remarkable for its size, capacity, and the speed at which it travels. 1200 w. Elec Rev—Dec. 11, 1895.

An Electrically Operated 150-Ton Revolving Derrick. Walter A. Post. A general description of the derrick crane at the yards of the Newport News Shipbuilding and Dry Dock Co., with numerous detail drawings. 4000 w. 10 plates. Trans Soc N A & M E—1898.

Electrically Operated 150-Ton Jib Crane at Newport News Shipyard. Walter A. Post. Abstract of a paper read at the meeting of the Soc. of Naval Archts. and Marine Engs. A statement as to size, capacity, range of operation, etc., with description of particular details. Ill. 3000 w. Elec Eng, N. Y.—Feb. 2, 1899.

**Electric, Paris Exposition.**—The 30-Ton Electric Crane in the French Section of Machinery Hall, Paris (Grue Titan Electrique de 30 Tonnes de la Salle des Machines La Bourdonnais). Alfred Boudon. A well illustrated description of this large traveling cantilever crane. 1500 w. 1 plate. Génie Civil—May 19, 1900.

**Electric, Quai d'Orsay.**—Electric Traveling Crane with Movable Frame (Grue Electrique à Charpente Mobile). An illustrated account of the traveling wharf crane on the Quai d'Orsay at the Paris Exposition. 1500 w. Revue Technique—Aug. 25, 1900.

**Electric, Southampton.**—The Electric Cranes of the Southampton Harbor Board. Illustrated detailed description of the new cranes. The installation consists now of six electrically-driven traveling jib cranes. 1400 w. Engr, Lond—Dec. 2, 1898.

The New Electric Cranes at Southampton Harbor. Illustrated description of these cranes and report of their satisfactory work. 1300 w. Elect'n, Lond—Nov. 18, 1898.

**Electric, Steamship "Bremen."**—Electric Cranes on the Steamship "Bremen" (Schiffskrahne an Bord des Dampfers "Bremen"). An illustrated account of the electrical hoisting plant on one of the North German Lloyd steamers. 1200 w. Glaser's Annalen—Sept. 15, 1897.

See also **ELECTRIC EQUIPMENT**—Ship "Bremen."

**Electric, Wandsworth.**—See **CONVEYOR PLANT—Wandsworth, Eng.**

**Flohr at Paris.**—The Carl Flohr 25-Ton Electric Traveling Crane at the Paris Exposition (Pont Roulant Electrique de 25 Tonnes del'Usine Suffren).). A well illustrated description of this fine crane in the German section of Machinery Hall. 1 plate. 1500 w. Génie Civil—April 28, 1900.

**Foundry.**—Foundry Cranes. A. E. Outerbridge, Jr. Read at meeting of Amer. Foundrymen's Assn. A very interesting paper illustrating and describing mechanism for handling heavy materials in foundries from early date to the present time. 3200 w. Foundry—Aug., 1896.

Foundry Cranes. A. E. Outerbridge, Jr. Fundamental practical considerations common to all cranes are discussed and essential qualifications are set forth. 1600 w. Ir Age—May 14, 1896.

See also Electric; OVERHEAD TRAMRAIL.

**Freight Handling.**—English Facilities for Handling Freight—Hydraulic Cranes and Capstans. System illustrated by description of a typical freight house on a large English railway. 1200 w. Am Mach—Aug. 27, 1896.

**Gantry.**—A Two Hundred-Foot Gantry Crane. John W. Seaver. Illustrated description of the plant of the Cambria Iron Co., of Johnstown, Pa., installed in their storage and loading yard. 2800 w. Am Soc of Mech Engs—Dec., 1896.

Traveling Gantry at Messrs. Harland and Wolff's Shipyard, Belfast. Describes machines used for lifting of plates and sections into position, and to support riveting machines when at work. 1100 w. Engng—Jan. 28, 1898.

**Gas Engine.**—Gas Motor Crane. C. Jimels. Translated from "Le Génie Civil." Illustrated detailed description of an installment erected by the Parisian Gas Light and Heating Co. Handles 1200 kilos of coal at each load, lifting it 21 meters, together with the bucket which weighs 500 kilos, at the rate of 30 metres per minute. 1800 w. Pro Age—March 1, 1896.

**German Shear.**—100-Ton Shear with Adjustable Boom. From "Le Génie Civil." Describes a crane of peculiar construction in use in a German shipyard. Ill. 500 w. Eng News—Jan. 25, 1900.

**Hydraulic.**—A Twenty-five Ton Hydraulic Traveling Crane. Illustrates and describes a traveling crane recently installed in the Altoona shops of the Pennsylvania Railroad. 700 w. Am Mach—Aug. 9, 1900.

The Hydraulic Cranes at the Port of Dunkirk (Grues Hydrauliques du Port de Dunkerque). Illustrated description of traveling hydraulic cranes, with details of hoisting mechanism and plans of the hydraulic installation. Radial cranes are mounted on bridge gantries traveling on tracks along the quay walls. 1800 w. 1 plate. La Revue Technique—April 10, 1898.

See also Freight Handling.

**Locomotive.**—A Five-Ton Locomotive Crane. Illustrated detailed description of a machine built by the Case Manufacturing Co., of Columbus, O., for use in mill yards, stone yards, or wherever suitable tracks are available. 1200 w. R R Gaz—March 18, 1898.

The Stability of Locomotive Cranes. J. V. McAdam. Develops formulas for use and gives graphical plot for finding the weight of the crane. 1200 w. Sib Jour of Engng—Oct., 1900.

**Locomotive Shop.**—A Locomotive Shop Traveling Crane, 5,000 pounds capacity. Description with drawings. 500 w. Ry Rev—Oct. 17, 1896.

**Newport News.**—See Electric.

**Paris Exposition.**—Cranes at the Paris Exposition of 1900 (Die Weltausstellung in Paris 1900. Hebemaschinen). H. Kammerer. A general description of cranes, windlasses and other hoisting machines at the Exposition, with a table and plan. Serial. Zeitschr d Ver Deutsche Ing—May 19, 1900.

See also Electric; Flohr.

**Petro-Automotor.**—A Petro-Automotor Crane. Illustrated description of an application of the petromotor to work a movable crane. 1200 w. Automotor Jour—Jan., 1899.

**Power.**—Cranes and the Power to Be Used with Them. Mr. Pitt. Read before the Engng. Conference of the Inst. of Civ. Engs., England. Considers self-contained cranes carrying their own motive power, and cranes actuated by power from a separate generator. Discussion. 2700 w. Engr, Lond—June 28, 1899.

**Power for Traveling.**—Power Calculation for a Traveling Crane. Charles T. Griffin. Formula for computating is presented, based on the principle that the power required for bridge traverse will be practically that required to overcome journal friction after the speed has once been established. The power necessary for starting is separately dealt with, as is also the power for effecting the hoist. 1300 w. Am Mach—April 2, 1896.

**Radial.**—Radial Crane of 100 Tons Capacity (Grue Pivotante de 100 Tonnes). Illustrated description of large steam wharf-crane of variable radius, recently installed at the shipbuilding establishment of Blohm & Voss, at Hamburg. 1500 w. Génie Civil—Dec. 2, 1899.

**Railway Wrecking.**—Steam Wrecking Crane for the Atchison, Topeka & Santa Fé. Illustrates and describes a heavy crane of 85 tons capacity designed for emergency service. 1100 w. R R Gaz—April 1, 1898.

**Shipyard.**—See also SHIPYARD APPLIANCES—Union Iron Works.

**Steam.**—How to Run a Steam Crane. Joseph Horner. General Instructions. 1800 w. Mech Wld—Sept. 10, 1897.

**Titan.**—40-Ton Block-Setting "Titan." Illustrated description of a machine to be used in the construction of the harbor works at Vera Cruz, Mexico. 1200 w. Engng—May 14, 1897.

**Traveling.**—A Novel Arrangement of Traveling Crane. The arrangement described has been adopted in works in Chicago. Ill. 400 w. Am Mach—April 19, 1900.

See also Electric; Gantry; Hydraulic; Locomotive Shop.

**Variations.**—Some Variations in Standard Crane Practice. Joseph Horner. Discusses differences in detail and workmanship, and the taste in design. 4800 w. Engng—Feb. 3, 1899.

**Wharf, Hamburg.**—100 Ton Derrick Crane (Derrik-Kran von 100,000 kg. Tragfähigkeit). Illustrated description of the powerful new wharf crane recently erected at the shipyards of Blohm & Voss, at Hamburg. 1800 w. Zeitschr d Ver Deutscher Ing—April 16, 1898.

**Wharf, Newcastle, N. S. W.** Crane Regulations at Newcastle, N. S. W. Regulations for the working of cranes and wharf at this port. 2600 w. U. S. Cons Repts, No. 810—Aug. 17, 1900.

## CRANE BEDS.

Making Revolving Crane Beds. Joseph Hornér. Illustrated description. Serial. Am Mach—Nov. 16, 1899.

## CRANE CHEEKS.

**Machining.**—Machining Crane Cheeks. Joseph Horner. Illustrates and describes English practice in crane building. 1500 w. Am Mach—Oct. 5, 1899.

## CRANE GIRDER.

Calculations for a Crane Girder. A. D. Williams. Considers one particular girder, showing how the formulas met with in the "pocket books" were applied. 2000 w. Am Mach—Feb. 8, 1900.

**Machining.**—The Machining of Crane Girders. Joseph Horner. Illustrations of the Machining of cross girders of cranes by the aid of templets. 1200 w. Am Mach—Oct. 26, 1899.

## CRANE HOOKS.

Crane Hooks. C. F. Blake. Describes a method applicable to any short piece of mechanism eccentrically loaded, whether in tension or compression. 800 w. Am Mach—June 14, 1900.

## CRANK ANGLES.

The Effect of Different Arrangements of Crank Angles upon the Economy of Quadruple Expansion Engines. A. L. Mellanby. Read before the North-East Coast Assn. of Engs. and Ship-builders, at Newcastle-on-Tyne. An account of a series of experiments carried out on the engines at the Durham College of Science. 2000 w. Ind & Ir—April 29, 1898.

## CRANK-EFFORT.

**Diagrams.**—Diagrams of Crank-Effort. G. H. Shepard. Explains the method of obtaining the curves. Ill. 2500 w. Sib Jour of Engng—Dec., 1898.

## CRANK PINS.

**Locomotive.**—A Device for Turning Worn Crank Pins. Description and illustration of an interesting device for truing up pins while in the wheel. 200 w. Loc Engng—May, 1896.

**Stresses.**—A Comparison of Fiber Stresses in Crank Pins and Axles. L. R. Pomeroy. Gives a table showing the material, dimensions and fiber-stress on pins and axles taken from modern engines, with comments. 700 w. R R Gaz—June 17, 1898.

Stresses in Crank Pins and Axles. Explaining the stresses at work to produce rupture. 1000 w. Loc Engng—Aug., 1898.

## CRANK SHAFTS.

Crank Shafts. John Brady. Considers the construction of stationary and marine crank-shafts, the materials used, and their bearings on present-day practice. Ill. 2500 w. Engr, Lond—May 4, 1900.

**Single Acting Engines.**—Crank Shafts of Single Acting Engines. W. H. Booth. An argument, sustaining Wöhler's law of stresses and asserting that this law is ignored in the design of crankshafts. 900 w. Am Mach—Nov. 21, 1895.

**Large Engines.**—Crank Shafts for Large Engines. W. H. Booth. A reply to criticisms of a former article, with an explanation of the writer's views. 1500 w. Am Mach—Feb. 15, 1900.

**Marine Engines.**—Computations for Multiple Crank Shafts for Marine Engines (Berechnung Mehrmals Gekröpfter Kurbelwellen für Schiffsmaschinen). H. Von Berling. A very comprehensive study of this important subject, with analytical and graphical investigation of stresses and strains, together with examples showing practical applications. 7500 w. Zeitschr d Ver Deutscher Ing—April 30 1898.

On Crank Shafts. John H. Macalpine. The investigation deals with the estimation of the various stresses which are induced in the crank shaft of an engine when running. The principal practical result is the ascertaining of the dimensions of a set of crank shafts which, under working conditions, will not in any part have stresses rising above a definite value. Serial. Jour Am Soc of Naval Engs—Nov., 1896.

**Stresses.**—The Stresses in Crank-Shafts. Presents two indicator diagrams and the circumstances under which they were taken, discussing the indications. 1400 w. Elec Rev, Lond—Oct. 13, 1899.

**Twisting Moment.**—Twisting Moments of Quadruple Expansion Engines. H. J. Teiper. Results and method of obtaining the twisting moments or crank effort as worked out by the writer, with necessary explanations. 1500 w. Eng—Dec. 5, 1896.

### CREMATORY.

See also **COLUMBARIUM.**

**Garbage.**—See **REFUSE DISPOSAL.**

### CRIBWORK.

See also **DAM; RIVER REGULATION.**

**Cost.**—Cost of Crib Construction—Brief Methods for Preparing Estimates. G. A. M. Liljencrantz. Explains the plan of the writer for obtaining a reasonably accurate estimate in a short time. Describes four different methods, each in turn giving a closer approximation to accuracy than the preceding. 4000 w. Jour W Soc of Engs—Oct., 1899.

**Riker's Island, N. Y.**—The Riker's Island Cribwork. Elbert Nostrand Peter. A well illustrated description of a cribwork to prevent washing at Riker's Island, where the New York city refuse is dumped. The crib was built on a mud bottom, and had to be repeatedly repaired. Improved methods are suggested. 1200 w. Eng News—Jan. 9, 1896.

**Rock River, Ill.**—See **DAM—Rock River, Ill.**

### CROOKES.

William Crookes. Sketch of his life and his remarkable discoveries, and contributions to scientific literature. Ill. 900 w. Sci Am—Feb. 15 1896.

### CROSS-SECTION PAPER.

Cross-Section Paper in the Shop. William O. Webber. Possibilities of its usefulness unrealized by the mechanical engineer and draftsman in ordinary metal-working establishments. 800 w. Am Mach—March 5, 1896.

**Logarithmic.**—The Properties and Uses of Logarithmic Cross Section Paper. J. A. Brown. An explanation of the manner in which results are obtained and the uses to which it may be applied. Serial. Am Mach—June 21, 1900.

### CROSS TIE.

See also **RAIL; TIMBER PRESERVATION TRACK.**

Economy in the Selection, Use, and Renewal of Cross-Ties. H. G. Hetzler. A first prize paper, from the Roadmasters' Assn. The paper is thorough and practical. 3300 w. Ry Age—Dec. 20, 1895.

The Crosstie Situation. Editorial on the use of metal ties and other materials. 1200 w. R R Gaz—Nov. 17, 1899.

Wooden Cross Ties. H. W. Church. Second prize paper on the best practice in selecting, laying, removing and adjusting railway ties. 1700 w. Ry Age—Dec. 26, 1895.

**Beech Wood.**—The Use of Beech Wood for Railway Sleepers (Ueber Verwendung von Buchenholz zu Eisenbahnschwellen). A paper by Ober-Baurath Wetz before the German Railway Association, with discussion, mainly concerning the best method of preserving such sleepers from decay. 6000 w. Glaser's Annalen—May, 15, 1899.

**Cedar.**—Cedar Ties in Service. Moses Burpee. A study of the character of the wood, reasons for its failure under certain conditions, its weak points and redeeming qualities. Ill. 3700 w. Ry Rev—March 13, 1897.

**Collet Treenail.**—See **RAIL FASTENING.**

**Colorado.**—Average Life of Cross-Ties in Steam Railroads in Colorado. William Ashton. Reports concerning ties used in Colorado, and the life of the different kinds used, with remarks on metallic ties. 1200 w. Jour Assn of Eng Soc—Sept., 1897.

**Computation.**—The Computation of Cross-Tie Structures (Beitrag zur Berechnung des Querschwellen Oberbaues). Prof. Skibinski. A very complete mathematical discussion of the stresses in railway sleepers, with numerous diagrams and tables both for metal and wooden sleepers. Two articles. 9000 w. Zeit d Oesterr Ing u Arch Ver—Feb. 24, March 3, 1899.

**India.**—Railway Ties in India. Clement F. Street. Describes some of the designs now in use on the railways of British India, in which country metal ties have probably been more extensively used than in any other. Ill. 10500 w. Jour W Soc of Engs—June, 1897.

Sleepers. Editorial discussion of the various types of railway ties and sleepers employed in India. 1400 w. Ind & East Eng—Dec. 21, 1895.

**Iron.**—See **Steel.**

**Rail Cut.**—Rail Cut Ties. Criticism of Mr. Reece's theory, that the cutting is due to longitudinal movement of rail, and Mr. Reece's rejoinder. 2200 w. Ry Rev—Aug. 29, 1896.

**Steel.**—Steel Sleepers. Discusses the causes of the absence of unanimity on the part of railway engineers respecting the merits and demerits of metallic sleepers. Shows that in certain places they cannot be used, a possibility of the effect upon high speed, and various disadvantages are mentioned. 2200 w. Eng Lond—Dec. 25, 1896.

The Use of Iron and Steel for Railway Sleepers. A summary of the European situation, with some notes of current practice, and of results experienced. The conclusions drawn are non-committal, but inclined to be favorable. 1800 w. Ir & Coal Trs Rev—April 10, 1896.

**Steel, Gothard Railway.**—Experience with Steel Ties on the Gothard Railway, Switzerland. Particulars as to the experience of this road, taken from a report showing the results obtained up to Jan., 1898, and giving the present opinions of the officers of the railway. 1000 w. Eng News—April 7, 1898.

Steel Cross Ties on the St. Gothard Railway (Les Traverses d'Acier au Chemin deFer du Saint Gothard). A review of the experiences with steel ties from 1882 to 1898. In addition to the constructive advantages, a marked economy over wooden ties appeared. 1000 w. La Revue Technique—April 10, 1898.

**Steel, Huntingdon & Broad Top Mt. Ry.**—Steel Ties on the Huntingdon & Broad Top Mountain R. R. Illustrated description of a form of steel tie which has been in experimental service for about six months. 800 w. Eng News—July 19, 1900.

**Steel, Mexico.**—Steel Ties in Mexico. Gives particulars concerning the design of the ties and the methods of maintaining track laid. Also states the advantages and disadvantages shown by experience. Ill. 1200 w. Ry & Engng Rev—Dec. 23, 1899.

**Steel, Netherlands.**—Comparative Trials on Metallic Sleepers (Essais Comparatifs de Traverses Metalliques). Ch. Renson. A review of the results obtained with various types of metallic cross-ties on the Liége-Limburg Railway between 1881 and 1898. Two articles. 6000 w. Schweizerische Bauzeitung—June 10, 17, 1899.

Comparative Tests of Metallic Cross Ties (Essais Comparatifs de Traverses Métalliques). A very full report of the results of tests of various kinds of metallic ties on the Netherlands State Railways from 1881 to 1898, with plate showing the forms tested. 6000 w. 1 plate. La Revue Technique—July 10, 1898.

Comparative Experiments with Iron Sleepers (Vergeischende Versuche mit Eisernen Querschwellen). Ch. Renson. Report of tests made on the Liége-Limburg railway for the past 17 years, with illustrations of the most satisfactory type. 4000 w. Stahl und Eisen—Sept. 15, 1898.

Report on the Testing of Metallic Sleepers on the Liége-Limburg Railway. Ch. Renson. A very complete series of tests, lasting over 17 years, conclusively showing the advantages of metallic sleepers over those of oak. 8000 w. Bulletin Int Railway Congress—Sept., 1898.

Steel Ties on the Netherlands State Railways; 1881 to 1898. Abstract of report prepared by the resident engineer, Ch. Renson, on the general results of careful observations for 17 years, giving interesting and instructive information. 2400 w. Eng News—Aug. 25, 1898.

**Steel, Queensland.**—Steel Sleepers in Queensland. John Alfred Griffiths. Describes the construction of the Normanton-Croydon Railway, 94 miles in length. Serial. Ind and East Eng—Sept. 19, 1898.

**Steel, Rochester, N. Y.**—Steel Ties Construction at Rochester, N. Y. Illustrates and describes a track construction in which old steel rails were used for ties. 500 w. St Ry Rev—Nov. 15, 1898.

**Steel, Sumatra.**—Steel Sleepers (Les Traverses d'Acier). An account of the experiences with steel railway-sleepers on the State Railway of Sumatra. 8500 w. Revue Technique—Sept. 25, 1900.

Steel Ties on the Sumatra State Railways. Information from the report made by L. K. Lindhout, and printed in the Bulletin of the International Railway Congress. 1300 w. Eng News—Nov. 23, 1899.

**Steel, Turkey.**—The Use of Metal Ties on the Turkish Railways (Emploi des Traverses Métalliques sur les Chemins de Fer Turcs). A. Magnier. With illustrations showing the machines for transporting and placing sections of track, with steel sleepers. 2000 w. 1 plate. Le Génie Civil—March 19, 1898.

**CRUCIBLE.**—See also **FOUNDRY; STEEL MANUFACTURE.**

The Manufacture and Care of Crucibles. John A. Walker. Read before the American Foundrymen's Assn. A brief account of crucibles and crucible making, also discussing how they should be cared for, and the causes of failure. 2500 w. Ir Age—May 20, 1897.

**Baumann Pre-Heating.**—The Baumann Tilting Pre-Heating Crucible Furnace (Baumann's Aufkippbar Vorwärmer-Tiegelofen). An ingenious form of crucible furnace in which the charge is heated by the escaping gases before entering the crucible. 1200 w. Stahl und Eisen—June 15, 1898.

**Permeability.**—On the Permeability of Steel-Melting Crucibles. J. O. Arnold and F. K. Knowles. Read before the Iron and Steel Inst., London. Experiments and results, showing the walls of the crucible form little protection against the absorption of sulphur by the metal inside. Discussion follows. 6000 w. Ir & St Trds Jour—May 15, 1897.

**CRUCIBLE STEEL.**

See **STEEL—Crucible; STEEL WORKS—Crucible.**

**CRUISER.**

See also **ARMORED CRUISER; COMMERCE DESTROYER; WARSHIP.**

**"Albany."**—Our Latest Protected Cruiser, the "Albany." Illustrated description of an English-built cruiser purchased by the U. S. at the opening of the Spanish War, and but recently completed. 1400 w. Sci Am—March 10, 1900.

U. S. Steel-Sheathed Protected Cruiser "Albany," Built at Elswick. Illustrated description. 500 w. Marine Engng—April, 1900.

**"Albany" Trial.**—Contract Trial of the United States Protected Cruiser "Albany." Harold P. Norten and H. G. Gillmor. Illustrated detailed description of the vessel, with report of trials. 8400 w. Jour Am Soc of Nav Engs—May, 1900.

**"Albany" and "New Orleans."**—Purchase of Brazilian Cruisers "Amazonas" and "Abrouill" by the United States. Description of these new vessels, with data regarding their armament, and comparison with U. S. S. "Cincinnati." Also descriptions of other vessels, the subject of negotiations, auxiliary ships, U. S. shipbuilding, new dock facilities, etc. Ill. 4500 w. Marine Engng—April, 1898.

**"Argonaut."**—H. M. S. Argonaut. Description, with illustration, of a protected cruiser of the Diadem type, launched Jan. 24, 1898, from the yard of the Fairfield Shipbuilding Co. 2000 w. Engr, Lond—Feb. 4, 1898.

**"Argonaut" Trials.**—Trials and Experiments Made on H. M. S. "Argonaut." Sir John Durston. Read before the Brit. Inst. of Naval Archts. An account of the results of the contract, trials and of experiments made. 3600 w. Trans of Brit Inst of Naval Archts—March, 1899.

**Armored.**—See **ARMORED CRUISER.**

**"Blake" and "Blenheim."**—Our First Large Cruisers. Detailed description, with illustration, of H. M. first-class cruisers "Blake" and "Blenheim." 3000 w. Engr, Lond—July 28, 1899.

**"Buenos Aires."**—The Argentine Cruiser "Buenos Aires." Illustrated detailed description. 900 w. Engng—May 29, 1896.

**"Chattanooga" Class.**—New Cruisers for the American Navy. Illustration, with description of vessels of the "Chattanooga" class. 1800 w. Engr, Lond—Nov. 24, 1899.

**"Chicago."**—The Boilers and Bulkhead Doors of the "Chicago." Illustrated description of the changes made in this vessel to convert her into a fast cruiser, with special attention to the system for closing the bulkhead doors in an emergency. 1500 w. Sci Am—June 25, 1898.

The Reconstructed Cruiser "Chicago." An illustrated account of the changes and improvements. 2500 w. Sci Am—July 15, 1899.

**"Chitose."**—The New Cruiser for Japan. Illustrates and describes the "Chitose," the second of the cruisers built in the United States for the imperial navy of Japan. 600 w. Sci Am Sup—March 18, 1899.

**"Denver" Class.**—Characteristics of the New Protected Cruisers of the Denver Class. Brief notes on the chief characteristics, dimensions and features of six new cruisers for the United States Navy. Ill. 900 w. Marine Engng—July, 1899.

Designs for the "Denver" Class, Sheathed Protected Cruiser. Philip Hichborn. A description of the sheathed protected cruisers provided for in the last appropriations for increase of the U. S. Navy. 9 plates. 2500 w. Soc of Nav Archts & Marine Engs, No. 10—Nov., 1899.

Protected Cruisers of the "Denver" Class for the U. S. Navy. Illustrated detailed description of these vessels and their equipment. 1800 w. Marine Engng—June, 1900.

**"Denver" vs. "New Orleans."**—Present and Proposed Cruisers of the United States Navy Compared. Gives illustrations of the new cruisers and the "New Orleans" comparing them and pointing out the advantage of one over the other. 1500 w. Sci Am—Sept. 2, 1899.

**"Diadem."**—Cross-Section of the "Diadem." Cross-section of a vessel of the protected cruiser type, with description. 1700 w. Engr, Lond—April 21, 1899.

H. M. S. "Diadem." Illustrated description, with dimensions and particulars of the vessel, equipment and armament. 2500 w. Engr, Lond—Oct. 28, 1898.

**"Diadem" Trials.**—Recent Trials of the Cruiser "Diadem." Sir John Durston. Read before the Inst. of Naval Arch'ts, London. An account of the contract and experimental trials with tables of mean results. Ill. 3300 w. Engng—April 8, 1898.

Recent Trials of the Cruiser "Diadem." Sir John Durston. Report of the trials and their results, which show that the engines and boilers are economical and efficient for warship service. Discussion. 4800 w. Jour Am Soc of Naval Engs—May, 1898.

Trials of H. M. S. "Diadem." Editorial on the trials now taking place in the English Channel, giving some of the features of the ship and her machinery. 1800 w. Engng—Jan. 21, 1898.

**Dutch.**—Trials of Dutch Cruisers. Gives results of trials of three vessels of the Dutch navy, which were fitted with a combination of small tube, or express water-tube boilers and return tube boilers, giving also details of the vessels. 800 w. Engng—June 3, 1898.

**Elswick.**—On Elswick Cruisers. Philip Watts. Read at meeting of the British Inst. of Naval Archts. Gives particulars of Elswick cruisers built during the last ten years. 3000 w. Engr, Lond—July 28, 1899.

**"Europa."**—The Machinery of H. M. S. "Europa."

Illustrates and describes the main propelling engines and other machinery, giving an account of her official steam trials. 2700 w. Engng—June 10, 1898.

**"Garibaldi."**—The Argentine Cruiser "Garibaldi." Illustrated description. 400 w. Engng—July 10, 1896.

**"General San Martin."**—The Argentine Cruiser "General San Martin." Illustrated description of vessel and equipment, with report of trials. 1800 w. Engng—July 15, 1898.

**German.**—Fourth-Class Cruiser "G" of the German Navy. From "Illustrirte Zeitung." Brief description, with illustration, of a vessel being constructed at Krupp's Germania Dock, at Kiel. 400 w. Sci Am Sup—July 30, 1898.

**"Hermes."**—The New Second-Class Cruiser "Hermes." Compares the vessel with some earlier second-class cruisers, showing the progress, and describes the important features. 1500 w. Engng—April 15, 1898.

**"Hermes" and "Highflyer."**—H. M. SS. "Hermes and "Highflyer." Engraving, with illustrations of the machinery of these second-class cruisers lately completed for the British navy, with description. 2000 w. Engng—July 7, 1899.

**"Highflyer."**—H. M. Cruiser "Highflyer." Illustrated description of a second-class cruiser, recently launched. 1800 w. Engs' Gaz—July, 1898.

**"Hyacinth."**—H. M. S. "Hyacinth." Describes the twin-screw, wood-sheathed, steel-protected cruiser just launched. 1200 w. Engr, Lond—Oct. 28, 1898.

**Japanese.**—American Built Cruisers for Japan. Illustrated description of a vessel to be built by the Union Iron Works of San Francisco. 900 w. Sci Am—July 3, 1897.

**"Kasagi."**—The Japanese Protected Cruiser "Kasagi." Illustration description of the vessel and her armament. 1800 w. Engr, Lond—March 31, 1899.

**"Kherson."**—The Russian Auxiliary Cruiser "Kherson." Editorial comment upon the recent trial of the ship named and upon the performance of the Belleville boilers with which she is fitted. 2500 w. Engng—May 22, 1896.

**"Minneapolis."**—The United States Cruiser "Minneapolis." Full detailed illustrated description. Two-page inset of engravings. 2800 w. Engng—Nov. 15, 1895.

The United States Cruiser "Minneapolis." Illustrated description and contract trial data of this new cruiser. The official trial took place July 14, 1894. 2000 w. Engng—Dec. 13, 1895.

See also **AUXILIARY ENGINE**—Steam Consumption.

**Model.**—A Model Cruiser. Illustrates and describes the "Tigress" model cruiser, constructed by Charles L. Palmer, Albany, N. Y. 1300 w. Engr, Lond—April 14, 1899.

**"Newark."**—The Reconstructed Cruiser "Newark." Describes the vessel as first constructed and the alterations made. Ill. 1300 w. Sci Am—July 23, 1898.

**"New Orleans."**—See **"Albany;" "Denver."**

**"Niobe."**—The Launching of H. M. S. "Niobe." Illustrated description of the launching and of the cruiser. 3000 w. Engng—March 5, 1897.

**"Niobe," "Doris," "Powerful."**—Our New Cruisers. Illustrated description of the new English cruisers "Niobe," "Doris" and "Powerful." Serial. Engng—June 12, 1896.

**"O'Higgins."**—The Chilian Cruiser "O'Higgins." Illustration with important particulars of this recently completed vessel. 800 w. Engng—May 27, 1898.

**"Olympia."**—The United States Protected Cruiser "Olympia." Brief review of this flagship of the Asiatic fleet, whose battle with a Spanish squadron in Manila Bay is now a topic of interest. Ill. 4500 w. Eng News—May 5, 1898.

**"Pactolus."**—H. M. S. "Pactolus." Particulars and report of preliminary trials, just successfully completed. 1500 w. Engr, Lond—Oct. 28, 1898.

**"Pegasus" and "Pyramus."**—H. M. SS. "Pegasus" and "Pyramus." Illustrated description of these two vessels, belonging to a class of eleven. They are fitted with express or small-tube boilers. Gives results of the official trials and of the boiler trials. 2700 w. Engng—Dec. 22, 1899.

**"Philadelphia."**—Protected Cruiser "Philadelphia," of the United States Navy. Engraving and brief description of this cruiser, which had the honor of carrying the annexation commission to Honolulu. 900 w. Sci Am—Oct. 1, 1898.

**"Raleigh" Trial.**—Forced Draft Trial of the U. S. S. "Raleigh." C. R. Roelker. Full description of trial, with diagram, speed curve and brief table of economic performance. 1400 w. Jour Am Soc of Nav Engs—May, 1896.

**Rams.**—Cruisers with Rams. Describes a class of cruisers now being built in the British dockyards. They are as effectively armed as ordinary cruisers, but special attention has been given to the strengthening of the ship forward, so that they may use their ram without the least fear of serious damage. 1300 w. Engng—Dec. 4, 1896.

**"St. Louis."**—American Liners as Auxiliary Cruisers in the Spanish-American War. W. G. Randle. A report of the service rendered by the St. Louis. 900 w. Marine Rev—Sept. 28, 1899.

**"Spartiate."**—H. M. S. "Spartiate." Illustrated description, with drawings of the engines and boilers. 1800 w. Engr, Lond—April 7, 1899.

**"Takasago."**—The Japanese Cruiser "Takasago." Illustrated description of the latest development of second-class cruiser, as regards armament and propelling machinery. A noticeable feature is the absence of excessive superstructure and the very modest proportion of cowls. 700 w. Engr, Lond—June 3, 1898.

**United States.**—Hichborn's Protest. From a letter to the Secretary of the Navy on the subject of protected cruisers. 1800 w. Marine Rev—Aug. 23, 1900.

**U. S. Auxiliary.**—See **"St. Louis."**

**"Zenta."**—The Austro-Hungarian Cruiser "Zenta." Brief description and report of trials of this twin-screw cruiser. Of interest especially as regards the working together of a group of eight Yarrow boilers, which type has been adopted in the Austrian navy for this class of cruiser. Illustrates the triple-expansion engines. 900 w. Engr, Lond—Aug. 25, 1899.

**"Zenta."**—The Austro-Hungarian Cruiser "Zenta." Illustrates the general arrangement of the boilers and stoke holds. 200 w. Engr, Lond—Sept. 1, 1899.

## CRUSHING MACHINERY.

See also **ORE CRUSHER; STONE CRUSHER.**

Crushing, Grinding and Separating Machinery. An account of machines for crushing, grinding and separating materials that have been made by Messrs. Johnson & Sons, Leeds. Ill. 2000 w. Engng—March 19, 1897.

## CRYSTAL PALACE.

The Crystal Palace. Illustrated description of the beautiful, interesting and educational features of this institution. 5000 w. Ill Car & Build—Sept. 3, 1897.

## CUBA.

See also **IRON REGION; MINERAL REGION; RAILWAY PROJECT; SANTIAGO; WEST INDIES.**

Cuba and Puerto Rico. Summary by the Bureau of Foreign Commerce, which will appear in the Review of the World's Commerce, 1896-97, printed in advance in response to a demand for information concerning the Spanish West Indies. 7500 w. Cons Repts, No. 117—May 17, 1898.

Cuba from the Standpoint of a Cuban Engineer—Prospects for Business and Work. J. de T. Tejada. A statement of past and existing conditions. 2800 w. Am Mach—Dec. 22, 1898.

Cuban Reconstruction. Richard J. Hinton. Discusses the resources and industries of this island, the wrongs that have caused such disaster, the difficulties in the situation, etc. 4500 w. N Am Rev—Jan., 1899.

Cuba's Industrial Problems. Reviews the present conditions in the island and considers the serious problems to be solved in developing the industries and fitting the people for self-government. 4000 w. Gunton's Mag—Feb., 1899.

Cuba's Wealth to be Expanded. Bradley T. Johnson. Opportunities for enterprise when the island is under stable government. 1800 w. Mfrs Rec—July 8, 1898.

Future Industrial Opportunities in Cuba. Wilfrid Skaife. A discussion of the commercial, manufacturing, and industrial possibilities of the island under a secure and stable government. 3500 w. Eng Mag—June, 1898.

The Undeveloped Resources of Cuba. G. E. W. Reviews the industries, chiefly agricultural, which offers opportunities for expansion. 1800 w. Sci Am—Sept. 10, 1898.

**CULM.**

See also **COAL; COAL DUST; COAL DUST FUEL.**

**Burning.**—Burning Low-Priced Fuel. W. H. Wakeman. Points out objections to the use of culm or fine coal. 500 w. Am Mach—Feb. 9, 1899.

**Gas.**—Conversion of Culm Into Gas. N. W. Perry. Extract from a paper read at meeting of the Anthracite Coal Operators Ass'n. A study of the question leads the writer to the conclusion that the solution of the problem of the utilization of anthracite culm lies in its conversion first into fuel gas, to be burned in gas engines, and transmitting the energy electrically. 3300 w. Am Mfr & Ir Wld—Nov. 20, 1896.

Culm Banks and Fuel Gas. Alton D. Adams. An estimate of the cost of gas developed from the anthracite coal culm, and transmitted 50 miles. 2200 w. Sci Am—Oct. 13, 1900.

Utilization of the Anthracite Culm Heaps in the Production of Power. Nelson W. Perry. The vast amount of mechanical power now latent in the heaps of unutilized culm, and the feasibility of utilizing this power is the subject discussed. 6500 w. Jour Fr Inst—July, 1896.

**Power Transmission.**—See also **POWER TRANSMISSION—Gas.**

**Scranton, Pa.**—The Utilization of Anthracite Culm at Scranton, Penn. Records the carrying out, with successful results, of attempts to utilize culm as fuel for generating power. The success reached indicates that a vast quantity of power may be realized from culm piles. 1800 w. Eng News—Dec. 26, 1895.

**Utilization.**—The Accumulations of Culm in the Coal Regions and Their Utilization for Power Purposes. Harry N. Gardner. Showing that progress in furnaces and grates has made it possible to burn much of this culm with profit. Ill. 1400 w. Am Elect'n—April, 1899.

The Utilization of Anthracite Culm. Edward H. Williams, Jr. Showing the amount of culm sent to the dump, the ways in which it has been wasted, and the methods by which it may be made available for fuel purposes. Ill. 3700 w. Eng Mag—July, 1896.

**Washery.**—The Yield of the Reynolds Anthracite Culm Bank. A. De W. Smith. Illustrates the Washery at Plymouth, Pa., giving results of the production. 600 w. Eng & Min Jour—April 15, 1899.

**CULM FLUSHING.**

**Anthracite.**—The Method and Cost of Flushing Culm into Anthracite Mines. Report of the committee appointed to investigate this subject, prepared by James B. Davis, superintendent of the "Black Diamond" and "Dodsin" collieries. Gives the mode of filling these mines with culm, the expenses and suggestions for improvements. Ill. 7000 w. Anth Coal Op Assn—Feb., 1898.

Flushing of Culm in Anthracite Coal Mines. William Griffith. Brief general description of the process with illustrations; also discussion of the advantages and of the saving effected. 3000 w. Jour Fr Inst—April, 1900.

**CULVERT.**

See also **CANAL—Erie; RAILWAY BRIDGE.**

Culverts and Bridges. A. W. Campbell. Extract from a paper read before the Assn. of Ontario Land Surv's. Contrasts the practice in Canada with England in regard to the durability of structures; discusses the selection of a site, the size, materials, design, etc. 3000 w. Can Engr—May, 1899.

**Cement-Concrete.**—Cement-Concrete Culverts. A. W. Campbell. From a paper read before the Assn. of Ontario Land Surveyors. Concerning the cost, the care needed in mixing and selection of materials, etc. 1500 w. Can Engr—May, 1900.

**Concrete.**—See **CONCRETE STRUCTURES—Railway.**

**Flood Discharge.**—See **FLOOD DISCHARGE—Culvert.**

**Rail Top.**—Rail Top Culverts. Illustrated description of an excellent design of rail top culvert which has proved itself to be satisfactory in service. 900 w. Ry Rev—Dec. 5, 1896.

**Railway.**—Comparison of Cost and Efficiency of Various Styles of Small Railway Culverts. Hunter McDonald. Part of a paper read before the Engng. Assn. of the South. The different materials used are reviewed, and the construction discussed. 3000 w. Ry & Engng Rev—June 3, 1899.

How to Determine Size and Capacity of Openings for Waterways. Committee report of methods actually adopted on railroads to obtain quick and practical results. 8800 w. American Assn of Ry Supts of Bridges & Buildings.

**CUPOLA.**

See also **DOME; FOUNDRY; FOUNDRY IRON.**

Are Our Cupolas Built Right? John Pettigrew. Suggestions for improving shape of cupolas in vertical section, for practical reasons assigned. 600 w. Foundry—Dec., 1895.

Cupolas and Cupola Practice up to Date. Edward Kirk. Prepared for the National Convention of Foundrymen, Phila. A review of the best practice in cupola melting, with much information on the subject. 2000 w. Ir Tr Rev—May 28, 1896.

Cupola Capacity—Tuyere Area and Arrangement—Blast Pressure—Charging Cupolas—Design for a Cupola. L. C. Jewett. Briefly considers the subjects named. 1800 w. Am Mach—May 4, 1899.

Cupola Practice. Edward B. Gilmour. Describes the cupola furnace and states its advantages, and considers the investigation of Mr. Hart as to causes affecting its working. 1100 w. Foundry —Aug., 1900.

Cupola Practice. H. M. Ramp. Personal opinion based on experience. First part reviews recently published articles by leading foundry men. Serial. Foundry—Sept., 1896.

Improvements in Cupola Uractice. Answers of prominent foundrymen to a circular letter of inquiry as to the direction in which there is greatest room for improvement in foundry practice. 1200 w. Ir Tr Rev—Nov. 5, 1896.

Improvements in Melting Furnaces (Neuerungen in Schmelzöfen). E. Herz. Illustrating and describing an improved foundry cupola, with auxiliary tuyeres and heated blast, by which a high economy is attained. 1500 w. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1899.

Improvement of Cupola Practice. James A. Beckett. A response to the circular letter asking for suggestions for improvement in cupola practice in the foundry. The writer thinks the greatest need is a more general knowledge of cause and effect in the matter of combustion of fuel in the cupola; in fact, more intelligence in the workers. 1800 w. Ir Tr Rev—Nov. 26, 1896.

Management of Cupolas. E. Grindrod. Holds that there is no chance work in casting when a cupola is properly charged, and gives practical directions for proper charging. 700 w. Foundry —April, 1896.

Modern Cupola Practice and the Physics of Cast Iron. Bertrand S. Summers. Condensed from a paper presented at the Am. Inst. of Min. Engs. Briefly considers the separate elements and their effects; examines tabulated analyses of various castings, and discusses other influences. 3800 w. Eng News—Oct. 6, 1898.

Modern Cupola Practice, with Special Reference to the Discussion of the Physics of Cast Iron. Bertrand S. Summers. Outlines the effects of the metalloids, mentions some new ideas which recent practice has developed, giving some results of practical tests. 7000 w. Trans Am Inst of Min Engs—Aug., 1898.

The Cupola and What Goes On in It. A. Humboldt Sextion. Discusses the phenomena attending the melting of pig iron. Serial. Prac Eng —May 14, 1897.

**Bessemer Process.**—See **BESSEMER PROCESS—Cupola Practice.**

**Blast.**—Blast in Cupola Meltings. Dr. Edward Kirk. From a new work on Cupola Practice, now in press. Considers the means which have been devised for supplying the required amount of air. 2300 w. Ir Trd Rev—Feb. 9, 1899.

On the General Utility and Economy of Central-Blast Cupolas. Thomas D. West. A discussion of the advantages and sources of economy obtained by the use of the central blast, with outside tuyeres. 3000 w. Ind & Ir—May 14, 1897.

Possibilities of Cupola Practice. A letter from Dr. Edward Kirk on the use of hot-blast, and a letter from Herbert M. Ramp, showing the real need in cupola practice to be brains. 1300 w. Ir Trd Rev—Nov. 19, 1896.

Power of Blast Penetration and Improvements in Center Blast. Thomas D. West. Read at meeting of Western Foundrymen's Assn. Experiments with and arguments in favor of the use of the center blast in melting, with illustrated description of improvements in the method, and discussion. 5300 w. Ir Trd Rev—June 25, 1896.

Some of the Advantages of the Positive Pressure Blower Over the Fan for Melting Iron. J. A. Caldwell. From a paper read at meeting of the New England Foundrymen's Assn. The positive pressure of the blast, and its good results are set forth. 1700 w. Foundry—April, 1898.

The Action of Blast in Cupolas. Thomas W. West. Paper read before the Western Foundrymen's Assn., Chicago. Power of blast penetration and improvements in center blast. 2700 w. Engng—July 31, 1896.

**Blast Meter.**—Does the Blast Meter Tell the Truth? H. Hansen. Reasons why a speed indicator may probably furnish more reliable indications with reference to a blast for a cupola, than a blast meter. 1200 w. Foundry—April, 1896.

**Bottom.**—The Bottom of a Foundry Cupola. L. C. Jewett. A leaf from the experience of a practical foundrymen. 1300 w. Am Mach—Nov. 5, 1896.

**Cast Iron.**—See **CAST IRON.**

**Charging.**—Charging a Cupola. Edward Kirk. Describes how to make a fire in a cupola, and other matters relating to its proper management. 2400 w. Foundry—Aug., 1900.

Charging Cupolas. E. Grindrod. A plain, practical talk by a practical man who has reasons to offer for each detail of practice. 700 w. Foundry—Sept., 1896.

**Design.**—Some Variations in Cupola Design. Part first considers cupolas attempting to secure economy through the arrangement or shape of their tuyeres. Ill. Serial. Ir & Coal Trds Rev—April 15, 1898.

**Humidity.**—The Effect of Atmospheric Temperature and Humidity on Melting Iron in a Cupola. A. Sorge, Jr. Maintains that atmospheric humidity is an important factor in melting iron and pouring it into molds, and explains how adverse effects are produced by it. 600 w. Foundry—April, 1896.

**Iron from Cinder.**—The Recovery of Iron from Cupola Cinder. W. J. Keep. Presented at convention of the Nat. Assn. of Stove Mfrs., at Phila. Gives facts concerning the prevention of this waste, and the saving effected. 1600 w. Met Work—May 28, 1898.

**Lining.**—A New Cupola Lining. Illustrated description of a lining formed of specially designed, hollow, cast-iron bricks. 1000 w. Engr, Lond—March 23, 1900.

Cupola Linings. Linson H. De Voe. Read at meeting of the Foundrymen's Assn., Philadelphia. Briefly outlines several methods. 2200 w. Ir Age—Feb. 10, 1898.

**Melting.**—Economy in Melting. J. P. Pero. Considers in detail the factors involved in melting iron economically. 2400 w. Foundry—Jan., 1898.

Experiments in Melting Iron. Edward Kirk. From advance sheets of a work on "Cupola Practice" soon to be issued. Further experiments are described and results given. 2500 w. Ir Trd Rev—Jan. 19, 1899.

Melting Iron in the Cupola. Dr. Edward Kirk. From a forthcoming work on Cupola Practice. Gives a case of bad melting and the cause and remedy. 2500 w. Ir Trd Rev—Feb. 16, 1899.

Melting Iron for Foundry Purposes. Walter J. May. Some points on cupola and crucible furnaces and their management. 1100 w. Prac Engr—July 28, 1899.

The Melting Ratio. W. F. Prince. Discusses the progress and improvements in the melting and cupola practice. 1500 w. Foundry—Jan., 1898.

Experiments in Melting Iron. Edward Kirk. From a forthcoming work on "Cupola Practice." Gives opinions formerly held, describing experiments made, and results. 3500 w. Ir Trd Rev—Dec. 29, 1898.

**Silicon Carbide.**—Carbide of Silicon in Cupola Practice—A New Softener. F. J. Tone. The value of this product to the founder, its action, method of handling, etc. 1000 w. Foundry—May, 1900.

### CURB.

See **PAVEMENT—Curb.**

### CURVES.

See **ALTERNATING CURRENT—Curve; RAILWAY CURVE.**

### CUT-OFF.

See **STEAM ENGINEERING—Cut-off.**

### CUT-OUT.

See **ELECTRIC CUT-OUT; ELECTRIC CIRCUIT BREAKER; ELECTRIC SWITCH.**

### CUTTER.

**Boiler Tube.**—See **COMPRESSED AIR—Cutter.**

### CYANIDE.

**Analysis.**—Notes on the Estimation of Sulphides and Cyanides and Cyanates in Commercial Cyanide. Messrs. Feldtmann and Bettel. Read at meeting of the Chemical and Metallurgical Society of South Africa. The paper deals with two of the most troublesome estimations in the analysis of cyanide—the estimation of sulphides and cyanates. The first part describes a rapid and accurate method for the estimation of sulphides. Serial. Min Jour—Dec. 5, 1896.

**Gas By-Product.**—See **GAS MANUFACTURE—Cyanides.**

### CYANIDE PROCESS.

See also **CHLORINATION; GOLD METALLURGY; METALLURGY—Gold and Silver.**

Aids to the Cyanider. Matt W. Alderson. The paper aims to show how certain well known facts may be utilized to advantage in every day work, and how tests may be made and conclusions reached without the aid of a chemist. 2300 w. Min & Sci Pr—Oct. 15, 1898.

Cyaniding Gold Ores. H. Rosales. Explains the nature of cyanogen and of cyanide of potassium, their value and adaptability as solvents of gold from auriferous ores, and describes in detail the method and treatment. 8400 w. Aust Min Stand—April 22, 1897.

Improvements in Gold Extraction. H. Livingstone Sulman, with Discussion. Detailed description of results of experimental work relating to some of the problems which have recently become prominent in the modern processes of gold extraction—viz., the application of an improved cyanide solvent to refractory ores; a new method of precipitating gold from solutions of potassic cyanide, and the leaching of slimes. 22500 w. Inst of Min & Met, Lond—Vol. III., Pt. II.

Notes on Sump Solutions, Extractor-Box Work and Cleaning Up in the Cyanide Process. Alfred James. Abstract of a paper to be presented at the October meeting of the Institution of Mining and Metallurgy. Gives results of experiments made, concluding that increased extractions may be obtained by the proper treatment of sump solutions, or by the making up of fresh solutions. 2000 w. Eng & Min Jour—Sept. 11, 1897.

Notes on the Action of Potassium Zinc Cyanide Solutions on Gold. W. J. Sharwood. The views of various writers as to the nature of the chemical changes taking place during solution are reviewed in part first. Serial. Eng & Min Jour—Oct. 2, 1897.

Precipitation of Gold from Cyanide Solutions. L. Ehrmann. From Trans. Chem. and Met. Soc., Johannesburg. Describes experiments made giving results. Discussion follows. 2500 w. Min & Sci Pr—June 19, 1897.

Precipitation of Gold from Cyanide Solutions. H. Watson. Discusses the methods at present in use, and the experiments tried by the writer. 1300 w. Mod Mach—June, 1900.

Remarks and Observations on the Cyanide Process. Walter J. Studds. Experiments on the effect of the addition of different alkalies to cyanide solutions, the extraction varying from 15 to 93 per cent. 1600 w. Aust Min Stand—Dec. 21, 1895.

Solvent Power of Various Cyanide Solutions. A. F. Crosse. From the "South African Mining Journal." Describes experiments which will prove interesting to those practically engaged in the cyanide process of gold recovery. 8400 w. Min Jour—Jan. 23, 1897.

Some Notes on the Recovery of Gold from Cyanide Solutions. S. C. Coles. Read before the Inst. of Min. and Met. Gives results obtained from gold cyanide solutions of varying strengths with aluminum cathodes and iron anodes. 1800 w. Min & Sci Pr—June 11, 1898.

Some Notes on the Recovery of Gold from Cyanide Solutions. Sherard Cowper-Coles. Reports results obtained from gold cyanide solutions of varying strengths with aluminum cathodes and iron anodes. 1600 w. Min & Sci Pr—Nov. 26, 1898.

Some Problems in Cyaniding. C. C. Longridge. Some results of experimental work undertaken to effect improvements and secure economy. 1500 w. Min Jour—Jan 23, 1897.

The Chemistry of the Cyanide Process. J. Ohly. Considers mainly the effect of copper and its ores and the cause and mode of determining its presence. Serial. Min Rept—Sept. 21, 1899.

The Cyanide Process. Louis Fade. Read before the International Mining Congress at Salt Lake City. Discusses the preliminary treatment of the ore, crushing, sorting, etc., the Elsner theory, and the success of the process. 2800 w. Min & Sci Pr—July 16, 1898.

The Cyanide Process. J. Stanley Muir. Discusses the means of ascertaining what ores are amenable to this treatment, the necessity of expert examination in order to get the most profitable results, with description of the process. 2000 w. Min Rept—July 7, 1898.

The Cyanide Process for the Treatment of Gold Ores. Joseph W. Richards. The story of the rise of the commercial cyanide process is briefly told, the patented basis examined, improvements made and needed, and conditions for successful use. 4800 w. Jour Fr Inst—Feb., 1897.

The Cyanide Process of Gold Extraction. An illustrated description of the nature of the process, its chemical principles, etc. Serial. Engr, Lond—April 16, 1897.

Professor Christy on Cyanide. W. Bettel. A review of S. B. Christy's paper on "The Solution and Precipitation of the Cyanide of Gold." A severe criticism. 3800 w. Reprint from So African Min Jour—May 8, 1897.

The Solution and Precipitation of the Cyanide of Gold. S. B. Christy. A discussion of how gold dissolves in cyanide solutions, and how it is precipitated from them. The results of a systematic investigation. 14000 w. Trans Am Inst of Min Engs—Dec., 1896.

The Cyanide Process. Discussion of the papers of S. B. Christy, H. Van F. Furman, and George A. Packard. 9700 w. Trans Am Inst of Min Engs—Sept., 1897.

**Alkali.**—Notes on the Estimation of Protection Alkali in Cyanide Solutions. Andrew F. Crosse. Describes experiments and the writer's method of determining protective alkali. 1200 w. Jour of Chem & Met Soc of S Africa—May, 1899.

**America.**—The Cyanide Process for Gold Ores in Western America. Thomas Tonge. Reviewing the development of the process in America, and showing the importance of testing the ores with proper skill before assuming the process to be suitable. The necessity of skilled supervision is also emphasized. 3500 w. Eng Mag—Jan., 1898.

**Analyses.**—Analyses of Cyanide Mill Solutions. W. J. Sharwood. Gives analyses made in the laboratory of the Univ. of California, describing methods. 800 w. Eng & Min Jour—Aug. 20, 1898.

See also **CYANIDE—Analysis.**

**Anodes.**—Influence of the Anodes in Depositing Gold from Its Cyanide Solution. E. Andreoli. Refers to the important work in this field and the results, and gives the writer's experience with peroxidized lead anoles. 1500 w. Eng & Min Jour—Jan. 22, 1898.

**Aurex Sluice.**—Notes on the Aurex Sluice. T. M. Chatard and Cabell Whitehead. Describes this apparatus for utilizing the electric current in connection with cyanide solutions upon gold and its ores, giving the results obtained in test-runs, and the conclusions reached. 8400 w. Eng & Min Jour—Feb. 3, 1900.

**Australia.**—Practical Cyanidation of Tailings and Ores. Alfred S. Edgecombe. Remarks on the practical treatment of tailings and ores, gained by some years' experience in Australia. 2500 w. Can Min Rev—Aug., 1898.

**Base Ores.**—Cyaniding Base Ores. Matt W. Alderson. The treatment of the base ores at Cripple Creek is described, and the subject generally discussed. 1400 w. Min & Sci Pr—Feb. 4, 1899.

**Bendigo, Australia.**—Successful Cyaniding. Illustrated description of the process as applied at the United Pyrites Works, Bendigo. 1600 w. Aust Min Stand—July 1, 1897.

**Black Hills, South Dakota.**—Some Further Mill Practice in Cyaniding the Silicious Ores of the Black Hills, South Dakota. J. M. Henton. An account of operations at the mill of the Dakota M. & M. Co., at Central City. 1600 w. Min & Sci Press—Sept. 8, 1900.

**Bromo.**—Some Experiments with Brom-Cyan. H. C. Cutter. Experiments made with the new solvent for gold showing that in some cases brom-cyan solution gives better results than simple potassium cyanide. 800 w. Engs' Year Book—Univ of Minn, 1896.

The Bromo-Cyanide Process of Treatment of Gold Ores and Tailings. Present advantages over the ordinary cyanide process. 1400 w. Aust Min Stand—Dec. 3, 1896.

See also **GOLD METALLURGY.**

**Charcoal.**—Charcoal in Cyaniding. Norman Danvers Power. Gives information relating to the use of this precipitant, and directions for the process. 1500 w. Aust Min Stand—Oct. 14, 1897.

**Charters Towers, Australia.**—Charters Towers Cyanide Works. Brief description of the method used in treating sludges and concentrates. 700 w. Aust Min Stand—March 5, 1896.

**Chemistry.**—Chemistry of the Cyanide Process. Reviews the theories which have been formulated to explain how gold becomes dissolved in this process. 2200 w. Min & Sci Pr—March 12, 1898.

Contributions to the Chemistry of the Cyanide Process. E. A. Schneider. An article upon the economical use of potassium cyanide in the cyanide process and the causes for excessive consumption. Serial. Eng & Min Jour—Nov. 23, 1895.

Contributions to the Chemistry of the Cyanide Process. William Skey. Discusses how the cyaniding of gold is effected, the actual chemical decompositions that occur in the process, etc. Serial. N Z Mines Rec—Jan. 17, 1898.

**Chlorination.**—Ore Treatment—Cyanide and Chlorination. W. P. Harvey. Giving interesting results obtained by both processes in the United States, and stating that the ores of British Columbia must be treated by these methods. 2300 w. Min & Sci Pr—Jan. 11, 1896.

**Concentration.**—Concentration After Lixiviation. Mall. W. Anderson. On the treatment of tellurium ores in the cyanide mills treating the refractory ores of the mines of Cripple Creek and vicinity. 1100 w. Min & Sci Pr—Dec. 31, 1898.

**Coolgardie, Australia.**—Cyanide Solutions for Leaching Auriferous Ores and Tailings. Walter J. Studds. Describes the solution as applied on the Coolgardie gold fields. 1000 w. Aust Min Stand—Sept. 16, 1897.

**Copper.**—On the Chemistry of the Cyanide Copper Assay. J. J. Beringer and H. W. Hutchin. A discussion of the conditions which affect the results in this process. 1000 w. Eng & Min Jour—Oct. 24, 1896.

**Copper Salts.**—Statement as to My Process of Precipitating Gold by Means of Copper Salts. P. de Wilde. Replies to the objections, from various quarters, to the writer's process for precipitating gold from solutions of cyanide by means of sulphurous acid and sulphate of copper. 1700 w. Jour of Chem & Met Soc of S Africa—May, 1898.

**Cripple Creek.**—A Description of the Arequa Cyanide Mill at Cripple Creek, Colorado. Arthur Lakes. Describes how the ore is treated, and the machinery used in sampling, roasting and leaching it. Ill. 3000 w. Mines & Min—Aug., 1899.

**Dry Ores.**—Cyanide Experiments Upon Dry Ores of Southern Slocan District. W. S. Johnson. Gives the results of experiments carried out by the writer. 5000 w. Can Min Rev—Aug., 1898.

**Electrolytic.**—Electrolytic Precipitation of Gold from Cyanide Solutions. Stuart Croasdale. Experiments were made and reasons given for the method decided upon, which was electrolytic precipitation, using amalgamated zinc plates for the positive electrodes and sheet lead for the negative electrodes. 750 w. Eng & Min Jour—Dec. 12, 1896.

See also **Siemens-Halske; Zinc; ELECTRO-METALLURGY—Gold; GOLD METALLURGY.**

**Hawthorne, Nevada.**—A Cheap Cyanide Plant. M. A. Knapp. Description of a small and successful plant constructed at Hawthorne, Nevada. 1100 w. Min & Sci Pr—Oct. 10, 1896.

**Johannesburg.**—Notes on the Cyanide Process. J. E. Clennell. A letter to Prof. S. B. Christy on his article on "The Solution and Precipitation of the Cyanide of Gold," and records experiments made at Johannesburg. 2500 w. Min and Sci Pr—March 27, 1897.

**Laboratory Tests.**—Laboratory Tests in Connection with the Extraction of Gold from Ores by the Cyanide Process. H. Van F. Furman. Description of the latest laboratory methods. How to determine the adaptability of an ore to this method of treatment. 5300 w. Trans Am Inst of Min Engs—Sept., 1896.

**Liberty Bell, Colorado.**—The Cyanide Works of the Liberty Bell Gold Mining Company, Colorado. F. L. Bosqui. An illustrated account of a cyanide plant with a capacity of 240 tons per day, with cost of operation. 900 w. Eng & Min Jour—Sept. 22, 1900.

**MacArthur-Yates.**—See Patents; **GOLD METALLURGY.**

**Mercur, Utah.**—The Cyanide Process of the Mercur Mine. B. E. Janes. Extracts from a paper read before the students of the University of California. The first notable success with the cyanide process in America was made at the Mercur mine. The peculiar nature of the ore seems to be adapted to the cyanide process. 2400 w. Min & Sci Pr—May 23, 1896.

New Cyaniding Plants at Mercur, Utah. An account of two important new plants soon to be put up. 900 w. Eng & Min Jour—July 31, 1897.

Some Observations on Practice of the Cyanide Process at Mercur, Utah. William Magenau. A classification of the ores based on the mode of treatment is given, with outline and notes concerning the treatment of the oxidised ore. 1st part. Serial. 2500 w. Min & Sci Pr—April 21, 1900.

The Largest Cyanide Gold Reduction Works in the World. W. P. Hardesty. An interesting account of the Golden Gate Mill of De La Mar's Mercur Mines Co., Mercur, Utah. Ill. 3500 w. Eng News—May 19, 1898.

Utah's Latest Triumph. An illustrated detailed description of the great De La Mar cyanide plant at Mercur, and its operation. 3000 w. Min Rept—July 21, 1898.

See also **GOLD MINES—Mercur, Utah.**

**Modifications.**—Some Modifications of the Cyanide Process. Brief abstracts of description of modifications proposed by European workers. The Pape-Henneberg and Koepner-Diehl combination process, and the Netto process. 1700 w. Min & Sci Pr—Jan. 28, 1899.

**Netto.**—The Netto Process for the Treatment of Gold and Silver Ores (Le Procédé Max Netto pour le Traitement des Minerals d'Or et d'Argent). L. Legrand. A description of a modified cyanide process as used at the mines at Horcajo, Spain. 3000 w. Rev Univ des Mines—Feb., 1899.

**New Zealand.**—Cyaniding in New Zealand. James Park. Describes the geological conditions of the Hauraki peninsula and the treatment of the ores. 5500 w. Trans Am Inst Min Engs—Sept., 1899.

**Nova Scotia.**—The Cyanide Process as Applied to the Concentrates from a Nova Scotia Gold Ore. Richard W. Lodge. Reprinted from Trans. of Am. Inst. of Min. Engs., Florida meeting, March, 1896. Work of W. A. Tucker which seems to disprove the view that the presence of arsenic interferes with the extraction of gold by the cyanide method. 800 w. Tech Quar—Dec., 1896.

**Oxygen.**—Notes on the Application of Oxygen in the Cyanide Process. H. T. Durant. Considers the use of atmospheric or molecular oxygen, and the methods of application, giving the results of experiments made. Ill. 1800 w. Jour of Chem & Met Soc of S Africa—May, 1898.

**Oxygen Estimation.**—The Estimation of Oxygen in Working Cyanide Solutions. Andrew F. Crosse. A contribution to analytical chemistry giving a simple method of determining the amount of oxygen in cyanide solutions. 3300 w. Jour of Chem & Met Soc of S Africa—Aug., 1898.

**Patents.**—Are the Cyanide Patents Invalid? J. S. C. Wells. Contending that the processes of dissolving gold in cyanide and of the precipitating it by zinc are public property. 3700 w. Eng Mag—Aug., 1896.

How Germany Cancelled the Cyanide Patent. G. G. Turri. A translation of the decision of the Imperial German Court by which the cyanide patent was cancelled. The argument is given in full. 2400 w. Aust Min Stand—Jan. 30, 1896.

The Cyanide Patent. G. Massey. Particulars prepared for the benefit of a meeting to take steps to contest the amendment of the cyanide patent. Claiming the right of free use of the dilute solution of cyanide for the extraction of precious metals. 2200 w. Aust Min Stand—April 8, 1897.

The Cyanide Process of Gold Extraction—Discovered 43 Years ago. J. C. Montgomerie. Showing why the patents held should not be valid. 1800 w. Aust Min Stand—Dec. 14, 1895.

The Cyanide Process of Gold Extraction. John C. Montgomerie. A letter to the editor giving reasons why the MacArthur-Forrest patents are not valid. 2000 w. Min & Sci Pr—Nov. 30, 1895.

**Patent, Transvaal.**—The Cyanide Process Patents Declared Void in the Transvaal. An account of the use of this process in South Africa, the large amount of gold recovered by it, the heavy royalties, and the successful effort to have the patent set aside in South Africa. It is believed that it will result in a general overthrow which will cause immense additions to the world's stock of gold. 2300 w. Sci Am—Nov. 14, 1896.

The Cyanide Patent Decision in the Transvaal. An account of the case and the effect the decision will have in the Transvaal, with some information relating to other countries, and a brief summary of the history of the cyanide patents. 1800 w. Eng & Min Jour—Nov. 14, 1896.

**Pelatan—Clerici.**—See **GOLD METALLURGY.**

**Roasting.**—Roasting Previous to Cyaniding. Wallace MacGregor. Presents the advantages of this method in certain cases, and gives suggestions. 1000 w. Eng & Min Jour—Aug. 14, 1897.

**Selective Action.**—On the So-Called "Selective Action." James Mactear. A paper read before a meeting of the Inst. of Mining and Metallurgy, tending to prove that there is no "selective action," but rather that a greater proportion of base metal is dissolved by cyanide. 4400 w. Min Jour—Nov. 23, 1895.

**Siemens-Halske.**—Gold, Zinc, and Electrolysis (Gold, Zink, und Electrolyse). A paper by E. Andreoli discussing the Siemens method of reducing gold from a cyanide solution by electrical deposition, instead of zinc shavings. 3500 w. Elektrochem Zeitschr—Oct., 1897.

The Electro-Deposition of Gold in the Transvaal (L'Electrodéposition de l'Or au Transvaal). Dr. Andréoli. An account of the practical operation of the Siemens & Halske process in South Africa. Serial. Electricien—Oct. 1, 1898.

The Siemens & Halske Process in the Transvaal (Der Siemens & Halske Prozess in Transvaal). H. Pauli. Showing the extent to which the process has been introduced, and its advantages over the MacArthur-Forrest process. 1200 w. Zeitschr f Elektrochemie—Sept. 1, 1898.

See also **GOLD METALLURGY—Electrolytic.**

**Slimes.**—Cyaniding Slimy Ores and Tailings. Matt. W. Alderson. Part first is a brief historical account of the early attempts to treat slimes in Montana. Serial. Min & Sci Pr—June 3, 1899.

Discrepancies in Slime Treatment. W. A. Caldecott. Notes on the assays of slime residues for total gold, and on the determination of the specific gravity of dry slimes. Also discussion. 4000 w. Jour Chem & Met Soc of S Africa—July, 1898.

Discrepancies in Slime Treatment. Discussion and correspondence on the paper of W. A. Caldecott. 4300 w. Jour of Chem & Met Soc of S Africa—Sept., 1898.

The Treatment of Battery Slimes. Discussion on J. R. Williams' paper by the society members. 2800 w. Chem & Met Soc of S Africa—Sept. 18, 1897.

The Treatment of Slimes. Arthur J. Chappell. Describes method of treatment found successful; claiming the advantages of efficiency, cheapness and freedom of user. Consists in agitation and precipitation of the slimes, and the drawing off of the solution from the top. 600 w. Aust Min Stand—June 24, 1897.

The Treatment of Slimes in the Transvaal (Traitement des Slimes au Transvaal). A review by M. Schiff, of J. R. Williams' paper on the electrical treatment of cyanide slimes by the Siemens & Halske method. 3000 w. Génie Civil—Nov. 13, 1897.

The Economic Treatment of Slimes. Charles Butters. Valedictory address of the president of the Chem. & Met Soc. of S. Africa. States the general features of the slimes problem, and the work of the writer in this field. Also discussion. 9000 w. Jour of Chem & Met Soc of S Africa—Feb., 1898.

Treatment of Slimes.W. B. Gray. Gives experience in the treatment of the water which overflows from the cyanide vats and carries off the slimes in suspension, dealing with the collection of the slimes, their treatment by cyanide, and the precipitation of the gold by charcoal. 1500 w. Trans Aust Inst of Min Engs—Vol. V.

See also **GOLD METALLURGY.**

**Slime-Sorting.**—The Spitzkasten and Settling Tank. R. H. Richards and C. E. Locke. The means of slime-sorting approved in the old country is discussed and the writer's investigations given. 3300 w. Trans Am Inst of Min Engs—March, 1897.

**Solvent Powers.**—The Solvent Powers of Cyanogen. William Skey. Condensed paper describing tests made and giving some facts ascertained. 900 w. Min & Sci Pr—Jan. 15, 1898.

**South Africa.**—Applications of the Cyanide Processes in South Africa. Charles Butters. Abstract of a lecture before the Chemical Section of the Science Assn. of the University of California. Gives the working details and method of treatment. 800 w. Eng and Min Jour—March 6, 1897.

**Stamp Milling.**—The Stamp Milling of Gold Ores in its Relation to Cyaniding. Discussion of paper by E. H. Johnson. 4400 w. Chem & Met Soc of S Africa—Jan. 29, 1898.

The Stamp Milling of Gold Ore in Its Relation to Cyaniding. E. H. Johnson. A continued discussion of this paper. 6500 w. Jour of Chem & Met Soc of S Africa—April, 1898.

**Sulphide Ores.**—Cyaniding Sulphide Gold Ores. R. Recknagel. Remarks on this subject, causes of failures, differences in extraction, etc. 3800 w. Eng & Min Jour—Nov. 13, 1897.

**Tailings.**—Notes on the Treatment of Tailings by the Cyanide Process at the Standard Consolidated Mines, Bodie, California. Thomas H. Leggett. Paper read before the Inst. of Mining and Metallurgy. Detailed statement of time required, quantities, and values involved in the process are given. including cost of treatment, supplies consumed and value of products. 400 w. Min Jour—Jan. 4, 1896.

The Treatment of Tailings in the Witwatersrand. E. P. Chester. Illustrated description of the process in use. 1100 w. Eng & Min Jour—July 2, 1898.

The Treatment of Tailings by the Cyanide Process. John Yates. A comparison of the zinc and electrical methods, with a short description of the plant and appliances required in each. 1st part. Serial. 1900 w. Aust Min Stand—March 11, 1897.

Treating Tailings by Cyanide. Describes the adaptation of the process to the special difficulties met with in the treatment of tailings. 1100 w. W Min Wld—Aug. 15, 1896.

**Taylor Mine, California.**—Method of Working at the Taylor Mine Cyanide Plant, El Dorado County, Cal. E. F. Gropello. Illustrated detailed description of the plant and its operation. 1400 w. Min & Sci Pr—Oct. 28, 1899.

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**Utica Mine.**—The Cyanide Process at the Utica Mine. Thomas N. Smith. The process is limited to the slimes saved at the canvas plant. The work is explained, and a statement given showing results. 700 w. Min & Sci Pr—Oct. 1, 1896.

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**Paris.**—The Cyclone of June 18 (Le Cyclone du 18 Juin). An account of the damage done in the vicinity of Paris, with a suggestion as to the imbedding of metal in masonry, in order to resist sudden tensional stresses. 1500 w. Rev Tech—July 10, 1897.

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See also **WIND PRESSURE.**

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**Electric.**—Chase Electric Cyclorama. Illustrated description of an apparatus devised by Charles A. Chase consisting of "an ingenious combination of arc lamps, fed from rubbing contacts on a circular track suspended from the ceiling of an exhibition room, and an arrangement of especially devised projecting lenses and a continuous photographic film, with the necessary mechanism for blending and adjusting the projected sections of the picture in one complete cycloramic view. 900 w. W Elec—Nov. 16, 1895.

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**Vienna.**—The Cyclorama Building in the Prater at Vienna (Rundgemälde-Gebäude im Prater in Wien). Oskar Marmorek. With view of entrance, and plan on section showing details of construction. 1000 w. Wiener Bauindustrie Zeitung—July 6, 1899.

**CYLINDER.**

See also **STEAM ENGINE.**

**Boring.**—See **BORING—Cylinder.**

**Cast Iron.**—Smeaton and the First Use of Cast Iron Blowing Cylinders. Frank Firmstone. A review of the records and their probable correctness, concluding on the probable use between 1765 and 1768. 1400 w. Eng & Min Jour—Nov. 19, 1898.

**Compound Engines.**—Cylinders for Compound Engines. Tables for computing the sizes of cylinders for compound engines arranged for both condensing and non-condensing, with boiler pressures varying by increments of 10 lbs. from 80 to 250 lbs. per square inch above the atmosphere. 600 w. Mech Wld—July 29, 1898.

**Corliss.**—Making Corliss Cylinders. Joseph Horner. Illustrated description of the methods employed in construction. Serial. Mech Wld—April 28, 1899.

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**Smeaton.**—See **Cast Iron.**

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**CYLINDER-HEAD STUDS.**

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The Repair and Extension of the Sweetwater Dam. H. N. Savage. An illustrated description of the construction of the curved masonry dam, and its repair and raising after being overtopped by heavy flood. 3000 w. Eng Rec—March 12, 1898.

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The Castlewood Dam. A. M. Welles. Illustrated description of a dam of loose rocks faced with cement mortar masonry, built across a torrential stream near Denver. 2400 w. Eng Rec—Dec. 24, 1898.

The Castlewood Rock-Fill Dam and the Canal of the Denver Land & Water Co. W. P. Hardesty. Describes the system of this company, which was formed for the purpose of storing water and using it to irrigate land in the vicinity of the city. 4500 w. Eng & Min Jour—Feb. 9, 1899.

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**Clinton, Mass.**—The Clinton, Mass., Dam. Describes the huge dam about to be built by the Metropolitan Water Commission of Boston. It will retain the largest amount of water ever stored in any reservoir, amounting to 65,000,000,000 gallons. 1300 w. Fire & Water—Dec. 12, 1896.

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**Concrete.**—See **Arched; Cold Springs, N. Y.; Coosa River, Ala.; Muchkundi, India; Rock Island Arsenal; Scioto River, O.**

**Concrete and Steel.**—See **Steel and Concrete.**

**Coosa River, Ala.**—Concrete Dams on the Coosa River, Alabama. Charles Firth. These government improvements will open up 776 miles of river waterway to steamboats. The work was carried out by U. S. engineers, and is fully described. Ill. 1700 w. Eng News—Feb. 20, 1896.

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**Croton.**—Progress on the New Croton Dam. Recent views of the work with report of the progress and the amount of excavation and other work already accomplished. 1500 w. Eng News—Oct. 20, 1898.

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**Davis Island, Ohio River.**—See **Bear Trap.**

**Drum.**—Modified Drum Weir. H. M. Chittenden. Consideration of the modified drum weir; the principal difficulties in dealing with any of the bear trap forms of movable gate are stated; and the advantages in this form are noted. Ill. 1800 w. Jour Assn of Eng Soc—June, 1896.

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**Earth Backing.**—Earth Backing for Masonry Dams. E. S. Gould. A theoretical demonstration that an earth-fill behind a masonry dam diminishes the pressure coming on it. 1000 w. Eng Rec—Dec. 23, 1899.

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**East Canyon Creek, Utah.**—East Canyon Creek Dam, Utah. M. S. Parker. Illustrated description of a rock-fill dam with a steel core in asphalt concrete. 2000 w. Eng Rec—Sept. 2, 1899.

**Fishway.**—See **FISHWAY.**

**Floating.**—See **WATER WHEEL—Von der Heydt.**

**Foundation.**—See **FOUNDATION—Herr Island Lock and Dam.**

**Framing Resistance.**—The Resistance of Dam Framing (La Résistance de Fermettes de Barrages). M. Claise. Giving the results of tests of the strength of the frames used to support the sections of a movable dam of the needle type, and the method adopted to increase stiffness. 3000 w. 1 plate. Ann des Ponts et Chaussées—4 Trimestre, 1899.

**Gila River.**—See **DIAMOND DRILLING.**

**Gileppe.**—The Gileppe Dam. Illustrated description of one of the great dams of the world. 600 w. Eng Rec—Oct. 17, 1896.

**Godavery, India.**—Falling Shutters, Godavery Anicut. J. C. Larminie. Describes the falling shutters substituted in lieu of a permanent raising of the anicut by two feet. Ill. 600 w. Ind Engng—Dec. 18, 1897.

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**Great Kanawha River, W. Va.**—See **Movable; LOCK; RIVER REGULATION.**

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The Hemet Dam, California. A plan profile and cross-section of this arched masonry dam, with a few facts regarding it. 800 w. Eng News—March 24, 1898.

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**Holyoke, Mass.**—The New Holyoke Water Power Dam. Sanford E. Thompson. Describes the construction of the present wooden dam, and the repairs that have been necessary, and gives details of the new stone dam, the materials, special tests and contract work. Ill. 7000 w. Eng News—May 13, 1897.

The New Masonry Dam at Holyoke. Illustrated description of a dam across the Connecticut River which has an unusual profile on the downstream face, and is being laid with special precautions to secure good workmanship. 1800 w. Eng Rec—July 22, 1899.

**Indian River, N. Y.**—The Indian River Dam. George W. Rafter, Wallace Greenalch and Robert E. Horton. Gives facts relating to the water storage in this Adirondack region, and a general description of the area; also an illustrated description of the construction of the dam. 9500 w. Eng News—May 18, 1899.

**Iron Sheeting.**—Reservoir Dams with Iron Sheeting. Thomas Thomson. An investigation of the points in favor of a dam constructed in this manner. The only disadvantage is fear of corrosion, but with proper precautions the writer thinks it can be so constructed as to last centuries. The cost is only about one-third of that for masonry dam construction. 1800 w. Engr, Lond—May 8, 1896.

**Johannesburg.**—Building an Impounding Dam for Storage Reservoir for the Consolidated Gold Fields, Johannesburg, South Africa. Frank B. Knight. Illustrated description of interesting mechanical appliances. 900 w. Mines & Min—May, 1900.

**Kampsville, Ill.**—The Kampsville Dam. S. T. Morse. Illustrated description of the location, design and construction, with time, cost and durability statement. 1700 w. Tech—May, 1896.

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**Masonry.**—The Computation of Masonry Dams for Reservoirs (Calcul des Barrages de Réservoirs en Maçonnerie). M. Barbet. Discussing and extending the recent treatment by M. Maurice Lévy, based upon the elastic theory. 8000 w. Ann des Ponts et Chaussées—2 Trimestre, 1898.

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**Merthyr Tydfil.**—See **WATERWORKS.**

**Mine.**—Mine Dams. James McNaughton. Read before the Lake Superior Min. Inst. Describes how they are built to withstand heavy pressures in the iron mining district of Michigan. 2000 w. Mines & Min—May, 1900.

**Mine, Bohemia.**—The Construction of a Concrete Dam in the 18 Heading of the Lillschächt Mine at Pribram (Ueber den Bau eines Betondammes am 18 Laufes des Lillsschächter-Ostschlages in Pribram). W. Oppe. Describing the construction of an arched dam filled with concrete to hold back the water in an important mine in Bohemia. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 20, 1900.

**Minneapolis.**—A New Dam at Minneapolis. H. M. F. Dahl. A general description of the dam built below the falls for the purpose of utilizing the power. Ill. 1700 w. Eng's Year Book, Univ of Minn—1897.

**Model Tests.**—Investigation of the Distribution of Pressure on the Base of Dams, by Tests Made on an Elastic Model. F. F. Hall. Illustrated description of the apparatus used and method of experimenting, discussing results. 4000 w. Trans Assn of Civ Engs of Cornell Univ—1900.

**Morena, California.**—California's Big Dam. Helen H. Gardener. Interesting information and popular account of the great Morena Dam, near San Diego, and its construction. 2500 w. Harper's Wk—Jan. 8, 1898.

**Movable.**—A Design for a Movable Dam. B. F. Thomas. Describes a style of trestle applicable to any of the places now occupied by the Poirée trestle, and which has the advantage of requiring a much less depth of sill for its protection. 800 w. Jour Assn of Engng Soc—June, 1896.

Lifting Dam. Amos Stickney. The movable dam here described is one designed by the writer for closing the navigable pass at Dam No. 6, Ohio River. 1800 w. Jour Assn of Engng Soc—June, 1896.

Movable Dams on the Great Kanawha River, West Virginia. Photographs, general elevation and notes describing this work. 1000 w. Eng News—Dec. 31, 1896.

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See also **Bear Trap; Drum; Godavery, India; Needle.**

**Muchkundi, India.**—The Muchkundi Dam. Illustrated description of a concrete dam in India, forming an irrigation reservoir intended to store water for distribution in the plains at a lower level. 800 w. Engr, Lond—Oct. 22, 1897.

**Nashua, N. H.**—See **Arched.**

**Needle.**—See also **Movable.**

**Needle, Big Sandy River.**—Movable Dams. B. F. Thomas. Valuable information on this subject with a description of the needle dam recently completed on the Big Sandy River at Louisa, Ky., and urging the construction of movable dams of higher lift on American rivers. Ill. 57500 w. Pro Am Soc of Civ Engs—Feb., 1898.

The Movable Dam on the Big Sandy River Barrage Mobile du Big Sandy. A French account of this important needle-dam on the Big Sandy River, Kentucky. 3000 w. 1 plate. Génie Civil—May 14, 1898.

The New U. S. Government Needle Dam at Louisa, Ky., on the Big Sandy River. Illustrates and describes the construction and operation. 5400 w. Eng News—July 7, 1898.

**Needle, Meuse River.**—Needle Dams (Les Barrages à Aiguilles). Describing the difficulties in operating the movable dams on the Meuse, and the improvements devised by M. Baudisson. 4500 w. 1 plate. Ann des Ponts et Chaussées—Part II., 1897.

The Movable Dam on the French Meuse (Eine Variation der Stauanlagen der Französichen Meuse). Description of the combined needle and shutter dam for the control of the level of the River Meuse in connection with the Eastern Canal of France. 2000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1897.

**New South Wales.**—The Big Dam at Junction Point (N. S. W). Particulars of the greatest engineering work of the kind in construction with mining in New South Wales. The dam across the Belubula River. 1100 w. Aust Min Stand—Jan. 28, 1897.

**Niagara River.**—See **GREAT LAKES—Levels.**

**Ochoa, Nicaragua.**—The Ochoa Dam. Illustrates and describes the nature of the structure which forms the key to the latest proposition for a Nicaragua Canal, with typical cross-sections of the canal. 700 w. Eng Rec—May 13, 1899.

**Ogden, Utah.**—See **Arched.**

**Ohio River.**—See **Bear Trap; Movable.**

**Osage River.**—See **Drum.**

**Otay, Cal.**—A Rock-Fill Dam with a Steel Heart-wall at Otay, Cal. One of the three reservoirs for the water supply of San Diego. The construction is illustrated and described. 3700 w. Eng News—March 10, 1898.

**Periae, India.**—The Periae Dam. J. S. Chandler. Illustration and brief description of this great dam in India, which provides irrigation for 150-000 acres of land. 500 w. Sci Am Sup—April 8, 1899.

**Profiles.**—Profiles for Masonry Dams (Profils des Barrages en Maçonnerie). M. Pelletrau. An analytical investigation of ordinary profiles and suggestions of a method of reinforcement giving greatly increased strength. 30000 w. 1 plate. Ann des Ponts et Chaussées—Pt. I., 1897.

**Remscheid and Chemnitz, Saxony.**—See **Arched.**

**Rock-Fill.**—Rock Dams with Metallic Reinforcement (Barrages-Réservoirs en Remblai Rocheux). A. Dumas. With illustrations of important reservoir-dams in California, constructed with sheet-iron core, and stone embankment. 3000 w. Génie Civil—Oct. 21, 1899.

See also **Castlewood; Goose-Neck Canyon; Otay, Cal.**

**Rock Island Arsenal.**—Concrete Water Power Dam at Rock Island Arsenal. Odus C. Horney. Illustrated description of the construction, and report of a series of tests of importance, also discussion. Ill. 6800 w. Jour W Soc of Engs—June, 1897.

**Rock River, Ill.**—A Low Crib Dam Across Rock River. J. W. Woermann. Illustrated description of one of the structures of the Illinois and Mississippi Canal, built for the purpose of furnishing slack water navigation in Rock River above the Lower Rapids. The crib-work, or dam proper, only are considered in this paper. 3800 w. Jour Assn of Engng Soc—July, 1896.

**Sandy Lake, Minn.**—See **Bear Trap.**

**San Juan River, Argentina.**—Regulating Dam in the San Juan River (Digue Nivelador, Rio San Juan). José S. Corte. A general description of the dam and of its partial destruction in Dec., 1898, with numerous photographs. 2500 w. 3 plates. La Ingeneria—Dec. 31, 1899.

**Scioto River, Ohio.**—Specifications for a Large Concrete Dam. Reviews the leading features of some unusual specifications for a structure to be built across the Scioto River. 900 w. Eng Rec—Oct. 29, 1898.

**Sidhnai, India.**—The Sidhnai Weir, River Ravi, Punjab. An interesting description with illustrations. 2000 w. Ind & East Eng—July, 1896.

**Southbridge, Mass.**—The Southbridge, Mass., Dam. Brief illustrated description of dam for the new water supply. 500 w. Eng Rec—Sept. 12, 1896.

**South Yuba River, Cal.**—The Nevada County Electric Power Company's Dam in the South Yuba River. The dam is forty feet deep, 28 ft. high, and 206 ft. long; it is built of timber cribbing bolted to the rock bottom and weighted with 9000 tons of broken granite. Pelton wheels working under 206 ft. head, drive two 300-K. W. Stanley transformers, furnishing light and power to Grass Valley and Nevada City and adjacent mines. Ill. 500 w. Min & Sci Pr—Feb. 8, 1896.

**Steel.**—Steel Dam at Ash Fork, Arizona, A. T. & S. F. Ry. Illustrated description of a dam 184 ft. long on top, consisting of a series of triangular steel frames, resting on concrete foundations, and carrying steel face plates on the upstream face. 2500 w. Eng News—May 12, 1898.

The Use of Steel in the Construction of Dams and Reservoirs. John S. Fielding. Considers steel as the proper material with which to construct a dam or reservoir and discusses the designs. Ill. 2800 w. Can Arch—Aug., 1897.

Steel Weir, Ash Fork, Ariz. Describes a dam 184-ft. long and 50-ft. deep, formed of steel frames faced with steel plates. Ill. 900 w. Eng Rec—April 9, 1898.

**Steel-Concrete.**—Proposed Design for a Steel and Concrete Dam. John S. Fielding. Illustrates and describes a truss design, discussing its advantages. 2200 w. Eng News—Nov. 16, 1899.

**Sweetwater, Cal.—See Arched.**

**Trapezoidal Formula.**—The Use of the Trapezoidal Formula in the Study of the Resistance of Masonry Dams (Sur la Légitimité de la Régle dite du Trapèse dans l'Etude de la Résistance des Barrages en Maçonnerie). Maurice Lévy. A discussion of the extent to which the trapezoidal formula may safely be used, having reference to the failure of the Bouzey dam. 2500 w. Comptes Rendus—May 2, 1898.

**Wachusett, Mass.**—Geology of the Wachusett Dam and Wachusett Aqueduct Tunnel of the Metropolitan Water Works in the Vicinity of Clinton, Mass. W. O. Crosby. The present paper considers the hard rocks of this district, their distribution, characters, and general relations, with the structural details of the site of the dam. Ill. 11000 w. Tech Quar—June, 1899.

The Wachusett Dam. Illustrated description of a masonry dam of unusually heavy section, over 200 ft. high, for the Metropolitan Water Board of Massachusetts. The first part describes the site, the character of the masonry and the gate chambers. Serial. Eng Rec—Sept. 8, 1900.

The Wachusett Dam for the Metropolitan Water Supply, Boston, Mass. Alfred D. Flinn. An elaborately illustrated description of the proposed great masonry dam, with selected passages from the specifications. 1 plate. 8000 w. Eng News—Sept. 13, 1900.

## DAM FAILURE.

See also **DAM.**

**Austin.**—Municipal Ownership at Austin, Texas. W. D. Hornaday. Illustrates and describes the serious condition of the great dam across the Colorado River. 1000 w. Elec Wld & Engr—Oct. 14, 1899.

The Silting-Up of Lake McDonald and the Leak at the Austin Dam. Thomas U. Taylor. Information relating to the amount of silt deposited, with explanation of theory, an illustrated description of leaks occurring and means of remedying them. 1600 w. Eng News—Feb. 22, 1900.

Failure of the Great Masonry Dam Across the Colorado River at Austin, Tex. Illustrated description of the break which occurred on April 7, with an outline of preceding troubles, and review of the work. 2000 w. Eng News—April 12, 1900.

Soundings and Measurements at the Break in the Austin Dam. Thomas U. Taylor. Report of soundings made by the writer on June 9. Ill. 450 w. Eng News—June 21, 1900.

More Light on the Failure of the Austin Dam. Thomas U. Taylor. Facts explaining some discussed points and discussion of the cause of the break and the possible solutions of the problem of water and lights. 2000 w. Eng News—May 10, 1900.

The Failure of the Austin Dam. Reports of the failure from T. U. Taylor, H. M. Chance, and A. B. Roome, with illustrations. 6000 w. Eng News—April 19, 1900.

The Failure of the Austin Dam. Illustrated description of the construction of this masonry dam, 1275 feet long and 68 feet high, of the overflow type, which was wrecked by a flood. 2200 w. Eng Rec—April 14, 1900.

Concerning the Austin Dam. R. D. Parker. Illustrated reports from various sources on the results of soundings at low water to determine the manner of failure of a 67-ft. masonry dam; these points point to undermining as the cause. 1700 w. Eng Rec—June 30, 1900.

The Failure of the Austin Dam. William von Rosenberg, Jr. Illustrated description of the erosion of the river bed at the toe of a 60-ft. masonry dam, subsequently washed away. 900 w. Eng Rec—May 19, 1900.

Failure of the Austin Dam. R. D. Parker. Illustrated description of the failure of a 68-ft. masonry dam, written by an engineer who was at the scene soon after the accident, and personally interviewed reliable witnesses of the break. 1000 w. Eng Rec—April 21, 1900.

Some Considerations Regarding the Failure of the Austin Dam. An editorial discussion on the importance of making a perfect jointure between the base of a dam and the bed rock. 1000 w. Eng Rec—May 26, 1900.

Speculation Suggested by the Austin Dam. W. R. Hutton. Letter discussing the effect of overflow on river bed below dam. 1000 w. Eng Rec—June 9, 1900.

The Austin Dam Failure. Letter from C. Baillairge urging the construction of dams and retaining walls of a thickness equal to their height. 1100 w. Eng Rec—May 19, 1900.

The Austin Dam. Report by H. B. Patterson, in charge of this 60-ft. masonry dam, describing the reason for its recent failure. 900 w. Eng Rec—July 28, 1900.

The Failure of the Masonry Dam at Austin, Tex. Brief illustrated description, with remarks on the probable cause of the disaster. 1000 w. Sci Am—April 28, 1900.

**Bouzey, France.**—Failure of the Great Dam of Bouzey. General remarks on this and other dam failures. 3600 w. Eng, Lond—Jan. 17, 1896.

The Failure of the Bouzey Dam (Rupture de la Digue de Bouzey). A Dumas. A discussion of the testimony before the French Courts, showing the failure to have been due to defective design and construction. Three articles. 9000 w. Génie Civil—July 10, 17, 24, 1897.

The Failure of the Bouzey Dam. Editorial on the results of the official inquiry into the cause of the failure. 2000 w. Eng, Lond—Sept. 10, 1897.

See also **DAM—Trapezoidal Formula.**

**Butte, Mont.**—Partial Failure of the Timber Crib Dam of the Montana Power Company, near Butte, Montana. M. S. Parker. Gives a general description and details of the causes of the partial failure, with the object of calling engineers' attention to elements to be guarded against in the construction of such dams, and the precautions necessary. Ill. 9000 w. Jour Assn of Engng Socs—April, 1899.

Partial Failure of Timber Dam near Butte, Mont. M. S. Parker. Illustrates and describes the injury that occurred during a period of high water, lasting for several days, showing that care should be taken to secure sufficient bearing surface for the timbers composing the crib to support the pressure and take up the compression. 1200 w. Eng Rec—Aug. 6, 1898.

**California.**—The Failure of the Snake Ravine Dam, Turlock Irrigation District, California. J. B. Lippincott. Gives the history of this dam, with comments on the Wright Act, which provides for district irrigation in California. Ill. 1800 w. Eng News—Oct. 20, 1898.

**Denver Water Co.**—Accident to the Partially Built Dam of the Denver Union Water Co. Views and particulars of the structure and accident. 500 w. Eng News—May 17, 1900.

**Fishkill Reservoir.**—The Failure of the Melzingah Dams of the Fishkill and Matteawan Water Co. Illustrated study of the accident. 3000 w. Eng News—July 22, 1897.

Two Reservoirs Burst. Illustrated description of the bursting of the Melzingah reservoirs, 500 feet up the Fishkill Mountains. 600 w. Fire & Water—July 17, 1897.

**Minneapolis, Minn.**—Failure of a Minneapolis Dam by Ice Pressure. Illustrated description of the overthrow of a stone wing dam after it was weakened by ice pressure. 1100 w. Eng Rec—May 13, 1899.

Failure of Dam at Minneapolis Due to Previous Weakening Through Ice Pressure. James W. Rickey. An illustrated account of the failure of a portion of the main dam which controls the falls of the Mississippi River. 800 w. Eng News—May 11, 1899.

**Prescott, Ariz.**—The Failure of the Lynx Creek Masonry Dam, near Prescott, Arizona. Jas. D. Schuyler. Notes on this disaster with photographs taken on a recent visit. 1200 w. Eng News—June 9, 1898.

**St. Anthony Falls.**—Effects of Mississippi River Floods on the New St. Anthony Falls Dam at Minneapolis. Horace B. Hudson. The conditions under which the break occurred are stated, and illustrations showing the appearance of the dam. 700 w. Eng News—May 13, 1897.

**Tampa, Fla.**—The Destruction of a Dam at Tampa. Illustrated description of a dam failure caused by a dynamite explosion. 500 w. Eng Rec—Dec. 31, 1898.

**DECIMAL SYSTEM.**

See also **GAUGE; SCREW THREAD; WEIGHTS and MEASURES.**

The Extension of the Decimal System to the Day and to the Circle (Sur l'Extension du Système Décimal au Jour et au Cercle). M. Rey-Pailhade. Presenting the arguments in favor of the practical advantages of the change from the sexagesimal to the decimal division of the circle and the day. 1200 w. Comptes Rendus—Feb. 14, 1898.

**American Steel Manufacturers' Assoc.**—The Decimal System of Gauging Adopted by the American Steel Manufacturers' Association. Report of committee favoring and recommending the adoption of a decimal gauge which will measure all materials in thousandths of an inch. The form of gauge is illustrated. 3000 w. Ir Age—Oct. 29, 1896.

**Time.**—Decimal Division of the Hour (Décimalisation de l'Heure). A discussion of the propositions of the government commission as to the decimal sub-division of the hour and of the circle, by the Society of Civil Engineers of France. 1200 w. Rev Tech—July 10, 1897.

The System of Decimal Time (Sur la Système de l'Heure Decimale). An abstract of a report upon the decimal sub-division of the hour, with its relations to the divisions of the day and the circle, presented to the French Academy by M. D. Sarranton. 1500 w. Comptes Rendus—Jan. 17, 1898.

**United States.**—Decimal Numeration in the United States. E. E. Slosson. The use of it is regarded as on the increase, and the author appears to anticipate its general adoption. 1800 w. Science—July 17, 1896.

**DELIVERY WAGON.**

**Electric vs. Horse.**—See **ELECTRIC VEHICLE—Delivery Wagon.**

**DEPARTMENT STORE.**

**Paris.**—The Dufayel Department Store (Un Palais Industriel: L'Administration Dufayel). An illustrated description of the new central building of the Dufayel system of department stores in Paris. 2000 w. Rev Tech—Aug. 10, 1899.

**DERRICK.**

See also **CRANE.**

**Building Erection.**—A Tower Derrick for Building Erection. Illustrated description of a special tower for handling material under exceptionally difficult conditions. 700 w. Eng Rec—June 16, 1900.

See also **GIRDER.**

**Design.**—The Design of Derricks. Benjamin F. La Rue. The object of the article is to explain how the stresses may be accurately computed and the material properly proportioned for the ordinary boom derrick. 2500 w. Stone—June, 1896.

**Extension Tower.**—An Extension Tower Derrick. Illustrated description of plant used satisfactorily on several high buildings in New York. 1200 w. Eng Rec—Jan. 7, 1899.

**Quarry.**—100-Ton Derrick at the Avondale Marble Quarries, Chester, Pa. Illustrated description of derrick and method of working quarry. 800 w. Eng News—Jan. 23, 1896.

**Skeleton Construction.**—A Compact Derrick for Skeleton Buildings. An illustrated description of a derrick used for over two years on both high and heavy iron erection. It has many advantages, is very light and quickly moved, raised and refastened and adjusted. 700 w. Eng Rec—June 5, 1897.

**DERRICK CAR.**

Derrick Car C., M. & St. P. Ry. Illustrates and describes a new form of derrick car used in connection with the bridge erection and track elevation work on the Chicago, Milwaukee & St. Paul road. 900 w. Ry & Engng Rev—Oct. 15, 1898.

**DESERT.**

Steppes, Deserts and Alkali Lands. E. W. Hilgard. An explanation is herein attempted, of the singular fact that the countries which have harbored most of the ancient civilizations are regions of deficient rainfall and compulsory irrigation; and an examination of the effect of deficient rainfall upon the character of soils in arid regions. 4800 w. Pop Sci M—March, 1896.

**DESTRUCTOR.**

See **REFUSE DISPOSAL.**

**DETROIT.**

Detroit: An Interesting City. A finely illustrated article describing the interesting features of the city and its municipal affairs. 3800 w. Munic Engng—Aug., 1898.

**DEWEY ARCH.**

See **ARCH—Dewey.**

**DIAMOND.**

**America.**—Emigrant Diamonds in America. William Herbert Hobbs. A study of the origin of diamonds found in the neighborhood of the Great Lakes. Ill. 3800 w. Am Pop Sci M—Nov., 1899.

**Brazil.**—Diamond and Gold Mining in Minas Geraes. Extracts from a report of this region by Mr. Dawson, who has recently visited the country. 8500 w. U S Cons Repts, No. 424—May 12, 1899.

The Diamond Fields of Brazil. Extracts from the U. S. Cons. Rept. of Minister Bryan, describing the various kinds of diamond mining. 2500 w. Stone—July, 1899.

**California.**—The Occurrence and Origin of Diamonds in California. H. W. Turner. Reports concerning the occurrence and number of diamonds found, with discussion of the origin. 8000 w. Am Geol—March, 1899.

**De Beers.**—A Big Diamond Deal. W. S. Dowel. An account of the De Beers purchase, and the cashing of a check for £5,338,650. 1200 w. Aust Min Stand—March 1, 1900.

**Deposits.**—Diamonds, Where They Occur and How to Search for Them. Melville Attwood. Describes the various types of placer deposits, and the methods of examining the gravel. 700 w. Eng & Min Jour—Aug. 15, 1896.

**Electric Furnace.**—See **ELECTRIC FURNACE—Moissan.**

**Kimberley.**—See **South Africa.**

**New South Wales.**—Diamonds in the Gwydir Valley (N. S. W.). L. O. B. Describes facts concerning them. 1500 w. Aust Min Stand—Jan. 7, 1897.

The Occurrence of Diamonds in New South Wales. A report by D. C. McLachlan, Under Secretary for Mines and Agriculture, Sydney, N. S. W. Thinks the diamond mining industry destined to become important in these areas. 1400 w. Jour Soc of Arts—Sept. 8, 1899.

**South Africa.**—The African Diamond Mines. An account of some of the early diamond discoveries in South Africa. A Boer, named Van Nickerk, produced the first large stone which he obtained from a witch doctor for £400 in "trade," sold it to Colony Jews for £11,200, and it is now reposing in the casket of a Countess, a 46½ caret gem, worth £25,000. Other similar instances are given. 2500 w. Aust Min Stand—Oct. 19, 1896.

The Development of the South African Diamond Fields. H. S. Canby. A study of the development of these mines. Part first deals principally with the alluvial or placer mines and dry diggings, giving interesting information. Serial. Yale Sci M—Nov., 1897.

The Diamond Industry of the Cape (L'Industrie Diamantifère au Cap). F. Schiff. A discussion of the geology and working details of the diamond mines of the Cape of Good Hope. 2500 w. Génie Civil—Aug. 18, 1900.

The Diamond Mines of Kimberley. History of the discovery and working of this great diamond field. Ill. 1400 w. Sci Am—Jan. 27, 1900.

The Diamond Mines of Kimberley. Dr. William Crookes. Two lectures delivered at the Imperial Inst. Interesting description of Kimberley, the mines, workings, etc. 6800 w. Nature—April 1, 1897.

The Kimberley Diamond Mines (Note sur l'Exploitation des Mines de Diamants à Kimberly). Albert Bordeaux. Treats of the geology of the regions, describes the principal mines, method of extracting and treating the rock, and gives a table of diamond production for eight years. 2 plates. 7000 w. Rev Universelle des Mines—Sept., 1898.

The Parent-Rock of the South African Diamond. T. G. Bonney. The substance of a paper, read before the Royal Society, giving an account of investigations made and conclusions reached. 1200 w. Nature—Oct. 26, 1899.

The South African Diamond District. Prepared by the Philadelphia Commercial Museum from South African correspondence. Where the diamonds occur and a description of the machinery and methods used in mining them. 2000 w. Mines & Min—Feb., 1899.

The South African Diamond Mines. William F. Booth. A brief sketch of their history and development, and how the gems are obtained from the clay. Ill. 1400 w. Col Eng—May, 1897.

**Steel.**—Diamonds in Steel (Les Diamants dans l'Acier). An account of the discovery of microscopic diamonds in steel, by Prof Rossel, of Berne. 1600 w. Génie Civil—May 15, 1897.

### DIAMOND DRILLING.

See also **MINING MACHINERY; PROSPECTING; SHAFT SINKING; WELL BORING.**

Diamond Drilling. H. M. Lane. Notes on the different devices and methods used in drilling, showing the circumstances which necessitate their application and the dangers to be guarded against. 4400 w. Mines & Min—Dec., 1899.

Diamond Drilling. H. M. Lane. Recovery of lost rods, bits and diamonds and methods of obtaining cores from soft or soluble material. 2000 w. Mines & Min—Nov., 1899.

Diamond Drilling Machines. H. M. Lane. Gives some of the peculiarities, advantages and disadvantages of the different types of machines in use, describing the feed arrangements, methods of uncovering the hole, hand drills and their capabilities, and a few facts as to costs. 4400 w. Mines & Min—Jan., 1900.

Exploring with the Govt. Diamond Drill. Thomas W. Gibson. The important aid to mining rendered by the diamond drill, a description of the instrument and practice in operating, are the subject of part first. Serial. Can Min Jour—May, 1896.

Practical Notes on Diamond Drilling. H. M. Lane. Illustrated description of the drilling apparatus and how to use it under various conditions. 3500 w. Mines & Min—Oct., 1899.

Prospecting with the Diamond Drill. J. Parke Channing. Showing the methods employed in the different classes of diamond drilling, the difficulties encountered, and the devices resorted to in case of mishap. Ill. 4500 w. Eng Mag—March, 1896.

The Diamond Drill in Prospecting. Some points on the manner of using. 1200 w. Min & Sci Pr—May 13, 1899.

**Drift.**—Determining the Deflection of Drill Holes. G. C. McFarlane. Illustrates a device which will determine the amount and direction of a drill hole's deflection at any point, which the writer believes to be more accurate than the methods in use. 500 w. Eng & Min Jour—Sept. 16, 1899.

Drift in Diamond-Drill Holes. H. M. Lane. On the amount of dependence that can be placed upon the apparent position of the end of the diamond-drill holes. 1900 w. Mines & Min—Aug., 1899.

**Gila River Dam.**—Exploration for Bed-Rock at Gila River Dam Sites with Diamond Core Drills. J. B. Lippincott. Illustrates and describes interesting investigations for the purpose of locating sites for reservoirs, thus furnishing water to irrigate the dry lands of Arizona. 2200 w. Eng News—Jan. 18, 1900.

**Setting Bits.**—Setting Diamond Drill Bits. Practical instructions, with illustrations, prepared by J. Parke Channing and published by the Sullivan Machinery Co. 900 w. Eng & Min Jour—July 15, 1899.

### DIE.

**Armature Blanks.**—Die for Punching Holes in Armature Blanks. William Baxter, Jr. Illustrated description. 1200 w. Am Mach—Feb. 10, 1898.

**Armature Cores.**—Dies for Punching Blanks for Grooved Armature Cores. William Baxter, Jr. Gives illustrated description of the forms designed by the writer for this use, with the objects sought to be accomplished. 1500 w. Am Mach—Sept. 23, 1897.

**Automatic Bending.**—An Automatic Bending Die. H. B. Harris. Illustrated description. 500 w. Am Mach—Aug. 31, 1899.

**Bottle Stoppers.**—Dies for Metal Bottle Stoppers. Joseph V. Woodward. Illustrated detailed description. 1500 w. Am Mach—Sept. 6, 1900.

**Cast Iron.**—Cast Iron Dies. R. I. Clegg. Particulars concerning the use and capacity, the molding and pattern making in getting out the dies and tools. Ill. 1300 w. Am Mach—May 11, 1899.

**Coining.**—The Making of Coining Dies (La Fabrication des Monnaies). Illustrating and describing the machine used at the Paris Mint for reproducing, on a reduced scale, the designs for dies, for coins, medals, etc. 1200 w. Génie Civil—April 15, 1899.

**Compound.**—A Compound Punching and Forming Die. W. E. Willis. Illustrated detailed description, with information relating to the working. 1300 w. Am Mach—Oct. 5, 1899.

Compound Dies. J. L. Lucas. Illustrations of compound dies and their work, with information regarding them. 1100 w. Am Mach—March 18, 1897.

Making a Compound Die for Punching an Irregular Piece in a Sub-press. Lundvald and Klute. Illustrated description of best method of construction. 1500 w. Am Mach—Dec. 28, 1899.

See **PRESS—Sub.**

**Compound Watch-Wheel.**—Making a Compound Watch-Wheel Die. Lundvall and Klute. Illustrated detailed description. 1800 w. Am Mach—Sept. 7, 1899.

**Construction.**—Die Construction. George B. Painter. An explanation of methods and rules to be observed. Ill. 2200 w. Am Mach—Jan. 5, 1899.

Die Construction. George B. Painter. Description and drawing showing a construction useful in duplicating shapes. 1500 w. Am Mach—April 6, 1899.

Die Construction. George B. Painter. Illustrated description of a combination shearing, piercing, bending and forming die, applicable to a large variety of press work. 800 w. Am Mach—Feb. 23, 1899.

Die Construction. George B. Painter. Illustrates a die for shearing and drawing a piece of sheet metal into the form of a cup with irregular edges. 700 w. Am Mach—July 20, 1899.

**Drawing.**—Drawing Dies. J. L. Lucas. Illustrated description of the work. 1100 w. Am Mach—Aug. 12, 1897.

**Forming.**—Some Special Forming Dies. Joseph V. Woodworth. Illustrates and describes dies for forming cold-rolled sheet steel, .048 inch thick, to shape shown. 900 w. Am Mach—Aug. 16, 1900.

Two Forming Dies. A. H. Cleaves. Illustrated description. 400 w. Am Mach—July 26, 1900.

**Manufacture.**—Relation of the Machinist's Trade to Die Making. George B. Painter. Presents some of the disadvantages due to the modern practice of dividing the work into sub-branches, and the limited knowledge of metal working. 1400 w. Am Mach—May 26, 1898.

Screw Testing and Die Making. Illustrated description of tools the writer has seen and used. 1200 w. Am Mach—April 28, 1898.

**Press Work.**—Bending Dies for Press Work. J. L. Lucas. Illustrated description of three dies for this class of work. 500 w. Am Mach—June 24, 1897.

**Punch.**—Making a Punch and Die in a High-Pressure Machine Shop. A. H. Cleaves. Illustrated description. 500 w. Am Mach—May 25, 1899.

**Screw.**—See **SCREW DIE.**

### DIELECTRIC.

See also **ELECTRO-PHYSICS; INSULATION; INSULATOR.**

Some Dielectrics and Their Insulating Properties. George T. Hanchett. Practical consideration of exceptions to the results given of the dielectric strength of insulators as measured by formulas. 1000 w. Elec Wld—Feb. 6, 1897.

**Loss.**—Energy Loss in Dielectrics. P. Gasnier. A review of what has already been done toward elucidating this question, and what are the conclusions which different experimenters have drawn from their work. 2200 w. Elect'n——Nov. 1. 1895.

**Losses.**—Energy Losses in Dielectrics. A review of the work done by investigators of this subject. 1200 w. Elect Rev, Lond—Dec. 27, 1895.

**Viscosity.**—The Viscosity of Polarized Dielectrics. Describes a method of testing that can be applied to very viscous liquids, and reviews results that have been obtained by experimenters. 1300 w. Elec Rev, Lond—Jan. 15, 1897.

**DIELECTRIC STRENGTH.**

Dielectric Strength. Jas. Rowland Bibbins. A brief exposition of results of various experiments, especial attention being given toward the establishment of a secondary standard for use in ordinary shop tests of materials and apparatus. 3500 w. Elec Wld & Engr—Aug. 25, 1900.

**Air.**—Dielectric Strength of Air. Charles Proteus Steinmetz. A report of tests made to investigate this subject, describing methods and giving results. 7500 w. Trans of Am Inst of Elec Engs—May, 1898.

**Oils.**—Dielectric Strength of Oils under Alternating Potentials. Elihu Thomson. Facts sustained by experiments and tests with oil. 1300 w. Elec Eng—Feb. 12, 1896.

Dielectric Strength of Oils. Charles Proteus Steinmetz. Calls attention to an interesting fact relating to their disruptive strength. 500 w. Elec Wld—Nov. 20, 1897.

**DIESEL MOTOR.**

See **OIL ENGINE; THERMODYNAMICS—Heat Motor Cycles.**

**DIKE.**

See **SHORE PROTECTION.**

**DIMENSIONAL FORMULAS.**

Theory of Dimensional Formulas. Percy H. Thomas. An interesting contribution to this subject. 1700 w. Elec Wld—Nov. 23, 1895.

**DISEASES OF OCCUPATIONS.**

The Diseases of Occupations. John S. Billings. Lecture before the Pratt Inst. The special diseases and accidents whose prevalency is increased by the various industries of civilization, or which are peculiar to particular industrial occupations are stated, with interesting facts connected therewith. 3500 w. Prog of Wld—Aug., 1896.

**DISINFECTION.**

See also **SANITATION.**

A Practical Point in the Use of Disinfectants and Antiseptics. A. G. Young. This article demonstrates that comparatively inefficient antiseptics may be made active and efficient by applying them at proper temperatures—as first intimated as possible by Koch, but until now, not much considered. Even a solution of common washing soda, when heated, becomes active as a disinfectant. 1600 w. San—Jan., 1896.

Practical Disinfection. Edward F. Willoughby. Unsatisfactory work of municipal authorities alleged, and suggestions for improved methods. Serial. San Rec—Dec. 6, 1895.

**Apparatus.**—A New Apparatus for Continuous and Automatic Disinfection (Ein neuer Apparat zur Kontinuirlichen und Automatischen Disinfektion). Dr. H. Köhler. The disinfecting liquid is kept in circulation by capillary action, and evaporated from the surface of a porous plate. The liquid used is generally coal-tar containing a high percentage of carbolic acid. 2000 w. Gesundheits-Ingenieur—Feb. 28, 1898.

Some Practical Ideas on Steam Disinfecting Apparatus. The subject is discussed both theoretically and practically. A description is also given of an apparatus, cheaply constructed and considered adapted to the service of health boards in muncipalities. 1700 w. San Rec—April 3, 1896.

The Epidemic Hospital at Brünn (Das Epidemie-Spital in Brünn). An account of the disinfecting apparatus, used in connection with the heating and drying plant, whereby a considerable economy is effected, and thorough sterilization insured. 2500 w. 1 plate. Gesundheits-Ingenieur—Feb. 28, 1897.

**Cattle Cars.**—The Thorough Disinfection of Railway Cattle Cars (Die Wirksame Desinfection der beim Thiertransporte Verwendeten Eisenbahnwagen). Adolf Freund. A description of the methods adopted in various parts of Germany for the prevention of the spread of contagious diseases in the railway transport of cattle. Two articles. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 13, 20, 1899.

**Oven.**—The Disinfecting Oven of Vaillard & Besson (Der Disinfektionsofen von Vaillard & Besson). A convenient portable steam apparatus for disinfecting clothing and bedding, especially adapted for military use. 1500 w. Gesundheits Ingenieur—Feb. 15, 1897.

**Ship.**—Disinfecting Ships. C. M. Green. On the development of the government work of disinfecting vessels, crew, passengers and baggage to prevent the spread of infectious diseases; describes the Sanator, a modern vessel for this work. Ill. 4500 w. Marine Rev—Feb. 15, 1900.

Disinfecting Steamer "Sanator" for the U. S. Marine Hospital Service. C. M. Green. Illustrated detailed description of a floating disinfecting plant. 4800 w. Marine Engng—March, 1900.

**Station.**—Disinfecting Stations. Reviews a recent book by Samuel Rideal, giving brief abstract of chapter on the subject named. 1400 w. Builder—Nov. 12, 1898.

**Station, Genoa.**—The Disinfecting Station at Genoa. James H. Fuertes. Illustrates a municipal station built to guard against contagious diseases. 1300 w. Eng Rec—July 22, 1899.

**Station, Liverpool.**—The Disinfecting Station at Liverpool. James H. Fuertes. Describes a small plant where infected bedding, clothing, and other articles are taken for treatment. 800 w. Eng Rec—Sept. 9, 1899.

**Station, Zürich.**—The Disinfecting Station at Zurich. James H. Fuertes. Illustrated description of the municipal station and its fittings. 1000 w. Eng Rec—Nov. 11, 1899.

**Woolf Electrolytic.**—See **SANITATION.**

**DISPERSION.**

See **ELECTRO-PHYSICS.**

**DISTILLING PLANT.**

See also **EVAPORATOR.**

**Dry Tortugas.**—Report of a Six-Day Trial of the "Lillie" Multiple-Effect Distilling Plant at Dry Tortugas, January 13 to 20, 1900. R. K. Crank. Describes the methods and plant, giving results of the test, and other information of interest. Ill. 3700 w. Jour Am Soc of Naval Engs—Feb., 1900.

Test of a Multiple-Effect Distilling Plant. A report of the duty of a plant for producing daily 60000 gals. of drinking water from salt water, used by the U. S. Navy at Dry Tortugas. 2000 w. Eng Rec—March 17, 1900.

Test of Distilling Plant at Dry Tortugas. R. K. Crank. Report of a six-day trial of the "Lillie" multiple effect distilling plant, Jan. 13 to 20, 1900. Ill. 2000 w. Ice & Refrig—Aug., 1900.

Water Distilling Plant at the Dry Tortugas. Illustrated description of the large multiple-effect distilling plant erected at Fort Jefferson, on the Dry Tortugas, Fla., to furnish water for the naval station and barracks. 4500 w. Eng News—March 29, 1900.

**U. S. S. "Rainbow."**—Evaporating Plant of U. S. S. Rainbow. A description of the evaporating and distilling plant. 2000 w. Jour Am Soc of Naval Engs—Aug., 1898.

**DITCH.**

See also **CANAL; FLUME; IRRIGATION.**

**Idaho, Rapp's Creek.**—Ditch Construction in Idaho. Augustus J. Bowie. Gives details and cost of construction of Rapp's Creek ditch and flume. 2700 w. Min & Sci Pr—Feb. 27, 1897.

**DITCHING MACHINE.**

See also **CAR—Ditching.**

Ditching Machine on the Chicago Great Western. An illustrated description of a ditcher car which has done good service. 1000 w. Ry & Engng Rev—Sept. 15, 1900.

**DIVIDING ENGINE.**

**Champion.**—Mechanically Originating a Dividing Wheel. John Randol. Describes a method devised chiefly by Mr. Champion, of the Newton Machine Tool Works, of Philadelphia, which the writer thinks will produce almost perfectly divided index wheels. Ill. 1600 w. Am Mach—April 28, 1898.

**Cornell.**—Originating the Index Wheel of the Cornell Dividing Engine. H. B. M'Cabe. Sketch and description. 400 w. Am Mach—Sept. 8, 1898.

**Grating.**—A Wonderful Ruling Machine. From N. Y. "World." Popular description of the most perfect ruling machine ever constructed for producing gratings used for decomposing light in optical investigations. It rules from 15,000 to 125,000 perfectly parallel and perfectly cut lines to the inch. 1000 w. Age of St—Dec. 21, 1895.

**Hoe.**—The R. Hoe & Co.'s Dividing Wheel. John Randol. Illustrates and describes the construction and manner of use of a dividing wheel believed and to have no measureable variations in its spacing. 1800 w. Am Mach—June 2, 1898.

**Index Plate.**—See **INDEX PLATE.**

**Mundo.**—The Mundo Wheel Dividing Device. Morris Fulton. Illustration with description and mode of operation. 2000 w. Am Mach—July 21, 1898.

**Thorne.**—The Thorne Mechanically Originated Dividing Wheel. John Randol. Illustrated description of a dividing wheel of cheap construction that produces excellent work. 1000 w. Am Mach—June 9, 1898.

**Wurdemann Automatic.**—The Wurdemann Automatic Dividing Engine. C. L. Berger. Illustrates and describes an engine for automatically graduating the circles of astronomical and scientific instruments, which is of interest on account of novel features and its remarkable accuracy. 1000 w. Eng News—Nov. 2, 1899.

### DIVIDING TOOL.

Some Dividing Tools. A. H. Cleaves. Illustrates and describes a number of methods of doing different kinds of dividing work. 800 w. Am Mach—May 7, 1896.

### DIVIDING WHEEL.

See **DIVIDING ENGINE.**

### DIVING APPARATUS.

See also **WRECKING.**

Some Facts About Diving Apparatus, etc. Discusses the business of Messrs. Barnett and Foster, specialists in the matter of diving apparatus. 2300 w. Trans—Feb. 12, 1897.

### DIVING BELL.

See also **WRECKING.**

**Deep Water.**—A Diving Bell for Deep Water Wrecking. Description, as given by J. S. Gadsden in the "Inter-Ocean," of the form of diving bell being used in trying to recover a cargo of copper from the sunken steamer in Lake Huron, near Alpena, Mich. 1200 w. Eng News—Oct. 14, 1897.

### DOCK.

See also **CONVEYOR; HARBOR; HARBOR IMPROVEMENT; MECHANICAL HANDLING; PIER.**

Modern Wharf Improvements and Port Facilities. Foster Crowell. Contrasting the effects of private enterprise and those of political blight upon the water-fronts of typical Atlantic cities. Ill. Serial. 1st part. 4500 w. Eng Mag—Oct., 1897.

Modern Wharf Improvements and Harbor Facilities. Foster Crowell. Devoted largely to American coal handling plants; also giving plans of docks at Antwerp, Hamburg, Dunkerque, Marseilles, and Glasgow. The defects of American harbors are compared with the superior arrangements of the European ports. 5000 w. Eng Mag—Nov., 1897.

Modern Wharf Improvements and Harbor Facilities. Foster Crowell. With illustrations and descriptions of dry docks on both sides of the ocean, as well as floating docks, and the details of docking and overhauling vessels. 4000 w. Eng Mag—Dec., 1897.

Wharf Improvements and Harbor Facilities (Outillage et Aménagement des Ports). A condensed abstract and translation of Mr. Crowell's article in "The Engineering Magazine" of November, 1897. 2500 w. La Rev Tech—Jan. 10, 1898.

**Barrow-in Furness.**—Recent Improvements in Docks and Docking Appliances. Preliminary remarks upon the ideal requirements of docks and docking appliances. A statement of how far they have hitherto been met and an illustrated description of the new dock for the port of Barrow-in-Furness, claimed, in its design, to be a decided advance over other docks. Serial. Eng, Lond—June 19, 1896.

**Barry, Wales.**—New Works at Barry Dock. An account of a visit of members of the British Assn.. to these docks with information from the paper of R. C. H. Davison, presented at the recent meeting at Bristol. Ill. Serial. Engr, Lond—Dec. 2, 1898.

Barry Docks. A well illustrated account of improvements in and about Bristol Channel at Barry. The Lady Windsor lock is fully described. 4500 w. Engng—Jan. 31, 1896.

**Bristol, Eng.**—The Bristol Docks and River. Editorial discussing the proposed improvements of this port, and how the matter now stands. 1800 w. Engr, Lond—Aug. 5, 1898.

The Dockization of the Avon. Review of the report to the Dockization Committee of the City of Bristol, Eng., in reference to a gigantic scheme to provide necessary accommodation for modern vessels. 2200 w. Transport—June 22, 1900.

The Problem of Bristol Docks. The necessary improvements were first reported on by the resident Dock Engineer, and then Mr. Barry, whose estimates are here discussed, was asked to report on the same scheme. The cost of this work is estimated at £2,580,000. 2500 w. Engr Lond—March 27, 1896.

**Buenos Ayres.**—Harbor Enterprise in South America. Information from an article by R. W. Perks. The docks are described as the largest, newest and best equipped in the American continent. 1800 w. Trans—Aug. 6, 1897.

The Machinery Plant at the Harbor of La Plata (Die Maschineneinrichtung des Hafens von La Plata). Giving an account of the new warehouse plant, with basin, hydraulic cranes, etc., at Ensenada below Buenos Ayres on the La Plata, Argentina, with details of the pumps, accumulators and cranes. Two plates. 3500 w. Zeitschr d Ver Deutscher Ing—Aug. 7, 1897.

**Cardiff.**—The New South Dock at Cardiff. Illustrated description of work now in progress. 1400 w. Transport—April 27, 1900.

**Coal.**—A Great Coal Dock on Lake Superior. The dock is situated at Duluth, Minn., has a storage capacity of 250,000 tons, is 1560 ft. long and 300 ft. wide, has covered bins 950x150 ft. in area, and loading and unloading is done entirely by mechanical conveyors and buckets. 400 w. Sci Am—March 28, 1896.

A Modern Coal Dock. Edward N. Saunders, Jr. Describes the dock of the Northwestern Coal Railway Co., at Superior, Wis. Ill. 1800 w. Yale Sci M—March, 1898.

Coal Dock Plant of the Baltimore and Ohio Ry., Sandusky, Ohio. A description of the plant and its operation. Ill. 700 w. Ry & Engng Rev—July 1, 1899.

See also **COAL HANDLING.**

**Coal, Dortmund Canal.**—The Harbor of the King Ludwig Works at Bruch Die Hafenanlage der Gewerkschaft König Ludwig zu Bruch). A description of the harbor plant on the Dortmund-Ems Canal for the handling of coal and coke in connection with the Westphalian mining district. 2500 w. Glückauf—Jan. 1, 1899.

**Concrete.**—Concrete Dock Construction at the South Works of the Illinois Steel Company. Victor Windett. Illustrated description of the repairs rebuilding, etc., with account of cost and satisfactory results. 6300 w. Jour W Soc of Engs—Dec., 1899.

Concrete Docks for the Illinois Steel Co., at South Chicago, Illinois. Describes the conditions which made necessary reconstruction, and gives an illustrated description of the type adopted. 1700 w. Eng News—Dec. 14, 1899.

Concrete Docks of the South Works of the Illinois Steel Company. Illustrations showing the details of construction, with brief description. 1200 w. Ir Age—Dec. 14, 1899.

**Concrete-Steel, Venezuela.**—The New Concrete and Steel Government Docks at Puerto Cabello, Venezuela. Brief illustrated description of a rather novel construction. 700 w. Eng News—Dec. 23, 1897.

**Dry.**—See **DRY DOCK.**

**Grangemouth, Scotland.**—New Docks at Grangemouth. General description of a new enterprise of the Caledonian railway, the extent of the work and the methods to be employed in carrying it out. It will be a concrete structure and the earthwork to be disposed of from 3,000,000 to 4,000,000 cu. yds. 1000 w. Arch, Lond—Sept. 2, 1898.

**Iron-Ore, Great Lakes.**—Iron-Ore Loading Docks. Waldon Fawcett. An illustrated account of construction under way which will make a holding capacity of 800,000 tons at the Great Lakes. 2000 w. Am Mfr & Ir Wld—July 19, 1900.

**Iron-Ore, Minnesota.**—The Eastern Minnesota Ore Dock. Dwight E. Woodbridge. Illustrates and describes the largest iron ore shipping dock ever built and the largest piece of timber construction in the world. 1200 w. Ir Age—June 21, 1900 .

**Iron Ore, Spain.**—Ore Shipping Piers on the Cantabrian Coast. Brief illustrated description of piers designed to meet special needs. 700 w. Eng, Lond—Oct. 9, 1896.

**Leith, Scotland.**—The Docks at Leith. Gives briefly the history of the construction of the docks now in existence, and the new dock works now being constructed. 2700 w. Engr, Lond—July 22, 1898.

**Liverpool.**—Dock Extensions at Liverpool. Reviews the improvements of the last three decades, specially describing the changes now in progress. Ill. 6500 w. Engr, Lond—Aug. 26, 1898.

Extension of the Liverpool Docks. Information of the extensions and improvements now in progress and in contemplation, with description of the docks, port and harbor. 3300 w. Cons Repts—Jan., 1898.

Extensions of Liverpool Docks. Report of the works committee of the Liverpool Docks and Harbor Board. 1800 w. Arch, Lond—Oct. 22, 1897.

**Manchester Canal.**—Manchester Ship Canal Dock Warehouses. Illustrates and describes two of the blocks of warehouses erected by the Ship Canal Warehousing Co., Limited. General plan is given. 1400 w. Eng, Lond—July 30, 1897.

**Milford.**—The Position and Prospects of the Milford Docks. A brief history of the undertaking, with the story of the difficulties. Interesting to those concerned in port administration. 3300 w. Trans—May 14, 1897.

**New London, Conn.**—New York, New Haven & Hartford Dock at New London, Conn. H. M. Smith. Illustrates and describes a dock 500 ft. long by 100 ft. wide now being built for the use of passenger and freight trains meeting the boats of the Norwich, Stonington and Fall River lines. 800 w. R R Gaz—April 7, 1899.

**New York.**—The Improvement of the North River Water Front, New York City. Illustrated detailed description. 1300 w. Sci Am—June 6, 1896.

The North River Water Front. A valuable report by the Board of Consulting Engineers, appointed by the Commissioners of the Dept. of Docks, to investigate plans for improving the western river front of the city. Serial. R R Gas—Feb. 14, 1896.

See also **HARBOR IMPROVEMENT.**

**Penarth, Wales.**—Developments at Penarth Dock. Brief account of the work the Taff Vale Railway Co. is undertaking at this place. 1300 w. Engr, Lond—March 10, 1899.

Penarth Docks. Illustrates and describes a clever piece of engineering in connection with the entrance of these docks. 1800 w. Engng—July 15, 1898.

**Port Talbot, Wales.**—See **RAILWAY.**

**Ship's Hull.**—A Remarkable Dock. Describes the hull of an old ship of about 800 tons which was sunk in the mud to be used as a dock, and also the new dock which is to replace it. 1000 w. Engr, Lond—Sept. 30, 1898.

**Swansea, Wales.**—Docking the River at Swansea. A scheme under consideration, with plan. The advantages and objections. 1000 w. Eng, Lond—Aug. 28, 1896.

**Thames.**—The Thames Docks. An editorial explanation of their unsatisfactory condition and the problems to be solved. 2500 w. Engng—May 18, 1900.

**United States Cities.**—Water Front Engineering in American Cities. Report of an investigation made by H. C. Holmes for the California State Harbor Commission. Part first gives the organization of the waterfront commission of Boston, New York and Philadelphia, and describes the construction of wharves in New York. Serial. Eng Rec—July 8, 1899.

### DOCK OFFICES.

**Liverpool.**—The Liverpool Dock Offices. Illustrations, with report and estimate of plans which obtained the second prize in the recent competition. 6500 w. Archt, Lond—Aug. 3, 1900.

### DOME.

See also **SPIRE; TOWER.**

Domes. A consideration of noted domes, such as St. Sophia, St. Peter's, etc. 3000 w. Arch, Lond—Nov. 15, 1895.

The Dome as the Basis of an Architectural System. Arthur Bolton. Read at a meeting of the Archt. Assn., London. An interesting paper, giving a critical survey of past methods, many illustrations and suggestions, and also editorial. 13500 w. Builder—Jan. 20, 1900.

The Modern Dome. A. D. F. Hamlin. A study of dome design in both ancient and modern buildings; the value and beauty of this feature, with special reference to the dome of the new library of the university. 4000 w. Sch of Mines Quar—Jan. 1897.

**Construction.**—The Theory of Construction of Domes and Spires (Beitrag zur Theorie der Kuppel und Turmdächer und Verwandter Konstruktionen). H. Müller-Breslau. A very full theoretical and practical discussion of the structural works of domes, cupolas, gasholders and spires, with diagrams and photographs of structures. Two articles. 1200 w. Zeitschr d Ver Deutscher Ing—Oct. 29, Nov. 5, 1898.

Notes on the Theory of Cupola and Spire Construction (Beitrag zur Theorie der Kuppel und Turmdächer). R. Kohfahl. A discussion and criticism of the recent paper of Prof. Müller-Breslau on the same subject, with diagrams showing methods of resisting wind pressure. 2500 w. Zeitschr d Ver Deutscher Ing—Dec. 17, 1898.

Notes on the Theory of Dome and Tower Construction (Beitrag zur Theorie der Kuppel und Turm-Dächer). R. Kohfahl. Discussing especially the details of framed structural metal domes, spires and towers, both from a theoretical and practical standpoint. Two articles. 9000 w. Zeitschr d Ver Deutscher Ing—June 25, July 2, 1898.

**Court House, N. Y.**—Dome Framing, Appellate Court House, New York. Illustrated description of a cylinder framework carrying an upper and a lower dome, supported by brackets from girders of two stories. 500 w. Eng Rec—April 14, 1900.

**Hospital.**—Construction of a Cupola on a Hospital. W. Neubecker. Illustrated description of the erection of a piece of ornamental metal work. 500 w. Met Work—Sept. 10, 1898.

**Metal Frame.**—See **Construction; Steel Framing.**

**Philadelphia City Hall.**—The Metal Dome of the City Hall Tower, Philadelphia, Pa. Francis Schumann. An abstract of the official report of the writer upon the construction of the dome, giving interesting details. Ill. 12000 w. Pro of Engs Club of Phila—March, 1898.

**Plate-Girder Construction.**—Plate-Girder Construction of a Large Church Dome. Illustrated description of the construction of Christ Methodist Church, Pittsburg, Pa. 850 w. Eng Rec—July 25, 1896.

**Rahway, N. J., Reformatory.**—Erecting the Dome of the Rahway Reformatory. Illustrated description of construction of a metal dome 120 feet in diameter, 8 feet larger than that of St. Paul's, London. 1200 w. Eng Rec—May 14, 1898.

**Schneider Pavilion.**—See **PARIS EXPOSITION.**

**Steel Framing.**—Steel Dome and Spire of St. Paul's Church, Chicago, Ill. An interesting example of structural steel-skeleton framework is illustrated and described. 500 w. Eng News—Oct. 13, 1898.

Steel Domes of the Parrott Building and the City Hall at San Francisco, Cal. Illustrated description giving description of the construction giving the general arrangement and construction of the various members. 1600 w. Eng News—Jan. 6, 1898.

The New York Clearing House Dome. Illustrated description of special framing for a heavy hemispherical dome 60½ ft. in diameter. 600 w. Eng Rec—Sept. 29, 1900.

**Steel Observatory.**—The Steel Dome for the Yerkes Observatory, Lake Geneva, Wis. Illustrated description of the features of particular interest to engineers, the chief being the main dome and its operating machinery. 2800 w. Eng News—July 14, 1898.

**Synagogue.**—See **SYNAGOGUE.**

### DOOR.

**Water-Tight.**—See **BULKHEAD DOOR; CRUISER—Chicago.**

### DOOR OPENERS.

**Electric.**—Electric Door Openers for Elevators. Explains the action of pneumatic door openers and describes an electric operating device. Ill. 1200 w. Elec Eng, N. Y.—Sept. 29, 1898.

**DOVETAILING.**

A Type Dovetailing Job. Walter Gribben. Describes the inserting of some printers' type in the periphery of a tool steel wheel. Ill. 1400 w. Am Mach—Jan. 26, 1899.

**DRAFT.**

**Forced.**—See **MECHANICAL DRAFT.**

**Locomotive.**—See **LOCOMOTIVE—Draft Appliances.**

**Mechanical.**—See **MECHANICAL DRAFT.**

**DRAFT GEAR.**

See **CAR—Draft Gear.**

**DRAFTING.**

See **DRAWING.**

**DRAFTING ROOM.**

See **DRAWING ROOM.**

**DRAFTSMEN.**

The Position of Draughtsmen. Editorial review of an address upon the subject of training engineers, delivered by Mr. Archibald Denny at the Institution of Junior Engineers. 3000 w. Engng—Nov. 22, 1895.

**Architectural Students.**—See **ARCHITECTURAL EDUCATION—Columbia University.**

**DRAIN.**

See also **DRAINAGE; PLUMBING; SEWER.**

**Construction.**—Construction of Drains. E. C. Lynde. From a paper read before the Incorporated Assn. of Munic. & Co. Engs. Deals with improved methods of drainage construction. 1500 w. San Plumb—Dec. 1, 1896.

**Grade.**—Which Should Have the Steeper Grade, Main Drain or Laterals? (A general discussion). 1800 w. Ill Soc of Engs & Surv—11 An Rept.

**House.**—Laying House Drains. Treating of trench, fall, joints, clearing shafts, testing, etc. 1600 w. Ill Car & Build—Dec. 20, 1895.

**Soil Pipes.**—English Soil Pipes, and How Plumbers Run Them. A few details of soil pipe work, with illustrations. 1000 w. Dom Engng—April, 1897.

**Stoppages.**—Some Causes of Stoppages of Drains. William A. Murray. Calls attention to points requiring care. Ill. 1700 w. Dom Engng—Oct., 1898.

**Testing.**—Drain Testing by the Application of Walter J. R. Anderson. Discusses arguments for and against this method of testing, but considers it the only reliable test to apply to house drains under ground. 2100 w. Dom Engng—Oct. 15, 1900.

Drain Testing. J. Spottiswoode Cameron. Some facts revealed by testing the drains of 1121 houses in which typhoid and diphtheritic disease was thought to be present. 1500 w. Jour of San Inst—April, 1898.

Examining and Testing Old Drains and Sanitary Appliances. T. E. Coleman. Reprint from a book received from Messrs. Spon & Chamberlain. Urges the periodical examination and testing as a matter of health and expense. Directions for testing are given. 2500 w. Dom Engng—Aug., 1897.

**Ventilation.**—Experiments on Secondary Ventilation Pipes for House Drainage Systems (Versuche über die Notwendigkeit der Sekundären Entlüftungsrohre bei Hausentwässerungsleitungen). A. Unna. With full details of important experiments, using gauges on the various siphon traps under different conditions, showing the effects of flushing with and without proper ventilation. Two articles. 7500 w. Gesundheits-Ingenieur—Feb. 28, March 15, 1898.

The Ventilation of House Drains. Richard Horton. Read before the Inst. of San Engs., England. States the usually accepted theory of ventilation, compares it with the facts and gives a few experiments and their results. Serial. San Rec—March 5, 1897.

Ventilation of House Drains. A report by Dr. Unna, the municipal engineer of Cologne, on experiments made upon the necessity of fixing secondary ventilating pipes for house drains, and the consequent circulation of water and air in the same. Ill. 5000 w. Can Arch—Dec., 1898.

Fresh Air Inlets. Illustrated description of a number of methods of providing air inlets to running traps on house drains. 400 w. Dom Engng—Sept., 1896.

The Trap on the House Drain. Against a current belief that traps on house drains should be abolished are opposed facts and experience. 600 w. Dom Engng—Oct., 1896.

Sanitary Excess. Wm. Watson. Strongly condemns the "American system" of interception traps on house drains, and cites Bradford, England, as an example of meeting successfully very difficult conditions. 2300 w. Can Engr—Sept., 1898.

Recent Experiments in Trap Siphonage. William Paul Gerhard. An account of experiments made in Cologne, Germany, by Herr Unna, with the results. Ill. 4000 w. Am Arch—May 21, 1898.

See also **DRAINAGE—House; SEWER VENTILATION.**

**Ventilation, Dauba, Bohemia.**—The Sanitary Arrangements of the Public Offices at Dauba, Bohemia (Ueber die Einrichtung der Abortanlage in dem Amtsgebäude zu Dauba). The ventilating pipes from the closets are connected to a flue in the chimney, thus causing a constant and powerful ventilation. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1897.

**DRAINAGE.**

See also **DRAIN; PLUMBING; SEWERAGE; SHORE PROTECTION.**

**Boston Railway Station.**—See **WATERPROOFING.**

**Explosives.**—The Use of Explosives for the Production of Natural Drainage (Emploi des Explosifs à la Constitution de Drains Naturels). Describes the success which has been attained in some instances by the use of explosives for loosening the ground and breaking up clayey, water-tight strata. 2000 w. La Revue Technique—Oct. 25, 1897.

**Farm.**—The Utility of Drain Tile. P. S. Kempton. A paper read before the Ill. Clay Workers Assn. on the beneficial effects of subsoil drainage on agricultural lands. 2800 w. Brick—Feb., 1896.

Farm Drainage. John Cownie. A scheme is proposed by which the extensive Iowa swamp lands may be tile drained. 1800 w. Clay Rec—Feb. 12, 1896.

Farm Drainage. John Cownie. Some consideration of the importance of drainage and irrigation, and recommending the securing of legislation to aid the farmer in draining his land. 3300 w. Brick—March, 1896.

Hints on Farm Drainage. The Proper Methods and Results of Draining Land. Anton Vogt. Discusses tile drainage and results, with suggestions for laying the tile, etc. Serial. Brick—Dec. 1, 1899.

**Hackensack, N. J. Marshes.**—The Drainage of the Hackensack and Newark Tide Marshes. Plans for the redemption of this waste land as prepared by C. C. Vermeule. The method shuts out the tides by earthen embankments and drains off the water. 1600 w. Eng Rec—July 3, 1897.

**House.**—See also **DRAIN; PLUMBING.**

Advantages of Main-Trap and Fresh-Air Inlet in House Drainage. J. J. Cullington. Discusses precautions necessary to have plumbing safe. 2000 w. San Plumb—Jan. 1, 1897.

A Model System of Plumbing. William S. MacHarg. Practical conclusions on the subject of house drainage, drawn from the writer's experience. 3000 w. Dom Engng—Aug. 15, 1900.

Details in House Drainage and Plumbers' Work. J. Kemsley. Reports cases where inspection showed that lack of attention to details caused serious illness and much trouble. Serial. San Rec—May 28, 1897.

Diameter and Inclines of Drains. A. B. Plummer. Abstract of paper read before the Sanitary Institute Congress at Newcastle-on-Tyne. Description of interesting experiments with flush tanks and drains, the object being to minimise the amount of water required for effective flushing. 1800 w. Arch & Build—Oct. 10, 1896.

Drainage; Its Workmanship and Control. R. Thornton. Read at meeting of Staffordshire Assn. of Sanitary Inspectors. Advocates the use of the best material; discusses the fall in the drain, traps, fittings, joints, etc. Serial. San Rec—Jan. 29, 1897.

Error in Drainage Practice. W. M. Watson. Showing the evils of using too many drain traps and using drains of too large size. 1000 w. Can Eng—Aug., 1898.

House Drainage and Sanitary Fitments. Gerard

J. G. Jensen. Chapter first considers form and materials of piping for drainage work. Ill. San Rec—April 7, 1899.

House Drainage as It May Be. The first of a series of articles on house drainage. Ill. Serial. Dom Engng—Nov., 1899.

House Drainage. Abstract of a paper by Lamorock Flower, on "The Drainage of Buildings Possessing No Open Space," read at the Congress of the Sanitary Institute, England. 800 w. Arch, Lond—Sept. 8, 1899.

House Drainage from an English Standpoint. James I. Little. Describes the underground drainage, how drains should be laid, etc., in accordance with English practice. 1400 w. San Plum—March 15, 1898.

Improved Methods of Drainage Construction. E. C. Lynde. Explains best methods of making socket joints, drain traps and the construction of branch drains, tools required, etc. 2000 w. Plumb & Dec—Nov. 2, 1896.

Modern Standards for House Drainage. Gives the series of by-laws drafted by the London County Council, which it is proposed to enact into law, which will give a uniform drainage practice to the entire metropolitan area. Serial. Dom Engng—April, 1897.

Notes on the Discharge Piping of Houses (Vortrag über Hausentwässerungsleitungen). An address by Building Inspector Olshausen of Hamburg, upon the best arrangement of discharge pipes for the connection of various portions of buildings with the sewer. 3500 w. Gesundheits—Ingenieur—May 15, 1898.

Notes on Drainage and Sanitation. From the "Building World." Calls attention to points of importance in the construction of drains and the renewing of a drainage system. Ill. 1400 w. Dom Engng—March, 1897.

Some Thoughts on House Drainage. Robert Smeaton. A discussion of the essentials to a perfect system. 1400 w. Dom Engng—Aug. 15, 1900.

The Drainage of Buildings. A paper read before the Sanitary Inspectors' Association, held at Leeds, Eng. A general dissertation setting forth under various heads the essentials to good house drainage. 1300 w. Arch & Build—Oct. 3, 1896.

I. The Construction and Ventilation of House Drains. A. Bostock Hill. II. Combined Drainage. Its pros and cons. Joseph Priestley. Two sanitary papers with discussion presented at the congress at Birmingham, England. 7000 w. Jour of San Inst—Jan., 1899.

I. Ventilation of Sewers and Drains. R. Read. II. House Drainage. W. H. Savage. Two papers contributed to the Cardiff Meeting of the Assn. of Munic. & Co. Engs., with discussion. 6300 w. Builder—July 8, 1899.

See also **PLUMBING**.

**House, British Law.**—The Effect of Recent Decisions on the Liabilities and Rights of Owners in Respect of the Drainage of Buildings. Alexander MacMorrow. Paper read at a meeting of the Auctioneers' Inst., England. Calls attention to important points that have been the subjects of recent decisions, showing what the British law requires. Serial. San Rec—Nov. 11, 1898.

**Iowa Laws.**—Drainage Laws. Joseph A. Williams. The law of drainage in the State of Iowa is discussed. 4000 w. Brick—March, 1896.

**Lake Fucino, Italy.**—The Drainage of Lake Fucino (Die Trockenlegung des Fuciner Sees). An account of the completion of the recovery of 35000 acres by the drainage of Lake Fucino, in Italy, by Prince Torlonia. The total cost of the work was $8,300,000. Two articles, 5000 w. Deutsche Bauzeitung—Nov. 27, Dec. 4, 1897.

**Location.**—Location and Alignment of Drainage Districts. D. L. Braucher. Maintaining that easy curves and long tangents are of the greatest importance in locating a drainage channel. 700 w. 10th An Rept of Ill Soc of Eng & Surv—1895.

**Merjelen Glacier Lake, Rhone Valley.**—The Emptying of the Merjelen Glacier Lake. C. S. Du Riche Preller. The water banking up against the side of a glacier formed a lake which occasionally overflowed and flooded the Rhone Valley. This danger was mitigated by running a drainage tunnel into the bottom of the lake. 1400 w. Engng—Jan. 17, 1896.

**Mexico.**—Drainage and Irrigation Works in Mexico. Describes works for "unwatering" and also for rendering land fertile by bringing water on to it. Gives brief outline of early work in this region. 1500 w. Nature—Oct. 21, 1897.

**Mexico City.**—The Drainage of the City of Mexico. A brief account of the nature of the work of two centuries to drain and sewer the city and valley of Mexico. 600 w. Eng Rec—March 24, 1900.

Drainage of the Valley and City of Mexico. Willis B. Wright. Historical review of the drainage of the city, and description of the new drainage and sewerage systems under construction. Ma. 2260 w. Jour Assn of Engng Socs—April, 1900.

**Mine.**—See **MINE DRAINAGE.**

**Netherlands.**—Engineering in The Netherlands. H. A. Van Ysselsteyn. Historical and descriptive account of machinery used for keeping dry the lands lying lower than the surface of the sea. Ill. 2000 w. Power—Feb., 1898.

**New Orleans.**—Drainage and Sewerage of New Orleans. A. N. Bell, in the "Times-Democrat." Historical account of work and its effect on public health. 7500 w. San—Oct., 1899.

The Drainage Problem of New Orleans. A statement of the unusual topographical conditions making surface drainage more difficult than sewerage. 1200 w. Eng Rec—Sept. 16, 1899.

The Drainage Works of New Orleans. Illustrated description of the open and closed canals for surface drainage. 2000 w. Eng Rec—Nov. 11, 1899.

The Electric Drainage of New Orleans. Lyman C. Reed. A statement of the conditions and an illustrated detailed description of the plant. 4400 w. Elec Wld & Engr—Nov. 18, 1899.

The Drainage of New Orleans. L. W. Brown. Illustrated description of the investigations made, and system adopted. Serial. Eng News—March 15, 1900.

Progress of Drainage in New Orleans. Alfred Francis Theard. A study of the general plan as recommended in the report of the Advisory Board of Engineers, explaining the general features, and showing how far it is has been carried out. Ill. 4500 w. Jour Assn of Engng Socs—Jan., 1900.

The New Orleans Sewerage Ordinance. Describes the features of the ordinance under which the city proposes to spend many millions for drainage, sewerage and water-works. 1000 w. Eng Rec—July 15, 1899.

**Niemen Delta.**—Drainage Plant of the Delta of the Niemen (Installation de Dessèchement du Delta du Niémen). Fully illustrated description of the electrically operated system of scoop wheels by use of which a large volume of water is lifted a moderate height, recovering nearly 45,000 acres of land. 3000 w. 1 plate. La Revue, Technique—April 25, 1898.

The Drainage Works in the Delta of the Niemen (Die Schöpfwerke im Memel-Delta). Describes the use of electric power to recover a large tract of land at the mouth of the Niemen. The first installment contains an account of the central electric station. Serial. Der Elektrotechniker—Dec. 31, 1897.

The Drainage Works of the Delta of the Niemen (Travaux d'Epuisement du Delta du Niemen). An illustrated account of the steam and electric drainage plant. Power is distributed electrically to a number of points where electric motors operate large scoop wheels. 3500 w. Le Génie Civil—Jan. 29, 1898.

The Electric Drainage Plant at the Memel Delts (Die Elektrischen Schöpfwerksanlagen im Memel-Delta). With plan and detailed account of the application of electric power for the operation of the scoop-wheel pumps for draining 45000 acres of the delta of the Niemen on the Baltic Sea. 10000 w. Elektrotechnische Zeitschr—Sept. 30, 1897.

**Norfolk, Eng.**—See **SHORE PROTECTION.**

**Philadelphia Lowlands.**—The Drainage and Protection of the Philadelphia Lowlands. Harrison Souder. Illustrated description of these lands and the methods used. Discussion. 4000 w. Pro of Engs' Club of Phila—May, 1900.

**Pinsk, Russia.**—The Drainage of the Pinsk District, Russia (Trockenlegung der Sümpfe in Polesie). With a very complete map, showing the existing canalisation of the district, and the projected improvements for the drainage of this marshy district of western Russia. 2000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1899.

**Rain Water.**—See **RAINFALL.**

**Red River Valley, Minn.**—Reclamation of Wet Land in the Red River Valley. W. R. Hoag. An account of the drainage of valuable wheat land in Minnesota, the difficulties met and overcome. 2500 w. Year Bk of Soc of Engs, Univ of Minn—1898.

State Drainage Work in the Red River Valley, Minnesota. Information from the last biennial report of the State Drainage Commission, stating the conditions and the success. 1000 w. Eng News—June 15, 1899.

**Road.**—See **ROAD DRAINAGE.**

**Subsoil, Newton, Mass.**—See **SEWERAGE—Newton, Mass.**

**Surface.**—Surface Drainage of Suburbs. Abstract of a report (1895) by Bertrand T. Wheeler, Supt. of Streets, Boston, Mass. 1200 w. Eng Rec—July 18, 1896.

**Surface Channels.**—Dimensions of Channels for Surface Drainage. Charles Edward Livesey. From Proceedings of Institution of Civil Engineers (England) Vol. CXXVIII. Statement of theory and description of its application in the construction of irrigation works in India. 2800 w. Jour W Soc of Engs—Oct., 1897.

Dimensions of Channels for Surface Drainage. Charles Edward Livesay. Reprinted from the Minutes of Proceedings Inst. C. E. Formulates a theory and describes its application in actual practice in India. 5000 w. Engng—Feb. 11, 1898.

**Tiber Marshes.**—Reclamation of the Tiber Marshes. Extract translation from "Gurnale del Genio Civile," Dec., 1895, with three plans. Describes the delta of the Tiber and the district reclaimed, the work and the great improvement in the sanitary condition. 4200 w. Ind Engng—June 5, 1897.

**Tile.**—Benefits of Tile Drainage. E. M. Pike. Read at meeting of Illinois Clay Workers Assn. Sets forth the advantages of tiling and explains how it improves the condition of the soil. 1800 w. Brick—Jan., 1898.

The History of Drain Tile and Its Uses. Thomas Townley. Deals principally with the use of tile in land drainage. 4000 w. Brick—May 1, 1899.

Tile Drainage in New England. H. N. Brooks. Presents some of the benefits of under draining and a few suggestions for laying drains. 1700 w. Brick—July, 1897.

**Trellised.**—Note on Trellised Drainage in the Adirondacks. Albert Perry Brigham. Gives features of the drainage of this region, with map. 900 w. Am Geol—April, 1898.

**DRAINAGE CANAL.**

See **CANAL—Chicago Drainage.**

**DRAINAGE PLANT.**

**Gasoline Engine, Chicago.**—Gasoline Engine Drainage Plants at Sixteenth Street Crossing, Chicago. Illustrates and describes the manner of solving a difficult problem in the disposal of surface water. 700 w. Ry & Engng Rev—May 13, 1899.

**Port Mourant, British Guiana.**—Erection of a Drainage Plant. An illustrated account of the erection of a plant at Port Mourant, Berbice, British Guiana. 1700 w. Engr, Lond—Jan. 5, 1900.

**DRAINAGE WATER.**

See **SEWAGE.**

**DRAUGHT.**

See **DRAFT.**

**DRAUGHTING.**

See **DRAWING.**

**DRAUGHTSMEN.**

See **DRAFTSMEN.**

**DRAWBRIDGE.**

See **BRIDGE.**

**DRAWBRIDGE MACHINERY.**

See **BRIDGE MACHINERY.**

**DRAWING.**

Drawing and Drawing Instruction (Das Zeichnen und der Zeichnenunterricht). A paper by H. Pickersgill on the methods of teaching drawing in connection with engineering instruction. 5000 w. Zeitschr d Ver Deutscher Ing—June 4, 1898.

**Architectural.**—Architectural Rendering in Pen and Ink. D. A. Gregg. Phases of the work, with suggestions from an artist of sixteen years of practice. Ill. 1600 w. Brickbuilder—April, 1896.

Architectural Rendering in Pen and Ink. D. A. Gregg. Hints, with illustrations, of this class of work. 1800 w. Br Build—May, 1897.

Fifty Years of Architectural Draughtsmanship. R. Shekleton Balfour. Comments on the collection of architectural drawings and designs recently on view in the rooms of the Royal Institute. 2200 w. Jour Roy Inst of Brit Archs—June 17, 1897.

Instruction in Architectural Drawing. William R. Ware. Revised copy from original in "School of Mines Quarterly." Part first deals with tracing and copying, giving many illustrations. Serial. Stone—Dec., 1896.

The Instruction in Architectural Drawing at Columbia College. William R. Ware. The first part treats mainly of tracing and copying, and is copiously illustrated. Serial. Sch of Mines Quar—April, 1896.

See also **ARCHITECTURAL EDUCATION—Columbia University.**

**Black Prints.**—Black-Print Processes. Albert E. Guy. Mentions the defects of the blue-print process, and presents the difficulties attending the manufacture of black-print paper. Serial. Am Mach—Feb. 17, 1898.

**Cabinet.**—Cabinets for Drawings. William H. Derbyshire. A design for cabinet, used in the works of Bement, Miles & Co. 100 w. Am Mach—Sept. 24, 1896.

**Copying Processes.**—Copying and Duplication Processes for Technical Use (Praktische Erfahrungen über das Copir-und Vervielfältigungs-verfahren in der Technik und in den Gewerben). Dr. T. Koller. Giving details of various blue and black print processes for reproducing mechanical drawings, etc. Two articles. 5000 w. Glaser's Annalen—Sept. 15, Oct. 1, 1899.

**Descriptive Geometry.**—Descriptive Geometry and Working Drawings. W. H. Kirchner. The importance of the study in constructive mechanics, and the different quadrant methods of projection, are the chief topics of discussion. 1400 w. Engineers' Year Book, Univ of Minn—1896.

**Electrical Engineering.**—Notes on Electrical Engineering Drawing. J. H. C. B. The first part of a serial on this subject with the object of comparing some of the divergent methods and endeavoring to select the most useful. Serial. Elec, Lond—May 22, 1896.

**Plotting Contours.**—A Rapid Method for Plotting Contours. Emil L. Neubling. Illustrates method of dividing lines rapidly into a given number of parts. 400 w. Eng Rec—April, 1898.

**Projection Methods.**—The Method of Projection That Is Actually Used. Louis Rouillion. Results of inquiries made by a committee of the Art Teachers' Assn. Letters of inquiry were addressed to technical schools, teachers, colleges, authors, and leading mechanical firms. The third angle method of projection is recommended as the simplest and most used. 1000 w. Am Mach—March 19, 1896.

**Shade Lines.**—The Use of Shade Lines in Drawings. F. A. Halsey. An attempt to show that the light and shaded surface view is untenable and causes many lines to be drawn in a way which is the reverse of clear and would not be understood by many. Their purpose is to make the drawing plainer. 1800 w. Am Mach—March 11, 1897.

**Sketching.**—Sketching. O. H. R. A first class practical paper full of useful hints and presented in concise and clear style. The usefulness of the accomplishments of being able to make readily a good free-hand sketch is exemplified, and by following the directions given, there are few who could not acquire it. 2400 w. Loc Engng—Feb., 1896.

The Art of Making Mechanical Sketches for Marine Engineers. C. W. MacCord. Part first shows the importance of a knowledge of the principles of mechanical drawing and gives some suggestions for free-hand sketches. Serial. M Engng—July, 1897.

**Structural Iron.**—Drafting Rules for Structural Iron Work. Illustrated reproduction of the instructions of the Pittsburg Bridge Co. to its draftsmen. Serial. Eng Rec—Jan. 14, 1899.

**Shipbuilding.**—Drafting Methods of the Newport News Shipbuilding & Dry-Dock Co. An account of the methods adopted in carrying on the designing and estimating work. 1500 w. Eng Rec—April 15, 1899.

**DRAWING INSTRUMENT.**

The Choice and Care of Drawing Instruments. V. T. Wilson. Aims to aid beginners in the choice of tools, and the care needed in handling. 2800 w. Sib Jour of Engng—March, 1899.

**Beam Compass.**—A Beam Compass for Plotting Surveys. C. Gregorie. Describes an instrument with which measurements of one link and less can be accurately plotted on plans of two chain and 1-2500 ordnance scale. 900 w. Col Guard —July 6, 1900.

**Bevel.**—Adjustable Bevel for Drawing. F. Spalding. Illustrated description of an instrument for mechanical and topographical drawing, and an explanation of its uses. 800 w. Mach—Aug. 1896.

**Compass.**—Compass for Drawing Arcs of Large Radius. Ulrich Peters. Illustrates and describes a system of link connections. 800 w. Am Mach —March 22, 1900.

**Ellipsograph.**—The Mundo Ellipsograph. Morris Fulton. A sketch and brief description of the ellipsograph made and used at the Mundo Iron Works, and found convenient by the draftsmen. 1600 w. Am Mach—Aug. 11, 1898.

**Parallel Ruler.**—Parallel Ruler Attachments. William Pilton. Illustrated descriptions. 800 w. Am Mach—Nov. 16, 1899.

**DRAWING ROOM.**

A Model Drafting Room. Illustrates and describes a convenient arrangement with novel features. 1500 w. Mach, N. Y—Jan., 1900.

A Modern Drafting Room. Illustrated description of a room in which the heating, lighting and ventilation are special features. 1200 w. Mach N. Y.—Feb., 1900.

Hints for the Draughting Room. W. S. Huyette. Practical suggestions of value, particularly with reference to keeping records of constructive changes. 1200 w. Mach—March, 1896.

The Drawing Office. C. E. Hodgkin. Read before the Falcon Works Engng. Soc. On the importance of good delineation, the functions of draughtsmen, etc. Serial. Prac Engr—Sept. 1, 1899.

**Blue Book.**—See **SHAFT—Stresses.**

**Boston Water Works.**—Office Furniture, Engineering Department, Metropolitan Waterworks. Giving details of drawing cases, drawing tables, blue print apparatus, etc., as used by the Metropolitan Water Board, Boston. 3500 w. Eng Rec —Sept. 17, 1898.

**Browne and Sharpe.**—The New Drafting Room of the Browne & Sharpe Manufacturing Company. L. D. Burlingame. Illustrated detailed description of a fully equipped room. 2000 w. Am Mach—March 8, 1900.

**Bullock Electric Mfg. Co.**—Drawing Office System of the Bullock Electric Manufacturing Company. W. H. Warren. Describes some features of the room and its furnishings, and the system used. 3800 w. Am Mach—June 7, 1900.

**Gates Iron Works.**—The Gates Iron Works Drawing Room. John Randol. Illustrated detailed description, with plans of room, etc. 2200 w. Am Mach—Jan. 16, 1896.

**Index System.**—See **Record System.**

**Railway.**—Drawing Office Method. J. R. S., in "New York Railroad Men." An outline of methods used in practice respecting indexing drawings, scales, tracings, numbering drawings, etc. 600 w. R R Car Jour—Nov., 1895.

**Records System.**—A System of Drawing-Room Records. The plan described is the outgrowth of a process of trial covering an extended period. 1500 w. Mach—Dec., 1896.

System in the Drafting Room. James C. Hemphill. Illustrated description of a system in actual use for arranging, classifying and indexing miscellaneous drawings for easy reference. 700 w. Mach—Nov., 1896.

The Decimal Index in the Drafting Room. H. W. Alden. Describes a system providing a simple and ready reference for drawing, and a logical pattern number which indicates the use for which the pattern was intended. 2000 w. Am Mach Feb. 4, 1897.

**Schenectady Locomotive Works.**—The New Drawing Office of the Schenectady Locomotive Works. Illustrated description of an office representing the best facilities. 1500 w. Am Mach—Jan. 18, 1900.

**Union Iron Works.**—Draughting Department, Union Iron Works. Illustrated description of the special drafting building, furniture and methods of management in a San Francisco ship and machinery building establishment, where the designing is particularly difficult because of the distance of the plant from the sources of supply in the Eastern States. 3000 w. Eng Rec—March 10, 1900.

**DREDGE.**

See also **DREDGING; HARBOR IMPROVEMENT; RIVER REGULATION; STEAM SHOVEL.**

Dredges (Les Dragues). R. Masse. The first installment of a treatise on dredging machinery. Part first treats of suction dredges. 3500 w. Revue de Mécanique—Aug., 1900.

**"Alexander Barminsky."**—Sand-Pumping Dredger "Alexander Barminsky." Description, plans, and sections of centrifugal pump suction-dredge built in Holland for the Russian government. 800 w. Engng—Sept. 9, 1898.

**Antwerp.**—Suction Dredge and Collector (Saugpumpenbagger mit Sammelbehälter). An illustrated description of the new dredge built for use in the port of Antwerp. 1200 w. Schweizerische Bauzeitung—Sept. 16, 1899.

**Bates.**—American Dredge in Russia. An interesting account of the trials of the Beta, which far exceeded the contract demands. 1200 w. U. S. Cons Repts, No. 647—Feb. 6, 1900.

High Powered Dredges and Their Relations to Sea and Inland Navigation. Lindon W. Bates. Part first considers the evolution of modern hydraulic dredging, various types of dredges and their characteristics. Ill. Serial. Naut Gaz—March 9, 1899.

Hydraulic Dredges. Statements from a paper by Lindon W. Bates, on high-power dredges and their relation to sea and inland navigation, presented at the International Congress of Navigation, at Brussels. 2800 w. Eng Rec—Sept. 24, 1898.

**Bates, Calcutta.**—Dredge for Calcutta. Describes the first of four dredges for use at the Kidderpore docks, Calcutta, and in improving the canal between the Baltic Sea and the Volga River. 1000 w. U S Cons Repts, No. 833—Sept. 14, 1900.

The Bates Dredge for Calcutta. Illustrated description of a sea-going hydraulic dredge noteworthy for having the ladder for the suction pipe and cutter in a well-way in the center in the forward third of the hull. 2000 w. Eng Rec—June 9, 1900.

**Bates, Volga.**—American Electrical Dredges on the Volga River, Russia. Illustrated detailed description of these high-powered suction dredges. 3000 w. Elec Wld & Engr—Oct. 7, 1899.

New Russian Dredge. A description of the dredge for the Volga ordered by the Russian government, with report of tests. 3800 w. U. S. Cons. Repts, No. 564—Oct. 27, 1899.

The New Bates Hydraulic Dredger for the Volga. Illustrated description of a centrifugal dredge propelled by electricity and provided with cutters and a pontoon line containing many new features. 2000 w. Eng Rec—July 22, 1899.

**"Benyaurd," Mississippi.**—The Sea-Going Hydraulic Dredge "Benyaurd." Description of dredge for Southwest Pass of Mississippi River; the dredging machinery has an hourly capacity of 2000 yards of sand from a depth of 30 ft. 1000 w. Eng Rec—Oct. 6, 1900.

**Boat Channel.**—Boat Channel Dredgers for the Colonies. The need of type of dredger for special work is shown, and the conditions are stated. 1000 w. Ind & East Eng—Oct. 17, 1896.

**"Brancker."**—See **Mersey Bar.**

**Buffalo Breakwater.**—Ten-Yard Clam-Shell Dredge for the Buffalo, N. Y., Breakwater Construction. Describes and illustrates a dredge that has operated successfully under disadvantageous conditions. 1500 w. Eng News—Feb. 2, 1899.

**Conversion.**—The Conversion of the "Wenlock" from a Bucket to a Sand-Pump Dredger. A copy of the specification with illustration. 1800 w. Ind Engng—Dec. 3, 1898.

**Deep Sea.**—Deep Sea Dredges and Dredging. Waldon Fawcett. Illustrated description of sea-going vessels that can dredge and dump 9000 tons of sand a day. 1700 w. Am Mfr & Ir Wld—May 24, 1900.

European Sea-Going Dredges and Deep-Water Dredging. E. L. Corthell. Reviewing the importance of harbor and channel improvement and the increasing use of powerful dredges for this service, with many illustrations of typical sea-going dredges of European construction, and data of capacity and cost of operation. 4500 w. Engineering Magazine—April, 1898.

European Sea-Going Dredges and Deep-Water Dredging. E. L. Corthell. The second paper discusses the conditions which justify dredging together with an account of the resultant commercial benefits. Many illustrations. 3500 w. Engineering Magazine—May, 1898.

**Dipper, Great Lakes.**—A 6-Cubic Yard Dipper Dredge for Use on the Great Lakes. Brief illustrated description. 900 w. Eng News—March 1, 1900.

The Largest Dipper Dredge Ever Built. Illustrates and describes a large dipper dredge recently built for use on the Great Lakes. 1500 w. Eng News—July 13, 1899.

**Dipper, Phosphate.**—A Dipper Dredge for Digging Phosphate Rock. Illustrated description of a 1 cu. yd. dipper dredge, handling 50 to 70 cu. yds. per hour. 400 w. Eng News—Feb. 6, 1896.

**Electric.**—See **Bates, Volga.**

**English and American.**—English and American Dredging Practice. A. W. Robinson. A letter to the editor discussing the advantages and disadvantages of various forms of dredgers. 1900 w. Eng News—March 19, 1896.

The Evolution of Dredging Machinery. H. St. L. Coppée. A communication aiming to throw light on the subject of the cause of difference between the dredging machinery used in this country and in England. 1500 w. Eng News—April 30, 1896.

**French for Russia.**—Steam Barges, Suction Dredges, and Bucket Dredges (Porteurs à Vapeur-Dragues à Succion Dragues a Godets). Especially devoted to recent French dredges constructed for use in Russia. 2000 w. La Revue Technique—Oct. 10, 1898.

**French Government.**—Dredging Machine for the French Government. General view, with side elevation, and plan showing general arrangement, with description and report of trials. 1200 w. Engng—Dec. 2, 1898.

**Ganges.**—Report on Sand-Pump Dredges. W. R. Haughton. Gives general description with illustrations, and discusses the requirements for working on the Ganges. 2000 w. Ind Engng—Feb. 25, 1899.

**Gold.**—See **GOLD DREDGING.**

**Holland.**—An Improved Suction and Force Dredge (Saug-und Druckbagger Neuerer Konstrukton). H. v. Horn. Illustrated description of an improved dredge used in Haarlem, Holland. The spoil may be delivered to the shore or scow under pressure. 800 w. Zeitschr d Ver Deutscher Ing—Feb. 17, 1900.

See also **"Alexander Barminsky;" Smulders.**

**"Iota," Mississippi.**—Self-Propelling Hydraulic Dredge for the Mississippi River. Two-page plate and description of a steel-hulled vessel fitted with side wheels, to be called the "Iota." Describes the tests to be made, as given in the specifications. 2800 w. Eng News—May 31, 1900.

**Kretz Jet.**—Experiments with the Kretz Jet Dredge (Versuchsfahrten mit dem Kretzschen Spülbagger). With illustrations showing the combined action of forcing and suction streams. 3500 w. Zeitschr d Ver Deutscher Ing—May 13, 1899.

The Kretz Jet Dredge (Kretz'sche Spülbagger). An illustrated description of this improved dredge, in which powerful jets of water are used to disinteregrate the material and enable the suction currents to remove it. 3000 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1900.

**"La Puissante" Hopper.**—Hopper Dredger "La Puissante." A well illustrated description of the largest dredger of the stern-well bucket type, built in England for the Suez Canal Company. 900 w. Engr, Lond—Sept. 7, 1900.

**Liverpool.**—See **Mersey Bar.**

**Mersey Bar.**—River and Harbor Dredging. Illustrated description of the sand dredger "Brancker" which was used for the removal of the Mersey Bar. 2400 w. Ind & East Engr—June, 1898.

Sand Pump Dredgers. Anthony Geo. Lyster. Read before the Engineering Conference of the Inst. of Civ. Engs., England. Information of the work on the Mersey Bar by dredging, especially since 1898. 1400 w. Engng—June 16, 1890.

The Great Sea-Going Dredges on the Mersey Bar, Liverpool. An illustrated description of the sea-going dredge "Brancker" and its work, with an interesting account of the circumstances which led to its construction. 2000 w. Sci Am—Aug. 27, 1898.

**Mississippi.**—A Great Dredge. A description of a 3000 horse-power machine being built at Sparrow's Point, by the Maryland Steel Co., for improving the Mississippi River. 1000 w. Mfrs' Rec—Dec. 13, 1895.

Hydraulic Suction Dredge for the Navigation Improvements of the Mississippi River. An excellent description, with illustrations of the same dredge reviewed in our Feb'y number. 3000 w. Eng News—April 23, 1896.

The Mammoth Hydraulic Dredge for the Mississippi River. Illustrated description of dredge and of the operation of dredging. 1400 w. Engng—July 17, 1896.

An Enormous Suction Dredge. A dredge designed for government work on the Mississippi river channel, having the enormous capacity of 3000 cubic yards per hour. It is thought to be the largest yet built. 1800 w. Eng Rec—Dec. 14, 1895.

New Hydraulic Dredges for the Mississippi River Improvement. Illustrated detailed description of dredges designed for low water use, where there is no hard material. The rotary cutters have been omitted and powerful water jets are adopted for stirring up the material to be excavated. 2000 w. Eng News—July 22, 1897.

U. S. Government Hydraulic Dredges. Illustrates suction and jet dredges used on the Mississippi. 900 w. Eng Rec—May 14, 1898.

Dredges on the Mississippi (Die Bagger auf dem Mississippi). R. Wels. A very full review of the Government work upon the Mississippi, with many illustrations of suction and bucket dredges, based on various official and professional reports. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 22, 1898.

Dredges on the Mississippi. Waldon Fawcett. Brief illustrated descriptions of some of the dredges used. 1500 w. Sci Am—July 7, 1900.

Experiences in the Operation and Repair of the Hydraulic Dredges on the Mississippi River. F. B. Maltby. Relates some of the experiences in the operation, the methods, results obtained, and repairs made necessary through wear. 4500 w. Jour Assn of Engng Socs—May, 1900.

Steam Tenders and Dredges on the Mississippi River. Illustrated description of one of the five large tenders under construction. 1500 w. Eng News—Dec. 7, 1899.

See also **"Benyaurd;" "Iota;" DREDGING. RIVER REGULATION.**

**Natal.**—The Suction Pump Dredger "Octopus" for the Natal Government. Illustrated description. 700 w. Engng—Aug. 20, 1897.

**"Octopus."**—See **Natal.**

**Russia.**—Bucket Dredging Machine. Description with illustrations of a sea-going bucket dredger constructed for the Russian Government. 500 w. Engng—June 23, 1899.

See also **"Alexander Barminsky;" Bates; French for Russia; Smulders.**

**Smulders, Azov.**—Bucket and Suction Dredge (Seebagger mit Eimern und Saugrohr). An illustrated description of the powerful dredge built by Smulders, of Rotterdam for the Russian government for use in the sea of Azov. 1000 w. 1 plate. Zeitschr d Ver Deutscher Ind—July 3, 1897.

**Smulders, Port Arthur.**—Bucket and Suction Harbor Dredge (Drague Marine à Godets, à Succion et à Refoulement). Illustrated description of powerful new dredge, built by Smulders for the harbor of Port Arthur. 1500 w. Génie Civil—Sept. 15, 1900.

**Smulders, Vladivostock.**—Marine Bucket-Dredge of 1000 Horse Power (Drague Marine à Godets de 1000 Chevaux). An illustrated description of the powerful dredge built for the Russian Government by Smulders, of Rotterdam, for use in the harbor of Vladivostock. 1000 w. 1 plate. Génie Civil—Aug. 19, 1899.

The 1000-H. P. Ladder Dredge for the Vladivorstock. Harbor Improvement Work, Russia. Illustrated description. 700 w. Eng News—Oct. 5, 1899.

**Suez Canal.**—See **"La Puissante" Hopper.**

**"Thomas."**—Mammoth Dredging Steamer Launched. Describes the launching from the shipyard of the Maryland Steel Co., of the "Thomas," the first of two built to deepen New York harbor. 2700 w. Naut Gas—Oct. 4, 1900.

**"Thomas" and "Mills."**—Hydraulic Hopper Dredges for the East Channel, New York Harbor. Illustrated description of the "Thomas" and "Mills," each 300 feet long, 52½ feet wide and carrying 7000 tons. 1500 w. Eng Rec—Sept. 22, 1900.

### DREDGING.

See also **DREDGE; HARBOR IMPROVEMENT; RIVER REGULATION.**

**Centrifugal Pump.**—Pioneers of Centrifugal Pump Dredging. Letter to the editor from Frank E. Lesourd, criticizing the claims to inventions made by A. W. Von Schmidt and A. B. Bowers, with replies from the parties criticized. 5500 w. Eng News—June 17, 1897.

**Cost.**—Cost of Dredging in the United States. Tables compiled for the Nicaragua Canal Commission by T. Jenkins Hains. Also cost of concrete in the United States. 2500 w. Eng News—Feb. 17, 1898.

**Gold.**—See **GOLD DREDGING.**

**Hydraulic.**—Hydraulic Dredging: Its Origin, Growth and Present Status. W. H. Smyth. Read before the Technical Society of the Pacific Coast. Discussion. Reviews briefly the salient points in the progress of this art. 10000 w. Jour Assn of Engng Socs—Oct., 1897.

**Measurement of Materials.**—The Measurement of Dredged Materials. A description of the investigations at Buenos Ayres to determine the relation between place and scow measurements. 1500 w. Eng Rec—Jan. 6, 1900.

**Mississippi.**—Dredges and Dredging on the Mississippi River. J. A. Ockerson. Presents a general view of the physical conditions, showing the probable requires different treatment in different parts of the river, and its general complexity; describes some devices for the removal of sand bars and other work, and their operation; gives illustrated description of numerous dredges and auxiliary machinery, and shows the magnitude of the work undertaken. Ill. 28300 w. Pro Am Soc of Civ Engs—June, 1898.

The Improvement of the Mississippi River by Dredging. H. St. L. Coppée. A fully illustrated account of the work of the Government engineers in removing bars, dredging channels, and regulating the navigation of the Mississippi. 4500 w. Engineering Magazine—June, 1898.

See also **DREDGE; RIVER REGULATION.**

**Tidal Channels.**—Hydraulic Dredging in Tidal Channels. W. H. Wheeler. Describes the results and cost of works in several countries. 5000 w. Eng, Rec—Feb. 4, 1899.

The Improvement of Tidal Channels by Pump Dredging. W. H. Wheeler. Read at the International Congress on Navigation, at Brussels. Gives examples showing that increased depth can be obtained at a reasonable cost, and that these channels, if due consideration is given to the direction of the tidal currents, will maintain themselves. 4500 w. Engr, Lond—Dec. 2, 1898.

### DRILL.

See also **COAL MINING MACHINERY; DIAMOND DRILLING; MINING MACHINERY; ROCK DRILL.**

**Diamond.**—See **DIAMOND DRILLING.**

**Ratchet.**—See **RATCHET DRILL.**

**Rock.**—See **ROCK DRILL.**

**Special Tools.**—Special Drilling Tools. A. H. Cleaves. Illustrated detailed description. 600 w. Am Mach—Sept. 15, 1898.

**Testing.**—Some Records of Drill Testing. Describes experiments made by the writer tending to show the superiority of milled drills for the class of drilling used. 800 w. Am Mach—March 18, 1897.

**Twist.**—Teachings of a Drill Factory. John Randol. Describes the manufacture of twist drills as carried on by the T. & B. Tool Co., of Danbury, Conn. Photographs of various steps of the process are given, and description of the fine work. Serial. Am Mach—Dec. 23, 1897.

The Limiting Size of a Twist Drill. On some experiments made by L. P. Breckinridge in 1888, with comments. Ill. 1000 w. Am Mach—Nov. 23, 1899.

See also **TOOL MANUFACTURE—New Bedford.**

### DRILL GRINDER.

See **GRINDER.**

### DRILLING.

**Speed.**—Speed of Drilling. Alfred C. Lane. Gives a table prepared by W. W. Stockly, with comments. 700 w. Eng & Min Jour—Nov. 4, 1899.

### DRILLING MACHINE.

See also **MACHINE TOOL.**

**Five-Spindle.**—A Five-Spindle Drilling Attachment. A. H. Cleaves. An illustrated detailed description of the tool. 600 w. Am Mach—March 2, 1899.

**Horizontal.**—Horizontal Drilling Machines. John Randol. Comments on the excellent work done by this tool and the causes of its rarity, with illustrated description of several machines. 1700 w. Am Mach—April 15, 1897.

**Nieustaedt.**—Nieustaedt's Improvements in Drilling Machines. From the "English Mechanic." Illustrated description of mechanism for controlling the velocity in drilling. 1000 w. Prac Eng—Sept. 30, 1898.

**Radial.**—A Large Radial Drill (Grosse Radialbohrmaschine). Description, with photograph, and working plan and elevation of a large radial drill press adapted either for belt or electric driving. 1000 w. Zeitschr d Ver Deutscher Ing—Nov. 5, 1898.

Double Radial Drill-Press (Doppelte Auslegerbohrmaschine). A special tool for drilling the field rings of large electric generators. The drills are electrically driven, and full details are shown. 1500 w. Zeitschr d Ver Deutscher Ing—Sept. 23, 1899.

4½-Foot Semi-Universal Radial Drill. Illustrated description of a machine intended for drilling and boring. 300 w. Am Mach—Jan. 4, 1900.

**Travelling.**—A Travelling Drilling Machine. Illustrated description. 500 w. Engr, Lond—Nov. 17, 1899.

### DRILLING TOOLS.

**Portable.**—A Portable Drilling Tool with Suction Support. E. P. Buffet. From "Génie Civil." Illustrated description of a portable drill for use in shipyards, invented by M. L. Moissenet. 800 w. Am Mach—Jan. 18, 1900.

### DRILL JIG.

A Duplex Drill Jig for a Multiple Spindle Driller. D. E. McCarthy. Illustrated description of a tool recently designed by the writer. 400 w. Am Mach—Jan. 11, 1900.

### DRIVING WHEEL.

**Automobile.**—See **AUTOMOBILE—Driving Wheel.**

**Balancing.**—See **LOCOMOTIVE—Counterbalancing.**

**Locomotive.**—See **LOCOMOTIVE DRIVING WHEEL.**

### DROP HAMMER.

See also **HAMMER; STEAM HAMMER.**

The Development of the Drop Hammer. C. E. Billings. Interesting and instructive, historically and technically. The first use of drop hammers is attributed to Col. Samuel Colt, in the year 1853. The essential features of a good drop hammer installation are separately treated. Ill. 1700 w. Am Mach—Dec. 19, 1895.

The Largest Drop Hammer in the World. Illustrated description of what is probably the largest specimen of this type of tool in existence, made for and by the Billings & Spencer Company, of Hartford, Conn. 1800 w. Ir Age—Dec. 30, 1897.

### DROSOPHORE.

See **HUMIDITY.**

### DRUM.

**Hoisting.**—See **HOISTING DRUM.**

### DRY DOCK.

See also **DOCK; FLOATING DOCK.**

**Blocks and Appliances.**—Graving-Dock Blocks and Appliances. Arthur John Maginnis. Read before the Engng. Conference of the Inst. of Civ. Engs. England. Considers keel blocks, side shores, and lifting appliances. 1600 w. Engs' Gaz—July, 1899.

**Boston.**—Naval Dry Dock at Boston. Illustrates and describes this large concrete structure, which is to cost $1,025,000. 2000 w. Marine Rev—Aug. 17, 1899.

The New Dry Dock for the U. S. Navy at Boston, Mass. Plans and description of a dock to be built of concrete, with rubble stone fillers, and lined with cut stone masonry. 1800 w. Eng News—July 20, 1899.

The New Masonry Dry Dock at Boston, Mass. Illustrates and describes the leading features of this structure, 788 feet long, giving the elaborate cement specifications in full. 2800 w. Eng Rec—Feb. 4, 1899.

See also DRY DOCK FAILURE.

**Brooklyn.**—A Leak in the New Dry Dock, Brooklyn Navy Yard. A statement of the case based on such facts as could be ascertained with the measures being taken to remedy the defect. 1000 w. Sci Am—May 22, 1897.

Reconstruction in Concrete of Dry Dock No. 2, New York Navy Yard. Brief illustrated account of these repairs. 1500 w. Sci Am—Oct. 20, 1900.

Repairs to Dry Dock No. 3, at the Brooklyn Navy Yard. Brief general description of the work. 600 w. Sci Am—Aug. 28, 1897.

The Reconstruction of a Dry Dock. Illustrated description of the methods employed in building an old timber dock in the Brooklyn navy yard into a concrete dock. 1400 w. Eng Rec—Jan. 20, 1900.

**Brooklyn Timber.**—The Timber Dry Dock No. 3 at the New York Navy Yard. Popular description with views of the work in progress. 1100 w. Sci Am—Feb. 1, 1896.

The Timber Dry Docks at the Brooklyn Navy Yard. Illustrated detailed description of new dock No. 3, construction, cost, etc. 1800 w. Sci Am—Feb. 20, 1897.

See also Timber vs. Masonry; DRY DOCK FAILURE.

**Chile.**—The Dry Dock of Talcahuano, Chile (Das Trockendock von Talcahuano, Chile). A detailed account of this fine masonry dock, with map of the Bay of Concepcion, and drawings of the masonry construction and gates. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—May 19, 1899.

**Clyde.**—The New Graving Dock of the Clyde Navigation Trust. Illustrated description of the Glasgow Dock—No. 3, and its construction. Serial. Engr, Lond—May 20, 1898.

See also PUMPING MACHINERY—Dry Dock.

**Concrete-Steel.**—Dry Dock Construction. A statement of the advantages of concrete-steel construction for dry docks. 900 w. Eng Rec—June 16, 1900.

**Detroit.**—See SHIPYARD—Detroit.

**Entrances.**—Modern Warships and Dock Entrances. Descriptive, with engravings showing the widest and the least, of the existing and proposed entrances. 1000 w. Eng, Lond—Feb. 28, 1896.

**Floating.**—See FLOATING DOCK.

**Glasgow.**—The New Graving Dock at Glasgow. Giving the detailed specifications for this important structure with plan, and section, also plate of details of caisson gates, and illustration of hydraulic caisson hauling engine. 3500 w. 1 plate. Engng—Sept. 2, 1898.

**Great Lakes.**—Notes on Dry Docks of the Great Lakes. A. V. Powell. After some historical notes, the author proceeds to describe the construction of the Chicago Shipbuilding Co.'s dry dock in detail, giving many views to illustrate. 3500 w. Jour of W Soc of Engs—Jan., 1896.

**Hydraulic Lift.**—Hydraulic Lift Dry Dock at the Union Iron Woks, San Francisco. Illustrated description. 1000 w. Sci Am—Aug. 1, 1896.

Hydraulic Lifting Dry Dock at Union Iron Works, San Francisco. Illustrated detailed description. 1500 w. Marine Engng—Nov., 1899.

**Kingston, Ont.**—The Dry Dock at Kingston, Ont. Henry F. Perley. Read before the Canadian Soc. of Civ. Engs. Illustrated description. 2500 w. Can Eng—June, 1896.

**Lorain, O.**—The Construction of the Lorain Dry Dock and Shipyard of the Cleveland Shipbuilding Company. James Ritchie. Illustrated detailed description of this work. 5000 w. Pro of Am Soc of Civ Engs—March, 1898.

**Masonry vs. Timber.**—See Timber vs. Masonry.

**New York.**—Dry Docks in the Port of New York. Editorial. The position taken in the report of the board of consulting engineers to the effect that such docks should be a part of the dock system of New York is approved, and reasons for this view are given. 800 w. Eng Rec—March 21, 1896.

**Portsmouth, Eng.**—The New Docks at Portsmouth. Interesting description of the harbor of Portsmouth, Eng., and of the two large new docks rapidly approaching completion, and which will accommodate the largest English warships. 4200 w. Trans—June 19, 1896.

The Two New Docks at Portsmouth. The method of construction is fully described and illustrated by drawings. The two docks are each 563 ft. 6 in. long, 120 ft. wide, and 43 ft. 6 in. deep. 3300 w. Eng, Lond—Feb. 21, 1896.

**Puget Sound.**—Government Dry Dock at Port Orchard, Puget Sound, Washington. A. McL. Hawks. Illustrated description. 1300 w. Sci Am—Oct. 3, 1896.

**Responsibility.**—Responsibility of Dry Docks. Concerning a recent case in the Liverpool assize court, which allowed no damages for the collapse of a vessel in dock where exceptional construction had not been provided for. 1300 w. Marine Rev—Sept. 14, 1899.

**Supporting of Ships.**—Graphical Method of Finding the Pressure on Blocks Under a Ship Due to Overhang. H. S. Hele-Shaw. A letter with explanation of the graphic construction given. 1000 w. Engng—Aug. 4, 1899.

The Supporting of Ships in Dry Docks. Francis Elgar. Read at Newcastle, before the Inst. of Naval Architects. Considers the distribution of pressure over the bottom of a ship in dry dock, and over the dock blocks, and to what extent it may become dangerously affected by conditions that sometimes arise in docking. Ill. 4500 w. Engng—July 28, 1899.

**Timber.**—See Brooklyn.

**Timber vs. Masonry.**—The Comparative Merits of Timber and Masonry Dry-Docks. Report in full of Mordecai T. Endicott, Chief of the Bureau of Yards and Docks, respecting materials for the four new dry-docks provided for by the U. S. Congress. 1300 w. Eng News—Feb. 9, 1899.

Masonry or Wooden Dry-Docks. A review of the important light thrown on the relative advantages of timber and masonry graving docks, by the results of the competition for the new Boston structure. 1200 w. Eng Rec—Feb. 11, 1899.

Masonry or Wooden Dry-Docks. Brief synopses of papers by William Ledyard Cathcart and Mordecai T. Endicott, given at special meeting to discuss the relative merits, with particular reference to the needs of the U. S. Navy. 2800 w. R R Gaz—Feb. 17, 1899.

Dry Docks—Stone vs. Wood. An informal discussion of this subject at a special meeting of the society. 18000 w. Pro Am Soc of Civ Engs—March, 1899.

The Lesson of Timber Dry Docks. A statement of the relative prime cost of timber and masonry docks and of their maintenance, from the records of the U. S. Navy Department. Indicates that masonry docks are much cheaper in the end. 1400 w. Eng Rec—Jan. 13, 1900.

**Toulon.**—Dry Dock with Steel Caisson Foundations at the Port of Toulon, France. Two-page plate and description of a novel application of pneumatic steel caisson foundations. 2800 w. Eng News—June 7, 1900.

The Construction of the Third Graving Dock at Missiessy (Travaux de Construction du 3me Bassin de Radoub de Missiessy). M. Guiffart. An account of the new graving dock at the port of Toulon. A caisson of structural and sheet iron was first constructed and filled with masonry. 10000 w. 3 plates. Ann des Ponts et Chaussées—3 Trimestre, 1899.

**Troon, Scotland.**—New Graving Dock at Troon. Describes a recently opened dock which has been under construction for two years. Ill. 1800 w. Engr, Lond—July 14, 1899.

**Union Iron Works.**—See Hydraulic Lift.

**U. S. Navy Yards.**—Four Immense Dry Docks—League Island, Mare Island, Boston and Portsmouth. Brief illustrated description. 1200 w. Marine Rev—Sept. 28, 1899.

Our Naval Dry Docks. An editorial statement placing the blame of naval dry-dock failures on line officers' interference with civil engineers. 1200 w. Eng Rec—March 5, 1896.

See also Boston; Brooklyn.

**DRY DOCK FAILURE.**

**Boston.**—Flooding of the New Dry Dock Excavation at the Boston Navy Yard. Frank O. Maxson. Illustrated description of the sliding of a large area in consequence of excavation behind the coffer dam. 2800 w. Eng Rec—Sept. 22, 1900.

Partial Failure of Coffer Dam, New Dry Dock, Boston Navy Yard. Frank O. Maxson. Illustrated description of the failure of a coffer dam over 40 ft. high and 36 ft. wide. 2000 w. Eng Rec—Aug. 4, 1900.

**Brooklyn.**—Accident to Dry Dock No. 2—New York Navy Yard. Illustrated description. 500 w. Sci Am—Aug. 22, 1896.

Repairing the Leak at Dry Dock No. 3, Brooklyn Navy Yard. Illustrated description of this difficult piece of engineering work now in progress. 1700 w. Sci Am—Dec. 25, 1897.

The Brooklyn Dry-Dock Failure. A history of the dock which failed to hold water. 2000 w. Eng Rec—Feb. 19, 1898.

The Failure of a Timber Dry-Dock. Describes the failure of Dock 2 of the Brooklyn navy yard, after nine years of service. 800 w. Eng Rec—July 29, 1899.

See also **CIVIL ENGINEER—U. S. Navy.**

**DRY DOCK GATES.**

See **DRY DOCK—Entrances; PUMPING MACHINERY—Dry Dock.**

**DRYING**

See also **HUMIDITY.**

Drying Installations (Trockenanlagen). M. Grellert. A general investigation of the various methods of drying, with computations of the quantities of heat required to accomplish given results. 2500 w. Gesundheits-Ingeneieur—May 15, 1898.

Modern Drying Apparatus (Moderne Trockenanlagen). A discussion of the action of heat in increasing the absorbing capacity of air for moisture, together with the theory of air-drying apparatus. 3000 w. Zeitschr d Ver Deutscher Ing—Jan. 22, 1898.

The Physical Principles and Practical Construction of Modern Drying Plants (Ueber die Physikalischen Grundlagen und die Technische Ausbildung Moderner Trockenanlagen). Prof. P. Pfeifer. A general discussion of the principles involved in artificial drying, and an account of the methods of construction. 4000 w. Gesundheits Ingenieur—Feb. 15, 1898.

**DRYING MACHINE.**

**Gibbs.**—Gibbs' Harvest Saving and Drying Machines. Interesting detailed illustrated description of a very unique machine for drying hay and other analogous farm produce. 1100 w. Eng, Lond—Nov. 8, 1895.

**DRYING ROOMS.**

Drying Rooms. J. L. Bixby, Jr. Describes practically the essentials of drying rooms, for different purposes, and illustrates different constructions by diagrams. Ill. 2200 w. Heat & Ven—Dec. 15, 1895.

**DUMPING BUCKET.**

The O'Rourke Dumping Bucket. Illustrated description of a recently patented drop-bottom bucket. 1100 w. R R Gaz—Nov. 24, 1899.

**DUMPING SCOW.**

**New York.**—Steam Dumping Scow for the Street Cleaning Department of New York. Illustrated description of scow, with brief comment on the efficient work of this department. 1300 w. Sci Am—June 5, 1897.

**DUODECIMAL SYSTEM.**

See **WEIGHTS AND MEASURES.**

**DURANA.**

See **COPPER ALLOY.**

**DUST.**

**Collection.**—Methods for the Collection of a Metallurgical Dust and Fume. Malvern W. Iles. A valuable synopsis with a brief description of each of the eight processes which have been used for the purpose. 10500 w. Sch of Mines Quar—Jan., 1896.

**Prevention.**—Dustless Buildings. C. J. Woodbury. Describes a device for removing the annoying dust from the air in large buildings, caused by methods of heating and ventilation. 800 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Removal.**—Removal of Dust from a Boiler Room. Illustrated review of a paper by A. A. Cary on a plant designed to intercept all the dust given off in the boiler house of a wire-insulating plant. 900 w. Eng Rec—Feb. 3, 1900.

**DYKE.**

See **SHORE PROTECTION.**

**DYNAMITE.**

See **EXPLOSIVE—Dynamite.**

**DYNAMO.**—See also **ALTERNATOR; ELECTRIC LIGHTING—Apparatus; ELECTRIC MACHINERY; ELECTRIC PLANT; ELECTRIC POWER STATION; ELECTRIC STATION; HYDRO-ELECTRIC STATION.**

A Dynamo for the Direct Generation of a Uni-Directional Current (Dynamomaschine zur Direkten Erzeugung, eines Gleichgerichteten Stromes). An illustrated description of a dynamo in which part of the armature winding is surrounded by a strongly paramagnetic substance, and part by a diamagnetic or non-magnetic substance. 600 w. Elektrizität—July 7, 1900.

Electric Generators. H. F. Parshall and H. M. Hobart. Part 1st considers the variety of materials entering into the construction, and the need of testing them, also the methods. Ill. Serial. Engng—Jan. 7, 1898.

Notes on the Designs and Manufacture of Dynamo Electric Machinery. C. H. Chalmers. Treats briefly of a few points in the design and manufacture of dynamo electric machinery, particular attention being paid to the considerations which the technical press and text-books regard as of minor importance. 1200 w. Engineers' Year Book—Univ of Minn—1896.

On Dynamos. W. M. Mordey. Read before the Institution of Elec. Engs. The development of the dynamo and a discussion of its value and means of improving dynamos. Serial. Elect'n—May 28, 1897.

Points to Consider in a Dynamo. Arthur L. Rice. Briefly considers such points as can be determined without the test of continuous use. Diagrams. 1500 w. Engr, U. S. A.—Feb. 1, 1899.

Twenty-Five Years of Dynamo-Electric Machinery. W. B. Esson. Especially discusses the Gramme and the Von Hefner-Alteneck machines, noting also the general development of designs. 2000 w. Elec Rev, Lond—Nov. 12, 1897.

**Air Space.**—The Problem of the Small Air-Space Dynamo. H. B. Atkinson. Discussing a paper by W. M. Mordey on Dynamos. 1800 w. Elect'n—June 11, 1897.

See also **DYNAMO DESIGN.**

**Air Space Variable.—See Variable Air Space.**

**Allg. Elek. Ges. at Paris.**—The 4,000 Horse-Power Rotary Current Dynamo of the Allgemeine Elektricitäts Gesellschaft at the Paris Exposition (Die 4000 Pferdige Drehstrom-Dynamomaschine der A. E. G. auf der Weltausstellung in Paris). A short discription, with photographic illustrations. 400 w. Ill Zeitschr f Klein u Strassenbahnen—July 1, 1900.

3000 Kilowatt Rotary Current Dynamo of the Allgemeine Elektricitäts-Gesellschaft at the Paris Exposition (Die Elektricität auf der Pariser Weltausstellung. Drehstrom-Maschine von 3000 K W der Allgemeinen Elektricitäts-Gesellschaft). A brief illustrated description of this huge machine. 800 w. Elektrotech Zeitschr—May 17, 1900.

**Alternating Current.**—See **ALTERNATOR.**

**Application.**—Application of the Dynamo. H. Richards, Jr. Considers briefly its connection with the electric railway and lighting purposes. 800 w. Yale Sci M—Oct., 1899.

**Arc.**—The Design of Large Arc Dynamos. George Albers. Describes a complex commutator as an accompaniment to a type of machine which is given as an example of the extreme practical limit of subdivision of units for a large station. 2200 w. Elec Eng—Oct. 7, 1896.

Western Electric Iron Clad Arc Dynamos. Illustrated description. 2800 w. Elec Eng—March 4, 1896.

**Arc, Regulation.**—Arc Machine Regulation. H. Franklin Watts. Remarks on the systems of regulations employed, criticising some of the regulators, and suggesting a remedy for their shortcomings. 1700 w. Elec Wld & Elec Engr—July 29, 1899.

**Armature Current Losses.**—See **ARMATURE CURRENT—Losses.**

**Bipolar.**—See **Multipolar; DYNAMO DESIGN.**

**Boston Elevated Ry.**—The Largest Dynamo in the World. S. H. Short. Illustrations and description of the 3000 kilowatt machine for Boston Elevated Ry. Co., its construction, and the weights of its various parts. 1000 w. Ry Wld—Dec. 8, 1898.

**Breguet.**—Belleville-Breguet Compound Generating Set (Groupe Electrogéne Belleville-Breguet). A description of the exhibit at the Paris Exposition, and an analysis of the action of the compound alternator. 3500 w. L'Electricien—Oct. 20, 1900.

Generating Set of 1000 Kilowatts (Groupe Electrogéne de 1000 Kilowatts). Ch. Dantin. Illustrated description of the set consisting of a 1250 h. p. Delaunay Belleville engine connected to a 1000 kilowatt three-phase generator, by Breguet, exhibited at Paris. 3000 w. 1 plate. Génie Civil—Sept. 8, 1900.

**Brushless.**—On a Direct Current Dynamo Without Brushes. Albert Campbell. Concludes that commutation can be obtained without slipping contacts, that is, in absolutely fixed circuits, by means of alternations in resistance produced by magnetic, thermal or other means. Ill. 1000 w. Elec Rev, Lond—April 14, 1899.

**Capacities.**—Dynamo and Engine Capacities. Alton D. Adams. On the importance of giving attention to combined operative efficiency under average working conditions. 1400 w. Engr, Cleveland, O.—March 1, 1899.

**Capacity Limits.**—Capacity Limits in Direct-Current Machines. Alton D. Adams. A discussion of the maximum possible rate of work in electrical machinery. 1200 w. Eng News—Nov. 23, 1899.

**Care.**—A Few Points on the Care of Electrical Machinery. William Baxter, Jr. Deals especially with the adjustment and care of brushes. 4800 w. Power—Dec., 1896.

Dynamo Troubles and How to Overcome Them. Percy Domville. Read before the Hamilton Assn. C. A. S. E. Hints as to the care of a dynamo and an idea of some of the accidents which are likely to occur, and the best way to repair them. 2800 w. Can Elec News—Nov., 1897.

**Characteristics.**—Dynamo Characteristics. Wilbur M. Stine. Considers the effect of armature reaction, and the causes for the departure of actual curves from their theoretical outlines. 1100 w. Am Elect'n—May, 1897.

Dynamo Charactertistics. Wilbur M. Stine. Showing that the characteristic occupies the same practical relation to the dynamo that the indicator does to the steam engine, and gives directions that will enable any one in charge of a dynamo, who possesses a good voltmeter and ammeter, to correctly lay down the several curves of his machine. 1400 w. Am Elect'n—Feb., 1897.

Interpretation of Dynamo Characteristics. H. J. Hotchkiss. Read before the Electrical Soc. of Cornell Univ. The aim of the paper is to call attention to a few of the fundamental ideas that may serve as a general basis for the interpretation of characteristic curves. 1200 w. Sib Jour of Engng—June, 1897.

See also **MAGNETIC INDUCTION—Curve.**

**Commutation.**—Recent Papers on the Commutation or the Direct-Current Dynamos. An account of the work done and papers published bearing on this problem. Ill. Serial. Elec Rev, Lond—Jan. 12, 1900.

**Commutatorless.**—Commutatorless Dynamos. James Whitcher. Criticism of statements in an article by Ricardo Malagoli on "An Alternating Rotary Magnetic Field and its Application." 1800 w. Elec Engr, Lond—Jan. 17, 1896.

Notes on Commutatorless Dynamo Design. H. M. Heath. Describes several forms, giving illustrations, and pointing out the advantage of this type for the production of large currents at low voltages. 1600 w. Elec Wld & Engr—Feb. 10, 1900.

**Compound.**—Compound Dynamos and Their Action. James T. Jennings. Information regarding the action of compound wound generators working in multiple. 1800 w. Am Elect'n—Dec., 1897.

The Compound Dynamo. George F. Sever. Lecture delivered before the Henry Electrical Club. The paper treats of the function, uses, methods of working, etc. 3000 w. Elec Pow—Jan., 1896.

See also **Parallel.**

**Construction.**—See **DYNAMO CONSTRUCTION.**

**Cornell.**—See **Sibley College.**

**Criticism.**—Electrical Things That Are Not What They Seem. Alton D. Adams. Critical review of the claims of a new electric generator recently advertised. 1200 k. Elec Wld & Elec Engr—March 18, 1899.

**Design.**—See **DYNAMO DESIGN.**

**Dissimilar Action.**—Dissimilar Action of Similar Machines. William Baxter, Jr. Considers the causes that tend to vary the action of machines. 2800 w. Elec Wld—Feb. 20, 1897.

**Double Current.**—Direct-Alternating Generators. Alton D. Adams. Gives a brief review of existing conditions in electrical supply, the present tendency, and suggestions for the solution of the central station problem. 2500 w. Elec Wld & Engr—Sept. 9, 1899.

Double Voltage and Current Generators. Alton D. Adams, with editorial. An explanation of the position taken by the writer in a previous paper, which was criticised editorially. 2600 w. Elec Wld & Engr—Dec. 16, 1899.

Double Voltage and Current Generators. Alton D. Adams. States the advantages of generators that are able to deliver their output as either direct or alternating current, or a part in each. 1200 w. Elec Wld & Engr—Nov. 11, 1899.

The Double Current Generators and Polyphase Apparatus of the Chicago Edison Company. Homer E. Niesz. Illustrates and describes a complete equipment for the simultaneous generation of alternating and direct currents in the same machines, or the conversion of direct to alternating currents for high-tension transmission purposes and reconversion. 3500 w. Am Elect'n—Oct., 1899.

Transmission Problems for Modern Central Station Supply. The Use of Double Current Machines. Eustace Thomas. Discusses the systems for a wide area of supply, and the use of the machines named. 1200 w. Elect'n, Lond—Dec. 1, 1899.

See also **Polyphase—Singlephase; DYNAMO DESIGN.**

**Eddy Currents.**—See **ARMATURE; ELECTRIC MACHINERY; HYSTERESIS.**

**E. M. F. Division.**—Dividing the Electromotive Force of Direct Current Dynamos by Means of Inductive Resistances (Spannungstheilung an Gleichstrommaschinen mittels Drosselspulen). Prof. A. Sengel. A mathematical treatment of methods of determining the difference in voltage in a divided circuit of a direct current machine; with results of tests and tables. Serial. 2 parts. 4000 w. Electrotech Zeitschr—May 17, 24, 1900.

**Efficiency.**—Efficiency of Dynamo-Electric Machinery. Alfred E. Wiener. A study of the electrical efficiency, commercial or net efficiency, efficiency of conversion, and weight efficiency and cost of dynamos. 2000 w. Am Elect'n—July, 1897.

Measurement of the Efficiency of Continuous Current Electric Machines of all Powers. P. Dupuy, in "L'Eclairage Electrique." A method of determining the efficiency which necessitates the use of two similar machines. 500 w. Elec Rev, Lond—April 22, 1898.

New Method for Determining Dynamo Efficiency (Nouvelle Methode pour la Determination des Rendements). J. L. Rontin. The measurements are made with a tachometer only. 1200 w. L'Eclairage Electrique—Oct. 24, 1896.

The Determination of the Efficiency of Continuous Current Dynamos (Sur la Determination du Rendement des Dynamos à Courant Continu). C. Pierron. A discussion of the various methods of measuring dynamo efficiency, with especial reference to that of Swinburne, with examples of its application. 2500 w. L'Electricien—April 8, 1899.

The Efficiency of Direct Current Dynamos and Motors. Explanation of the terms employed. with table giving equivalent volts for efficiencies ranging from 60 to 95 per cent. 1600 w. Elec, Lond—Jan. 29, 1897.

The Measurement of the Efficiency of Dynamos. M. Bunet. Abstract translation of an article in the "Revue de Physique et de Chimie," describing various methods of testing the efficiency and their advantages or disadvantages. 2000 w. Elec Rev, Lond—Aug. 5, 1898.

See also **Tests.**

**Electro-Dynamic Force.**—See **ARMATURE.**

**Erection.**—Setting Up Large Generators. George T. Handchett. Points on the setting of a dynamo of the direct connected multipolar type. Attention is called to faults of these machines. Ill. 2500 w. Elec Wld—Dec. 4, 1897.

**Exciting.**—A Method of Exciting Continuous Current Generators with Half the Pressure at the Brushes (Schaltungsanordnung zur Erregung von Gleichstrom Nebenschlussmaschinen mit der Halben Bürstenspannung). A. Sengel. By the introduction of a contact ring and third brush, a current of half the brush voltage may be derived and used for excitation. The details of the method and its advantages are described. 3500 w. Electrotech Zeitschr—Aug. 11, 1898.

**Exciting, Doushea Method.**—The Doushea Method of Charging the Fields of Large Central Station Dynamos. The advantages and disadvantages of the three methods are stated, and the Doushea Method, which is claimed to obviate the difficulties of the three systems, is explained. 1000 w. Elec Eng—Jan. 22, 1896.

**Fault.**—Faults in Dynamos. A few simple methods of attaining certain ends. 1700 w. Am Elect'n—May, 1896.

Faults in Dynamos. Difficulties that occur with dynamos that cause them to become inoperative, but are more properly classified as blunders rather than faults. 2000 w. Am Elect'n—July, 1896.

Faults in Dynamos. Mistakes in armature connections are illustrated by diagrams and described in the text. 1400 w. Am Elect'n—Aug., 1896.

See also **Troubles.**

**Fault Location.**—The Determination of Defects in Dynamos (Beiträge zur Fehlerbestimmung in Dynamo-maschinen). Karl Richter. A review of Frölich's method, showing the use of the Wheatstone bridge in detecting and locating defects in electric generators. 6000 w. Elektrotech Zeitschr—Jan. 11, 1900.

**Ferranti.**—See **ELECTRIC STATION—Deptford.**

**Field Windings.**—Field Windings of Dynamos. Arthur L. Rice. The use of field winding is explained and the considerations which determine the size of wire, and other important determinations. 2000 w. Am Elect'n—Jan., 1899.

See also **ELECTRO-MAGNET.**

**Fly-Wheel.**—Fly-Wheel Continuous Current Generators (Gleichstrom-Schwungradmaschinen). F. Collischonn. Illustrating and describing vertical and horizontal engines in which the electric generator for continuous current is built-up upon the rim of the fly-wheel. Details of the windings and connections are given. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 17, 1900.

M. Patin's New Fly-Wheel Dynamo. Illustrates and describes a somewhat novel type of dynamo in use in Paris. 800 w. Engr, Lond—March 18, 1898.

Patin's New Fly-Wheel Dynamo. L. Bayly. Illustrated description. 800 w. Elec Rev, N. Y. —May 4, 1898.

**Gas Engine.**—See **GAS ENGINE—Dynamo; Electric Station.**

**Helios at Paris.**—Rotary and Alternating Current Generator of the Helios Company (Dreh-und Wechselstromgenerator des Helios, Elektricitäts-A. G.). An illustrated description of this large dynamo in the German section of Machinery Hall at the Paris Exposition. 1600 w. Elektrotech Zeitschr—June 21, 1900.

The 3000 Horse-Power Steam Dynamo of the Helios Company (Die 3000 PS. Dampfdynamo der Helios Elektricitäts-Aktiengesellschaft in Köln-Ehrenfeld). Dr. M. W. Hoffman. A well illustrated description of this great rotary current generator, exhibited at Paris. 1400 w. Glaser's Annalen—May 1, 1900.

The 3,000-Watt Augsburg-Nuremberg Engine and Helios Dynamo at the Paris Exposition (Exposition de 1900. Groupe Electrogène de 3,000 Kilowatts des Sociétés d'Augsbourg-Nuremberg et Helios). Alfred Boudon. An illustrated description of this group, consisting of a 4-cylinder horizontal engine directly connected to a dynamo which generates both simple-alternating and triphase currents. 3000 w. 1 plate. Génie Civil —July 28, 1900.

**Inductor Alternator.**—See **ALTERNATOR—Inductor.**

**International Electrical Co.**—The Dynamos of the International Electrical Company (Les Dynamos de la Compagnie Internationale d'Electricité). Paul Saney. Especially describing the 1,000 kilowatt three-phase generator shown at Paris, coupled to a compound steam engine by Van den Kerchove. 1200 w. Rev Tech—Oct. 10, 1900.

**Lahmeyer.**—See also **Three-Wire.**

**Lahmeyer, at Paris.**—Rotary and Direct Current Generators of the Lahmeyer Electrical Company at the Paris Exposition (Die Elektricität auf der Pariser Weltausstellung. Drehstrom und Gleischstromgeneratoren der Elektricitäts-A.-G. vorm. W. Lahmeyer & Co., Frankfurt a. M.). An illustrated description of a 1,000 k. w. rotary current generator and a 350 k. w. direct current generator. 500 w. Elektrotech Zeitschr—May 10, 1900.

**Lanhoffer Varying Voltage.**—A Continuous Current Dynamo for Widely Varying Voltages, Designed by E. Lanhoffer. Condensed translation from "L'Electricien." Illustrates and describes the machine and its action, making claims that the editor considers too wide to be substantiated. 3500 w. Elec Engr, Lond—Oct. 12, 1900.

Continuous Current Dynamo with Differential Pressures (Dynamo à Courant Continu à Tension Différentielle). A description of the Lanhoffer system, by which a variation in the pressure of the current is obtainable. 3000 w. L'Electricien—Sept. 29, 1900.

**Low-Voltage.**—Low-Voltage Dynamos. E. Kilburn Scott. Illustrated discussion of a few designs. 800 w. Elect'n, Lond—Oct. 20, 1899.

**Luisenstrasse, Berlin.**—The Dynamos of the Luisenstrasse Electric Station at Berlin (Die Dynamomaschinen in der Centrale Luisenstrasse der Berliner Elektricitäts-Werke). Giving photographic views and scale elevations of the 1,000 k. w. generators recently installed. 1000 w. 1 plate. Schweizer Bauzeit—Sept. 9, 1899.

See also **ELECTRIC STATION.**

**Magnetic Materials.**—See **MAGNETISM—Dynamo Materials.**

**Moment of Inertia.**—On Some Methods of Determining Experimentally the Moments of Inertia of the Rotors of Dynamos and Alternators. Alfred Hay. Part first states two problems in which the moment of inertia is of importance, and commences the discussion of methods by means of which this quantity may be experimentally determined. Serial. Elec Rev, Lond—Aug. 24, 1900.

**Motive Power.**—The Comparative Advantages of Steam, Gas, Air and Water Power in the Generation of Electric Current. Brief discussion of the advantages and disadvantages of each. 1800 w. Elec, Lond—Oct. 29, 1897.

The Demands of Electro Technics Upon Prime Movers (Anforderungen der Elektrotechnik an die Kraftsmaschinen). R. M. Friese. A discussion of the requirements of prime movers for electrical plants, with especial reference to governing. The question of connecting generators in parallel is considered. 7000 w. Zeitschr d Ver Deutscher Ing—Sept. 30, 1899.

**Multifunctional.**—A Multifunctional Dynamo. George D. Shepardson. Describes the Edison dynamo of the Univ. of Minn. as an example of the value and flexibility of electrical machinery. 1500 w. Eng's Year Book, Univ of Minn—1897.

**Multiple Brush.**—See **BRUSH—Multiple.**

**Multipolar.**—A New Design of Multipolar Dynamo. A design built by the Triumph Electric Co., of Cincinnati. The chief point of superiority claimed is the construction of the magnetic circuits by which a greater efficiency is obtained. Ill. 500 w. Elec Ind—Dec., 1895.

The Advantages of the Multipolar Type of Electric Machinery. William Baxter, Jr. Showing the advantages to be numerous and the disadvantages of a doubtful character. Serial. Am Mach—July 30, 1896.

**Multipolar and Bipolar.**—Bipolar and Multipolar Construction. Alton D. Adams. Aims to point out certain features in which bipolar are inferior to multipolar dynamos as at present made. 1400 w. Elec Wld & Elec Engr—April 29, 1899.

**Oerlikon.**—Electrical Generating Set of 1000 Horse-Power (Groupe Electrogène de 1000 Chevaux). Ch. Parcey. A description of the horizontal Corliss engine of Escher, Wyss & Co., of 1000 horse-power, and the Oerlikon electrical generator of

1300 kilowatts at the Paris Exposition. 1000 w. Génie Civil—Sept. 1, 1900.

The Paris Exhibition Electric Power Station. The exhibits of Messrs. Escher, Wyss & Co., and Maschinenfabrik Oerlikon. A well illustrated description of a 1000 horse-power horizontal engine, coupled with a triphase generator. 700 w. Engng—Sept. 7, 1900.

**Operation.**—Dynamo Connections—Circuits and Methods of Operating. Frank B. Jones. The first of a series of papers aiming to show some of the different modes of connecting dynamos to their circuits, the method of control and the operations of starting and stopping the machines when so connected. Serial. Tradesman—April 1, 1897.

**Parallel.**—Accidents Due to Operating Dynamos in Multiple. An explanation of the serious trouble that may be caused under stated conditions. Ill. 1800 w. Power—April, 1899.

Direct Current Generators in Parallel. Frank W. Springer. Outlines methods of obtaining characteristic curves, and discusses points of importance where generators are paralleled. 3800 w. Year Book of Soc of Engs, Univ of Minn—1898.

The Connecting of Dynamos for Simultaneous Operation. Reviews the various methods in common use. Ill. 2700 w. Am Elect'n—Nov., 1897.

Running Shunt Dynamos in Parallel. Arnold Philip. Considerations and experiments of interest in connection with the recent breakdown at Brighton, Eng. 1600 w. Elect'n, Lond—Nov. 25, 1898.

The Operation of Compound Wound Generators in Parallel. J. E. Woodbridge. A study of the action of a plain shunt-wound machine and a simple series-wound machine, the compound-wound dynamo being a combination of the two. 2000 w. Elec Ry Gaz—April 25, 1896.

The Parallel Operation of Compound Dynamos. George T. Hanchett. Explains an arrangement for overcoming the difficulty arising in the operation of compound dynamos in multiple because of their failure to regulate for line loss with accuracy. Ill. 1100 w. Elec Wld—Feb. 12, 1898.

See also **ALTERNATOR.**

**Paris Exposition.**—The Construction of Large Dynamos as Exemplified at the Paris Exhibition. Silvanus P. Thompson. Abstract of paper before the British Association, giving a review of the dynamos at the Exhibition and calling attention to the tendencies in design which they illustrate. 1600 w. Elec Engr, Lond—Sept. 14, 1900.

See also **Allg. Elek. Ges.; Breguet; Helios; International; Lahmeyer; Oerlikon; Schuckert; Siemens-Halske; Swiss; ELECTRIC STATION.**

**Polyphase.**—A New System of Polyphase Generation. Concerning the system developed by C. P. Steinmetz, considering some of the direct applications of the principle suggested. Ill. 2000 w. Elect'n, Lond—June 9, 1899.

A Novel Three-Phase Alternator. Geo. D. Shepardson. Illustrated description. 1100 w. Eng's Year Book, Univ of Minn—1897.

See also **Allg. Elek. Ges.; Breguet; Helios; International; Lahmeyer; Oerlikon; Schuckert; Sibley College; Siemens-Halske; Swiss; ALTERNATOR; ELECTRIC MACHINERY; ELECTRIC PLANT; ELECTRIC POWER STATION; ELECTRIC STATION; HYDRO-ELECTRIC STATION.**

**Polyphase Regulation.**—Regulation of Field Current in a Three-Phase Generator Working Singly with a Widely Varying Motor Load, also Three-Phase Motors in Practice. Arthur H. Gibson. Suggests a device for overcoming the difficulty. 700 w. Elec Rev, Lond—Dec. 3, 1897.

**Polyphase-Singlephase.**—Single and Polyphase Alternate Current Generators. Discusses the principles upon which these machines are constructed, and gives an illustrated description explaining their operation. Serial. Col Guard—Aug. 24, 1900.

The Applications of Monophase Alternators (Application des Alternateurs Monophasés). Illustrated description of methods of producing from monophase generators polyphase currents adapted for use with motors. 2500 w. Rev Tech—Dec. 10, 1899.

The Factors Which Determine the Design of Monophase and Polyphase Generators. B. A. Behrend. Results of the writer's investigations are given, the present article dealing with the factors which are necessary to predetermine the static characteristic of the alternator. Serial. Elec Wld & Engr—Jan. 20, 1900.

**Power Generators.**—Some Features of Modern Electric Railway and Power Generators. Views of several generators of recent design, representing the best American practice, are given, with information concerning them. 2500 w. Eng News—Nov. 25, 1897.

**Railway.**—Connections of Railway Generators. J. E. Woodbridge. Describes the plan of a proposed system, stating its advantages. 700 w. Elec Wld—April 17, 1897.

**Regulation.**—Systems of Dynamo Regulation. Joseph Sachs. Edited by W. H. Freedman from the stenographer's notes of a lecture delivered before the Henry Electrical Club. A consideration of the various methods and their modifications. 2000 w. Elec Power—April, 1896.

See also **Arc; Polyphase; Third Brush.**

**Run as Motor.**—Generators Run as Motors. William Baxter, Jr. The cause of fly-wheel accidents in electric stations. 3400 w. Power—May, 1896.

**Sayers'.**—See **Third Brush Regulation; ELECTRIC MOTOR.**

**Schuckert at Paris.**—Schuckert Direct Current and Rotary Current Generators at the Paris Exposition (Die Elektricität auf der Pariser Weltausstellung. Gleichstrom-und Drehstrom-Generatoren der Elektricitäts A. G. vorm. Schuckert & Co., in Nurnberg). An illustrated description of two large Schuckert dynamos directly coupled to a 2200 horse-power engine. 500 w. Elektrotech Zeitschr—July 12, 1900.

**Series.**—The Series Dynamo. Joseph T. Monell. Illustrated lecture delivered before the Henry Electric Club. Descriptive of different types. 2500 w. Elec Pow—Dec., 1895.

See also **ELECTRIC MOTOR.**

**Shielded Conductors.**—See **MAGNETIC SHIELDING.**

**Shunt.**—The Shunt Dynamo. Max Osterberg. Lecture delivered before the Henry Electric Club. Explanation of the principle and action. 2100 w. Elec Pow—Dec., 1895.

**Sibley College, Cornell.**—The Sibley College Multi-Phase Generators. L. A. Murray and H. H. Norris. Machines are described. 900 w. Sib Jour of Engng—June, 1896.

**Siemens-Halske at Paris.**—Siemens-Halske Dynamo and Borsig Engine at the Paris Exposition (Group Electrogène, Machine à Vapeur Borsig et Alternateur Siemens et Halske). F. Loppé. An illustrated description of this 2000 kilowatt polyphase generator, with characteristic curves. 2 plates. 1600 w. Electricien—July 7, 1900.

Siemens-Halske Dynamo and Borsig Engine of 2500 Horse-Power at the Paris Exposition (Exposition de 1900. Groupe Electrogène de 2500 Chevaux Borsig et Siemens et Halske). Ch. Dantin. A well illustrated description of this great generating unit in the German section of Machinery Hall. 1 plate. 1800 w. Génie Civil—June 16, 1900.

2500 Horse-Power Triple Expansion Engine and Direct Connected Alternator at the Paris Exposition. Illustrated description of the general details of the engine and alternator installed at the Paris Exposition to provide current for lighting the buildings on the Champ de Mars. 1800 w. Eng News—June 21, 1900.

Siemens-Halske 2000 Kilowatt Rotary Current Dynamo at the Paris Exposition (Die Elektricität auf der Pariser Weltausstellung.—Drehstrommaschine von 2000 Kilowatt von Siemens & Halske A.-G). An illustrated account of this machine with stationary armature and rotating field, directly coupled to a Borsig engine. 700 w. Elektrotech Zeitschr—May 3, 1900.

**Sparkless Reversal.**—Sparkless Reversal in Dynamos. H. N. Allen. From the "Journal of the Institution of Electrical Engineers." Experiments conducted with the view of finding some of the factors on which the inductance depends, and to see how nearly the results would agree with the theory. Serial. Elec Eng, Lond—Aug. 5, 1898.

**Standards.**—See **STEAM ENGINE—Electric Station Standards.**

**Steam Engine.**—See **STEAM ENGINE—Dynamo.**

**Storey.**—See also **ELECTRIC MOTOR.**

**Swiss at Paris.**—Some Swiss Exhibits at Paris. Frank C. Perkins. A short illustrated account of some polyphase generators. 500 w. W Elect'n Sept. 15, 1900.

**Telephone Work.**—Signal Current Generators for Telephone Exchanges. H. P. Clausen. Illustrates the generators and describes the operation. 2000 w. W Elect'n—March 4, 1899.

**Tests.**—A Simple Method of Testing Dynamos (Ueber eine Einfache Methode zur Prüfung von Dynamomaschinen). C. Liebenow. Advocating the periodical testing of dynamos in the same systematic manner as is applied to engines and boilers and outlining a system. 3000 w. Elektrotech Zeitschr—April 13, 1899.

A Simple Method of Testing Dynamos (Ueber eine Einfache Methode zur Prütung von Dynamomaschinen). J. Fischer-Hinnen. Giving equations to be used in computing the losses due to friction hysteresis, and eddy currents. 2000 w. Elektrotech Zeitschr—June 1, 1899.

Dynamo and Motor Testing. Robert A. Ross. It is the purpose of this article to give a full description of the apparatus and operations involved, so that anyone slightly familiar with electrical terms and appliances may understand and make the tests. 2200 w. Am Mach—March 5, 1896.

Dynamo Tests for Efficiency. Arthur L. Ries. An explanation of what efficiency is, and the best method of computing it. 2400 w. Engr, Cleveland, O.—May 1, 1899.

Methods of Dynamo Testing. Considers the indicator, the calibrated motor, and the stray-power methods. 1700 w. Engr, Cleveland, O.—Nov. 1, 1899.

Test of a Multi-Circuit Direct-Current Dynamo. Edward J. Murphy, Jr., and P. Edwin Van Saun. Describes a test of the Rushmore dynamo. Ill. 2200 w. Am Elect'n—Nov., 1898.

Testing Dynamos. Part first discusses the indicator method. 1400 w. Am Elect'n—Aug., 1897.

See also **Efficiency; STEAM PLANT.**

**Theory.**—Electromotive Force Produced in a Portion of a Gramme Ring, Moving in a Constant Magnetic Field (Determination de la Force Electromotive induite dans une Portion d'Anneau Gramme tournant dans un Champ Magnetique Uniforme). M. Loppe. Derivation of formulae. 800 w. L'Eclairage Electrique—Oct. 17, 1896.

Elementary Practical Electricity. F. L. Hutchinson. Designed to explain in a simple manner the fundamental principles upon which dynamos and motors depend in their action. Serial. Ry Mas Mech—Jan., 1897.

Interaction between Armature and Field in the Continuous Current Dynamo. H. H. Norris. Describes the commutator and its use, with its action. 1500 w. Sib Jour of Engng—June, 1897.

**Third-Brush Regulation.**—Sayers' Automatic Third-Brush Regulation of Dynamos. Describes the arrangement and gives results of some experiments. 500 w. Elect'n, Lond—July 8, 1898.

The Sayers Pressure Regulator with Third Brush (Ueber die Sayers'sche Spannungsregulierung mittels Dritter Bürste). C. P. Feldman. An improved method of regulating voltage by the use of a third brush so arranged that its position relative to the main brushes may be shifted. The action is explained by numerous diagrams. 3500 w. Elektrotech Zeitschr—March 30, 1899.

**Three-Wire.**—A New Three-Wire Dynamo. T. R. D. Kenny. A discussion of the advantages of the machine. 1600 w. Elec Rev, Lond—Feb. 26, 1897.

New Dynamo for Three-Wire Distribution. M. Aliamet. From "L'Electricien." Illustrated description of arrangements for enabling the two sides of the three-wire system to be fed by means of a single dynamo, and the solution of the problem by M. Müller. 900 w. Elec Rev, Lond—Jan. 22, 1897.

Theory of the Three-Wire Generator with Double Field System (Theorie der Dreileitermaschinen nach dem Doppelfeldsystem). An historical review of the subject by Herr Rothert, with an account of his own improved construction. Two articles. 6000 w. Electrotech Zeitschr—April 23 and 29, 1897.

Three-Wire Distribution from One Machine. Edward Bretch. Explanation of the means for connecting the neutral of a three-wire system into the windings of a direct-current generator, the brushes of which are connected to the positive and negative sides of the system. 1100 w. Elec Wld & Engr—Jan. 13, 1900.

**Three-Wire, Lahmeyer.**—A New Three-Wire Machine (Eine Neue Dreileiter Maschine). An illustrated description of the new generator for use with the three-wire system, built by Lahmeyer, of Frankfurt-a-M. 2500 w. Elektrotech Rundschau—Jan. 1, 1897.

A New "Three-Wire" Dynamo. Alexander Rothert. Discussion of the new "three-wire" machine of the E. A. G., formerly W. Lahmeyer & Co., in Frankfort-on-the-Main. 1200 w. Elec Wld—Nov. 7, 1896.

See also **Lahmeyer.**

**Troubles.**—Dynamo Troubles. Percy Donsville. Read before the Hamilton Assn., C. A. S. E. Some points which should be considered in placing and caring for dynamos and motors. 2500 w. Mines & Min—May, 1898.

See also **Fault.**

**Unipolar.**—See **Commutatorless.**

**Variable Air Space.**—Automatic Regulation of a Dynamo by Varying the Air Space (Dynamomaschine mit Selbstthätiger Regelung durch Verändern des Luftraumes). An illustrated description of a dynamo with field magnets whose distance from the armature can be varied. 800 w. Elektrizität—April 14, 1900.

**Varying Voltage.**—See **Lanhoffer.**

**Walker.**—Some Recent Generators and Motors. Illustrated description of the generators and motors recently put upon the market by the Walker Manufacturing Company of Cleveland. 2800 w. St Ry Jour—Jan., 1896.

**Weak Fields.**—A Method for the Detection of Weak Dynamo Fields. Buckner Speed. Description of a method used by the writer many times, which has never failed to correctly indicate the weak spool. 600 w. Elec Wld—Jan. 11, 1896.

**Westinghouse.**—Westinghouse Dynamos (Machines, Dynamo-électriques de la Compagnie Electrique "Westinghouse"). An extended description of the Westinghouse generators and motors from a French point of view. 12000 w. La Rev Tech—Feb. 10, 1897.

See also **STEAM ENGINES—Westinghouse.**

## DYNAMO CONSTRUCTION.

Dynamo Construction. J. B. Hall. A short description and sketches of a two-light dynamo or one-eighth horse-power motor. Of interest to amateur electricians. 1300 w. Can Eng—May, 1896.

How to Make a Simple Dynamo. S. L. Barriett. Illustrated description with full directions. 2900 w. Power—Sept., 1896.

Modern Ideas in Dynamo Construction (Neuere Anschauungen im Dynamobau). Discussing the influences of material, winding and general proportions in the light of recent experience. 5000 w. Zeitschr d Ver Deutscher Ing—May 22, 1897.

The Building of a Great Dynamo. H. L. A. Illustrated description dealing with the machine shop work, and with the winding department operations in natural sequence, as the work is put through the shops. 1700 w. Am Mach—March 5, 1896.

On the Construction of Dynamo-Electric Machines. Maurice Leblanc. Read before the International Cong., at Paris. Description, with illustrations of construction on lines approved by the writer. 4200 w. Elect'n, Lond—Oct. 12, 1900.

The Relative Size, Weight and Price of Dynamos, Electric Machines. Ernest Wilson. Read at meeting of Inst. of Elec. Engs., England. Investigates the way in which weight and price of dynamo-electric machines vary with the variation of the mass factor. Tables, curves and discussion. 8000 w. Elec Eng, Lond—March 5, 1897.

**American.**—American Practice in Dynamo Construction. B. A. Behrend in "Elektrotechnische Zeitschrift." Brief comparison of American and European practice relative to the construction of electrical machinery. 1400 w. Elec Eng, Lond —March 31, 1899.

**Mechanical.**—The Mechanical Construction of Electrical Machinery. F. M. Weymouth. A consideration of some of the principles involved in the mechanical construction of a dynamo. Part I commences with the bed-plate. 2200 w. Elec Engr, Lond—Jan. 1, 1897.

**Review.**—Progress in Dynamo Construction (Neuerungen im Bau von Dynamomaschinen). A review of the present state of the art, taking up the various parts of the machine in order. Serial. Elektrizität—April 28, 1900.

### DYNAMO DESIGN.

Design of Dynamos. G. F. Sever. Lecture delivered before the Henry Electric Club. Treating of the elements of good design and bringing to notice points not often considered in text-books. 2500 w. Elec Pow—March, 1896.

Dynamo Design. Albert W. Smith. Proposes a design that overcomes some of the objectionable features of the usual type. 1500 w. Elec Eng—Aug. 12, 1897.

Note on the Relation Between the Speed and Efficiency of a Dynamo. Arnold G. Hansard. A graphic solution of this problem, giving the rather unexpected result that the speed which gives the highest efficiency is that which makes the eddy-current losses equal to the C2R losses. 700 w. Elect'n—Jan. 22, 1897.

**Bi-Polar Drum.**—Designing a Bi-Polar Drum Dynamo. Rankin Kennedy. Part first consists of statements preparatory to explaining and illustrating the processes generally used. Serial. Elec Rev, Lond—Oct. 16, 1896.

**Combined Alternating and Direct.**—Designs for Combined Alternating and Direct-Current Machines. J. C. Brocksmith. Gives designs and working drawings for a type of machine useful in experimental and laboratory work. Describes the working in different ways. 3500 w. Am Elect'n—March, 1900.

**Constant Potential.**—The Determination of the Size and Number of Turns of Wire in a Constant Potential Generator. William Baxter, Jr. Shows how to develop a practically constant pressure and explains the principle upon which the winding of constant poteutial generators depend. 2000 w. Am Mach—April 14, 1898.

**Direct Current.**—Determination of the Excitation in Continuous Current Dynamos under Full Load (Vorausbestimmung der Erregung bei Gleichstromdynamos für Vollbelastung). Emil Dick. Giving analytical and graphical methods for use in the preliminary computations. 2000 w. Elektrotech Zeitschr—June 17, 1897.

The Design of 100 K. W. 500 Volt Power Generator. H. J. Ryan and I. J. Macomber. The two general methods that may be used for designing a dynamo are stated, with outlines and explanatory notes for the design of direct current generators and motors. 5500 w. Sibley Jour of Engng—Jan., 1897.

**Field Magnets.**—On the Dimensioning of Field Magnets. George T. Hanchett. Enumerates the requirements and conditions in designing field magnets, and explains a method for determining with accuracy the length for the magnetic circuit. 1000 w. Elec Wld & Elec Engr—April 29, 1899.

See also ELECTRO-MAGNET.

**Induction Factor.**—The Induction Factor, a New Basis of Dynamo Calculation and Classification. Charles A. Carus-Wilson. Read before the N. E. L. A. Showing the use of the induction factor in dynamo calculations, giving examples. 2500 w. Elec Eng—June 16, 1897.

**Lines of Force.**—The Distribution of Lines of Force in a Dynamo (Die Gesetze der Kraftlinienvertheilung über den Umfang der Dynamomaschinen). Ch. Westphal. An analytical investigation of the laws governing the distribution of magnetic force, with diagrams for practical use. 3500 w. Elektrotech Zeitschr—Sept. 6, 1900.

**Magnetic Elements.**—See MAGNETISM—Dynamo Materials.

**Magnetic Flux.**—Air Gap and Core Distribution. W. Elwell Goldsborough. This first paper deals with the magnetic flux and its effect upon the regulation and efficiency of dynamo electric machinery. Outlines a method of calculating field densities which has been used by the writer with success. Serial. Trans Am Inst of Elec Engs—Aug. and Sept., 1898.

Air Gap and Core Distribution. W. Elwell Goldsborough. This second article treats of the magnetic flux and its effect upon the regulation and efficiency of dynamo-electric machinery. Also discussion. 5500 w. Trans Am Inst of Elec Engs—Oct., 1899.

The Relation of Magnetic Flux to Output in Dynamos. P. M. Heldt. An attempt is made to deduce an algebraic relation between the useful magnetic flux and the output of a dynamo, and to evaluate the constant occurring in this equation from the data of actual machines. 1100 w. Elec Wld—Dec. 26, 1896.

**Mechanical Details.**—Some Mechanical Details of Dynamo Design. E. Kilburn Scott. Part first discusses the bed-plate, field magnets, slide rails, winding cup, armature core, etc. Ill. Serial. Elec Rev, Lond—March 2, 1900.

**Modern Tendency.**—The Tendency of Modern Dynamo Design. William Cramp. Conclusions reached by a study of the exhibits at the Paris Exhibition. Ill. 2000 w. Elec Engr, Lond—Oct. 5, 1900.

**Philosophy.**—The Philosophy of Dynamo Design. Considers various points that must be kept in mind by the successful designer of continous-current machines. Serial. 1st part. 2200 w. Elec Engr, Lond—Oct. 17, 1900.

**Series Winding.**—The Determination of the Series Windings for a Compound Dynamo. Lawford H. Fry. Sets forth a method which will give approximately the number of ampere turns required. 700 w. Elec Rev, Lond—Oct. 22, 1897.

**Short Cuts.**—Short Cuts in Dynamo Calculations. Cecil P. Poole. Gives analysis of method, the object of which was economy in time, now modified so as to make it applicable to standard practice in designing. 1500 w. Elec Wld—Nov. 26, 1898.

**Shunt.**—Some Practical Points on the Design of a Shunt Dynamo. V. Zingler. Attempts to show how a dynamo may be calculated from first principles so that it may be put in the shops, and so that the winding as specified by the calculations will actually go on. Serial. Elec Rev, Lond—Jan. 7, 1898.

**Tramway.**—The Designing of Large Tramway Generators. Horace F. Parshall. Discusses the subject in relation to efficiency. The losses, dimensions, etc., are also considered. 3500 w. St Ry Jour—Oct. 13, 1900.

### DYNAMO FACTORY.

See also ELECTRIC WORKS.

A Primitive Dynamo Factory and Power Station. An account of work done by the inexperienced. 1700 w. Elec Wld—Nov. 13, 1897.

### DYNAMOMETER.

A Design for a Dynamometer. L. M. Hoskins. The device is described and illustrated. 800 w. Engng Jour—May, 1897.

A Suggestion for a Dynamometer. George T. Hanchett. A description of one that is cheap and claimed to be as accurate as any of its class. 800 w. Elec Wld—Nov. 16, 1895.

**Electric Brake.**—An Electric Brake Dynamometer (Ein Elektricher Bremsdynamometer). Prof. A. Grau. An illustrated description of a dynamometer in which the braking effect is due to a copper disc rotating in a magnetic field. 1200 w. Elektrotech Zeitschr—April 5, 1900.

**Electric Motors.**—See ELECTRIC MOTOR—Dynamometers.

**Electro.**—See ELECTRO-DYNAMOMETER.

**Hydraulic.**—A Hydraulic Dynamometer. James D. Hoffman. Read before the A. S. M. E. Illustrated detailed description of this machine, constructed at Purdue University for the purpose of tests on the application of cutting edges to iron. 1000 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

A New Hydraulic Dynamometer (Nouveau Système de Dynamomètre à Pression Hydraulique). The pressure on a thrust bearing or on the driving arms of a revolving coupling is transmitted hydraulically to a pressure gauge, enabling the force to be measured. 1200 w. Génie Civil—Feb. 18, 1899.

**Leneveu Recording.**—The Leneveu Rotary Recording Dynamometer (Dynamomètre de Rotation Enregistreur de M. le Captaine Leneveu). A well illustrated description of a transmitting and registering dynamometer. 5000 w. Rev de Mécan—May 31, 1900.

**Prony Brake.**—An Improved Prony Brake. E. J. Armstrong. Illustrated description. 500 w. Am Mach—April 19, 1900.

Prony's Friction Brake. William Barnet Le Van. From "Power and Transmission." Gives briefly the history of this invention with description of the brake and the recent improvements. 2000 w. Mech Wld—Dec. 16, 1898.

**Prony Brake, Spring Balance.**—Improved Spring Balance for Testing Electric Motors with the Prony Brake (Verbesserte Federwaage für Bremsungen von Elektromotoren mit dem Prony'schen Zaum). A. Wettler. A simple and delicate arrangement by which readings may easily be made, and power accurately computed. Full details of the apparatus are given. 1800 w. Elektrotech Zeitschr—Sept. 29, 1898.

**Train Resistance.**—The Teodorovitch Dynamometric Apparatus (Appareil Dynamometrique de M. Teodorovitch). H. Chevalier. An illustrated description of an improved dynamometer for the measurement of train resistance, as used on the Kharkow-Nicolaiew Railway, Russia. 2500 w. Soc Ing Civ de France—Jan., 1899.

**Transmission.**—A New Dynamometer for Measuring Power Absorbed in Driving Machinery. Illustrated Detailed description of a transmission dynamometer, claiming to be an improvement on an instrument built by Prof. S. W. Robinson of the Ohio State University for use in the mechanical laboratory of that institution. 700 w. Eng News—April, 23, 1896.

A New Form of Tranrsmission Dynamometer. Frederick Bedell. Describes an ingenious device that has been used in the laboratories of Cornell University. 900 w. Trans Am Soc of Mech Engs, Vol. XVIII.—May, 1897.

A New Transmission Dynamometer. William Ernest Dalby. Read before the British Inst. of Civil Engs. Treats of a new mechanism for measuring the deformation of the spring, and describes a self-contained dynamometer. Ill. 1800 w. Am Mach—Sept. 22, 1898.

Some New Forms of Transmission Dynamometer. John J. Flather. Illustrated description of a type of dynamometer which has given satisfaction under a variety of conditions in the laboratory and shop. 1200 w. Mach, N Y—Aug., 1898.

A New Transmission Dynamometer. W. Elwell Goldsborough. Illustrated description of the instrument and method of using it. 1800 w. Trans Am Inst of Elec Engs—April, 1900.

A New Transmission Dynamometer. S. W. Robinson. Illustrated detailed description with explanation of its application and method of showing corrected results. 2800 w. Digest of Phys Tests—April, 1896.

Transmission Dynamometers. Samuel Webber. Describes various types, and the uses to which they are put, giving a simple explanation of the calculations involved. Ill. Serial. Mach, N Y—March, 1898.

**DYNAMOMETER CAR.**

See **CAR—Dynamometer.**

**DYNAMOTOR.**

See **ELECTRIC CURRENT CONVERTER; ELECTRIC STATION—Bromley, Kent; MOTOR GENERATOR; ROTARY CONVERTER.**

## E

**EARTH CURRENT.**

See **ELECTRIC CURRENT—Earth.**

**EARTH PRESSURE.**

**Graphic Methods.**—Graphic Methods of Determining the Pressure of Earth on Retaining Walls. P. R. Kirk. Considers pressure of earth against a retaining wall with a vertical surface, and pressure on a retaining wall when the surface of the earth is horizontal and level with the top of the wall. Ill. 2800 w. Builder—Sept. 9, 1899.

**EARTHQUAKE.**

**Building Construction.**—See **BUILDING CONSTRUCTION—Earthquake Countries.**

**Japan.**—The Great Sea Waves in Japan. Editorial discussion of the seismic disturbance which caused the inundation of the northern Japanese coast in June, and the resources of engineering science which may help to avert the great destruction caused by such disturbances. 2500 w. Engng—Aug. 7, 1896.

The Great Seismic Wave of Japan. Summarizes the particulars of this occurrence, and gives causes which have been assigned for its creation; also refers to waves of a similar character that have occurred on former occasions and in other localities. 2200 w. Nature—Sept. 10, 1896.

**Parthenon.**—The Parthenon and the Earthquake of 1894. F. C. Penrose. Read at meeting of Royal Inst. of British Archs. Abstract of paper and discussion. 2000 w. Arch, Lond—May 21, 1897.

**EARTHQUAKE COUNTRIES.**

**Building Construction.**—See **BUILDING CONSTRUCTION—Earthquake Countries.**

**EARTH RESISTANCE.**

The Testing of Earth Resistance (Beitrag über die Bodenuntersuchung). Describing a method of determining the destiny of earth by pressure of weights upon a sharp wedge; data being thus obtainable for estimates of cost of excavation. 1000 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1899.

**EARTH SLIPS.**

Earth Slips on the Jordan Level Marl Beds of the Erie Canal. George A. Morris. States the conditions that caused the earth slips and gives illustrated description of methods adopted and the difficulties encountered. 2000 w. Eng News—Dec. 1, 1898.

See also **CANAL—Erie, Jordan Level.**

On Saving and Stopping Slips. Showing the cause of landslips to be the presence of water; tracing the different ways in which it may attack a bank, and indicating the effective methods of preventing it by drainage. 2700 w. Ill. Ind & East Engr—Aug., 1898.

**Railways.**—Causes of Earth Slips in the Slopes of Cuttings and Embankments of Railways, and How to Prevent or Remedy Them. Robert Elliott. Read before the Engng. Conference of the Inst. of Civ. Engs., England. A brief consideration of the topics named. 1600 w. Engr, Lond—June 23, 1899.

**EARTHWORK.**

**Computation.**—A Contribution to the Computation of Earthwork (Ein Beitrag zur Erdmassenberechnung). Giving a simplified approximate method especially adapted for cutting and filling, based upon the summation of a series of rectangular sections. 1200 w. Oesterr Monatschr f d Oeffent Budienst—Dec., 1897.

Some Practical Applications of the Mass Curve in Earthwork Computations. Walter L. Webb. Reviews the fundamental features of this method for the computation of earthwork, with applications of the curve. Discussion. Ill. 5800 w. Pro of Engs' Club of Phila—Jan., 1898.

**Measurement.**—The Measurement of Earthwork. In view of the different results obtained when earthwork is measured in different ways, the courts in the various states are sometimes called upon to establish one method as standard. The Supreme Court of California has recently fixed such a standard in a case reviewed under this title. 1000 w. Eng Rec—Feb. 4, 1899.

**Trestle Replacing.**—Replacing Trestles with Earthwork, Canadian Pacific Ry. P. Alex. Peterson. Filling in of trestles and similar replacement work. The subject of a paper before the Canadian Soc. of Civ. Engs. 8000 w. Eng News—Nov. 28, 1895.

Replacing Trestles with Earthwork. Editorial. A detailed comparison as to cost, expediency, etc., of various forms of railway trestles with embankments. Some valuable data are given. 8000 w. Eng News—Nov. 28, 1895.

See also **RAILWAY CONSTRUCTION.**

**EAVES.**

**Ice Melting.**—See **ICE MELTING.**

**ECCENTRIC.**

**Locomotive.**—See **LOCOMOTIVE ECCENTRIC.**

**ECLIPSE.**

**Solar.**—The Eclipse of the Sun. J. Norman Lockyer. An account of the expedition to Kiö Island, to observe the last solar eclipse, with its results. Illustrated. Serial. Nature—Aug. 27, 1896.

**ECONOMETER.**

**Arndt Gas Weighing.**—Arndt's Gas Weighing Econometer. A. Bement. Report of its value as a guide for managing fires and other uses, by a writer who has had experience with the instrument. 900 w. Sib Jour of Engng—June, 1900.

Test of Arndt's Gas Weighing Econometer. C. R. Jones and Austin Burt. Describes the apparatus and method of operation and underlying principles, the tests and results. 3000 w. Sib Jour of Engng—May, 1900.

The "Econometer." H. M. Kebby. Considers the production of heat from a given combustible, and gives an illustrated description of the apparatus named, which indicates continuously the exact percentage of carbonic acid contained in the escaping products of combustion. Gives also the report of the Franklin Inst. on this instrument. 4300 w. Jour Assn of Engng Soc's—Nov., 1898.

The Econometer: A Gas Balance for Indicating Continuously the Proportion of Carbonic Acid Gas in the Flow of Furnace gases. Report of the Institute, through its Committee on Science and the Arts, investigating the invention of Max Arndt, of Aix-la-Chapelle. Illustrates and describes the apparatus, and considers that its claims have been fully substantiated. 2500 w. Jour Fr Inst—March, 1898.

### ECONOMIZER.

See also **CONDENSER; FEED WATER HEATER.**

A Discussion of Economizer Feed Water Heaters (Note sur les Economisers-Réchauffers d'Eau). A general examination of the performance of economizers, showing the extent to which economy may be expected, and indicating the most effective arrangement. Two articles. 6000 w. 1 plate. La Rev Tech—May 25, June 10, 1898.

Economizers. Henry G. Brinckerhoff. Discusses their proper construction and uses. Paper read at the meeting of the New England Cotton Manufacturers' Assn., at Philadelphia. 1200 w. Bos Jour of Com—Oct. 30, 1897.

**Tests.**—Boiler Tests at the Armour Packing Co., Kansas City, Kan., Showing Per Cent. of Saving by Use of Economizers. F. G. Gashe. Tests of the plant known as "Boiler House No. 5." There are three Stirling boilers, Class A, equipped with Johns' mechanical stokers. The object of the trials was to obtain a measure of the benefit from the application of the Green fuel economizer. 2200 w. Power—Aug., 1897.

### EDDY CURRENTS.

See **ARMATURE—Eddy Currents; ELECTRIC MACHINERY—Eddy Currents; HYSTERESIS.**

### EDUCATION.

See also **APPRENTICE; COLLEGE; LABORATORY; SCHOOL; UNIVERSITY.**

Advice to Young Men Who Wish to Become Successful Engineers. W. H. Wakeman. Relates to education in schools and works. 2200 w. Lord's Mag—Jan., 1896.

A Higher Industrial and Commercial Education. J. B. Johnson. Abstract of the presidential address before the Society for the Promotion of Engineering Education, Boston. Describes the German mono-technic schools, considering them the explanation of that country's wonderful advancement during the last quarter century, and urges a specific scientific training for the directors of every kind of commercial and manufacturing industry in America. 3500 w. Eng News—Aug. 18, 1898.

An Engineering Education. A discussion of what lines should be laid down as a guide for training an engineer. 4000 w. Jour W Soc of Engs—Feb., 1898.

A Talk to Young Engineers. W. A. Truesdell. On the present opportunities for acquiring an education, and its advantages to the engineer; the qualifications needed and the conditions of success. 8000 w. Wisconsin Engr—Jan., 1899.

Past and Present Tendencies in Engineering Education. Mansfield Merriman. Presidential address at Buffalo, N. Y., meeting, showing the wonderful changes of opinion in regard to technical education, and urging that general education is more important than exclusively engineering courses. 4500 w. Pro of Purdue Soc of Civ Engs—1897.

Past and Present Tendencies in Engineering Education. Mansfield Merriman. Presidential address before the Society for the Promotion of Engineering Education. An elaborate article touching upon nearly all the aspects of the question. 3200 w. R R Gaz—Aug. 21, 1896.

Reforms in the Organization of Technical Education. Silvanus P. Thompson. Suggests the need of getting rid of the wrong use of the term, the adaptation to the needs of the various industries, the development of breadth of view and capacity in those trained, the proper selection of subjects, etc. 28000 w. Jour Soc of Arts—July 23, 1897.

Some Considerations Affecting the Training of Young Engineers. W. C. Borrowman. On the educational requirements and means of meeting them. Also discussion. 20000 w. Trans of N E Coast Inst of Engs & Shipbuilders—June, 1900.

Some Results of an Engineering Education. Editorial, defining the engineer as "the flower of the human race," and stating that there is no training which makes a man more useful and successful. 800 w. R R Gaz—Nov. 29, 1895.

Some Statistics of Engineering Education. M. E. Wadsworth. Statistical tables containing data from 1874 to date, with running commentary calling attention to certain points. 4000 w. Trans Am Inst of Min Engs—Feb., 1898.

Some Unrecognized Functions of Our State Universities. J. R. Johnson. Full address on the occasion of inauguration as Dean of the College of Mechanics and Engineering of the Univ. of Wisconsin. 600 w. Jour W Soc of Engs—Oct., 1899.

Status and Tendencies of Engineering Education. Robert Fletcher. Read at N. Y. meeting of Soc. for Promotion of Engng. Ed. Discusses whether the profession is overcrowded, the work of the schools, present conditions and apparent tendencies. 1500 w. Ry Age—July 6, 1900.

Technical Education. Editorial in which the so-called "bogie" of German competition with English industry is treated as based largely upon misrepresentation). 1800 w. Engr, Lond—Sept. 18, 1896.

Technical Education. Sidney H. Wells. A critique upon an editorial on this subject which appeared in "Engineering," Sept. 11, maintaining that the editorial referred to gives a false impression and does a grave injustice to a great and important educational movement. 1700 w. Engng—Sept. 25, 1896.

Technical Education—An Economic Necessity. V. M. Alderson. Extracts from an address before the Central Ry. Club. 3500 w. Am Mach—March 29, 1900.

Technical Education. An editorial protest against attempts to combine technical and collegiate subjects. 1400 w. Eng Rec—Aug. 20, 1898.

Technical Education. W. E. Ayrton. Verbatim report of an address delivered to the Coventry Technical Inst., England. 3500 w. Elec Engr, Lond—Feb. 25, 1898.

The Education of Engineers. G. F. Deacon. Address delivered by the president of the Section of Mechanics at the Toronto meeting of the British Assn. Interesting discussion of the best preparation for engineers. 4500 w. Arch, Lond—Aug. 27, 1897.

The Training of the Engineer (Zur Frage der Ingenieurausbildung). Dr. Walther Dyck. Treating especially of the value of training in physics and the natural sciences. 3000 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 1898.

The True Basis of Technical Education. W. Slingo. Read before the International Congress on Technical Education. The first aim should be to fit the student for a particular industry, and enable him to perfrom his work in a superior manner. Gives suggestions. 3500 w. Elect'n—Aug. 20, 1897.

Training for Competition with the World. Presidential address of R. H. Smith before the Civ. and Mech. Engs. Soc., England. 6000 w. Engr, Lond—Oct. 5, 1900.

**Admission Requirements.**—Admission Requirements to Engineering Schools. Mark Talcott. Interesting statement of occupations of post-graduates of Worcester Polytechnic Institute. 700 w. Am Mach—June 4, 1896.

See also **Entrance Examinations.**

**Applied Arts.**—The Training of Workers in the Applied Arts. Robert Anning Bell. Read before the Liverpool Society, Nov. 11, 1895. Describes means of attaining results that the writer considers desirable. 3000 w. Arch & Build—Oct. 31, 1896.

**Architectural.**—See **ARCHITECTURAL EDUCATION.**

**Art Training.**—The Training of Workers in the Applied Arts. Robert Anning Bell. Read before the Liverpool Soc. Causes that have retarded progress in architecture, sculpture and painting, and conditions to be desired in the relation of these arts. 3000 w. Jour Roy Inst of Brit Archs—July 23, 1896.

**Austria.**—The Technical High Schools of Austria and Their Future (Die technischen Hochschulen Oesterreichs und ihre Zukunft). An address delivered before the Rectors and Professors of the technical schools of Vienna, comparing the income and facilities of the schools of Austria with those of other countries and urging advance and improvement. Two articles with four plates of plans of the leading technical schools of Europe. 7000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 12 and 19, 1897.

**Berlin Technical School.**—The Centennial Celebration of the Technical High School at Berlin (Zur Hundertjahr-Feier der Technischen Hochschule zu Berlin). Giving a history of the institution, with an account of its work and of the notable educators associated with it. 2500 w. Zeitschr d Ver Deutscher Ing—Oct. 21, 1899.

The Centennial Celebration of the Technical High School at Berlin (Jahrhundertfeier der Technischen Hochschule in Berlin). With the address of the Emperor of Germany, also the speeches at the unveiling of the Krupp and Siemens memorials, and illustrations of the statues. 3000 w. Stahl und Eisen—Nov. 1, 1899.

The Centennial Celebration of the Royal Technical High School at Berlin (Die Hundertjahrfeier der Königlichen Technischen Hochschule zu Berlin). M. Geitel. A brief history of the institution, together with an account of the recent celebration and a review of the buildings. 8500 w. Glaser's Annalen—Nov. 1, 1899.

**Brick Design.**—Practical Schools of Brick Design. Robert D. Andrews. Outlines a scheme for establishing training schools where experiments in brick masonry may be tried. Illustrations of fine brick work. 2400 w. Br Build—Sept., 1896.

**Ceramics, Ohio University.**—A Unique Departure in Engineering Education. Edward Orton. An account of the work at the Ohio State University, located at Columbus, Ohio. Ill. 2000 w. Sci Am Sup—Dec. 2, 1899.

**Chemical and Technical, U. S.**—Chemical and Technical Education in the United States. Prof. C. F. Chandler. Presidential address before the Society of Chemical Industry, at London. Serial. Sci Am Sup—Sept. 29, 1900.

**Chemical Industry Society.**—See **GAS—Chemical Industry Society.**

**Chemistry.**—See also **CHEMISTRY—Education.**

**Correspondence School.**—Correspondence Schools. R. P. Rothwell. Discussion of this paper. H. H. Stock's reply to Mr. Rothwell's criticisms. 2000 w. Trans Am Inst of Min Engs—Feb., 1899.

The International Correspondence Schools, Scranton, Pa., with Special Reference to the Courses in Mining. H. H. Stork. An account of this undertaking and its marked success, with an outline of courses and methods. 4500 w. Trans Am Inst of Min Engs—Dec., 1898.

See also **CAR—Correspondence School.**

**Doctors of Engineering.**—See **German Degrees.**

**Elective System.**—The Elective System in Engineering Colleges. M. E. Wadsworth. Presents particulars and points out the conditions under which this system might with advantage be introduced more generally. 2800 w. Am Geol—Nov., 1896.

**Electrical Apprentices.**—See **ELECTRICAL ENGINEERING—Education Apprentices.**

**Electrical Engineering.**—See **ELECTRICAL ENGINEER—Training; ELECTRICAL ENGINEERING—Education.**

**Engineer.**—The Best Education for an Engineer. W. E. A. A critical review of the address of Sir Andrew Noble. 2500 w. Nature—Oct. 12, 1899.

Sir Andrew Noble on the Best Education for Engineers. Inaugural address given at the City and Guilds Central Technical College, England. Presents the necessity of acquiring a sound general education, and the necessity of basing practical work on theoretical knowledge. 3800 w. Nature—Oct. 5, 1899.

The Technical Education of Artisans. Address before the students of the Liverpool School of Science, Technology and Art, by W. H. Preece. The awakening in England to the value of technical education, the progress already made and necessities and duties of the future are the topics treated. 1800 w. Engr, Lond—Oct. 9, 1896.

**English v. American.**—Technical Education. English and American technical schools compared briefly. 1700 w. Engng—Sept. 11, 1896.

**English Views.**—English Views of Technical Education. W. S. Aldrich. Letter to the editor. 900 w. Eng Rec—Dec. 3, 1898.

**Entrance Examinations and Shop Experience.**—Credit for Shop Experience in Entrance Examinations. General editorial remarks upon the subject, with reference to previous editorials and to replies from seventeen technical schools in reply to a circular letter inquiring what their practice is with reference to this subject. 1800 w. Am Mach—Sept. 17, 1896.

**Europe.**—Technical Education in Europe. Explains what is meant by a technical school and gives many interesting facts. 1800 w. Bos Jour of Com—April 3, 1897.

See also **Austria.**

**Evolution.**—Evolution of Technical Education in Economics, Politics, Statecraft and Morals. Robert H. Thurston. An address at the meeting commemorating the seventy-fifth anniversary of the Franklin Inst. 14000 w. Jour Fr Inst—Feb., 1900.

**German Degrees.**—Doctors of Engineering. A statement of the new Prussian regulations authorizing technical schools to grant a doctor's degree in engineering equivalent to one in philosophy. 800 w. Eng Rec—July 14, 1900.

The Question of Degrees in the Prussian Technical High Schools (Die Titelfrage an den Preussischen Technischen Hochschulen). Dr. P. v. Salvisberg. A discussion of the recent decree of the Emperor giving the right to confer the higher degrees to the technical high schools. 1500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 2, 1899.

**Germany.**—A Comparison of Courses in 17 German Technical Schools (Vergleichende Zusammenstellung aus den Programmen von 17 Deutschen Technischen Fachschulen). With an elaborate chart showing the proportion of time given to various studies, giving a full discussion of the subject from the German standpoint. 10000 w. Zeitschr ver Deutscher Ing—September 11, 1897.

Engineering Education (Zur Frage der Ingenieurerziehung). Prof. O. Mohr. A discussion of the present methods of engineering education in Germany, suggesting simplification of the existing courses in order to provide time and opportunity for study of new subjects. 3000 w. Zeitschr de Ver Deutscher Ing—Jan. 23, 1897.

Technical Education in Germany. An account of the conference to discuss German trade and manufacturing interests, with the resolutions passed. 700 w. U S Cons Repts, No. 829—Jan. 20, 1899.

Technical Education in Germany. Extract from address of Jas. Loudon, at the Univ. of Toronto. 1500 w. Eng News—Nov. 30, 1899.

Technical High Schools and Scientific Investigation (Die Technischen Hochschulen und die Wissenschaftliche Forschung). An address by Prof. Riedler at the Technical High School at Charlottenburg comparing the work of that institution with the German universities. 4000 w. Zeitschr d Ver Deutscher Ing—July 15, 1899.

Technical Training in Germany. Information on some of the new schools from the report of a visit to Germany with a view of ascertaining the recent progress of technical education in that country. 2700 w. Arch, Lond—Feb. 26, 1897.

The Administration of Schools of Mechanical Engineering (Ueber die technische Hochschulbildung der Maschineningenieure). G. Leissner. A long discussion, with symposium of opinions from various educators, upon the question of reform in technical education now being much agitated in Germany. 12000 w. Glaser's Annalen—Feb. 15, 1897.

The Development of the Mechanical Engineer (Zur Ausbildung der Maschinen-Ingenieure). A symposium upon the subject of engineering education by members of the German Society of Mechanical Engineers, including the opinions of such men as Stambke, Leissner, von Borries, Vogel and others. 12000 w. Glaser's Annalen—July 1, 1897.

The Education of German Mechanics. Editorial discussion of the lessons to be learned from

German methods, and particularly from her educational system. 2500 w. Engng—Feb. 12, 1897.

The Overcrowding of the German Technical High Schools (Die Ueberfüllung der Deutschen Technischen Hochschulen). An address to the Prussian government by the German Society of Engineers, showing the manner in which the demand for a technical education is crowding the higher educational institutions, and suggesting various remedies. 5000 w. Zeitschr d Ver Deutscher Ing—Sept. 17, 1898.

The Question of Trade Schools (Zur Frage der Werkmeisterschulen). A paper by Mr. Teichmann, before the Würtemberg branch, discussing the need of more practical technical education in Germany. 1500 w. Zeitschr d Ver Deutscher Ing—Feb. 20, 1897.

The Recent Progress of Technical Education in Germany. Abstract of a report on the recent progress, dated Dec., 1896, and issued as a blue book. 1800 w. Col Guard—Jan. 22, 1897.

The Relation of the Technical and Classical Schools in Karlsruhe (Das Gutachten der Technischen Hochschule in Karlsruhe über die Oberrealschulen). A contribution to the subject of education, which though local in its immediate allusions, shows very clearly the active discussion now going on throughout Germany for more practical education. 6000 w. Zeitschr d Ver Deutscher Ing—June 12, 1897.

The University and the Technical High School (Universität und Technische Hochschule). F. Klein. An address showing the influence of the demand for technical training, and the importance of including a greater proportion of practical science in University instruction. 3500 w. Zeitschr d Ver Deutscher Ing—Sept. 24, 1898.

**See also Berlin Technical School; Europe; ENGINEERING COMPETITION — Germany vs. England; GERMANY.**

**History.**—A Quarter Century of Progress in Engineering Education. Robert Fletcher. Abstract of paper read before the Soc. for the Promotion of Engineering Education. Historical and critical essay. 3400 w. R R Gaz—Sept. 11, 1896.

**Industrial.**—Industrial Education. George W. Dickie. The writer's experience of the kind of preparation necessary to fit one to fill an honorable place in the industrial army. Also discussion. 9000 w. Jour Assn of Engng Soc—March, 1897.

Industrial Education. R. H. Thurston, in the "N. Y. Tribune." The lesson taught by Germany in her great governmental system of technical education and its results. 2000 w. W Elec—April 24, 1897.

**Industrial Design.**—Industrial Design in Art Schools. Lewis F. Day. The author's impression on the teaching as he saw it, saying where it seems to fail, and how he thinks it might be bettered. 4000 w. Arch, Lond—Aug. 21, 1896.

**Industrial in America.**—Industrial Education in America. Report of a committee of the Soc. for the Promotion of Engng. Ed., read at N. Y. meeting. 7500 w. Eng News—July 12, 1900.

**Japan.**—Technical Education in Japan. Survey of progress with references to and brief memoranda of facilities afforded by technical schools already established. 2200 w. Engng—July 17, 1896.

**Machine Shop Operations.**—The Educational Values of Machine Shop Operations. Abstract of paper by C. P. Benns, read at a recent meeting of the American Manual Training Assn. 2200 w. Am Mach—Sept. 8, 1898.

**Mechanical.**—Necessary Points in Mechanical Knowledge. Walter J. May. A criticism of many of the attempts made in the preliminary education of boys intended for mechanical trades. 1700 w. Prac Engr—June 22, 1900.

**Mechanical Engineers.**—Education of Machinists, Foremen, and Mechanical Engineers. M. P. Higgins. A discussion of the requirements, and questions of interest. 8500 w. Trans Am Soc of Mech Engs, No. 864—May, 1900.

Education of Machinists, Foremen, and Mechanical Engineers. M. P. Higgins. Outlines a special school for training. 12500 w. Trans Am Soc of Mech Engs, No. 834—Dec., 1899.

**See also Germany.**

**Mining.**—Technical and Mining Education. Regis Chauvenet. The writer considers that the value of such training is now admitted, and considers location and equipment of the institution, course and methods of instruction. 2300 w. Min Ind & Rev—Dec. 31, 1896.

Quackery in Mining Education. Criticism and reply of Prof. Edgar Kidwell, based upon his contribution to the "Engineering Magazine." 2000 w. Can Min Rev—Aug., 1896.

**Mining Engineer.**—See also **MINING ENGINEER—Training.**

**Mining School.**—The Camborne Mining School. Interesting information concerning this school and its work. Ill. 1400 w. Engr, Lond—Aug. 4, 1899.

**Natural Science.**—Natural Science in a Literary Education. Albert H. Tolman. In the present state of the educational question, the opinions and arguments contained in this attempt to show what ought to be the attitude toward science, of those students who wish a literary education, will be read with interest. 2300 w. Pop Sci M—May, 1896.

**Negro.**—The Education of the Negro. J. L. M. Curry. The process of educating the negro element of the American population is of necessity slow, but the progress so far made, if it can be called progress at all, is so meagre that the author evidently does not hope for much ultimate improvement in the Afro-American status. 5000 w. Am Mag of Civ—Feb., 1896.

**Preece.**—Mr. W. H. Preece on Technical Education. Reply to an assertion by the President of the British Inst. of Civ. Engs., that professors in technical schools are arrogant and behind the age. 1200 w. Eng Rec—Nov. 19, 1898.

**Preparatory Schools.**—Preparatory Schools for Engineering Education (Die Vorschulen für das Studium der Ingenieurwissenschaften). A plea for better technical preparatory course than is at present given by the existing gymnasium, by Rector Schumann of the Realschule at Stuttgart. 5000 w. Zeitschr d Ver Deutscher Ing—June 5, 1897.

**Purdue University.**—Engineering at Purdue University. Illustrated description. 2000 w. Ry Mas Mech—Sept., 1896.

**Quackery.**—Quackery in Engineering Education. Edward H. Williams, Jr., D. C. Jackson, H. K. Landis, and George L. Hoxie. A symposium suggested by Prof. Kidwell's article on the same subject. 4200 w. Eng Mag—June, 1896.

**Railway.**—Railroading as a College Course. R. L. Donald. Relates the experience of one who has endeavored to obtain such a course. 1400 w. R R Gaz—Jan. 22, 1897.

**See also RAILWAY EMPLOYEE.**

**Railway Mechanical Engineering.**—The Teaching of Railroading Mechanical Engineering. Extracts from a paper by H. Wade Hibbard, read at Nov. meeting of the Northwest Railway Club. Presents a plan that has proved satisfactory in the Univ. of Minnesota. 1400 w. R R Gaz—Jan. 8, 1897.

**Railway, Russia.**—See **RAILWAY—Schools, Russia.**

**Research Work.**—Engineering Education as a Preliminary Training for Scientific Research Work. Storm Bull. Extracts from an address before the Am. Assn. for the Adv. of Science. On the fitness of the technically trained engineer for scientific research work. 1300 w. R R Gaz—Sept. 15, 1899.

**Science and Art.**—The Science and Art Department and Education. Review of the report of the Royal Commission on Secondary Education. The South Kensington influence is regarded in the report as having been deleterious to the field of school education in Britain. This view of the case, the reviewer thinks, has not been well established. On the other hand the results attained are considered as justifying the faith in the possibilities of the schools under the control of the Science and Art Department. 1800 w. Engng—Dec. 27, 1895.

**Sellers' Lecture.**—Abstract of Lecture Delivered Before Senior Class of Stevens Institute of Technology. Coleman Sellers. Interesting and covering in popular style nearly the whole field of engineering, and stating the special educational equipment, for success in different branches of the profession. 4000 w. Stevens' Ind—July, 1895.

**State Universities.**—Some Unrecognized Functions of State Universities. J. B. Johnson. Condensed from address on the occasion of inauguration as Dean of the College of Mechanics and Engineering of the Univ. of Wisconsin. 3500 w. Eng News—Oct. 26, 1899.

**Sweden-Norway.**—Technical Education in Sweden (Das Technische Unterrichtswesen Schwedens). Th. Beckert. A very full account, showing the extent and high character of the technical educational work done in Sweden and Norway. 7500 w. Zeitschr d Ver Deutschr Ing—Feb. 5, 1898.

**Technical Institutes.**—Technical Institutes. Sidney H. Wells. A paper read before the Arch. Assn., England. General remarks. The requirements are divided for convenience in treatment into (1) educational, (2) administrative, (3) recreative and social, (4) general. Serial. Arch, Lond—Feb, 14, 1896.

**Thesis Work.**—Undergraduate Thesis Work. Edgar Marburg, at Boston meeting of the Soc. for the Promotion of Engineering Education. A protest against making the thesis entirely independent of other undergraduate work. 2500 w. Eng Rec—Aug. 27, 1898.

**Trade.**—Theory and Practice in Trade Teaching. Philip Magnus. Paper read at the International Congress on Technical Education. A few suggestions for trade teaching, with consideration of the difficulties. 3800 w. Jour Soc of Arts—July 9, 1897.

**Trade Schools.**—See also Germany; **APPRENTICE; ARCHITECTURAL EDUCATION — Building Trades' Schools.**

**Trade Schools, N. Y.**—The New York Trade Schools. Owen B. Maginnis. An illustrated article in praise of these schools, and an account of a recent visit to them. 1300 w. Arch & Build—Jan. 25, 1896.

**Tuskegee.**—Commercial Work by Students of Tuskegee Institute. Harry E. Thomas. An illustrated account of the work at this industrial school for the education of colored youth. 1400 w. Am Mach—Nov. 16, 1899.

**United States.**—Engineering Education in the United States at the End of the Century. Ira O. Baker. Condensed address of the president of the Soc. for the Promotion of Engng. Ed., at N. Y. meeting. 2000 w. Ry Age—July 6, 1900.

**University of Pennsylvania.**—See **SCIENCE.**

**Wisconsin University.**—Technical Education at the University of Wisconsin. Storm Bull. Reviews the history of technical education at this university. Ill. 4800 w. Wisconsin Engr—Jan., 1899.

**Worcester "Tech."**—At the Worcester "Tech." Illustrated description of mechanical engineering equipment. 600 w. Mach—Oct., 1896.

See also **LABORATORY; HYDRAULIC LABORATORY.**

**Yorkshire College, Leeds.**—The Engineering Department of the Yorkshire College, Leeds. Illustrated description. 2000 w. Engng—Aug. 28, 1896.

See also **MATERIALS' STRENGTH.**

## EGYPT.

The Commercial Development of Egypt. Editorial directing attention to points connected with the recent industrial and commercial development, based mainly on a report of the U. S. agent and consul-general at Cairo. 1800 w. Engng—Nov. 11, 1898.

## EIFFEL TOWER.

See **TOWER—Eiffel.**

## ELASTICITY.

See also **MATERIALS' STRENGTH; TESTING.**

Elasticity and Fatigue. H. K. Landis. Part first deals only with elasticity of steel, considering the elastic factors, methods of testing, drop of beam, permanent set, proportionality, comparison of limits and dynamic elasticity. Serial. Am Eng & R R Jour—May, 1897.

Elasticity and Fatigue. H. K. Landis. The importance of quality in construction work is noted, elasticity and fatigue defined, the usual method of testing commercial steel examined, with suggestion. 1900 w. Am Mach—July 29, 1897.

The Law of Elasticity and Its Practical Application (Das Elastizitätsgesetz und seine Anwendung für Praktische Rechnung). Rudolph Bredt. A mathematical discussion of the relation between stress and strain with examples of application to practical computation. 4000 w. Zeitchr d Ver Deutscher Ing—June 18, 1898.

Concerning the Law of Elastic Longitudinal Deformation (Ueber das Gesetz der Elastischen Langenänderung Prismatischer Körper durch Zug und Druck). W. Schüle. With many diagrams constructed from tests of materials by various observers, showing the close relation between computed and observed results. 3000 w. Zeitschr d Ver Deutcher Ing—July 30, 1898.

The Theory of Elasticity and the Study of the Strength of Materials (Die Theorie der Elastizität, und die Bedürfnisse der Festigkeitslehre). Dr. Kirsch. A mathematical investigation of the modern theory showing its application to practical problems, as well as the close agreement between observed and computed results. 9000 w. Zeitschr d Ver Deutscher Ing—July 16, 1898.

**Aluminum.**—See **PHYSICS—Elasticity.**

**Bach's Law.**—A Study of Bach's Law of Strain and Stress (Studie über das Bachsche Spannungs Gesetz). L. Geusen. A mathematical discussion of the law of Bach expressing the relation between extension and stress, with applications to practical examples. 3500 w. Zeitschr d Ver Deutscher Ing—April 23, 1898.

**Bending.**—The Bending Elasticity of Bodies of Unequal Resistance (Die Biegungselastizität bei Körpern von Ungleicher Festigkeit). R. Latowsky. Discussing the shifting of the neutral axis in bodies of different resistance to extension and compression. 3000 w. Zeitschr d Ver Deutscher Ing—Aug. 14, 1897.

**Compound Structures.**—Concerning the Relation of Elasticity and Resistance of Pillars of Variable Moduli of Elasticity (Ueber die Elasticitäts und Festigkeits-Verhältnisse von Stäben mit Veränderlichem Elasticitätsmodul). A highly mathematical discussion of the subject of elasticity of compound structures, such as occur in the Melan system and elsewhere. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 25, 1896.

**Concrete.**—See **CONCRETE—Elasticity.**

**Hooke's Law.**—The Error in Hooke's Law (Der Fehler in Hooke's Gesetz). Francis Rust. A simple experiment and a mathematical demonstration, showing that Hooke's law of elasticity is inadequate in the case of a beam fixed at one end and bent by its own weight. 3000 w. Oest Monatschr f d Oeff Baudienst—July, 1900.

**Rectangular Plate.**—The Elastic Equilibrium of a Rectangular Plate (Sur l'Equilibre Elastique d'une Plaque Rectangulaire). Maurice Levy. A mathematical treatment, deducing fundamental equations for various conditions. 1200 w. Comptes Rendus—Oct. 9, 1899.

**Steel Balls and Plates.**—See **BALL BEARINGS—Tests.**

**Steel Hoops.**—Report on the Investigations of MM. Gossot and Lionville (Rapport sur les Travaux de MM. Gossot et Lionville). An abstract of investigations into the elastic action of steel hoops when used as reinforcements for tubes, as in the case of artillery. Prize paper of the French Academy. 2000 w. Comptes Rendus—Jan. 10, 1898.

**Theory.**—The Equations of the Elastic Theory (Sur les Equations de la Theorie de l'Elasticite). A communication to the French Academy by MM. Eugène and François Cosserat, giving the fundamental equations of the mathematical theory of elasticity. 1500 w. Comptes Rendus—April 12, 1898.

**Young's Modulus.**—The Influence of Heat, of the Electric Current, and of Magnetization Upon Young's Modulus. Mary Chilton Noyes. Describes methods, apparatus and experiments directed to distinguish between the effects upon Young's modulus due to heat, to the longitudinal magnetization and the electric current through a wire, and instituted to investigate certain unexplained and irregular results in a previous set of experiments in which an electric current was used as a source of heat, in determining the effect of temperature upon this modulus for a piano wire. The results are illustrated by diagrams and afterward presented in tabulated form. 4500 w. Phys Rev—May-June, 1896.

## ELECTRIC ADVERTISING.

See **ELECTRIC SIGN.**

## ELECTRICAL CONGRESS.

See also **ELECTRIC LIGHT CONVENTION.**

**Como, Italy.**—The Electrical Congress at Como (Der Elektriker-Kongress in Como). A general report of the Congress with abstracts of the papers presented. 5000 w. Elektrotech Zeitschr—Oct. 12, 1899.

**Geneva, 1896.**—The International Congress of Electricians in Geneva. Editorial, reviewing the principal features of this congress, opened Aug. 4, and introductory to a full review of the proceedings. 1800 w. Engng—Aug. 7, 1896.

**Paris, 1900.**—International Electrical Congress. An account of the proceedings of the International Electrical Congress at Paris, with abstracts of the principal papers presented. 6000 w. Elec Wld & Engr—Sept. 15, 1900.

International Electrical Congress (Congrès International D'Electricité). The provisional program of the congress, which meets August 18 to 25, at the Paris Exposition. 1400 w. Electricien —June 9, 1900.

The International Electrical Congress. Short abstracts of various papers presented. 2100 w. Elec Wld & Engr—Sept. 22, 1900.

### ELECTRICAL ENGINEER.

See also **ELECTRICAL ENGINEERING.**

The Electrical Engineer. Editorial comment on a remark made in Mr. Preece's inaugural address, and prophesying that electrical engineers are destined to become known merely as engineers, a knowledge of electricity being understood to be part of the necessary equipment of all bearing the name. A sensible and timely argument. 1500 w. Engng—Dec. 23, 1898.

**Consulting.**—Are Consulting Engineers a Necessity or a Luxury? The duties of consultants, their qualifications, power, etc., are considered, with opinion as to when they are necessary, and when a luxury. 1800 w. Elec, Lond—Sept. 24, 1897.

The Relation between the Customer, Consulting Engineer and the Electrical Manufacturer. S. Dana Greene. Read before the N. Y. Elec. Soc. Gives a short sketch of this industry between 1887 and 1892, shows the necessity for a consulting engineer, giving the writer's views on various subjects of interest. 4200 w. Elec, N. Y.—Jan. 19, 1898.

**Fire Underwriter.**—See **FIRE HAZARD—Electrical Engineer.**

**German Society.**—Minutes of the Annual Meeting of the Verband Deutscher Elektrotechniker at Kiel, June, 1900 (Verband Deutscher Elektrotechniker. Bericht über die 8. Jahresversammlung in Kiel, 17 bis 20 Juni, 1900). Full minutes, with reports of various committees. 23000 w. Elektrotech Zeitschr—Aug. 2, 1900.

**Liberality of Mind.**—Liberality of Mind Among Electrical Engineers. R. D. Williams. Charges a spirit of illiberality against electrical engineers as a class, and in the matter of imparting information. 900 w. Am Mach—Sept. 10, 1896.

**Military.**—Military Electric Engineers. A proposition that the members of the Institution of Electrical Engineers shall place at the disposal of the government their technical knowledge for the purposes of national defence, and possibly also for offence. 2200 w. Engng—Jan. 24, 1896.

**Municipal Association.**—The Municipal Electrical Association Presidential Address by Mr. A. B. Mountain, at Huddersfield. Discusses the work of the association. 3300 w. Elect'n, Lond—June 22, 1900.

**Naval Corps.**—The necessity for a Naval Electrical Engineer Corps. F. W. Roller. Argument in favor of electric motors on American battleships, and the need of a corps of electrical engineers for the navy. 12000 w. Elec Eng, N. Y.—Dec. 29, 1898.

**Training.**—How to Become an Electrical Engineer. George B. Lauder. First prize letter in the competition inaugurated by this paper. 1700 w. Elec Rev, N. Y.—Dec. 8, 1897.

The Training of an Electrical Engineer. Suggestions for the acquiring of such knowledge as will prove most useful to workers in this field. 3200 w. Elec Rev, Lond—July 9, 1897.

See also **ELECTRICAL ENGINEERING—Education.**

### ELECTRICAL ENGINEERING.

See also **ELECTRICAL ENGINEER; ELECTRICAL EXHIBITION; ELECTRIC APPARATUS; ELECTRIC INDUSTRY; ELECTRICITY.**

Lessons in Modern Electrical Engineering. The first of a series of articles reviewing progress since 1890, and facts to be remembered. Serial. Builder—July 7, 1900.

**Address, Heaviside.**—Mr. A. W. Heaviside's Presidential Address to the Newcastle-on-Tyne Local Section of the Institution of Electrical Engineers. Abstract. Reviews the history of the telegraph, telephone and other electrical industries and their position in Newcastle. 4800 w. Elect'n, Lond—June 8, 1900.

**Address, Hopkinson.**—Dr. Hopkinson's Presidential Address to the Institution of Electrical Engineers. Serial. Elect'n—Jan. 24, 1896.

Inaugural Address of Dr. Edward Hopkinson to the Manchester Section of the Institution of Electrical Engineers. Abstract. Discusses English electrical engineering. 3500 w. Elect'n, Lond—March 16, 1900.

**Address, Kennelly.**—The Present Status of Electrical Engineering. A. E. Kennelly. Inaugural address presented at the General Meeting of the American Institute of Electrical Engineers. 3000 w. Elec Wld—July 9, 1898.

**Address, Preece.**—Applications of Electricity. W. H. Preece. Abridged from an inaugural address delivered at the Inst. of Civ. Engs. (England). Shows the enormous strides made in the use of electricity, touching on special applications in various fields. 3800 w. Nature—Nov. 3, 1898.

The Relations between Electricity and Engineering. William H. Preece. The "James Forrest" Lecture, delivered before the Inst. of Civ. Engs. Considers the uses to which electricity has been, and may be put to achieve engineering results. 6500 w. Elec Engr, Lond—April 27, 1900.

**Address, Thompson.**—Prof. Sylvanus P. Thompson's Presidential Address to the Institution of Electrical Engineers. Discusses the progress of electrical engineering and the tendencies. Serial. 1st part. 4000 w. Elect'n, Lond—Nov. 24, 1899.

**Advantages and Disadvantages.**—The Advantages and Disadvantages of the Electrical Profession. Extracts from the address and symposium presented at the meeting of the Electrical Club of the Young Men's Christian Assn., of Chicago. 4000 w. Elec Wld—March 4, 1899.

**British v. Foreign.**—Foreign and English Electrical Engineering. Part first considers slow-speed steam dynamos. These articles will discuss the general growth and position of the electrical industry, the differences of practice and conditions, and related subjects. Serial. Engr, Lond—Aug. 24, 1900.

**Code.**—The National Electrical Code. A copy of the code as adopted by the National Conference on Standard Electrical Rules, with report and discussions in New York and Chicago. 28000 w. Trans Am Inst of Elec Engs—Nov., 1897.

**Columbia University.**—Electrical Engineering at Columbia University. Francis B. Crocker. Brief illustrated description of the new engineering building, and the fine facilities for study in the various branches. 3000 w. Sch of Mines Quar—Jan., 1898.

Electrical Engineering of Columbia University. F. B. Crocker. A description of the new buildings and their equipment. Ill. 2200 w. Elec Wld—March 12, 1898.

**Diagrams.**—See **ELECTRIC APPARATUS.**

**Education.**—A Course of Reading on Electricity and Magnetism. F. A. C. Perrine. Points out a course of reading for a student who wishes to lay a firm foundation for a working knowledge of engineering. 2000 w. Elec Engng—Aug. 15, 1897.

Are We Educating Too Many to be Electricians? Henry Floy. Showing, by specially-gathered tabulated statistics, that graduates in electrical engineering are less successful than other technical specialists in obtaining remunerative employment. 2700 w. Eng Mag—Jan., 1896.

Electrical Engineering Education. Francis B. Crocker. Sketches the advance in applied electricity as representative of the changes in electrical education, the latter being moulded by the former. Prior to 1882, knowledge of the science was acquired by experience, or was self-taught. Results and criticisms of present educational methods are stated. 3300 w. Elec Eng—Jan. 6, 1897.

See also **Columbia; Nebraska University; Night School; Purdue; Stuttgart; ELECTRICAL ENGINEER—Training.**

**Education Apprentices.**—The Education of Electrical Apprentices and Journeymen. Arthur A. Hamerschlag. On the desirability of training young men to be efficient electrical workers. Discussion. 6400 w. Trans Am Inst Elec Engs—Jan., 1899.

The Education of Electrical Apprentices and Journeymen. Arthur A. Hamerschlag. Read at meeting of the Am. Inst. of Elec. Engs. Urging that the educating of apprentices and journeymen bears a vital relation to the future success or failure of the industry. 2800 w. Elec, N. Y.—Jan. 11, 1899.

**1896.**—Electrical Progress in 1896. Charles G. Armstrong, in the "Chicago Record." Review of progress in electrical interests, showing substantial improvements and healthy growth. 2300 w. W Elec—Jan. 9, 1897.

**Europe.**—Some Observations upon Electrical Engineering Progress in Europe. Charles T. Rittenhouse. An account of what appeared to the writer some of the chief features of construction and operation. 4500 w. Elec Pow—Dec., 1895.

Some Distinctive Features of Continental Electrical Engineering Practice. Kenelm Edgcumbe and E. J. Fox. Read at students' meeting of the Inst. of Elec. Engs. Points out in what respects Continental practice in general may be said to differ from that in England, with a few of the advantages and disadvantages met with in the respective systems. 5800 w. Elect'n—Sept. 11, 1896.

**France.**—Electrical Engineering in France. Edward Conner. Calls attention to the application of electricity to mining purposes in this country. 1500 w. Elec, Lond—July 8, 1898.

Electrical Industry in France During 1897. J. B. Oudin. Review of progress, devoted particularly to traction and lighting. 2200 w. Elec Wld—Jan. 1, 1898.

**History.**—Some Interesting Features. Interesting information in connection with the history of Electrical Engineering, mostly of a personal character. Photographs and fac-simile letters of prominent electricians. 800 w. Elec Pow—May, 1896.

**Inspection Bureau.**—An Electrical Bureau. William Brophy. Address delivered before the International Assn. of Commissioners and Inspectors of Buildings, held at Detroit, Mich. On the advisability of organizing and maintaining such bureaus for the protection of life and property. Serial. Arch & Build—March 12, 1898.

**Mathematics and Physics.**—Address to the Mathematical and Physical Section. W. E. Ayrton. Delivered to Section A of the British Association, and dealing with the relations of mathematical and physical science to applied electricity and engineering. 8500 w. Elec Engr, Lond—Sept. 9, 1898.

**Mechanical.**—Relations of Electrical and Mechanical Engineering. Elias E. Ries. An analysis of electrical engineering, showing the close connection with mechanical engineering of that branch which deals with the design and construction of electro-mechanical apparatus. 4300 w. Eng Mag—June, 1896.

**Municipal.**—Electricity in Municipal Engineering. R. B. Owens. Read before the Northwestern Elec. Assn., at Milwaukee. Emphasizes the economy that can often be effected by generating at one point all the power required by a municipality. 1600 w. Elec Wld—Jan. 29, 1898.

Municipal Electrical Association. Presidential address of Arthur Wright before this recently organized technical society. 4000 w. Engr, Lond—June 12, 1896.

The Advisability of Concentrating the Control of All Municipal Electrical Interests Under One Head. Morris W. Mead. Read before the Nat. Assn., of Munic. Elect'ns, at Wilmington, Del. Discussion of the subject. Serial. Elec Rev, N. Y.—Sept. 6, 1899.

The Application of Electricity to Municipal Work. F. J. Warden-Stevens. A résumé of the points at which electricity is becoming connected with municipal work, such as lighting, traction, etc. 5600 w. Arch, Lond—Jan. 7, 1898.

The Licensing of Employés on Electrical Work, and Improving the Quality of the Work and Material. William Brophy. Read before the Nat. Assn. of Munic. Elect'ns, at Wilmington, Del. Part first discusses the qualifications of the men occupying important positions and the work undertaken. Serial. Elec Rev, N. Y.—Sept. 13, 1899.

See also **MUNICIPAL ENGINEERING.**

**Municipal Association.**—Presidential Address at the Third Annual Meeting of the Municipal Electrical Association, London. A. H. Gibbings. Deals principally with matters of interest to the association. 3500 w. Elec Engr, Lond—June 10, 1898.

**Nebraska University.**—Electrical Engineering at the University of Nebraska. T. C. Martin. Illustrated description and historical account of the University; its departments are treated separately and much interesting information given. 3500 w. Elec Eng—March 25, 1896.

**Night Schools.**—Instruction in Practical Electricity in Night Schools. C. Walton Swoope. Illustrated account of a school adapted to the needs of those intending to become practical workers in electricity. 1000 w. Elec Wld—Sept. 25, 1897.

**Precision.**—The Precision of Electrical Engineering. Francis B. Crocker. Inaugural address of the president at meeting of the Am. Inst. of Elec. Engs. Claims exactness and certainty for the methods of this branch of engineering and examines the grounds for this claim. 8500 w. Elec—Sept. 8, 1897.

**Purdue University.**—Electrical Engineering at Purdue University. Illustrated description of the building and its equipment for the instruction of students, describing the electrical laboratory in detail. 2800 w. Elec Wld—May 28, 1898.

**Specifications.**—Electrical Engineers' Specifications. J. Alec. McLaren. Read before the Yorkshire College Engng. Soc. Considers some of the features of interest. Part first discusses penalties, terms of payment, cost of tendering and manufacture, and boilers. Serial. Engr, Lond—July 8, 1898.

Notes on Electrical Specifications. Ernest Kilburn Scott. Criticism of the usual form of specifications, discussing the various points in detail. 3500 w. Elec Rev, Lond—Oct. 6, 1899.

**Standardization.**—See **ELECTRIC APPARATUS.**

**Stuttgart.**—The Electrotechnic Institute of the Stuttgart Technical High School (Das Elektrotechnische Institut der Technischen Hochschule Stuttgart). With floor plans, showing the arrangement of lecture halls, class rooms and laboratories. 5000 w. Zeitschr d Ver Deutscher Ing—July 31, 1897.

**Switzerland.**—Electrical Engineering in Switzerland. General consideration of the development of electrical enterprise. 3000 w. Engr, Lond—Oct. 27, 1899.

Electro-Technical Excursion in Switzerland (Excursion Electrotechnique en Suisse). E. Herbet. An account of a visit made by the pupils of the Ecole Supérieure d'Electricité to the various hydraulic and electric plants in Switzerland, giving interesting data. 4000 w. Génie Civil—June 3, 1899.

**ELECTRICAL EXHIBITION.**

See also **ELECTRICAL CONGRESS; ELECTRICITY BUILDING.**

**Atlanta, Ga.**—Electricity at the Atlanta Exposition. Charles F. Foster. Full illustrated description of arrangements for lighting and electrical exhibits. 4500 w. Elec Wld—Dec. 28, 1895.

The Department of Electricity at the Atlanta Exposition. Luther Stieringer. From "Dixie." An account of exhibits with remarks on advances made since 1893. 1200 w. Elec—Nov. 20, 1895.

**Budapest.**—Electrotechnics at the Hungarian Millenial Exposition (Die Electrotechnik in der Millenniums-Landesausstellung zu Budapest). Giving illustrated descriptions of electric tools, motors, locomotives, etc., shown at Budapest. 4500 w. Zeitschr d Ver Deutscher Ing—Jan. 30, 1897.

**Como.**—Some Notes on the Electrical Machinery at the Como Exhibition. Kenelm Edgcumbe. Serial. Elec Rev, Lond—Aug. 18, 1899.

The Volta Centenary. Giulio Martinez. Notes and illustration concerning the exposition at Como, which was destroyed by fire. 900 w. Elec Wld—Aug. 26, 1899.

**Crystal Palace, 1881-82.**—The Crystal Palace Electrical Exposition of 1881-82. A brief account, especially noting the more complete representation made by the English. 500 w. Elec Wld—May 30, 1896.

**Geneva.**—Electrical Features of the Geneva Exposition. Illustrated description. 1900 w. Elec Eng—Aug. 19, 1896.

**Leipzig.**—Dynamos and Motors at the Leipzig Exposition (Dynamomaschinen und Elektromotoren auf der Leipziger Ausstellung). With general plan of the exhibiting plants and views of the leading exhibits. 2000 w. Die Elektricität—Dec. 18, 1897.

**London.**—The Victorian Era Exhibition. Gives illustrated description of some of the electrical exhibits. 1300 w. Elec Rev, Lond—Sept. 10, 1897.

**New York, 1896.**—The National Electrical Exhibition at New York. Illustrated description of exhibits with comments. 4500 w. Eng, Lond—June 12, 1896.

**New York, 1898.**—Events at the Electrical Exhibition. An account of the exhibition at Madison Square Garden, New York, with illustrated description of many of the exhibits. 9500 w. Elec Eng, N Y—May 12, 1898.

Opening of the Electrical Exhibition. An account of the opening, the features of interest and exhibits, giving floor plan. 2100 w. Elec, N Y—May 4, 1898.

The Second New York Electrical Exhibition. Editorial review of this exhibition, considering it very creditable. 900 w. Eng News—May 12, 1898.

**Omaha.**—Department of Electricity at the Trans-Mississippi and International Exposition. Illustrates and describes the building and exhibits. 1800 w. W Elect'n—Aug. 27, 1898.

See also **ELECTRIC LIGHTING—Omaha Exposition.**

**Paris, 1881.**—The Paris Electrical Exposition of 1881. William J. Hammer. The important exhibits are recalled and the effect produced on all branches of electrical development. 1500 w. Elec Wld—May 30, 1896.

**Paris, 1900.**—Electricity at the Paris Exposition of 1900. Georges Dary. A brilliant description of the plans which have been made for the electric lighting, traction and display at the coming exposition. 3000 w. Eng Mag—March, 1899.

Electrical Engineering at the Paris Exhibition. Part first begins a general review of continental work as compared with English. Serial. Engr, Lond—June 15, 1900.

Electricity at the Paris Exposition (Die Elektricität auf der Pariser Weltausstellung). Désire Korda. The first instalment of an extended report. This article discusses the polyphase generators exhibited. Serial. Elektrotech Zeitschr—Aug. 23, 1900.

Heavy Electrical Engineering at the Paris Exposition (Die Weltausstellung in Paris, 1900. Die Starkstromtechnik). Prof. M. Friese. A general review of the generation of electrical currents at the Exposition, and their distribution for power and lighting. Serial. Zeitschr d Ver Deutscher Ing—July 14, 1900.

The Electrical Installation for the 1900 Paris Exposition. Georges Dary. Information concerning the buildings in which will be installed the electrical power appliances, and details of the electrical features. Ill. 3000 w. Elec Wld & Elec Engr—July 15, 1899.

See also **DYNAMO; ELECTRIC STATION; PARIS EXPOSITION.**

**Paris, German.**—Editorial Review of the German Electrical Exhibit at the Paris Exposition, with Plan. 700 w. Elektrotech Zeitschr—May 3, 1900.

**Paris, United States.**—Electrical Preparations for the Paris Exposition. Illustrates and describes the United States Court of Honor for the exhibit of electrical and mechanical apparatus of a pioneer or historical character. 1400 w. Elec Wld & Engr—Jan. 20, 1900.

**Stuttgart, 1896.**—The Electrical Exhibition at Stuttgart, 1896 (Die Ausstellung für Elektrotechnik in Stuttgart, 1896). With illustrations of gas and petroleum motors, motor carriages, electrically driven tools, and one plate of 10-ton electric traveling crane. 5000 w. Zeitschr Ver Deutscher Ing—Jan. 16, 1897.

**Washington.**—See **ELECTRIC MUSEUM.**

**ELECTRICAL EXPOSITION.**

See **ELECTRICAL EXHIBITION.**

**ELECTRIC ANNUNCIATOR.**

See **ELECTRIC SIGNAL—Station Annunciator.**

**ELECTRIC APPARATUS.**

See also **ELECTRICAL ENGINEERING; ELECTRIC EQUIPMENT; ELECTRIC INSTRUMENT; ELECTRICITY; ELECTRIC LIGHTING; ELECTRIC MACHINERY.**

**Diagrams.**—Conventional Electrical Diagrams—The Chicago Electrical Association. Diagrams embodied in the report of the special committee, with statement of F. S. Hickok on the subject. 2000 w. Elec Eng, N Y—Feb. 24, 1898.

Standard Diagrams for Uniformity in Electrical Engineering and Patent Office Drawings. Diagrams approved and adopted by the Chicago Electrical Assn., Feb. 4, 1898. 1600 w. Elec Rev, N Y—March 2, 1898.

Proposed Standard Diagrams of Electrical Apparatus. Andrew Jamieson. Suggestions for improvement in the figures proposed in American papers, and showing the diversity between American, British and Continental practice. 900 w. Elec Rev, Lond—June 24, 1898.

**German Regulations.**—Safety Regulations for Electric Currents of Medium Voltage (Sicherheitsvorschriften für Elektrische Mittelspannungs-Anlagen). A full reprint of the regulations formulated by the Society of German Elektrotechnicians. 6000 w. Elektrotech Zeitschr—Aug. 10, 1899.

See also **ELECTRIC INDUSTRY.**

**German Standards.**—Modern Installation Accessories According to the Rules and Standards of the German Electrotechnical Society (Ueber Neuere Installationsmaterialien nach den Sicherheitsvorschriften und Normalien des Verbandes Deutscher Elektrotechniker). R. Hundhausen. With numerous illustrations of switches, fuses, cut-outs, and other acessories. 5000 w. Elektrotech Zeitschr—Aug. 25, 1898.

**High Tension.**—Modern High Pressure Apparatus (Ueber Moderne Hochspannungsapparate). H. A. Bertram. Describing improved arrangements of switches, switchboards, transformers, insulators, etc., for high pressure currents. Two articles. 7000 w. Elektrotech Zeitschr—Aug. 9, 16, 1900.

**High Tension and Frequency.**—Apparatus for the Production of Powerful Electrical Effects at the Paris Exposition (Exploseur Rotatif et Dispositifs Divers pour la Production de Puissants Courants à Haute Frequence). A. d'Arsonval. Description of apparatus for producing decorative effects on the façade of the Electricity Building. 1500 w. Electricien—May 5, 1900.

See also **ELECTRIC LIGHTING—Decorative.**

**Marine.**—See **ELECTRIC EQUIPMENT—Ship.**

**Military Uses.**—Electrical Appliances in Military Operations. Capt. John P. Wisser. A most interesting illustrated exposition of the many uses to which electricity is put in the military field, with descriptions of the apparatus and of the method of its use. Ill. 4500 w. Eng Mag—May, 1900.

Electricity in War. John Perry. An illustrated account of some of the work and training of the British Electrical Engineer Volunteer Corps. 2300 w. Nature—April 5, 1900.

See also **ELECTRIC EQUIPMENT; ELECTRICITY.**

**Nomenclature.**—See **ELECTRIC NOMENCLATURE.**

**Siemens-Halske.**—A New System of Electrical Fittings (Ueber ein Neues System von Installations und Sicherungsmaterialen). A paper read before the German Electrotechnical Society by Herr Hundhausen, describing the connections, conductors, fittings, etc., used by Messrs. Siemens & Halske. 9000 w. Elektrotech Zeitschr—Jan. 14 and 21, 1897.

**Specifications.**—See **ELECTRICAL ENGINEERING.**

**Standardization.**—Preliminary Report of the Committee on Standardization. Report submitted for criticism, not yet officially adopted. 5000 w. Trans of Am Inst of Elec Engs—May, 1898.

Electrical Standardization. Report adopted at the Boston meeting of the Am. Inst. of Elec. Engs. Part first gives the classification of apparatus. Serial. Elec Wld & Elec Engr—June 3, 1899.

The Standardizing of Generators, Motors and Transformers. A discussion opened by E. W. Rice, Jr. Also discussion at Chicago. 15000 w. Trans Am Inst of Elec Engs—Feb., 1898.

Report of the Committee on Standardization. Gives the report accepted by the American Institute of Electrical Engineers on June 26, 1899. 6000 w. Trans Am Inst of Elec Engs—June and July, 1899.

American Electrical Engineering Standarisation. C. P. Guilbert. Comments on the report of the committee by a French engineer, also editorial. 6000 w. Elec Wld & Engr—March 3, 1900.

See also **ELECTRICAL ENGINEERING—Code; ELECTRIC CIRCUIT BREAKER.**

**500-Volt Circuits.**—See **INCANDESCENT LAMP—500-Volt.**

**Voltage Regulator.**—New Automatic Pressure Regulator (Neuer Selbstthätiger Spannungsregulator). Emil Dick. The regulator is operated by a solenoid acting upon a field resistance. The weight of the solenoid core is counteracted by floating it in mercury. 2600 w. Elektrotech Zeitschr—Jan. 25, 1900.

**ELECTRIC ARC.**

See **ARC.**

**ELECTRIC BATTERY.**

See **ELECTRIC CELL.**

**ELECTRIC BELL.**

See **ELECTRIC CELL—Bells; ELECTRIC SIGNAL.**

**ELECTRIC BOAT.**

Electric Boats (Elektrische Boote). Max Büttner. With illustrations of various boats used in Germany, also giving construction of controllers and data as to the performance of the accumulators. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 25, 1899.

Electric Power for Marine Propulsion. Charles T. Child. A discussion of the advantages of electric propulsion for special conditions, such as ferryboats, torpedo boats, etc., where intermittent service or silence and secrecy render steam unsatisfactory. 2500 w. Engineering Magazine—June, 1899.

**Czar.**—Electric Launch for the Czar of Russia. Gives dimensions and construction, fittings and furnishings and electrical equipment of this boat being built by the Electric Launch Co., of New York. Ill. 1300 w. Elec Eng, N. Y.—Dec. 16, 1897.

**Italy.**—The Electrical Navigation of Rivers (La Navigazione Elettrica Fluviale). T. Tommasina. An argument in favor of the navigation of rivers, in Italy, by means of accumulator boats. 900 w. L'Elettricità—Oct. 30, 1898.

**Motor.**—See **ELECTRIC MOTOR—Launch.**

**Torpedo.**—See **TORPEDO BOAT—Electric.**

**"Utopian."**—The Electric Yacht "Utopian." Illustrated description. 1200 w. Elec Wld—Nov. 7, 1896.

**Wallen Lake, Switzerland.**—Electric Installations on Wallenlake, Switzerland. C. Du Riche Preller. Describes the electric launch, Electra, which successfully navigates this lake during the summer season. Also describes the telephone cable at the same place, which is the longest telephone span in Europe. Ill. 1500 w. Engng—Aug. 5, 1898.

**ELECTRIC BRAKE.**

See **BRAKE—Electric.**

**ELECTRIC CABLE.**

See also **ELECTRIC CONDUCTOR; ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION—Underground; INSULATION.**

Insulated Wires and Cables: Their Construction and Design—Insulation; 1st Efficiency and Defects. J. Draper Bishop. These papers are intended to cover broadly the manufacturing processes of all kinds of cables at present used, as well as the principles governing their design and the value of their insulation electrically. Deep-sea telegraph cables, however, are omitted. Part first considers the commercial side of the question and describes briefly the physical nature and qualities of the various insulating materials. Serial. Elec Wld—Nov. 14, 1896.

Mains for Electricity Supply. F. J. Warden-Stevens. Considers the cables and the methods of laying them. Serial. Arch, Lond—Jan. 6, 1899.

The Use of Insulated Cables for Strong and Weak Currents (Isolirte Kabel für Stark und Schwachstrom und ihre Herstellung). G. Zapf. A paper before the Electrotechnic Society of Cologne, discussing cables for telephone and other electrical conductors. 5000 w. Elektrotech Zeitschr—Aug. 10, 1899.

**Air Circulation.**—Electric Cables with Dry-Air Circulation. A. Barbarat. Abstract of a paper read before the Société Internationale des Electriciens. Describes the system of telephone cables employed at present in Paris. The telephone network is entirely underground, and the cables are made with paper insulation and dry air circulation. 800 w. Elect'n, Lond—May 13, 1898.

**Air-Drying Process.**—The Air-Drying Process for Telephone Cables. Dr. V. Wietlisbach. Principles of the process, method, plant, apparatus, etc. 2000 w. Elec Engng—Sept., 1896.

The Air-Drying Process for Telephone Cables. Dr. V. Wietlisbach. The principles of the process, method, apparatus, etc. 1700 w. Elec Engng—April 1, 1897.

**Air-Insulated.**—The Drying of Air-Space Cables (Das Austrocknen von Luftraumkabeln). Describes apparatus for removing the moisture from air insulated cables by chemical means, as used in Paris. 3000 w. Elektrotechnische Zeitschr—April 8, 1897.

**Alternating Currents.**—Cables for Alternating Currents (Wechselstrom-Kabelnetz). H. Andriessen. A discussion of methods of increasing the capacity of cables, with especial reference to concentric cables. 1500 w. Elektrotech Zeitschr—Dec. 15, 1898.

**Breakdown.**—On Electric Lighting Cable Breakdowns. Gisbert Kappe, in "Electrotechnische Zeitschrift." Reviews the causes of breakdowns, showing them to be often due to the improper connections. 3000 w. Elec Rev, Lond—March 9, 1900.

The Breaking of Cables (Ueber Kabeldurchschläge). Gisbert Kapp. A general review of the causes of breakdowns in cables, showing these to be mainly due to the connecting and disconnecting of the conductors in the wrong order; or to the earth contact of the inside conductor, the discussion referring to concentric cables. 6000 w. Elektrotech Zeitschr—Dec. 28, 1899.

**Capacity.**—See **ELECTRIC MEASUREMENT; ELECTROSTATIC CAPACITY; SUBMARINE CABLE.**

**Concentric.**—See **Breakdown.**

**Fault.**—Some Interesting Faults Met with in Cable Manufacture. J. Wright. Showing the difficulties with which the manufacturer must contend. 2500 w. Elec Rev, Lond—Oct. 12, 1900.

**Fault Localization.**—See **ELECTRIC MEASUREMENT; ELECTRIC TESTING.**

**Guilleaume.**—See **SUBMARINE CABLE.**

**Heating.**—On the Heating of Underground Cables (Ueber die Erwärmung Unterirdisch Verlegter Kabel). Dr. Richard Apt. Theoretical discussion, and results of experiments with alternating currents, with diagrams, tables and curves. 2600 w. Elektrotech Zietschr—July 26, 1900.

The Warming of Electric Conducting Cables (Ueber die Erwärmung Elektrischer Leitungskabel). J. Herzog and C. Feldman. With data of observations upon a number of cables, and methods of computing safe temperature limits. 7500 w. Elektrotech Zeitschr—Sept. 20, 1900.

**High-Tension.**—High-Tension Trunk Mains. Gives the experience in trying to furnish current for the Deptford station, London, and the first use of the Ferranti Trunk Main, describing it, and giving recent experience with high-tension mains, and with insulating materials. 6800 w. Engr, Lond—Dec. 2, 1898.

**Manufacture.**—Combined Cabling and Serving Machine. Illustrated description of a machine for cabling gutta-percha covered cables, and at the same time serving them with compounded tape. The machine is arranged for cabling seven wires. 400 w. Eng, Lond—April 24, 1896.

Covering Machines for Wires and Cables. V. B. Discusses the various methods of covering and the merits of different machines. 1100 w. Ind Rub Wld—Feb. 10, 1897.

The Improvement in Wire and Cable Manufacture. Henry A. Reed. Synopsis of the development of the insulated wire industry during the past fifteen years. 1700 w. Elec Eng—Jan. 6, 1897.

See also **ELECTRIC CABLE WORKS.**

**Martha's Vineyard.**—See **SUBMARINE CABLE LAYING.**

**Mine Shafts.**—Cables for Electric Light and Power in Mine Shafts. G. W. Bousfield. Remarks on the opinions advanced by Sydney F. Walker in a recently published article. 1400 w. Col Guard—March 16, 1900.

Cables for Electric Light and Power in Mine Shafts. Sydney F. Walker. Discusses the problem of protecting the cables from damage, and of keeping the water from destroying the insulating properties. 3500 w. Col Guard—March 2, 1900.

**Paper Insulation.**—Paper Cables as Used in Telephony, etc. E. J. J. Illustrates and describes the method of applying paper insulation, the laying of the cables, construction of the terminals, etc. 2200 w. Elec Rev, Lond—April 7, 1899.

**Paris Exposition.**—Insulated Cables at the Paris Exhibition. Comments on the exhibits, noting the great extension of the employment of fibrous materials in place of rubber and gutta-percha. 8200 w. Engng—July 27, 1900.

**Resistance.**—See ELECTRIC MEASUREMENT—Potentiometer; ELECTRIC RESISTANCE; ELECTRIC TESTING.

**Resonance.**—Electrical Resonance. Remarks on this subject, with reference to a paper read before the Chicago Electrical Assn., by Kempster B. Miller. Ill. 1800 w. Elec Rev, Lond—June 4, 1897.

See also ELECTRO-PHYSICS.

**Specifications and Tests.**—Cable Specifications and Tests. Jos. A. Jeckell. Read before the Municipal Elec. Assn., with discussion. Specifications issued by those who know what they want, and are desirous of obtaning it on the most favorable terms, are considered. 3000 w. Elect'n—July 17, 1896.

**Submarine.**—See SUBMARINE CABLE.

**Telephone.**—Telephone Cables. Dr. V. Wietlisbach. Talking through cables is considered, with the difficulties; how to overcome them by proper construction. 6500 w. Elec Engng—April 1, 1897.

Telephone Cables. Dr. V. Wietlisbach. The article deals with talking through cables and cable construction. The difficulties and how to overcome them. 8700 w. Elec Engng—Sept., 1896.

See also Air; Capacity; ELECTRIC BOAT—Wallen Lake, Switzerland; SUBMARINE CABLE.

**Testing.**—Cable Testing. George D. Hale. Considers the question: (1) How to manufacture such as will be suitable? (2) How to test the same during and immediately following the process of manufacture? (3) How to prevent their deterioration when laid? (4) How to locate the trouble in them when it arises? 1800 w. W Elec—April 8, 1897.

See also ELECTRIC TESTING.

**U. S. Navy.**—Specifications for Insulated Wire for the Navy. General specifications applying to lighting wire, bell wire and cable. 1600 w. Ind Rub Wld—Aug. 1, 1898.

### ELECTRIC CABLE WORKS.

**Prescot.**—The British Insulated Wire Co.'s Works at Prescot. Illustrated description of works for the manufacture of paper-insulated cables. Serial. Elec Rev, Lond—Aug. 31, 1900.

The British Insulated Wire Company's Works at Prescot. Illustrated description of the works and the process by which the cables are manufactured. 3000 w. Elect'n Lond—July 7, 1899.

**Siemens-Halske.**—The New Factory Buildings of the Siemens-Halske Company, near Berlin (Die Fabrikneubauten der Siemens & Halske A.-G. am Nonnendamm). C. Dihlmann. A well illustrated description of the new cable factory and brass foundry of the Siemens-Halske Co., on a large tract of land on the Spree. 3000 w. Elektrotech Zeitschr—June 14, 1900.

### ELECTRIC CAR.

See also ELECTRIC TRAMWAY; ELECTRIC RAILWAY; ELEVATED RAILWAY; UNDERGROUND RAILWAY.

Care of Car Equipment. J. H. Vanderveer. Views of the superintendent of shops, Brooklyn Heights R. R. Co., concerning the proper care. Discussions. Read at convention of the Am. St. Ry. Assn. 9000 w. St Ry Rev—Oct. 19, 1899.

Quality in Car Building. Discusses some of the false ideas in regard to cars and car-building, giving information on important points. 2500 w. St Ry Rev—Dec. 15, 1899.

The Development of Motor Cars for Electric Tramways (Die Entwickelung des Motorwagens für Elektrische Strassenbahnen). Max Stobrawa. A paper before the Elektrotechnische Gesellschaft at Cologne, giving a historical review of motor cars, with examples of present types. Serial. Elektrotech Rundschau—Aug. 1, 1900.

**Acceleration and Braking.**—Recent Tests of Acceleration and Braking. Report of tests made by the engineers of the American General Electric Co. to find out the maximum rate of acceleration that could be imparted to a car without discomfort to the passengers. Also a consideration of rapid braking. 1800 w. Eng News—Oct. 14, 1897.

**Brooklyn Bridge.**—See ELECTRIC TRAMWAY—Brooklyn Bridge.

**Chicago Elevated.**—Lake Street Elevated Motor Cars and Shops. Brief description with photographs. 250 w. St Ry Rev—April 15, 1896.

**Construction.**—Some Lessons in Car Construction Taught by Old Cars. W. E. Partridge. An illustrated deduction of improved practice from past defects. 1800 w. St Ry Jour—Sept., 1896.

**Convertible.**—A Large Convertible Car. An illustrated description of a car seating forty-six persons, built by the J. G. Brill Co., for the New Castle (Pa.) Traction Co., open in summer, closed in winter. 1000 w. St Ry Rev—Sept. 15, 1900.

**Dead Weight.**—Dead Weight—Is It Profitable or Practicable to Reduce It? A discussion of the question with strongly affirmative conclusions. 1000 w. St Ry Rev—Aug. 15, 1896.

**Design.**—Electric Tramway Car Design. W. E. Partridge. Shows that each type must be adapted to its special work, and gives various designs illustrating the text. 2200 w. Ry Wld—June 2, 1898.

**Double-Deck.**—The Latest Double-Deck Street Car. Illustrated description of a steel-built car, convertible into an open or closed car, having a central vestibule and double entrance. 600 w. Ry Rev—Nov. 27, 1897.

**Elieson.**—The Elieson Electric Motor Car. Illustrated description of the method of construction. 700 w. Elect'n—Nov. 12, 1897.

**Equipment.**—Deficiencies in Car Equipments. R. H. Tweedy. A criticism of American practice from an English point of view. 1500 w. Elec Rev, Lond—Aug. 24, 1900.

**Equipment and Maintenance.**—Equipment and Maintenance of Electric Cars. M. S. Hopkins. Read before the A. S. R. A. Gives the results of extended experience. 6800 w. St Ry Rev—Sept. 15, 1898.

**Guards.**—Guards for Open Cars. Illustrated description of various devices in use. 1800 w. St Ry Rev—July 15, 1898.

**Heating.**—See CAR HEATING.

**Inspection.**—Herrick's Electric Car Inspection System. A complete portable testing of instruments is provided, enabling systematic inspection to be carried out at any point on the line. 1500 w. Elec Engr, N. Y.—Sept. 8, 1898.

Inspection and Testing of Motors and Car Equipments by Street Railway Companies. Frederick B. Perkins. Read before the A. S. R. A. Discusses the care of electrical equipment and the system of inspection. 4500 w. St Ry Rev—Sept. 15, 1898.

Inspection of Electric Rolling Stock. Charles F. Uebelacker. Criticising the number of methods, and making suggestions. 1200 w. Elec Ry Gaz—Jan. 4, 1896.

The Daily Inspection and Care of Car Equipments. James B. Cahoon. Paper read before the N. Y. State Ry. Convention. Advocates rigid daily inspection, and suggests a plan therefor. 1600 w. Elec Wld—Sept. 19, 1896.

The Electrical Inspection of Street Car Equipments. Albert B. Herrick. Describes means by which troubles are detected and located. Ill. 4000 w. Jour Fr Inst—May, 1899.

**Ithaca, N. Y.**—Car Tests at Ithaca, N. Y. E. L. West. Describes tests made to determine the condition of the line and behavior of the cars when in regular service. 2500 w. St Ry Rev—June 15, 1900.

**"Knock Down."**—Building Cars for Export. Describes an improved system for the construction of "knock down" cars, or of cars that can be taken apart and snugly packed for shipment. Ill. 1000 w. St Ry Rev—April 15, 1898.

**Lighting.**—See CAR LIGHTING.

**Liverpool.**—New Rolling Stock for Liverpool Tramways. Illustrates and describes the new top-seat motor cars which are being supplied. 700 w. Tram & Ry Wld—Sept. 7, 1899.

See also ELECTRIC TRAMWAY.

**London Underground.**—New Rolling Stock for the Waterloo and City Railway. Illustrated description of motor cars for special requirements. 1800 w. Tram & Ry Wld—April 5, 1900.

**Maintenance.**—Maintenance and Repair of Rolling Stock. J. W. Greer. On the management of the mechanical department and the wisdom of letting employees understand that there is considerable on the expense side of the ledger. 1800 w. St Ry Rev—May 15, 1899.

Maintenance and Repairs of Rolling Stock. J. W. Greer. Part first is largely introductory and considers the labor account. Serial. St Ry Rev —April 15, 1899.

Maintenance of Rolling Stock. C. E. Ubelacker. Suggestions as to inspections, and repairs, with illustrations of tools and devices. 2300 w. Elec Ry Gaz—April 10, 1896.

See also Equipment.

**Mileage.**—Car Mileage—How Arrived at, and Its Use. A. H. Ford. Read before the St. Ry. Accountants' Assn. of America. Explains briefly its use and how arrived at, giving copies of some of the forms used. 500 w. St Ry Rev—Sept. 15, 1898.

**Motors and Gearing.**—Some Difficulties of Electrical Railroading. The difficulties encountered in applying motors to car axles, the disadvantage of two motors, and a statement that 30 per cent. of the power is consumed by the gears. 2000 w. Am Eng & R R Jour—Dec. 12, 1895.

**New York Metropolitan.**—Cars and Car Service in Metropolitan New York. H. H. Vreeland. A review of experiences since 1893, the traffic conditions, and methods adopted. 3200 w. St Ry Jour —Oct. 13, 1900.

The Standard Cars of the Metropolitan Street Railway Company of New York. Thomas Millen. Illustrates and describes in detail the four standards used by the company, and devices that have been found convenient. 3400 w. St Ry Jour—Oct. 13, 1900.

**Parlor.**—Parlor Cars for an Electric Railroad. An up-to-date departure in Brooklyn, N. Y. The cars are finely upholstered, the details being represented in the accompanying illustrations. 400 w. R R Gaz—Jan. 24, 1896.

See also Special.

**Pyott.**—The Pyott Electric Street Car. Illustrated description of a novel departure in street car building, embodying a number of features effecting the ease and comfort of passengers. 700 w. Elec Eng—Aug. 12, 1897.

**Repair.**—Repair of Electric Railway Apparatus. W. E. Shephard. A description of the general Electric controller, and the repairs. 200 w. Am Elect'n May 2, 1896.

Repair of Electric Railway Apparatus. W. E. Shepard. This series of papers gives an outline of the various branches and departments connected with the operating side of electric street railway work. The papers contain hints and suggestions in choosing, constructing and repairing railway apparatus and for guidance in the general routine of the maintenance department which may prove to be of assistance to the mechanic, foreman or superintendent having such work in hand. Serial. Elec Ind—Jan., 1896.

The Trolley Car After a Day's Run and Its Repairs. Daniel O'Mahoney. An account of the inspection and repairs, the usual difficulties to be overcome, and the improvements made. 2000 w. Elec Eng—June 2, 1897.

Truck and Motor Repairs. An itemized statement showing that the repair of gear wheels are 56 per cent. of the total number of repairs with a cost of 59 per cent. of the total cost of repair. 600 w. St Ry Jour—Feb., 1896.

See also ELECTRIC RAILWAY SHOP.

**Repairing With Steel.**—Steel in Car Repairing. W. H. Glenn. Suggestions relating to repairs and where steel can be substituted advantageously for wood. Ill. 1800 w. St Ry Rev—April 15, 1899.

**San Francisco.**—Electric Cars, Car Houses, and Car Repairs in San Francisco. S. L. Foster. A brief account of the cars and system of car maintenance practiced by the Market Street Railway Company, more particularly with reference to the electrical features. Ill. 4200 w. St Ry Jour—Sept., 1897.

**Sanitary.**—A Universal Sanitary Street Car. A new pattern adaptable to all weathers, and possessing many novel features. 1000 w. St Ry Rev—June 15, 1896.

**Single vs. Double Truck.**—Comparative Earnings and Economy of Operation Between Single and Double Truck Cars for City Use. Richard McCulloch. Read at the Boston convention of the A. S. R. A. Gives comparison of power required and weights carried and shows the advantages and disadvantages of each type. With discussion. Ill. 5800 w. St Ry Rev—Sept. 15, 1898.

The Single vs. the Double Truck Car. A letter from J. Hector Graham, taking exceptions to some of Mr. McCulloch's views. 1600 w. Elec, N. Y.—Sept. 28, 1898.

**Special.**—Special Cars in Brooklyn, N. Y. Illustrates and describes some novel cars used on the Nassau Electric Railway, including an office car, tower car, two parlor cars, and a new type of convertible car. 1800 w. St Ry Jour—Nov. 1898.

See also Parlor.

**Specifications.**—Car Specifications. Standard specifications of Consolidated Traction Co. of New Jersey for 20-ft. box cars. 1800 w. St Ry Jour Aug., 1896.

**Splicing.**—Spliced Cars at Rochester, N. Y. An illustrated account of the method of cutting cars in two and lengthening them 9 feet. St Ry Rev —Sept. 15, 1900.

Splicing Cars in Philadelphia. Illustrates and describes the splicing of two short cars together to make a long car. 250 w. St Ry Jour—Sept., 1899.

Splicing Small Cars. W. H. Pelton. Illustrated description of the forming of one 32-ft. car from two 16 ft. cars. 1100 w. St Ry Rev —May 15, 1897.

**Stephenson.**—Street Car Building. Charles Henry Davis. Illustrated detailed description of Stephenson practice. Serial. St. Ry Jour—Feb. 3, 1900.

**Test.**—See Ithaca; ELECTRIC TRAMWAY—Buffalo-Niagara Tests.

**Truck.**—See Single vs. Double Truck; CAR TRUCK —Electric.

**Vestibules.**—Arguments Against the Vestibuling of Cars. A letter addressed by John W. McNamara to the committee of railroads of the State Assembly of New York, arguing against the passage of bills in relation to the enclosing the platforms of cars of street railways. 1600 w. St Ry Jour—April, 1899.

**Wheels.**—See CAR WHEEL—Electric.

## ELECTRIC CELL.

See also ACCUMULATOR; ELECTRO-CHEMISTRY; ELECTROLYSIS; ELECTROLYTE; ELECTROLYTIC CELL.

Contributions to the Theory and Construction of Galvanic Elements (Beiträge zur Theorie und Konstrucktion Galvanischer Elemente). Dr. G. Platner. Applications of the modern electro-chemical theory to the galvanic battery, including the use of chlorate of sodium as a depolarising material. 1800 w. Elektrochemische Zeitschr—Oct., 1898.

Some Useful Forms of Galvanic Elements (Ueber Einige Formen der Gebräuchlichsten Galvanischen Elemente). E. Petersen. Data of tests upon various forms of primary batteries, investigating the chemical reactions. 2000 w. Zeitschr f Electrochemie—Dec. 1, 1898.

The Electric Cell. W. P. Jones. A brief and simple treatment of the subject. 1000 w. Elec Power—April, 1896.

**Accumulator.**—See ACCUMULATOR.

**Bells.**—Electric Bells and Batteries. W. A. Wittbecker. From Carpentry and Building. Discusses batteries, describing their chemical action and means of detecting a weak battery, with some points on the adjustment of bells. 1500 w. Met Work—Feb. 13, 1897.

**Cadmium, Standard.**—Note on the Uniformity of the Cadmium Normal Cell (Notiz über die Herstellung des Cadmium-Normalelements). Prof. Jaeger. Showing that with the cadmium element a standard of voltage may be obtained and reproduced within an error of one ten-thousandth part. 1500 w. Elektrotechnische Zeitschr—Oct. 21, 1897.

The Reichsanstalt Type of Cadmium Standard Cell. W. Jaeger. From the "Elektrotechnische Zeitschrift." Its particular feature is its very small temperature coefficient, enabling it to be used in most cases even for accurate measurements without account of its temperature being taken. 1200 w. Elect'n—Oct. 29, 1897.

**Carbon.**—A Carbon Cell Without a Metal Electrode. C. J. Reed. Objections made to Dr. D. Tommasi's theory of chemical reactions. 500 w. Elec Wld—Nov. 21, 1896.

Experiments Upon the Carbon Element (Untersuchungen über die Vorgänge im Kohle-Element). Experiments in the production of electricity by the solution of carbon in melted caustic potash, with reference to the researches of Dr. Jacques and Mr. Reed, made in the laboratory of the Hagen Accumulator Works. 3000 w. and many diagrams. Zeitschr für Elektrochemie—Feb. 20, 1897.

The Carbon Cell. Brief description of recent experiments of Dr. Borchers made to determine whether carbon monoxide could be oxidized in an electrolytic cell with the production of current, with comment. Ill. 2000 w. Elect'n—Sept. 3, 1897.

See also **Gas; Jacques Carbon.**

**Carbon and Iron.**—Two New Galvanic Elements (Ueber zwei neue Galvanische Elemente). The first is composed of two carbons, one in porous cell in clorine water, the other without in hyposulphite or soda; electromotive force 0.47 volt, very constant. The second is composed of an iron anode, and carbon cathode in a concentrated solution of cloride of iron. Very constant; electromotive force 0.9 volt. 1500 w. Zeitschr d Elektro Chemie. Feb. 5, 1897.

**Chemical Potential.**—The Chemical Potential of the Metals. Wilder D. Bancroft. Having in a previous paper communicated the electro-motive force of certain cells, the author, in the present paper, considers the relation between single-liquid polarizable cells and the corresponding constant reversible cells of the Daniell type. 5400 w. Phys Rev—Jan., Feb., 1896.

**Clark, Standard.**—On a Simple Modification of the Board of Trade Form of the Standard Clark Cell. H. L. Callender, and H. T. Barnes. Explains the construction of a very simple form of cell, devised by the writers, resembling the Board of Trade form, but somewhat more easily made, and also entirely free from diffusion-lag in the changes of its E. M. F. consequent upon the change of temperature. 1400 w. Elect'n—Sept. 10, 1897.

The Clark Standard Cell. Arthur Dearlove. A defence of this cell and explanation of the writer's use of it, and manner of constructing. 1100 w. Elect'n Lond—Jan. 14, 1898.

The Latimer Clark Standard Cell. J. Warren. Discusses the details of the named type of apparatus. 1500 w. Elec, Lond—July 8, 1896.

Variation in the Electromotive Force of Clark Cells with Temperature. W. E. Ayrton and W. R. Cooper. Dials with the temperature variations and their effect upon the accuracy of this standard. 3800 w. Elect'n—Jan. 1, 1897.

**Coal-Gas.**—On a Coal Gas Element. Dr. W. Borchers. Read before the Verb. Deutschr. Electrotechniker. A description of the investigations made and apparatus used. Ill. 1600 w. Elec Eng, N. Y.—Dec. 23, 1897.

**Compound Electrodes.**—Some Experiments on Voltaic Cells with Compound Electrodes. Frederick S. Spiers. Describes experiments that arose out of an investigation on the action of the zinc which is usually placed in boilers, and supposed to diminish electrolytic corrosion. Ill. Serial. Elec Rev, Lond—Dec. 8, 1899.

**Daniell Standard.**—A Simple Form of Daniell Standard Cell (Ueber eine Einfache Form des Daniell'schen Normalelementes). O. Grotrian. Describes a simple form, sufficiently constant for practical use, and more readily made than the Clark or Weston cells. 2000 w. Elektrotech Zeitschr—Aug. 18, 1898.

**Deposition.**—Concerning Galvanic "Deposition" Batteries (Ueber Galvanische "Fällungs" Elemente). R. Lorenz. By "deposition" battery is meant that form in which the products of the chemical decomposition settle to the bottom, leaving the electrolyte in its full activity. One form consists of plates of zinc and of oxide of copper in a solution of common salt; the hydroxid of zinc is thrown down. 2500 w. Zeitschr f Elektrochemie—Jan. 5, 1898.

**Dry.**—How to Make a Dry Cell. A dry cell is merely a non-spilling wet cell. Directions for making are given and some of the particular forms of dry cells considered. 2200 w. Am Elect'n—Oct., 1896.

The Practical Limitations of Dry Batteries. Aims to correct the misleading descriptions given of the capacity and efficiency. 900 w. Elec Rev, Lond—Oct. 13, 1899.

**Dry, Lessing.**—The Lessing Dry Cell. R. Mullineux Walmsley. Report on tests made. 3500 w. Elect'n—Feb. 28, 1896.

**Efficiency.**—Relation Between the Heat Given Off Inside Voltaic Couples and the Heat Capable of Being Transmitted to the Circuit under the form of Chemical Energy. Dr. D. Tommasi. An explanation of investigations and results. 1300 w. Elec Rev, Lond—April 7, 1899.

**Electrolytic.**—See **ELECTROLYTIC CELL.**

**Electromotive Force.**—On Criticism and on the Seat of E. M. F. in a Cell. Oliver Lodge. A criticism of Mr. Swinburne's second Canton lecture. 1200 w. Elect'n—Oct. 9, 1896.

Seat of the E. M. F. in a Voltaic Cell. W. R. Cooper. From a book on "Primary Batteries," to be soon published. States various theories and concludes that it is largely a question of definition. 2300 w. Elect'n, Lond—Dec. 8, 1899.

The Dependence of Electromotive Force of a Galvanic Element upon the Thermochemical Relations (Ueber die Abhängigkeit der Elektromotorischen Kraft Galvinischer Elemente von den Thermochemischen Daten). G. Platner. Showing the existence of a relation between the galvanic and thermochemical action and their interdependence. Serial. Elektrochemische Zeitschr—Aug., 1898.

See also **ELECTRO-CHEMISTRY.**

**Electromotive Force and Heat.**—The Relation Between Electromotive Force and Chemical Heat in Galvanic Elements (Ueber das Verhältniss Zwischen Elektromotorischer Kraft und Chemischer Wärme in den Galvanischen Elementen). T. Gross. An exhaustive discussion, comparing the results of a number of experimental investigations with the mechanical theory of heat. 5000 w. Elektrochemische Zeitschr—Oct., 1899.

**Energy Losses.**—Energy Losses in Galvanic Cells—Their Cause and Prevention. J. Warren. The first of a series of articles aiming to investigate the various causes detracting from the efficient working of the cells. Serial. Elec, Lond—April 13, 1900.

**Energy Transformer.**—The Primary Voltaic Cell as a Transformer of Energy. Henry H. Norris. Read before the Cornell Elec. Soc. Considers the elements of the cells, faults of primary cells, commercial efficiency and their operation as electric and current generators, etc. 3000 w. Sib Jour of Engng—Feb., 1899.

**Gas.**—A Gas Battery Experiment. J. R. Payson. Jr. Experiments with sulphuretted hydrogen in endeavoring to develop electrical energy direct from fuel. The writer thinks it presents features that may render it valuable. 1800 w. Elec Rev—Sept. 30, 1896.

The Generation of Electricity by Chemical Action (Elektricitätserregung auf Chemischem Wege). Ernst Andreas. A description of an improved gas battery in which the elements are composed of net-works of platinum wire between sheets of blotting paper, excited by various gases. It is suggested that this may be made available for the generation of electricity as a by-product in some chemical industries, such for example as the manufacture of sulphuric acid. 1200 w. Zeitschrift für Elektrochemie—Nov. 5, 1896.

**Gas and Carbon.**—On Some New Forms of Gas Batteries and a New Carbon Consuming Battery. Williard E. Case. Read before the Electrical section of the British Assn. for the Advancement of Science, at Toronto; Ont. A record of experimental determinations. 1200 w. Elec Rev—Sept. 1, 1897.

**Gas-Carbon.**—A Gas Carbon Element (Ueber ein Kohlen-Gas Element). A new carbon element consisting of carbon and copper electrodes in a solution of salammoniac or a metallic salt, traversed by a stream of carbonic oxide. 7500 w. Zeitschr f Elektrochemie—July 20, 1897.

**Gravity Alarm.**—The Gravity Alarm Battery. William Brophy. Extract from address before the Massachusetts State Firemen's Assn. "What substitute (if any) is there for the gravity battery for fire alarm purposes that would be equally reliable and less expensive to maintain?" 2000 w. Fire & Water—Nov. 9, 1895.

**Harrison.**—A New Primary Battery. J. D. Darling. Illustrates and describes the Harrison cell, the process of its manufacture, and the manner of overcoming galvanic polarization and local action. 2800 w. Jour Fr Inst—July, 1899.

**History.**—A Review of the Development of Primary Galvanic Batteries During the Last 25 Years (Rückblick auf die Entwickelung der Primären Galvanischen Batterien während der Letzten 25 Jahre). An interesting historical contribution to electrical science. 3000 w. Elektrochemische Zeitschr—Oct., 1899.

Historical Notes on the Primary Battery. W. R. Cooper. From a book to the published by "The Electrician" Printing and Publishing Co. Gives the early history and development. 1200 w. Elect'n, Lond—Aug. 18, 1899.

Twenty-Five Years Retrospect on Primary Galvanic Batteries. T. E. Gatehouse. Historical review of the progress as recorded in the "Electrical Review" during the time named. 4000 w. Elec Rev, Lond—Nov. 12, 1897.

**Internal Resistance.**—See **ACCUMULATOR.**

**Jacques Carbon.**—Dr. Jacques's Cell. Editorial criticism of article entitled "Electricity Direct from Coal," by Dr. William W. Jacques, published in Harper's Magazine for Dec., 1896. 1000 w. Elect'n—Dec. 11, 1896.

Direct Conversion of Carbon into Electrical Energy. Illustrated description of the patent of William W. Jacques. 1400 w. W Elec—May 23, 1896.

Dr. W. W. Jacques' Carbon Electrical Generator. Editorial comment drawing the conclusions that (1) the air blast must consume a very large proportion of the total energy of each cell. (2) That in addition to a very expensive form of fuel there must be added the cost of fuel required to keep the electrolytic fluid under very trying conditions. (3) That the electrolyte must be replenished as in other batteries. 900 w. Elec—June 3, 1896.

On the Jacques Carbon Battery and on a Thermo-Tropic Battery. Discussion following experiments given by C. J. Reed at the meeting of the Electrical Section of the Franklin Inst. 1200 w. Jour Fr Inst—Nov., 1896.

The Action in the Jacques Carbon Cell. C. J. Reed. Comment on the theories advanced. 1000 w. Elec Eng—Dec. 2, 1896.

The Direct Production of Electricity from Coal. George Herbert Stockbridge. A discussion of the carbon-consuming electrical furnace invented by Dr. W. W. Jacques, and of previous experiments of other investigators. Ill. 3200 w. Eng Mag—July, 1896.

The Jacques Carbon Battery. C. J. Reed. Description of experiments performed which determined the action derived from this cell to be thermo-electric. 1800 w. Elec Eng—July 22, 1896.

The Jacques Carbon Battery. John W. Langley. Endeavors to show that no new theory need be put forth to explain the action of this battery, but only an old one applied. 1800 w. Jour Fr Inst—Sept., 1898.

The Jacques Process for Converting Heat into Electricity. Abstract of a paper read by Prof. Langley before the Electric Club of Cleveland. Shows that Dr. Jacques, electric generator is an ordinary thermo-electric battery. Ill. 1700 w. Eng News—Sept. 29, 1896.

Theories of the Jacques Cell. C. J. Reed. An instructive study of the possibilities of the cell. 3300 w. Elec Wld—Jan. 2, 1897.

See also Carbon; **GAS MANUFACTURE—Efficiency.**

**Jeanty.**—A New Primary Battery Cell at Large Capacity and high economy. From "Cosmos." Illustrates and describes the Jeanty cell. 1200 w. Sci Am Sup—June 24, 1899.

**Lalande Copper Oxide.**—New Models of the Lalande Oxide of Copper Battery. Illustrated description of important improvements upon the old types. 1000 w. Elec Rev, Lond—Jan. 14, 1898.

**Leclanche.**—Notes on the Structure and Management of Leclanche Batteries. J. Warren. An explanation of some points not generally understood, with precautions needed in the care of the batteries. 900 w. Elec, Lond—Oct. 14, 1898.

**Lighting.**—See **ELECTRIC LIGHTING—Primary Batteries.**

**Mercury.**—See **ELECTRO-CHEMISTRY Mercury Cell.**

**Osmotic Pressure.**—See **ELECTRO-CHEMISTRY.**

**Primary and Secondary.**—A Galvanic Element with an Electrolyte of Constant Conductivity, Which Can Be Used Both as a Primary and as a Secondary Cell (Ein Primär wie Sekundär Benutzbares Galvanisches Element mit Elektrolyten von Unveränderlichem Leitungsvermögen). Ernst W. Jungner. It is proposed to use a solution of an alkali hydrate, and it is claimed that neither its concentration nor its composition will alter. 1200 w. Elektrochem Zietschr—Aug., 1900.

**Polarization.**—See **ELECTRO-CHEMISTRY.**

**Standard.**—A Comparison of the Electromotive Force of the Clark and Cadmium Cells. S. N. Taylor. Describes work performed at the Physical Laboratory of Clark University, and also the apparatus used and results obtained. 5700 w. Phys Rev—Sept.-Oct., 1898.

Standard Cells. W. C. Fisher. A defense of the Clark cell. 1700 w. Elect'n—Sept. 24, 1897.

Standards of E. M. F. John Henderson. States the conditions to be fulfilled by any satisfactory standard, and examines the behavior of various cells. Ill. Serial. Elec Eng, Lond—July 27, 1900.

Standard Cells. Henry S. Carhart. An account of a few standard cells which the writer has kept for several years. 1100 w. Elec Wld—Nov. 14, 1896.

See also Cadmium; Clark; Daniell.

**Testing.**—How Should Battery Cells Be Tested? Rankin Kennedy. Part first deals with preparations for the tests and methods used. Serial. Elec Rev, Lond—Dec. 24, 1897.

**Theories.**—The Contact vs. the Chemical Theory of the Volta Effect. Discusses the controversy on the action of the Volta contact effect, giving the views of prominent experimenters. Ill. 4000 w. Elec Rev, Lond—Dec. 29, 1899.

The Mechanics of the Galvanic Element (Die Mechanik des Galvanischen Elementes). J. F. Weydl. An attempt to explain the action by the mechanical conception of whirling molecules. Two articles. 3500 w. Elektrotech Zeitschr—June 9, 16, 1898.

The Chemical and Contact Theories. W. R. Cooper. From a book on primary batteries to be published shortly by the Elect'n Pub. Co. Considers the investigations of Volta, Kohlrausch, and others. Ill. Serial. Elect'n, Lond—Oct. 13, 1899.

Electrolytic Mechanism of the Voltaic Cell. W. R. Cooper. From a book on "Primary Batteries," soon to be published. Shows the Grotthus hypothesis to be unsatisfactory, and discusses the theories of other investigators in part first. Serial. Elect'n, Lond—Jan. 19, 1900.

See also Electromotive Force; **ELECTRO-CHEMISTRY.**

**Theory, Grotthus.**—Theory of Grotthus Applied to a Simple Voltaic Cell W. R. Cooper. From a book on Primary Batteries soon to be published by "The Electrician." Briefly considers the explanation of the main facts of electrolysis, and discusses the reaction in a voltaic cell. Ill. 1700 w. Elect'n, Lond—Sept. 8, 1899.

**Theory, Voltaic.**—The Theory of the Voltaic Cell. Appended to Prof. A. Righi's lecture on Volta, delivered at Como. An explanation of various phenomena, and of certain theories. 6000 w. Elec Rev, Lond—Feb. 9, 1900.

**Thermal Relations.**—Thermal Relations in the Voltaic Cell. W. R. Cooper. From a book soon to be published by "The Electrician." Considers the constitution of the cell and discusses mathematically the thermal relations. 4200 w. Elect'n, Lond—Sept. 29, 1899.

**Thermo-Tropic.**—The Thermo-Tropic Battery and a New Method of Developing Electrical Energy. C. J. Reed. An interesting contribution pointing out an apparently new method of generating electric energy. The electric current is developed merely by the passage of heat from one conductor to another, separated by an electrolyte. 2000 w. Elec Eng—Aug. 5, 1896.

**Volta.**—Volta and the Voltaic Cell. Extracts from a lecture delivered in Como, by Prof. Augusto Righi. 4500 w. Elec Rev, Lond—Oct. 27, 1899.

See also **ELECTRICITY—History.**

**Voltameter.**—See **ELECTRIC MEASUREMENT.**

## ELECTRIC CIRCUIT.

See also **ELECTRIC CONDUCTOR; ELECTRIC CURRENT; ELECTRIC DISTRIBUTION; ELECTRIC LINE; ELECTRIC TRANSMISSION; ELECTRIC WIRING.**

**Arc Lighting.**—See **ARC LIGHTING.**

## ELECTRIC CIRCUIT-BREAKER.

See also **ARC; ELECTRIC CUT-OUT; ELECTRIC FUSE; ELECTRIC SWITCH; RHEOSTAT—Starting.**

Electrical Circuit Breakers. William Baxter, Jr. Explains the principle of circuit breakers and gives an illustrated description of various types. Serial. Am Mach—Nov. 30, 1899.

**Fuse Compared.**—Circuit Breakers and Fuses. F. V. Henshaw. Criticises articles that have appeared on this subject, thinks both have a distinct value under different conditions, but that a fuse can be made to meet all conditions more nearly than a circuit breaker. 1100 w. Am Elect'n—Oct., 1897.

Circuit Breakers a Step Backwards in Electrical Progress. Harry H. Cutler. Favors the use of properly constructed fuses, with discussion of facts relating to their use. 2500 w. Am Elect'n—Aug., 1897.

Is the Fuse or the Circuit Breaker Best Suited for Motor Protection? Joseph Sachs. The article shows that each method has its proper place, and if their adaptation to different classes of work is understood there will be no need of controversy. 3000 w. Elec Wld—Sept. 25, 1897.

I. The Fuse and the Circuit Breaker. W. M. Stine. II. Circuit Breakers vs. Fuses. T. W. Bevan. Two articles in defense of circuit breakers. 2000 w. Am Elect'n—Sept., 1897.

**Magnetic.**—The Testing of Automatic Magnetic Circuit Breakers. C. M. Clark and C. W. MacMullen. Illustrated description of method of experimenting, apparatus, results, etc. Serial. Elec, Eng—July 15, 1897.

The Thomson-Houston Magnetic Blow-Out, as Applied to Electrical Traction Apparatus. Part first considers controllers and wiring apparatus in which the magnetic blow-out is applied, showing that in the design both efficiency and wearing qualities have been studied. Ill. 1700 w. Ry Wld—July, 1897.

See also **ELECTRIC FUSE.**

**Pneumatic.**—Pneumatic Circuit Breaker for Accumulator Conductors (Pneumatischer Stromunterbrecher für Akkumulatoren-Ladestromkreise). Describing the Peterson apparatus, in which the pneumatic pressure caused by the accumulation of gas in a closed cell interrupts the connection when the battery is charged. 1000 w. Elektrotech Zeitschr—May 4, 1899.

**Power Transmission.**—Circuit Breakers and Their Use in Power Transmission. W. H. Tapley. Considers in detail the protection demanded by a large manufacturing plant using individual motors as power supply, and claims the demands have been met in the modern circuit breakers. 3300 w. Elec Eng N. Y.—Jan. 27, 1898.

**Standards.**—Circuit Breakers and Interrupters (Coupe- Circuits et Interrupteurs). A general discussion by various members of the society, with a view of unifying construction and establishing standards. Two papers. 10000 w. Bull de la Soc Int des Electriciens—Jan., Feb., 1899.

### ELECTRIC CLOCK.

Electrical Time Service. F. Hope Jones. Read before the Inst. of Elec. Engs., England. An account of the various inventions connected with electric clocks, with an illustrated description of devices of the writer. Serial. Elect'n, Lond—Dec. 22, 1899.

Electrically Controlled Clocks. J. Warren. Some of the ways electricity is utilized in connection with the driving and regulation of clocks. Illustrated by two diagrams. 600 w. Elec, Lond Feb. 21, 1896.

**Hayden.**—The Hayden Century Clock. M. H. Lockwood. Illustrated description of a novel clock and its workings. The clock is run entirely by electromagnets which are actuated by the current from an earth battery. 600 w. Elec Eng—May 27, 1896.

**Karlsruhe, Baden.**—The Electric Master Clock System in the City of Karlsruhe, Baden (Die Elektrische Centraluhrenanlage der Haupt und Residenzstadt Karlsruhe, i. B.). Emil Giehne. With illustrations of the master clock, and of the escapement used on the auxiliary dials. Serial. Elektrotech Zeitschr—July 13, 1899.

### ELECTRIC COMPANY.

See **ELECTRIC INDUSTRY.**

### ELECTRIC CONDENSER.

Condensers. Harold B. Smith. Considers the various types. 1200 w. Jour Worcester Poly Inst—July, 1899.

Electrolytic Action and Insulation Resistance of a Commercial Condenser. Dr. K. E. Guthe. Abstract of a paper read before the Am. Assn. for the Advancement of Science, at Detroit. Describes experiments made and gives results. 1600 w. Elec Eng—Sept. 16, 1897.

**Alternating Current Rushes.**—On Alternating Current-Rushes in Condensers. Bernard P. Scattergood. Investigations of a phenomenon noticed while making experiments on a high tension circuit. Serial. Elec Rev, Lond—July 17, 1896.

**Alternating Current Work.**—The Employment of Condensers. P. Boucherot. Paper read at the Paris International Electrical Congress on the application of condensers in commercial alternating current work. 2000 w. W Elect'n—Sept. 22, 1900.

**Design.**—Note on the Design of Condensers. Harold B. Smith. The practical design and capacity of plate condensers. 500 w. Elec Pow—Feb., 1896.

**Discharge.**—Macfarlane on Discharge of Condenser. Discussion of paper read May 18, 1897. 3800 w. Trans Am Inst of Elec Engs—Oct., 1897.

**Induction Coil.**—Experiments on Induction Coil Condensers. Alfred G. Dell. Describes apparatus used and reports experiments made to determine the relation between an induction coil and its condenser. 800 w. Elec Rev, N. Y.—July 20, 1898.

**Large Capacity.**—The Behavior of a Condenser of Large Capacity (Ueber das Verhalten eines Kondensators von Grosser Kapacität). Dr A. Tobler. An account of investigations made with a condenser of 10 microfarads capacity. 1500 w. Elektrotech Zeitschr—Sept. 7, 1899.

**Short-Charge Capacity.**—A Study of the Apparent Capacity of Condensers for Short-Charge Periods. Hubert V. Carpenter. Experiments are described and results discussed. 1000 w. Phys Rev—Nov., Dec., 1896.

**Telegraph Circuits.**—Compensating Condensers in Telegraph Circuits. M. G. Simpson. Mathematical investigation of currents. 600 w. Elect'n, Lond—Aug. 25, 1899.

**Tesla.**—Tesla's Electrical Condenser. The inventor's own description, with sectional view. 800 w. Elec Rev—Sept. 23, 1896.

See also **ELECTRIC INVENTION.**

### ELECTRIC CONDUCTIVITY.

See also **ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE; ELECTRIC TESTING; ELECTRO-PHYSICS.**

On the Electrical Conductivity of Metallic Conductors. Edouard Branley. From the "Comptes Rendus." An account of recent experiments. 900 w. Elec Eng, N. Y.—Feb. 17, 1898.

**Aluminum.**—The Conductivity of Aluminum. Edwin F. Northrup. Gives recent tests made on rods manufactured by the Pittsburg Reduction Company, some of the specimens being pure aluminum and others alloyed with copper. 600 w. Elec Wld—Dec. 3, 1898.

See also **ALUMINUM—Electrical Conductivity.**

**Cement and Concrete.**—On the Electrical Conductivity of Cement and Concrete. Dr. St. Lindeck (Abstract from the "Elektrotechnische Zeitschrift." Communication from the Reichanstalt. The writer thinks it appears most probable that by using asphalt concrete the rails could be permanently insulated from earth to such an extent that leakage currents of any importance could not occur. 1000 w. Elect'n—April 10, 1896.

**Dielectric Influence.**—Influence of the Surrounding Dielectric on the Conductivity of Copper Wire. Joseph Francis Merrill. A report of investigations and their results, with a brief review of the conclusions reached by Prof. Sanford and Prof. Carhart. 5000 w. Phys Rev—Feb., 1899.

Electrical Conductivity of Metallic Wires in Different Dielectrics. Fernando Sanford, in the "Physical Review." Giving the results of careful experiments by the writer and other investigators. Serial. Elec—Dec. 4, 1895.

**Double Salts.**—Investigation of the Conductivity of Dilute Solutions of Double Salts (Verfahren zur Ermittelung des Leitungsvermögens Mässig mit Wasser Verdünnter Doppelsalzlösungen). J. G. MacGregor and J. H. Archibald. An account of experiments, with tables showing the observed and calculated values. 3000 w. Elektrochemische Zeitschr—April, 1900.

**Earth.**—The Earth as a Conductor. Dr. Louis Bell. A Study of the value of the earth as a conductor and its limitations. Only in telegraphy does it appear to serve a permanently useful purpose. 2400 w. Am Elect'n—Feb., 1897.

**Electrolyte.**—See **ELECTROLYTE.**

**Electrolytic.**—See **ELECTRO CHEMISTRY—Arrhenius's Theory.**

**Oxides.**—The Conductivity of Oxides at High Temperature (Ueber die Leitungsfähigkeit der Oxyde bei Hohen Temperaturen). J. Sohlman. An examination of a large number of oxides with a view of determining their conductivity and use for incandescent lighting. 1800 w. Elektrotech Zeitschr—Aug. 19, 1900.

See also **NERUST LAMP.**

**Pyridin Solutions.**—The Conductivity of Solutions of Certain Salts in Pyridin (Leitfähigkeit von Lösungen einiger Salze in Pyridin). Drs. Lasczynski and Gorski. Describing experiments on solutions of salts of potassium, sodium, lithium, etc., in pyridin, with notes on the results as to conductivity and decomposition. 1500 w. Zeitschr f Elektrochemie—Dec. 20, 1897.

## ELECTRIC CONDUCTOR.

See also **ELECTRIC CABLE; ELECTRIC LINE; ELECTRIC TRAMWAY—Overhead Construction.**

**Aluminum.**—Aluminum as a Material for Electrical Conductors (Ueber Aluminum als Leitungs Material). A discussion of the relations between weight, conductivity and cost, which may render aluminum conductors practicable. 1200 w. Deutscher Zeitschr f Elektrotechnik—July 15, 1897.

Aluminum as a Rival of Copper and Brass for Electrical Conductors. Alfred E. Hunt. Gives facts regarding copper and aluminum, in bars, rods, and wire suitable for electrical conductors, and calls attention to the merits of aluminum, stating its advantages and disadvantages. 3000 w. Sci Am Sup—Aug. 20, 1898.

Aluminum Feeders on the Northwestern Elevated Railroad, Chicago. Illustrated description of the installation and the methods used in handling the wire and manner of overcoming difficulties. 2000 w. Am Elect'n—Jan., 1900.

Aluminum Electrical Conductors. Frank C. Perkins. Illustrated description of the works of the Pittsburg Reduction Company, with information relating to the use of this metal. 4000 w. W Elect'n—March 10, 1900.

Aluminum Wires for Overhead Lines. Stuart A. Russell. Refers to statements made in paper by A. E. Hunt, and gives examples showing that they must be modified when the effect of wind pressure is taken into account. 900 w. Elec Rev, Lond—April 22, 1898.

Notes on Aluminum: The Relationship of its Cost of Production to its Use as a Conductor. John B. C. Kershaw. The use of aluminum as a conductor, in place of copper, in electrical construction work, and its bearing on the future development of the aluminum industry. 1200 w. Elect'n—Aug. 27, 1897.

The Use of Aluminum Wire for Electric Transmission Lines. F. A. C. Perrine and F. C. Baum. Abstracted from a paper before the American Institute of Electrical Engineers, giving the practical results attained on a 48-mile three-phase line in California. 2500 w. Eng News—Sept. 27, 1900.

The Use of Aluminum Line Wire and Some Constants for Transmission Lines. F. A. C. Perrine and F. G. Baum. Presents the results of a careful study of this wire. Concludes that aluminum can be safely used in place of copper when proper precautions are taken. 7500 w. Trans Am Inst of Elec Engs—June and July, 1900.

See also **ELECTRIC TRANSMISSION—Aluminum Line.**

**Aluminum, Copper and Iron.**—The Relative Costs of Copper, Aluminium, and Iron, when used as Electrical Conductors. J. B. C. Kershaw. A comparison of the cost and relative conductivity of the three metals, showing that at present prices aluminium is the most expensive. 1000 w. Elec Rev, Lond—Sept. 2, 1898.

**Aluminum vs. Copper.**—Aluminum as a Rival of Copper for Electrical Conductors. Alfred E. Hunt. Presenting the qualities of aluminum that show its adaptibility to this use, also the drawbacks. 1800 w. Elec Wld—Feb. 26, 1898.

Aluminum vs. Copper. Charles T. Child. A comparison of the relative values of the two metals for electrical uses, showing aluminum to be the cheaper metal of the two at the present prices. 1100 w. Elec Rev, N. Y.—Aug. 30, 1899.

**Capacity.**—See **ELECTROSTATIC CAPACITY.**

**Carrying Capacity.**—Safe Carrying Capacity for Electrical Conductors. C. H. Sewell. Read before the Chicago Electrical Assn. Discusses the general physical laws and conditions which bear upon the subject. 3000 w. Elect'n—Nov. 27, 1897.

**Covering Machines.**—See **Manufacture; ELECTRIC CABLE—Manufacture.**

**Cross Section.**—A Simple Method of Determining the Most Efficient Cross Section and the Loss in Electrical Conductors (Eine Einfache Methode zur Bestimmung des Wirthschaftlichen Querschnittes und Arbeitverlustes für Elektrische Leitungen). A. Bull. A mathematical treatment, resulting in practical working equations from which the most economical cross section for any given conditions may be found. 2000 w. Elektrotech Zeitschr—June 9, 1898.

The Computation of Partially Fed Electric Conductors (Berechnung Einseitig Gespeister Elektrischer Leitungen). A. Hecker. A development of formulas intended to enable the computation of the most economical cross section. Two articles. 4500 w. Deutsche Zeitschr f Elektrotechnik—Oct. 15, Nov. 1, 1899.

The Economical Current Density for Electric Light Mains. James Whitcher. Discussing questions involving points of doubt and difficulty that arise in the application of Lord Kelvin's law for the most economical current density for electrical distributing mains, particularly as they affect electric lighting. 2800 w. Elect'n—March 27, 1896.

The Formula for Most Economical Section of Electrical Conductors (Note sur la Formule Economique des Canalisations Electriques). D. Dujon. A mathematical examination of Lord Kelvin's law, with applications to practical examples. 2500 w. La Revue Technique—Aug. 25, 1898.

**Heating of Magnetic Coils.**—The Heating of Magnetic Coils. Henry S. Carhart. Investigations and formula. 1000 w. Elec Wld—Jan. 2, 1897.

**Heating of Underground.**—On the Heating of Underground Electric Conductors (Ueber die Erwärmung Unteriridischer Elektrischer Leitungen). K. Wilkens. Theoretical considerations, and results of tests made on underground cables under normal working conditions in Berlin, with curves and tables. 2500 w. Elektrotech Zeitschr—May 24, 1900.

**High Potential Tests.**—Tests of Conductors for 10,000 Volts (10,000 V-Kabelversuehe). A. Hassold. Tabulated data and results of tests made on the long-distance transmission between Bozen and Meran, Austria. 1800 w. Elektrotech Zeitschr—March 9, 1899.

**Manufacture.**—The Biography of a Piece of Copper Wire. C. T. Gage. An outline of the various processes through which the bare and insulated copper wire passes from its crude material to some of the forms in which it becomes useful. 2500 w. Elec Wld—April 2, 1898.

The Manufacture and Treatment of Wire for Electrical Purposes. J. Wright. Describes the various processes and treatments involved in the manufacture of wire from the raw material. 3800 w. Ind & East Engr—Sept., 1898.

The Manufacture of Wire. Frederick A. C. Perrine. Descriptive of the various operations. Serial. Elec Engng—Dec., 1895.

See also **COPPER METALLURGY.**

**Molecular Theory.**—The Molecular Theory of Conductors (Molekular Theorie der Stromleiter). A communication by Dr. Silberstein, relating especially to dielectrics and poor conducting materials 1500 w. Elektrochemische Zeitschr—Oct., 1897.

**Phono-Electric Wire.**—New Wire for Trolley and Other Purposes. F. Z. Maguire. Gives a report of tests showing the fundamental properties of phono-electric wire, a comparison with other wires, and the claims made for this new material. 800 w. Elec Rev, Lond—April 6, 1900.

**Protection.**—The Protection of Insulated Wires. Frederick Bathurst. Critical review of articles by Sydney F. Walker. 1600 w. Elec Rev, Lond—May 25, 1900.

**Shielded.**—See **MAGNETIC SHIELDING.**

**Temperature.**—Stability of Temperature in an Electric Conductor. H. E. Wimperis. An account of investigations made by the writer. 1100 w. Elect'n, Lond—Oct. 12, 1900.

### ELECTRIC CONDUIT.

See also **ELECTRIC DISTRIBUTION—Underground; ELECTRIC WIRING; SUBWAY.**

Conduits and Cables. Alex. Dow. Describes this practice of the present day with reasons for its adoption, and briefly reviews the earlier conditions. 6000 w. Jour Assn of Eng Soc—Sept., 1897.

Underground Conductors. F. A. C. Perrine. Describes the systems of underground construction which have been used, showing a very satisfactory development for the large cities. Ill. 7800 w. Elec Engng—July, 1898.

Underground Conduits for Electrical Conductors. C. H. Sewall. Gives briefly a review of the history of underground construction, and describes various types of conduit and the requirements of construction, with measures for meeting them. 2500 w. Elec Engng & Tel Mag—Nov., 1899.

Underground Electrical Construction. L. A. Ferguson. Abstract from a paper read at the recent convention of the Nat. Elec. Lgt. Assn., in New York. Part first describes the Edison Tube for feeders. Serial. Elec Wld & Elec Engr—June 24, 1899.

**Arc Circuits.**—See **ARC LIGHTING—Underground Circuits.**

**Baltimore.**—The Proposed Municipal Electric Subway System of Baltimore. Brief abstract from the report of Nicholas S. Hill, Jr., Engineer of the Electrical Commission of Baltimore, which has this work in charge. This report is said to be about the best treatise in existence upon the subject of electrical subway construction and management. 1200 w. Eng News—Jan. 28, 1897.

**Boston.**—See **Submarine.**

**Chicago.**—Construction of Chicago Edison Company's Underground Conduit in Jackson Street. Illustrated description of work now being executed, which embodies every advancement known to the art. 1500 w. W Elec—April 24, 1897.

Electrical Underground Construction. George B. Springer. Illustrated description of various methods of carrying out the work, with related information. 5000 w. Jour W Soc of Engs—Dec., 1899.

**Feeder.**—Feeder-Conduit Construction. N. S. Hill, Jr. Extract from report made by the Electrical Commission of the city of Baltimore. The different styles of conduits and methods of ventilating them. 1600 w. St Ry Jour—May, 1897.

**Harlem River.**—See **Submarine.**

**Hörde.**—The Hörde Conduit System. The aim has been to construct a conduit strong, cheap and easily accessible for repairs. Illustrated description. 1400 w. Elec Rev, Lond—Nov. 8, 1895.

**Illinois Company.**—Underground Work of the Illinois Telephone and Telegraph Company. Illustrated detailed description. 1700 w. W Elect'n—March 17, 1900.

**Indianapolis.**—Underground Telephone Wires in Indianapolis. Illustrated description of the system used. 700 w. Elec Eng—Nov. 11, 1896.

**Interior.**—Evolution of Interior Conduits from the Electrical Standpoint. Luther Stieringer. Read before the National Electrical Light Assn. An examination of the problem with the object of finding a plan of improvement. A brief review of conduits for water, gas and steam is given, especially before the introduction of electric currents. Facts demonstrated by the best experience of the past 15 years in interior wiring are also given. 7500 w. Elec Rev—May 13, 1896.

Interior Conduits. Replies received from manufacturers and engineers in response to a circular letter inquiring for opinions in regard to methods permitting the greatest economy consistent with safety. 3700 w. Elec Wld—Feb. 27, 1897.

Tubing for Interior Electric-Lighting Wires. Charles Henry Davis and Howard C. Forbes. The subject is considered from the commercial and from the engineering standpoint. Ill. 2000 w. Elec Rev—May 19, 1897.

Uninsulated Pipe for Interior Wiring. V. Zingler. The object of the paper is compare the uninsulated pipe with the insulated, from a practical point of view, and in the latter part of the article hints for its efficient installation will be given, taken from the results of actual experience. Serial. Elec Rev, Lond—May 7, 1897.

See also **ELECTRIC WIRING.**

**Interior Armorite.**—Armorite Interior Conduit. Illustrated description of a new electrical specialty. 2000 w. W Elec—Dec. 19, 1896.

**Municipal Ownership.**—The Municipal Ownership of Electric Subways. Discusses the question of ownership of the conduits when wires are put under ground, giving the practice in Baltimore and St. Louis, and gives some opinions as to the best system, profits, etc. 1700 w. Eng News—Jan. 28, 1897.

See also **MUNICIPAL OWNERSHIP.**

**New York.**—Progress of Electrical Subway Work. William Weaver, Jr. Illustrated description of the work, principally as carried out in New York. 1800 w. Elec Wld—Jan. 30, 1897.

See also **ELECTRIC DISTRIBUTION—Underground.**

**Providence, R. I.**—Electrical Subways, Providence, R. I. Illustrated description of the construction of subways in which special attention is paid to manholes with shelves for the cables. 900 w. Eng Rec—Dec. 3, 1898.

**St. Louis.**—Conduit Construction in St. Louis. Frank Clark Cosby. An account of the work of placing wires under ground. The various wire-using companies have selected various styles of conduits, thus giving an opportunity of comparing work under the same conditions, but involving nearly all types of conduit in the market. Ill. Serial. Elec Wld—Aug. 21, 1897.

**Stockholm.**—The Underground Telephone System in Stockholm (Die Unterirdische Fernsprechanlage in Stockholm). A. Hultman. A general description of the system. The wires are drawn through holes in insulating blocks. Two articles. 5000 w. Elektrotech Zeitschr—Feb. 17, 24, 1898.

**Submarine.**—Two Draw-In Conduits Under Boston Rivers. Illustrated detailed description. 1300 w. Elec Wld—Oct. 29, 1898.

A 557-ft. Telephone Subway under the Harlem River, New York City. Illustrated description of the interesting features in the construction and launching of this conduit. 1200 w. Eng News—Feb. 17, 1898.

A Submarine Conduit. Describes the method of putting in place the conduit laid across the Harlem River at New York, for carrying the cables of the American Telephone and Telegraph Co. Ill. 600 w. Elec Wld—Feb. 19, 1898.

**Telephone.**—Telephone Conduits and Subways. Dr. V. Wietlisbach. Illustrated article treating of simple construction, subways and conduit or duct construction. 7000 w. Elec Engng—Nov., 1896.

**Toledo, O.**—Underground Wiring of the Toledo Traction Co. Illustrated description of the work of placing underground the lighting mains and feeder wires in the business district of this city. 1400 w. St Ry Rev—Sept. 15, 1899.

**Utica, N. Y.**—The Electrical Subways in Utica, N. Y. Illustrated description of the city subways and account of their cost. 900 w. Eng Rec—March 6, 1897.

**Ventilation.**—Ventilating Electrical Subways. Editorial presenting the difficulties of the problem and suggesting the substitution of exhaust for forced draught. 700 w. Elec—Sept. 9, 1896.

### ELECTRIC CONDUIT TRAMWAY.

See also **CITY RAILWAY; ELECTRIC RAILWAY; ELECTRIC TRAMWAY; SURFACE-CONTACT TRAMWAY.**

Electric Conduit Roads. Alton D. Adams. Briefly reviews surface-contact systems, third-rail, and electric conduit roads, explaining their operation and advantages and disadvantages. 2300 w. Munic Engng—Feb., 1900.

Electric Conduit Systems. W. L. Hedenberg. Reviews the various systems that have been tried, commenting on the degree of success attained and illustrating the types, and giving a brief account of the extensive construction of the N. Y. Metropolitan St. Ry. Co. 2700 w. Elec, N. Y.—Nov. 23, 1898.

Electric Propulsion by Subterranean Conductors. From "La Nature." Notes on the different systems of subterranean conductors in conduits for electric propulsion, with illustrations of some of the most important. 1500 w. Sci Am Sup—May 2,1896.

The Application of Power to Street Railways, with Special Reference to the Lachmann Underground System (Die Anwendung der motorischen Kraft für Strassenbahnen, speziell unterirdische Stromzuführung, System Lachmann). A comparison between the various motor systems, by the inventor of the Lachmann underground trolley. 2500 w. Elektrotech, Rundschau—Jan. 15, 1897.

**Berlin.**—Combination Trolley and Conduit Electric Tramway at Berlin (Tramway Electrique de Berlin à Prise de Courant Tantôt Aérienne, Tantôt Souterraine). Henry Martin. Full detailed illustrated description of the tramway and construction methods. 2000 w. Le Génie Civil—Nov. 5, 1898.

**Bersier.**—A New System of Electric Traction for Tramways (Nouveau Systèm de Traction Electrique pour Tramways). An illustrated account of the Bersier System at Havre, with covered conduit and movable lid. 3000 w. Le Génie Civil—June 19, 1897.

**Brussels.**—Brussels' Electric Railways. Illustrates and describes the conduit trolley lines recently built. 1000 w. W Elect'n—Oct. 8, 1898.

**Chicago.**—The Sewall Conduit on the Chicago City Railway. Describes the construction and discusses the commercial advantages. Ill. 1200 w. Elec Eng, N. Y.—April 7, 1898.

**Closed Slot.**—See **Bersier**; **Hecker**; **Mapple.**

**Combined with Trolley.**—Combined Conduit and Trolley Road. Editorial dissertation upon the uselessness of such combinations in most cases, and the difficulties introduced by them. 900 w. Elec Rev, Lond—Aug. 14, 1896.

See also **Berlin**; **Brussels**; **Paris**; **Washington.**

**Construction.**—The Construction of Electric Tramways with Underground Conduits (Construction des Lignes de Tramways Electrique à Caniveau Souterrain). A general discussion of the constructive features of the problem, with sections of various forms of conduits for underground trolleys. 2500 w. L'Electricien—Aug. 6, 1898.

**Germany.**—Electric Tramways with Underground Conductors (Ueber Elektrische Bahnen mit Unterleitung). Describing various existing systems of underground trolleys used in Germany, with sections of conduits and arrangement of switches, turnouts, etc. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 13, 1897.

**Hecker.**—Underground Conductor with Closed Slot (Unterirdische Stromzuführung mit Verschlossenem Kanalschlitz). The Hecker system, in which the slot has a hinged lid which is raised in sections by the car automatically. 3000 w. Deutsch Zeitschr f. Elektrotech—Jan. 15, 1897.

**K. A. K.**—K. A. K. Conduit Electric Railway System. A system that has excited much attention in the west. It is a conduit system and has a line of railway in operation in Springfield, O. 800 w. W Elec—April 25, 1896.

The Trolley Conduit Railway in Springfield, Ohio. A descriptive account of the system which is said to give very gratifying results in operation. 800 w. W Elec—Sept. 5, 1896.

**London.**—Underground Conduit System for London United Tramways. Gives plans with designs for cars and poles to be used on the trolley sections. 1500 w. Tram & Ry Wld—Oct. 5, 1899.

**Love.**—See **New York**; **Washington.**

**Madras.**—Conduit Electric Railway at Madras, India. A railway that is interesting as being the first electric road in India, and also because it is constructed on the conduit system. The outer rail is of the grooved girder type, while the conductor is an insulated T rail. Ill. 800 w. Eng News—Nov. 14, 1895.

**"Mapple" Hinged.**—The "Mapple" Hinged Conduit System. Illustrated description of a system for electrical traction, in which the distinctive feature is found in the means provided for reaching the interior of the conduit without removal of the slot rails or disturbance of the paving of the roadway. 1100 w. Ry Wld—June, 1897.

**New York.**—Conduit Construction of the Third Avenue Railway Company, New York. The work of changing from the cable to the electric system is described; also the horse lines that are to be equipped electrically, and other improvements in rolling stock, etc., to be made by this line. 2500 w. St Ry Jour—Dec., 1898.

Conduit Railway Construction of the Metropolitan Street Railway Company, of New York. Illustrated account of this extensive work, with reasons for selecting this system. 4800 w. St Ry Jour—Dec., 1897.

Construction details of the Underground Trolley in New York City. Interesting description of the construction, with illustrations. 1800 w. Elec Wld—Sept. 18, 1897.

Electric Conduit Construction on Amsterdam Avenue, New York. The line, which is the extension northward of the Third Avenue line, is now about completed. Views and drawings fully illustrate construction. 800 w. St Ry Jour—Jan., 1896.

Equipment of the Broadway Cable Line with Electricity. Illustrates and describes the work being carried on by the Metropolitan Street Railway Co. 1000 w. Sci Am—Dec. 24, 1898.

Extension of the Underground Trolley System in New York. An outline of work undertaken on the Eighth and Fourth Avenue lines. Ill. 900 w. Sci Am—July 31, 1897.

New Electric Conduit Lines in New York. Illustrated description of proposed work for the extension of this system, with editorial. 1600 w. RR Gaz—March 5, 1897.

Note on American Electric Conduit Tramways (Note sur les Tramways Electriques Americains à Prise de Courant par Caniveau Souterrain). M. Mesnager. A description of the New York and Washington conduit roads, with map, and illustrations of yokes, etc. 6000 w. 1 plate. Ann d Ponts et Chaussées—4th quarter, 1899.

Opening of the Third Avenue Railway, N. Y. Illustrated account of the changing of the main lines of this railway from cable to electricity using the underground conduit system. 3000 w. St Ry Jour—Jan. 6, 1900.

Power Consumption on the Lenox Avenue Conduit Electric Road, New York City. G. F. Sever. Brief description of the construction and method of operation, with results of two series of tests when operated at 300- and 500-volts respectively. Ill. 1100 w. Sch of Mines Quar—Jan., 1898.

Proposed Electrical Construction of the Metropolitan Street Railway Company, New York. Illustrated description. 1200 w. St Ry Jour—Dec., 1895.

Roadbed Over a Sewer. Illustrates and briefly describes a piece of ingenious work found necessary in laying the electric conduit in Canal St., New York. 350 w. St Ry Rev—Dec. 15, 1898.

Reconstruction of New York Street Railways. Some facts regarding the recent improvements, and their cost, the magnitude and merit of the work, etc. 1000 w. Sci Am—Oct. 22, 1898.

The Love Conduit System on Amsterdam Avenue. Illustrated description of construction and equipment. The line has not yet emerged from the experimental stage. 1000 w. Elec Ry Gaz—May 25, 1896.

The New Work of the Metropolitan Street Railway Company of New York. Illustrates and describes some features of the electrical construction and station equipment. 1200 w. Elec Eng, N. Y.—May 12, 1898.

The Underground Trolley and the Third Rail in Electric Traction. Comment on the proposed further application of electricity on the N. Y., N. H. & H. R. R., and the proposed installation of the Metropolitan Traction Co., of N. Y. 1000 w. Sci Am—Dec. 19, 1896.

The Underground Trolley in New York City. Brief illustrated description of the fine construction now being put in place. 700 w. Elec Wld—Aug. 28, 1897.

The Value of Foresight in Engineering. Editorial on the announcement of the Third Avenue R. R. Co. of New York City, that electric traction on the conduit system will be substituted for the cable. 1400 w. Eng News—Feb. 3, 1898.

**Paris.**—Electric Conduit Construction in Paris. A. N. Connett. An illustrated description of a construction differing quite radically from the usual, and using the side of slot conduit. 3200 w. St Ry Jour—Dec., 1899.

Electric Conduit Road in Paris (Unterirdische Stromzuführung für Strassenbahnen in Paris). Well illustrated description of this road, with many novel details of construction. 1500 w. Ill. Zietschr f Klein u Strassenbahnen—March 16, 1900.

Electric Traction at Paris. From "La Nature." Illustrated description of the installation and of the system adopted. 700 w. Sci Am Sup—Sept. 11, 1897.

Electric Traction in Paris. Illustrates and describes the novel features in construction. 1800 w. Elect'n, Lond—Jan. 12, 1900.

See also **ELECTRIC TRAMWAY.**

**Siemens-Halske.**—The Siemens & Halske System of Underground Conduits for Electric Roads. Gustav

Braun. Abstract translation from the "Elektrotechnische Zeitschrift." Illustrates and describes the system in use in Germany and Austria. It differs from American practice and has ingenious features of interest. Also editorial. 2500 w. Elec Wld—Oct. 15, 1898.

Underground Conductors for Electric Railways (Die Unterirdische Stromzuführung für Elektrische Bahnen). G. Braun. A very fully illustrated description of the Siemens & Halske system as used at Budapest and elsewhere. 3500 w. Elektrotech Ztschr—Sept. 22, 1898.

**"Simplex."**—The "Simplex" Conduit Electric Tramway. Illustrated description of this inverted trolley system. 3000 w. Ry Wld—April, 1897.

The "Simplex" Conduit System of Electrical Traction. Illustrated description of a model line of tramway laid at Prescott, Lancashire. 2500 w. Elec Eng, Lond—March 12, 1897.

**Springfield, O.**—See K. A. K.

**United States.**—American Experiments with Electric Conduit Tramways. The editor discourages such installations, giving his reasons. 1400 w. Ry Wld—March, 1896.

Underground Conduit Electric Roads in America. Reviews the progress of electric conduit roads in the United States, giving brief accounts of a number of failures and of the successful roads. 1800 w. St Ry Rev—Jan. 15, 1898.

**Walker System.**—The Walker Conduit Electric Street-Railway System. Describes the most recent improvements in this system which has worked so successfully in New York and Washington. Ill. 900 w. Eng News—Aug. 4, 1898.

The "Walker System" of Electric Traction. Justus Eck. Read before the Tramways Institute. Pointing out the various specialties and advantages of this system. Ill. 3500 w. Elec Rev, Lond—April 23, 1897.

**Washington.**—A Combined Conduit and Overhead Trolley Tramway in Washington. Illustrated description. 900 w. Ry Wld—Sept., 1896.

Changing a Cable Conduit to an Electric Conduit. Illustrated description of the work in Washington, D. C., of replacing the cable with the underground electric system. 1300 w. St Ry Jour—Jan., 1898.

Changing a Cable Street Railway to a Conduit-Electric System in Washington, D. C. Describes and illustrates the work. 1800 w. Eng News—Feb. 24, 1898.

Conduit Electric Railways. A. N. Connett. Notes on the operation of the Ninth Street Line of the Metropolitan Railroad Co., Washington, D. C. The operating expense per train (motor car and trailer) mile was about 8.87 cents. 1700 w. St Ry Jour—Feb., 1896.

Test of Conduit Electric Railroad. H. G. Ogden, Jr., and F. W. Heitkamp. Abstract of a thesis presented for the degree of M. E. Briefly describes the Metropolitan Electric Street Railroad of Washington, D. C., and gives summary of plant test and line tests. 1800 w. Sib Jour of Engng—Dec., 1896.

The Open-Conduit System of the Capital Traction Company. Illustrates and describes the reconstruction of the tracks, the power-house, coal-conveying apparatus, boilers, flues and stack, steam and water piping, engine room, etc., with editorial. 6500 w. Elec Wld—Dec. 31, 1898.

Electric Conduit Construction in Washington. Description, with illustrations of some points in the Metropolitan R. R. Co.'s practice, especially with reference to the construction of insulators. 1300 w. St Ry Jour—May, 1896.

See also New York; ELECTRIC TRAMWAY—Washington—Mt. Vernon.

### ELECTRIC CONGRESS.

See ELECTRICAL CONGRESS.

### ELECTRIC CONTACT.

See ELECTRIC DISTRIBUTION—Contact.

### ELECTRIC CONTROLLER.

See CONTROLLER.

### ELECTRIC CONVERTER.

See ELECTRIC CURRENT CONVERTER; TRANSFORMER.

### ELECTRIC COOKING.

See also ELECTRIC HEATING.

Electric Cooking Apparatus (Elektrische Kochapparate). A description of the Voigt & Häffner apparatus, which, according to tests by Dr. Kittler, showed an efficiency of over 80 per cent. 1500 w. Gesundheits-Ingenieur—May 31, 1898.

The Economy and Utility of Electrical Cooking Apparatus. John Price Jackson. Describes tests made with the hope of obtaining a method of cooking that would be satisfactory with a minimum risk of fire. Results showing the cost of cooking by coal to be about 90 per cent. of the cost by electricity. 1500 w. Elec Wld—July 31, 1897.

### ELECTRIC CURRENT.

**Alternating.**—See ALTERNATING CURRENT.

**Ampère's Laws.**—The Study of Electro-Dynamics. J. Warren. Considers each of the laws and phenomena propounded by Ampère relating to the action of active conductors upon one another. Ill. Serial. Elec, Lond—March 4, 1898.

**Centennial.**—See also ELECTRICITY—History.

**Centennial Address.**—The Centenary of the Electric Current, 1799-1899. J. A. Fleming. Abstract of a lecture delivered at Dover meeting of the British Assn. A review of the chief conclusions reached after a century of investigation, and a discussion of the problems remaining to be solved in determining what is an electric current. 5000 w. Elect'n, Lond—Sept. 22, 1899.

**Chemical Conversion.**—See ELECTRIC CURRENT RECTIFIER.

**Combined Alternating and Continuous.**—Combined Alternating and Continuous Currents. Alexander Russell. Some singular effects that follow the super-position of a direct upon an alternating current and vice versa. 1300 w. Elect'n—Aug. 14, 1896.

**Earth.**—Atlantic Earth Currents. E. Raymond-Barker. An interesting record of earth-current observations made by the writer on a submarine cable. 700 w. Elec Rev, Lond—June 9, 1899.

Electric Earth Currents Viewed Astronomically. Arthur E. Cottrell. Suggestions as to the probable cause of these currents. Serial. Elec Rev, Lond—Oct. 22, 1897.

See also MAGNETISM—Terrestrial.

**Eddy.**—See ARMATURE; ELECTRIC MACHINERY; HYSTERESIS.

**Effects Adjacent Material.**—Effects of Electrical Currents on Adjacent Material. James B. Cook. Report of chairman of the special committee of the American Inst. of Architects, given at Detroit, Sept. 29, 1897. Gives theories and investigations made, offering suggestions. 8500 w. In Arch—Oct., 1897.

**Leakage.**—See ELECTRIC WIRING—Fire Prevention; STRAY CURRENT.

**Oscillating.**—Notes on the Theory of Oscillating Currents. Charles Proteus Steinmetz. The object of the article is to present a short outline sketch of a modification of the method of complex imaginary quantities, applied to oscillating currents. 8000 w. Phys Rev—March-April, 1896.

Oscillatory Currents and Some of Their Phenomena. E. F. Northrup. Describes the general methods and the construction of the necessary apparatus for obtaining oscillatory currents and their effects. Serial. Elec Wld—April 30, 1898.

**Polyphase.**—See ALTERNATING CURRENT.

**Rotary.**—See ALTERNATING CURRENT—Polyphase.

**Stray.**—See STRAY CURRENT.

**Three-Phase.**—See ALTERNATING CURRENT—Polyphase.

### ELECTRIC CURRENT CONVERTER.

See also ELECTRIC CURRENT RECTIFIER; MOTOR-GENERATOR; ROTARY CONVERTER.

Current Transformers. Charles T. Child. Part first shows the frequent necessity of converting one kind of current into another, and reviews the methods which have been employed. Serial. Elec Eng, N. Y.—May 26, 1898.

The Transformation of Alternating Currents (Sur le Redressement des Courants Alternatifs). M. P. Janet. A mathematical discussion of the transformation of an alternating into a continuous current. 1000 w. Comptes Rendus—June 20, 1898.

**Frequency Transformation.**—Frequency-Changing and Single-Phase Alternating-Current Motor Transformers. F. Jarvis. Patten. Explanation of the general system, and describing a system in which it is claimed the magnetic effects will be found almost constant. Ill. 1200 w. Elec Wld—Dec. 21, 1895.

Frequency Transformation. F. Jarvis Patten. Considers this subject and describes an apparatus from which almost any desired frequency can be derived from a given frequency. Ill. 2700 w. Elec Wld—June 12, 1897.

Frequency Transformation. F. Jarvis Patten. Describes an apparatus by means of which almost any desired frequency can be derived. Ill. 1300 w. Elec Eng—July 22, 1897.

How to get Different Kinds of Currents in a Cheap and Simple Way for Experimental Work. F. Jarvis Patten. An article prepared in the hope of making clear to those who do not possess sufficient theoretical knowledge to work unaided, how the different kinds of current may be obtained from a direct current. 1400 w. Am Elect'n—June, 1896.

**Phase.**—The Ferraris-Arno Phase Transformer (Phasen-Transformator nach Ferraris-Arno). Dr. Lombardi. A special form of motor transformer composed of a single phase alternating motor with auxiliary winding system, by means of which the amount of phase of the induced current is determined. Two articles. 6000 w. Elektrotechnique Zeitschr—Nov. 18, Dec. 2, 1897.

The Rotary Phase Converter. R. W. Quick. An analysis of the m-to-n phase conversion. 2800 w. Elec Wld & Engr—Jan. 6, 1900.

Wagner Method for Deriving Polyphase from Single-Phase Currents. Describes a method devised by Herbert A. Wagner for deriving two or more alternating currents differing from one another in phase from a source of electricity supplying alternating currents of single phase. 700 w. Elec Eng, N. Y.—Feb. 2, 1899.

**Rotating Liquid.**—A Rotating Liquid Converter. Henry S. Carhart. Describes a simple device to convert a direct current from any source, such as a storage battery, into alternating currents of one, two or three phases, and applies the principle involved to an explanation of the rotating converter. 1600 w. Am Elect'n—April, 1897.

## ELECTRIC CURRENT RECORDER.

See also **ELECTRIC METER.**

**Electrolytic.**—The Automatic Electrolytic Recording of Electric Currents (Die Selbstaufzeichnung Elektrischer Ströme auf Elektrolytischem Wege). Discussing the various methods of recording the strength, frequency, interruptions, etc., of electric currents by the electrolytic action upon suitably prepared paper ribbons. 9000 w. Elektrochemische Zeitschr—August, 1897.

## ELECTRIC CURRENT RECTIFIER.

See also **ELECTRIC CURRENT CONVERTER; MOTOR GENERATOR; ROTARY CONVERTER.**

**Aluminum Electrodes.**—Aluminum as an Electrode in Cells for Direct and Alternate Currents. E. Wilson. Read before the Royal Society. Deals with the great apparent resistance which aluminum offers to the passage of an electric current when used as an anode in cells containing such an electrolyte as alum in water. Serial. Elec Eng, Lond—July 15, 1898.

Aluminium as an Electrode in Cells for Direct and Alternate Currents. E. Wilson. A record of experiments made with aluminum plates as electrodes, using various solutions and currents. Serial Elec Rev, Lond—Sept. 9, 1898.

An Electrochemical Method of Transforming Alternating into Continuous Currents (Ueber ein Electro-Chemisches Verfahren um Wechselströme in Gleichströme zu Verwandeln). The transformation is effected by utilization of the polarizing properties of aluminum. 2500 w. Zeitschr f Elektrochemie—July 20, 1897.

The Phenomena Occurring at the Aluminum Anode (Ueber den Vorgang an der Aluminum Anode). K. Norden. A discussion of the subject of the electrochemical conversion of alternating into continuous currents by the use of aluminum anodes. Two articles, 8000 w. Zeitschr f Elektrochemie—Sept. 7, 14, 1899.

**Arc Lighting.**—Rectifiers for Arc Lighting. Describes an apparatus put into commercial use in England, for supplying direct current to high tension series arc circuits from a regular alternating current dynamo. Ill. 900 w. Elec Wld—Aug. 21, 1897.

On the Use and Economics of Rectifiers for Arc Lighting. John Hesketh. Abstract of paper read before the Northern Society of Elec. Engs. Recent experiences in the use of one special form of apparatus and system of generating the necessary energy. The apparatus is described and the points arising from its use discussed. 2800 w. Elec Eng, Lond—May 22, 1896.

The Use and Economics of Rectifiers for Arc Lighting. John Hesketh. Abstract of a paper read before the Northern Society of Elec. Engs. Inefficiences of present arc-lighting systems. 3300 w. Elect'n—Aug. 7, 1896.

**Polarization.**—On the Production of Asymmetrical Alternating Currents by Means of Electrolytic Polarization. W. L. Hildburgh. Doctorate thesis on electrolytic methods of rectifying alternating currents, with curves and tables. 1 plate. 6500 w. School of Mines Quar—July, 1900.

The Production of Asymmetrical Alternating Currents by Means of Electrolytic Polarization. W. L. Hildburgh. Serial. Elec Wld & Engr—April 14, 1900.

**Pollak.**—A New Electrical Current Rectifier. U. S. Consular report from Frankfort, Germany. An invention of ·Mr. C. Pollak which solves the hitherto stubborn difficulty of converting an alternating into a direct electrical current with a loss of but a trifling percentage of its energy. 1000 w. Eng & Min Jour—Jan. 18, 1896.

Pollak's Gleichrichter. Abstract from Report of F. H. Mason, U. S. Consul-General at Frankfort, Germany. A device invented by a Frankfort engineer, which solves the difficulty of converting an alternating into a direct electrical current with the loss of but a trifling percentage of its energy. 800 w. W Elec—Nov. 16, 1896.

**Single-Phase.**—The Design of a Single-Phase Rectifier. J. C. Brocksmith. States the more important requisites for a rectifier, and gives working drawings and description for the construction. 2800 w. Am Elect'n—June, 1899.

## ELECTRIC CUT-OUT.

See also **ELECTRIC CIRCUIT BREAKER; ELECTRIC FUSE; ELECTRIC SWITCH.**

Cut-Outs. Ed. C. de Segundo. Tabulated results from the researches of C. M. Clark and C. W. Macmullen of Columbia University. with comments. 900 w. Elec Rev, Lond—Oct. 1, 1897.

How Shall Electrical Apparatus Be Protected? Joseph Sachs. States the conditions with which the device must comply, and discusses the two methods—the fusible cut-out and the magnetic circuit-breaker. 3000 w. Am Elect'n—Nov., 1897.

**Automatic Time.**—Automatic Time Cut-Out. Illustrated description of a device designed by F. B. Badt of Chicago, which the inventor claims will entirely obviate the short-circuiting of batteries. 1300 w. W Elec—Nov. 30, 1895.

**Three-Wire.**—Protection for Edison Three-Wire and Other Balanced Systems of Electrical Distribution. Eustace Oxley. Explains the disastrous results that may follow the blowing of the neutral fuse, and describes and illustrates a simple safety attachment for a three-pole switch devised by the writer. 1400 w. Elec Eng, N. Y.—May 5, 1898.

## ELECTRIC DECORATION.

See **ELECTRIC LIGHTING—Decorative; ELECTRICITY BUILDING; ELECTRIC TOWER.**

## ELECTRIC DISCHARGE.

See also **ACCUMULATOR—High Tension; ELECTRO-PHYSICS; LIGHTNING.**

Disruptive Discharges, Leakage, and Ohmic Resistance. Alex. Jay Wurts. Observations and experience of the writer, with experiments and conclusions. 1700 w. Elec Wld—July 23, 1898.

Electrical Discharge in the Atmosphere and in Vacuum Tubes. John Waddell. The Object of this article is to give a short synopsis of the main facts already known concerning electrical discharge, both in the air at atmospheric pressure and in gases in a rarefied condition, before Röntgen's discovery brought the phrase "cathode rays" into current newspaper literature. 2000 w. Elec Wld—March 7, 1896.

On Electrical Discharges Through Poor Vacua, and on Coronoidal Discharges. M. I. Pupin. The first part is an introductory with a brief description of the experimental method. Serial. Elec Age—March 28, 1896.

On the Disruptive Discharge in Air and Liquid Dielectrics. T. W. Edmondson. Gives history of work in this field and describes experiments made, giving tabulated results. Ill. 4400 w. Phys Rev—Feb., 1898.

**Argon.**—See **ARGON—Electric Discharge.**

**Constitution.**—The Constitution of the Electric Spark. Arthur Schuster and G. Hemsalech. Read before the Royal Society. Investigation undertaken primarily to measure the velocity of diffusion, with the special view of comparing different metals, and different lines of the same metal. 2500 w. Nature—Feb. 9, 1899.

**Globular.**—Recent Experiments with the Globular Discharge. The first part is descriptive of experiments for investigating by artificial production this peculiar phenomenon. Serial. Elec Rev, Lond—April 3, 1896.

**Induction Coils.**—The Induction Coil Spark Analysed. Describes the apparatus used, and investigations by Walter, which give light on this subject. Ill. 900 w. Elec Rev, Lond—April 7, 1899.

**Kinetic Theory.**—Electrical Discharge from the Point of View of the Kinetic Theory of Matter. J. H. Moore. Part I, presented to the faculty of Princeton Univ. for the degree of Doctor of Science. Considers some notions concerning the elementary nature of electrical discharge in gases, which are almost wholly dependent upon the kinetic theory of matter. Ill. 7500 w. Am Jour of Sci—July, 1898.

**Magnetized Electrodes.**—The Action of Magnetized Electrodes upon Electrical Discharge Phenomena in Barened Cases. C. E. S. Phillips. Describes experiments in this field and the apparatus used. 1500 w. Elect', Lond—Feb. 3, 1899.

**Photographing.**—An Analysis of Spark Discharges Analyse von Funkenentladungen). Jul. H. West. Illustrated with many illustrations made in the mutoscope by continuous photography, showing the action of successive sparks. The Wehnelt interrupter was used. 3000 w. Elektrotech Zeitschr—Oct. 26, 1899.

Photographic Investigation of 150,000-Volt Power Discharge. Charles Proteus Steinmetz. Investigation of the phenomena taking place during a disruptive discharge at a very high voltage and in a circuit of sufficient power to maintain an arc. Ill. 2200 w. Elec Wld—March 5, 1898.

Photographing Electrical Discharges. Walter E. Woodbury. Illustrated description of interesting examples. 1200 w. Pop Sci M—July, 1896.

**Wave Motion.**—See **ELECTRO-PHYSICS—Wave—Spark.**

## ELECTRIC DISTRIBUTION.

See also **ELECTRIC DRIVING; ELECTRIC ENERGY; ELECTRIC POWER; ELECTRIC STATION; ELECTRIC SUPPLY; ELECTRIC TRANSMISSION; ELECTRIC WIRING.**

Distributing Systems. Abstracts of papers by J. A. Jeckell and J. R. Blaikie, read before the Municipal Electrical Assn., and was followed by discussion. The merits of the various methods are presented, insulation discussed, and related matters. 3500 w. Eng, Lond—July 16, 1897.

Distribution of Electrical Energy from a Central Station. Abstract of, and comment on, a paper read by William C. L. Eglin at the meeting of the Engineers' Club at Philadelphia. He described in detail the method of distributing electrical energy in large cities. 1200 w. Am Gas Lgt. Jour—Jan. 20, 1896.

Distribution of Electrical Energy from a Central Station. William C. L. Eglin. Dealing with the distribution of electrical energy in large cities using underground conductors with a continuous supply—twenty-four hours per day, and seven days per week. The energy to be supplied in such a form as to meet all the commercially practical uses to which electrical energy may be put. 4000 w. Pro Eng's Club of Phila—April., 1896.

Economy in Circuits. D. H. Keeley. Diagrams and explanation with the view of showing that without exceeding the weight of copper, or the drop of E. M. F. in current transmission, found in a single parallel system, it is possible to provide for distribution with an equalized pressure at all points. 1200 w. Can Elec News—June, 1897.

Economy in Distribution of Electrical Energy. Louis A. Ferguson. Discusses methods of combination of the alternating and the direct current the former being used for transmission and the latter for distribution. Read at Niagara Falls meeting and followed by discussion. 2700 w. Elec—Sept. 15, 1897.

Electric Currents and Subdivision Systems (Elektrische Strom und Stromverteilungssysteme). A series of articles of a general and descriptive character, rather elementary. 10000 w. 5 articles. Die Elektrizität—Jan. 2, 16, Feb. 13, March 13, 27, 1897.

Methods of Electrical Transformation. James Swinburne. Read before the British Inst. of Civ. Engs. Also discussion. Considers the various systems and the questions of copper and insulation. 2200 w. Elec Eng, Lond—June 9, 1899.

Notes on Systems of Distribution. Ellis H. Crapper. The systems are discussed and the factors to be considered in deciding which to adopt. Serial. Elec, Lond—Oct. 19, 1900.

Principles of Electrical Distribution. Francis B. Crocker. Studied chiefly from the development in electric lighting. Part first deals with the series system of distribution. Serial. Sch of Mines Quar—Jan., 1897.

Principles of Electrical Distribution. Francis B. Crocker. The subject is studied in connection with electric lighting, although it applies to all branches of electrical transmission and distribution. Part first discusses materials for electrical conductors, electrical resistance and the standard conductivity of copper. Serial.—Elec Wld—Dec. 19, 1896.

Systems and Apparatus for Light and Power Distribution. C. P. Steinmetz. Read at convention of the Assn. of Edison Illuminating Companies. Discusses the nature and behavior of the apparatus used. Serial. Elec Wld & Engr—Sept. 29, 1900.

Systems of Distributing and Generating Electricity. F. J. Warden-Stevens. Part first considers the two and three-wire systems, and high and low pressure. Serial. Arch, Lond—Jan. 20, 1899.

The Distribution of Electricity. G. Wilkinson. Abstract of a paper read before the Munic. Elec. Assn., England. Also editorial review. Calls attention to faults in systems in use. 2500 w. Elec Rev, Lond—July 6, 1900.

The Distribution of Electrical Energy. C. H. Wordingham. Read before the Northern Society of Electrical Engineers, England. The writer favors the use of continuous currents for distribution in cities and towns of considerable size. Serial. Elec Eng, Lond—Nov. 12, 1897.

The Systematic Arrangement of Circuits in an Electrical Plant. William Baxter, Jr. Suggestions and illustrated description. 2000 w. Am Mach—Sept. 28, 1899.

**Alternating.**—Distribution of Power by Alternate Electric Currents. Concerning alternafe-current transformers, explaining the principles and operation. Ill. Serial. Col Guard—Sept. 21, 1900.

Distributing Power and Light from Single-Phase Alternators. Joseph N. Mahoney. The object of this paper is to show a method of utilizing the present simple alternating apparatus for the generation and distribution of power and light by polyphase currents with no more complication than that met with in a three wire direct current system. 900 w. Elec Eng—Mach 18, 1896.

Ferraris and Arno's System of Alternate Current Electric Distribution. A new system of electric distribution of energy with alternate currents, which enables them to supply power, in combination with light, from single-phase alternate circuits. 900 w. Elec Eng—June 3, 1896.

General Distribution from Central Stations by Alternating Currents. Herbert A. Wagner. Paper read before the Nat. Elec. Lgt. Assn., at Chicago. Compares and contrasts the different methods of distribution, reviewing those in general use, and describing the most recent developments, stating the features in which the alternating current has been shown to be superior. Elec Eng, N. Y.—June 16, 1898.

Notes on Distribution of Electricity. Charles D. Taite. Read before the Municipal Elec. Assn., England. Reviews recent changes in distribution, especially in alternating-current practice. Discussion. 3500 w. Elec Eng, Lond—June 24, 1899.

Notes on the Distribution of Alternating Currents. Sidney E. T. Ewing. Notes indicating the apparatus and methods in most general use, with comments. Serial. Elec Eng, Lond—Dec. 16, 1898.

Principles of Alternating Current Distribution. Francis B. Crocker. Gives the principles of alternating currents, considering briefly the chief facts as a basis for study and calculations concerning alternating current-lines, transformers, etc. 6000 w. Sch of Mines Qr—Jan., 1900.

Results Accomplished in Distribution of Light and Power by Alternating Currents. W. L. R. Emmet. Read before the National Electric Light Assn. A review of the causes for the slow development of the use of alternate currents, and the means of overcoming the difficulties; facts are given showing the hold already taken upon the industry of the country, and the different methods of distributing power and light by alternating currents are illustrated by diagrams showing the connections used with each. 5000 w. Elec Rev—May 13, 1896.

Single-Phase Distribution of Electric Current. Herbert A. Wagner. Abstract of a paper read before the Nat. Elec. Lgt. Assn., New York. Describes the results obtained by the Missouri-Edison Electric Co., of St. Louis. 1900 w. Eng News—June 1, 1899.

The Application of Complex Quantities to Alternating Current Circuits. Harold B. Smith. Explains methods of calculation. Diagrams. 2500 w. Jour of Worcester Poly Inst—March, 1900.

The Distribution of Currents in Alternating Circuits (Ueber Stromvertheilung in Wechselstromnetzen). C. P. Feldmann & Josef Herzog. Methods for various numbers of conductors are shown, and a variety of numerical examples given. 4500 w. Elektrotech Zeitschr—Nov. 9, 1899.

The Regulation of Pressure and the Reduction of Light-Load Losses in Alternating-Current Systems of Electric Supply. E. W. Cowan and Alfred Still. Paper read before the Northern Society of Electrical Engineers, England. The object of the paper is to set forth what is believed to be the best methods of maintaining constant pressure in all parts of a distribution system under varying conditions of load. Serial. Elec, Lond—March 27, 1896.

See also Drop; **Pressure Regulator; Synchronous Motor Compensation.**

**Alternating House Service.**—House Service for Alternating Currents (Ueber Hausanschlüsse bei Wechselstromwerken). R. Helm. An illustrated description of methods used in Germany for connecting residences and apartments with underground high-tension alternating conductors. 2500 w. Elektrotech Zeitschr—April 6, 1899.

**Balancing and Boosting.**—Some Notes on Balancing and Boosting Sets. R. Wightman. Deals with the balance, its functions and design, noticing how these are affected by the addition of the boosters to the balancing set. 1800 w. Elec Rev, Lond—March 2, 1900.

**Booster.**—See **BOOSTER.**

**Boston Elevated Ry.**—The Feeder System of the Boston Elevated Railway. H. W. Weller. An illustrated description of the system and matters connected with it, with some of the methods adopted to obtain the most economical results. 3800 w. Ry Wld—July 6, 1899.

**Brighton, Eng.**—See **Combined Alternating and Continuous.**

**Buffalo Tramways.**—Railway Power Distribution Over Large Areas. A. H. Armstrong. Read before the N. Y. St. Ry convention. Describes the system adopted by the International Traction Co. for the operation of the various roads in Buffalo and vicinity. 1800 w. St Ry Rev—Sept. 15, 1899.

**Chart.**—Chart. A. B. Herrick. A carefully worked out chart showing the limits within which various systems of transmission can be profitably employed. Elec Eng, N. Y.—June 9, 1893.

**Cheltenham, Eng.**—Miscellaneous Notes on the Cheltenham Mains. Hamilton Kilgour. Read before the Northern Soc. of Elec. Engs. (England). Describes the distributing works of electric supply at Cheltenham in part first. Ill. Serial. Elec Eng, Lond—May 12, 1899.

**Chicago Cycle Show, 1897.**—Electrical Problems of the Chicago Cycle Show of 1897. D. Avery Kimbark. An account of the work necessary to furnish the current to light the building, furnish current for display signs, automatic apparatus, motors and general illumination for exhibitors. 5000 w. W Elec—Feb. 6, 1897.

**Chicago Edison Co.**—General Distribution from Central Stations by Direct Currents. Louis A. Ferguson. Read before the Nat. Elec. Lgt. at Chicago. Explains the method of distribution employed in the system of the Chicago Edison Co., considering what method gives the best efficiency, the value of the storage battery, its adaptation to elevator work, and other matters of interest. 7000 w. Elec Eng, N. Y.—June 16, 1898.

**Combined Alternating and Continuous.**—The Combined Alternate-Current and Continuous-Current system of Supply at Brighton. Illustrated description of the system for supplying the outlying districts during the greater portion of the 24 hours with continuous current, and during the few hours of heavy load with alternate currents. Particulars showing the substantial gain and practical success. 1100 w. Elect'n—May 8, 1896.

**Contacts.**—Electrical Contacts. Frank C. Mason. Read at the Pittsburg meeting of the International Assn. of Munic. Elect'ns. Discusses the three classes of contacts, and the things that destroy their efficiency. 1600 w. W Elect'n—Oct. 6, 1900.

**Cross Section.**—See **ELECTRIC CONDUCTOR.**

**Drop.**—Compensation of Line Drop in Alternating Current Circuits. E. J. Berg. An elucidation of this subject, illustrated by example. 2200 w. Elec Wld & Engr—Jan. 13, 1900.

Drop in Alternating-Current Lines. Ralph D. Mershon. Treats this subject in such a manner that the results may be turned to practical advantage. 3500 w. Am Elect'n—June, 1897.

Formulae for Calculating the Drop in Alternating-Current Conductors (Formeln zur Berechnung des Spannungsabfalls in Wechselstromleitungen). Dr. L. Fleischmann. Formulae giving the exact determination of the drop. 600 w. Elektrotech Zeitschr—March 29, 1900.

Ohm's Law Applied to the Calculation of Drop in Constant Current Circuits. Albert F. Ganz. Considers a number of numerical problems illustrating the calculation of drop in various forms of lighting circuits. 1800 w. Stevens Ind—Oct., 1900.

The Drop in Alternating-Current Wires. Cecil P. Poole. Discussion of methods of computing. 800 w. Elec Wld & Engr—Nov. 18, 1899.

The Drop in Alternating-Current Wires. Cecil P. Poole. Presenting facts bearing on this subject and discussing methods of computing. 1700 w. Elec Wld & Engr—Feb. 21, 1900.

**Earthing.**—On "Earthing" and Earth Connections. A discussion of this subject, suggested by Mr. Wordingham's recent paper. 1800 w. Elec Rev, Lond—Aug. 10, 1900.

**Earth Potential.**—On the Maintenance of Certain Portions of Distributing Systems at Earth Potential. C. H. Wordingham. Read at Cardiff convention of Munic. Elec. Assn. Considers earth connection in various systems of transmission, and the manner the currents return through the earth, and whether it is best for any supply to be connected to earth. 5000 w. Elec Eng, Lond—July 20, 1900.

**Equalizer.**—Equalizer Systems of Distribution. Editorial dealing with the present state of the art in the matter of distribution, and what has been proposed with reference to equalizers and compensators or balancers. 800 w. Elec Rev, Lond—Aug. 7, 1896.

Equalizer Systems of Distribution. A. Churchward. Read before the N. E. L. Assn. An abbreviated list of methods that have been devised to accomplish the results obtained by the three-wire system without the use of a divided source of electrical energy, and a compensating conductor connected to the point of division. 800 w. Elec Wld—May 23, 1896.

Equalizing Connections for Compound-Wound Dynamos Coupled in Multiple. E. R. Keller. Shows the action of compound machines together with the equalizer connection and the function which it has to perform, giving methods of attaining the end desired. 2700 w. Jour Fr Inst—March, 1897.

The Calculation of Lighting-Circuit Regulators (Beitrag zur Berechnung von Lichtleitungs-Regulatoren). E. Stadelmann. An article giving formulae and curves for calculating the resistance for equalizing the pressure in electric lighting circuits. 1600 w. Elektrotech Zeitschr—April 12, 1900.

The Churchward Equaliser System of Distribution. A. Churchward. Describes a system which has been in use in a central station in New York City for three years without a breakdown in the balance of the two circuits. Ill. 800 w. Elec Eng—Dec. 23, 1896.

The Equaliser. Explains the action of the Equaliser. 1500 w. Am Elect'n—Jan., 1897.

Voltage Equalisers for Three-Wire Systems. F. S. Hickok. Considers the necessity for such devices and the conditions which have influenced their development, giving a description of various methods that have been tried. 3200 w. W Elect'n—May 5, 1900.

See also Rotary Equaliser.

**Equilibrium System.**—See ELECTRIC RAILWAY.

**Evolution.**—See ELECTRIC STATION.

**Extensions.**—Central Station Extensions. G. L. Addenbrooke. A further consideration of the subject in reply to articles by Mr. Barnard and Mr. Baynes, and outlining facts of interest. 2300 w. Elec Rev, Lond—Aug. 28, 1896.

Extensions to Outlying Districts. A. H. Gibbings. Extensions as related to cost and revenue are discussed, and also the advisability of such extensions. 3000 w. Elect'n—Aug. 14, 1896.

**Factory.**—See ELECTRIC DRIVING.

**Feeder.**—See Boston Elevated Ry.; Railway; Return Feeder; ELECTRIC TRAMWAY.

**Feeding Points.**—The Determination of the Best Number of Feeding Points for a Distribution Network (Bestimmung der Günstigsten Zahl von Speispunkten eines Vertheilungsnetzes). A. Sengel. A mathematical investigation, showing the most economical system to be that based on a number of equilateral triangles. Two articles. 7500 w. Elektrotech Zeitschr—Nov. 16, 23, 1899.

**Ferraris and Arno.**—See Alternating.

**Five-Wire, Manchester.**—See ELECTRIC STATION—Manchester, Eng.

**German Safety Rules.**—See ELECTRIC APPARATUS; ELECTRIC INDUSTRY; ELECTRIC STATION; ELECTRIC TRAMWAY.

**Germany.**—The Distribution of Electrical Energy in Germany. J. Laffargue. Abstract of paper read before the Société Internationale des Electriciens. Gives general information with examination of some of the stations. 2300 w. Elec Rev; Lond—April 29, 1898.

**High Pressure.**—Electricity Supply at Higher Pressure. Deals with the difficulties which have arisen from increasing the maximum voltage at which current is delivered, considered mainly from the consumer's point of view. 2500 w. Arch, Lond—March 11, 1898.

**High v. Low Tension.**—High Tension and Low Tension Supply. Albert Gay. The object of the article is, if possible, to reduce the friction existing between the advocates of these two systems. The faults of each are enumerated, and their effect upon each other pointed out. 2800 w. Elec Rev, Lond—Jan. 10, 1896.

**Inductance.**—See INDUCTANCE.

**Leakage.**—See ELECTRIC WIRING—Fire Prevention; STRAY CURRENT.

**Machine Shops.**—See ELECTRIC DRIVING.

**Metropolitan Ry., New York.**—The Polyphase Distributing System of the Metropolitan Street Railway Company, of New York City. J. E. Woodbridge. Begins an illustrated description of the power generating equipment of the largest railway power plant in the world. Serial. Elec Wld & Engr—March 31, 1900.

**Mines.**—See ELECTRIC EQUIPMENT; POWER TRANSMISSION.

**Monocyclic System.**—Successful Monocyclic Power Distribution at Middletown, Ohio. An example of the introduction of this system into a direct-current station. Ill. 1000 w. Elec Eng, N. Y.—March 31, 1896.

**Network Calculations.**—The Equivalence of Triangles and Three-Pointed Stars in Conducting Networks. A. E. Kennelly. Gives a method which lessens the labor of calculating distributing networks. 1000 w. Elec Wld & Engr—Sept. 16, 1899.

**Paris.**—The Distribution of Electrical Energy in Paris. J. Laffargue. Reprint of an article appearing in the Paris supplement of the "Contract Journal." Part first reviews the conditions, giving map showing the distribution and positions of sections and considers the various networks. Ill. Serial. Elec Eng, Lond—April 29, 1898.

The Distribution of Electric Energy in Paris (La Distribution de l'Energie Electrique à Paris). A discussion of the report of M. Bos to the Municipal Council of Paris in the matter of the applications of various corporations for franchises for electric power distribution. It is recommended in the report that the work be kept under municipal supervision and regulation. 3000 w. La Rev Tech—Nov. 10, 1897.

**Paris Exposition.**—Distribution of Electrical Energy and Electric Lighting at the Paris Exposition (Distribution de l'Energie Electrique dans l'Enciente de l'Exposition Eclairage des Palais et des Jardins). Emile Cayla. An illustrated general description. 1 plate. 3000 w. Génie Civil—May 5, 1900.

Distribution of Electrical Energy at the Paris Exposition (Fourniture de l'Energie Electrique Necessaire aux Divers Services et aux Installations Particulières). J. A. Montpellier. A general description, with some of the Exposition rules and regulations. 1400 w. Electricien—April 28, 1900.

**Philadelphia.**—The Distribution of Electricity in Philadelphia. Gives the pole and wiring regulations of a city remarkable for its immunity from trouble with electrolysis. 1700 w. Eng Rec—July 22, 1899.

See also ELECTRIC STATION.

**Polyphase.**—Calculation of Lines for Three-Phase Lighting Systems. Hermann Cohen. Abstract of an article in the "Elektrotechnische Zeitschrift," giving a discussion of this subject and the writer's conclusions. 1600 w. Elec Wld—July 10, 1897.

Relation Between Armature and Line Currents in Polyphase Transmission. Henry S. Carhart. Gives a graphical method for elucidating the relative phases and magnitudes of the currents flowing in adjacent connected circuits of a polyphase generator and in the line when the system is balanced. 800 w. Elec Wld & Elec Engr—June 17, 1899.

Secondary Distributing Systems for Three-Phase Plants. Aug. J. Bowie, Jr. Briefly notes the six systems, with their advantages and disadvantages. 1700 w. Elec Wld & Elec Engr—April 29, 1899.

The Computation of Conductors for Lighting on the Multiphase System (Die Leitungsberechnung für Elektrische Beleuchtungsanlagen nach dem Drehstromsystem). H. Cahen. Showing the best arrangement of conductors for any given system, with formulas and tables for practical use. Two articles. 4000 w. Elektrochem Zeitschr—June 3 and 10, 1897.

Three-Phase Four-Wire Low-Tension Systems. A. J. Bowie, Jr. Describes a plant of this kind and tests made on it. 2400 w. Elec Wld & Elec Engr—June 17, 1899.

See also Metropolitan Ry., N. Y.; ELECTRIC MOTOR—Polyphase Losses.

**Portland, Ore.**—See ELECTRIC TRANSMISSION—Portland, Ore.

**Power Factor.**—Power Factor as Affecting Operation and Investment, with Special Reference to Induction Motors and Enclosed Arc Lamps. F. H. Leonard, Jr. Paper read before the Canadian Electrical Association, giving a general discussion of the subject. 2800 w. Canadian Elec News—Sept., 1900.

Power Factor Measurement. Aug. J. Bowie, Jr. Mathematical discussion, giving curves and tables. 3000 w. Elec Wld & Engr—Dec. 9, 1899.

The Theory of the Power Factor. Alexander Russell. An investigation attempting to show how the power factor is related to the shape of the waves of current and potential difference, and their relative positions. Mathematical. Serial. Elect'n, Lond—Nov. 3, 1899.

**Pressure Regulator.**—Pressure Regulator for Alternating Plants (Fernspannungsregulierung in Wechselstrom Anlagen). G. W. Meyer. Describing a system of maintaining a constant pressure over an extended area, for an alternating incandescent lighting system. 2500 w. Elektrotech Rundschau—June 15, 1898.

**Railway.**—Power Distribution for Electrical Traction. Ernest Wilson. Remarks on power distribution in general, with an examination of present practice of delivering the energy to the cars. 4000 w. Engr, Lond—Jan. 20, 1899.

Power Distribution for Electric Railroads. Louis Bell. A thoroughly technical article, illustrated by diagrams. 4000 w. St Ry Jour—Feb., 1896.

Power Transmission and Distribution for Railway Work. Ernst J. Berg. Explains the method of control of potential in the converter station, discussing its effects on the operation in general. 4800 w. Trans of Am Inst of Elec Engs—May, 1898.

Practice in Electric Railway Power Distribution in Eastern Massachusetts. Deals with work actually done on some of the lines, with nearly every variety of problem in electric feeding and the solutions adopted. 4000 w. St Ry Rev—Feb. 15, 1897.

Remarks Upon Long-Distance Distribution for Electric Traction. André Blondel. Describes a method which operates on the principle of feeding the cars by a series distribution of constant current without the necessity of operating any switches or commutators upon the line of the passage of the trains. 2500 w. Elec Wld—Jan. 1, 1898.

The Three Wire and Other Systems of Distribution for Electric Railway Work. Extracts from the discussion of the paper on "Some Recent Developments in Electric Traction Appliances" read by A. K. Baylor before the (London) Inst. of Elec. Engs. relating to interesting and important features of American and English practice. 5500 w. St Ry Jour—Sept., 1897.

See also **Boston Elevated Ry.; Metropolitan Ry., New York; Return Feeders.**

**Railway Circuits.**—Power from the Trolley Circuit—Is It Practicable? Why Do the Fire Insurance Companies Object? What Should Be Done to Overcome the Objections? H. S. Newton. Argues in favor of the policy as economical and remunerative, and considers insurance opposition unwarranted and remediable. 1600 w. Elec Wld—Sept. 19, 1896.

**Rearrangement.**—The Rearrangement of a Distribution System at Constant Resistance (Ueber Widerstandstreue Umgestaltung Elektrischer Leitungsnetse). J. Herzog and C. P. Feldmann. A graphical method of computing the conductors in changing or rearranging a distribution system. 3500 w. Elektrotech Zeitschr—March 1, 1900.

**Return Feeders.**—Return Feeders for Electric Railways. Translation of article by Mr. Böhm-Raffay in "Elektrotechnischer Neuigkeits-Anzeiger," giving simple formulae, or graphical methods of determining the section and volume of the return feeders. Serial. Elec Rev, Lond—March 3, 1899.

**Rotary Equaliser.**—Practical Applications of the Rotary Equaliser. Charles B. Davey. Gives applications of this device by means of which the potentials between the two sides of a three-wire system is maintained at a balance. 1700 w. W Elect'n—March 18, 1899.

**Safety.**—Means of Attaining Safety in Electrical Distribution. W. L. R. Emmet. Read before the Nat. Elec. Assn. at New York. Considers the principal sources of danger and considers methods for securing safety. Ill. 3300 w. W Elect'n—June 3, 1899.

**Safety Device.**—Improved Safety Device for Electric Circuits. Lewis G. Rowand. Describes the writer's method of reducing the element of danger arising from this source, giving different applications of the device to meet the requirements of electric trolley circuits. Ill. 1700 w. Jour Fr Inst—May, 1897.

Safety Devices for Electrical Circuits. W. M. Stine. Gives attention to certain mechanical safety devices, as well as fuse wires, and gives results of investigations. 3300 w. W Elec—Feb. 20, 1897.

See also **ELECTRIC CIRCUIT BREAKER; ELECTRIC CUT-OUT; ELECTRIC FUSE.**

**Scattered Areas.**—The Distribution of Electricity to Scattered Areas. L. Andrews. Read at Leeds, Eng., before the Munic. Elec. Assn. Deals with alternating vs. continuous currents for thinly populated sections. 2500 w. Elect'n, Lond—Aug. 10, 1900.

**Schwyz.**—See **HYDRO-ELECTRIC STATION.**

**Secondary Circuits.**—Design of Secondary Circuits in Alternating Plants. George L. Thayer. Gives details of what is becoming standard practice, discussing improvements in the direction of better regulation and increased efficiency of distribution. 3800 w. Elec Wld—Jan. 28, 1899.

**Shipboard.**—Electrical Distribution on Board Ship. J. C. Bagot. Notes on methods used and precautions necessary. Ill. 1200 w. Elec Eng, Lond—Oct. 7, 1898.

One or Two-Wire Systems of Electric Distribution, Comparatively Discussed. Alton D. Adams. A discussion of the advantages of both systems, showing that the preference for the two-wire insulated circuits on ships seems to be well founded. 3000 w. Marine Engng—May, 1900.

See also **ELECTRIC EQUIPMENT—Ship; Warship.**

**Synchronous Motor Compensation.**—Synchronous Motor as Compensator in Alternating Current Distributions. Ernst J. Berg. The article will show how the losses and the compounding of the generator are affected by using a synchronous motor as compensator in an alternating current system, discuss the general effect of synchronous motors at various power factors of the load, and the most suitable size of synchronous motor to be used and the gain made thereby. Serial. Elec Wld—Nov. 21, 1896.

**Third-Brush Regulation.**—See **DYNAMO.**

**Theory.**—Elements of a Theory of Distribution (Elemente einer Theorie der Schaltungen). Arthur Wilke. A theoretical and mathematical discussion of the fundamental principles of electrical distribution. Serial. Zeitschr f Elektrotechnik—Dec. 15, 1897.

**Three-Wire.**—Conductors for the Three-Wire System. William Herbert Donner. Explains the saving of wire in the use of the three-wire over the two-wire system. 1100 w. Am Elect'n—Jan., 1899.

Extension of Electrical Supply from Three-Wire Stations. Alton D. Adams. Discusses three plans for extending the service area. 1800 w. Elec Wld & Engr—March 17, 1900.

Improvements in the Three-Wire System. Alton D. Adams. Notes recent improvements which the writer thinks insure for this system a tendency to displace all other systems of public distribution. 2500 w. Am Elect'n—Feb., 1900.

Improvements in the Three-Wire System. Truman Hibbard. Reviews numerous patents since 1880, and the advantages gained. 4000 w. Eng's Year Book, Univ of Minn—1897.

Regulation of Pressure in Three-Wire Systems for Continuous Currents (Spannungsregulirung in Dreileiternetzen für Gleichstrom). C. del Proposto. Comparing the relative economy of different methods of regulation, with diagrams showing the corresponding arrangement of connections. 2000 w. Elektrotech Zeitschr—Dec. 8, 1898.

Saving by the Three-Wire System. Alton D. Adams. Shows that for a given number of lamps equal energy is lost in the two-wire and three-wire systems, and that the weight of conductors is only one-fourth as great for the three-wire as for the two-wire system. 1300 w. Am Elect'n—March, 1899.

See also **DYNAMO.**

**Three-Wire, 440-Volt.**—See **ELECTRIC STATION—Canton.**

**Three-Wire Marine.**—See **ELECTRIC EQUIPMENT—Ship Three-Wire.**

**Tramway.**—See **Railway; ELECTRIC TRAMWAY—Current Distribution.**

**220 Volts.**—Electricity Supply at 220 Volts. A. S. Barnard. A summary of the chief points of a paper read at the Convention of the Municipal Electrical Assn. 1400 w. Eng, Lond—June 19, 1896.

Electricity Supply at 220 Volts. A. S. Barnard. Read before the Municipal Elec. Assn., England. Deals with the advantages and disadvantages of the use of 220 volts on the distributing mains. Serial. Elec Rev—July 3, 1896.

**220-Volt vs. Alternating.**—See **ELECTRIC LIGHTING.**

**Two-Wire.**—Two-Wire Distributing Systems and Lamps, 200-240 Volts. John W. Howell. Presents the advantages over the three-wire system, and discusses the system in detail. 2300 w. Trans of Am Inst of Elec Engs—May, 1898.

**Underground.**—European Methods of Underground Distribution. Francis Jehl. Shows that European countries improve their cables, making them self-protective, instead of building expensive conduits, as is customary in England and America. Illustrates and describes methods used. 5000 w. Am Elect'n—June, 1898.

Practical Notes on Underground Electrical Service. E. J. Spencer. A review of the history of underground wiring, its failures and final success. The system in use for underground wiring are explained, and matter of interest regarding cost, etc., is given. 5000 w. Jour of Assn of Engng Socs—June, 1896.

Some Notes on Underground Distribution of Two-Phase Currents in New York City. E. A. Leslie. Abstract of paper read before the Nat. Elec. Lgt. Assn. Describes the system and explains why it was adopted; gives the method of testing for faults, testing insulation resistance of the line circuits, etc. 2400 w. Elec Wld & Elec Engr—June 17, 1899.

See also **ELECTRIC CONDUIT.**

**Wurts Apparatus.**—See **ELECTRIC SWITCH—Wurts.**

**Zipernowski-Deri Patents.**—See **TRANSFORMER PATENT—Zipernowski.**

## ELECTRIC DRIVING.

See also **ELECTRIC DISTRIBUTION; ELECTRIC EQUIPMENT; ELECTRIC MOTOR; ELECTRIC POWER; ELECTRIC TRANSMISSION.**

Economic Use of Electric Power for Driving Tools. Reginald A. Fessenden. Read at the Sept. meeting of the Eng. Soc. of W. Penna. Things to be considered in arranging the system of power for a factory. Advantages of electric driving, cost, rate of production, etc., with general resume of results. 3500 w. Ir Tr Rev—Oct. 15, 1896.

Electrically Driven Machinery. Schuyler S. Wheeler. Report of a lecture delivered at meeting of the New York Electrical Society, in Madison Sq. Garden. Presents the advantages of electric motors. 1300 w. Elec, N Y—May 18, 1898.

Electricity in Mining and Workshops (Die Elektricität im Bergbau und Hüttenbetrieb). With especial reference to the applications of continuous and polyphase currents, and illustrations of generators and motors. 4500 w. Stahl und Eisen—Jan. 1, 1898.

Electric Motors in Factories. C. M. Conradson. The writer is a believer in direct connected motors wherever possible. Tests were made by the writer and conclusions are given. 2700 w. Wis Eng—Oct., 1896.

Electric Power in Engineering Works. Dr. Louis Bell. A masterly discussion of the reduction in internal expense and facilitation of shop operations through the use of electric driving. Illustrated by examples of the application of the methods recommended. 4000 w. Eng Mag—Oct., 1899.

Electric Power Work in Iron Works, Shipyards and Engineering Establishments. Abstracts of papers read at meeting of the Cleveland Inst. of Engineers, held at Middlesborough. 3000 w. Col Guard—Nov. 19, 1897.

Individual Electric Motors. Oberlin Smith. The term defined. The purpose of the article is to take a general glance at the up-to-date development of the electrical system in question. The advantages of individual motor driving are considered. 3600 w. Elec Pow—Feb., 1896.

Short Distance Electric Power Distribution. James Swinburne. A characteristic discussion of the defects of existing practice, and of the general expediency of electric driving as a substitute for other methods. 2500 w. Eng Mag—Aug., 1899.

Some Considerations Concerning Electric Driving. H. A. Mavor. Read before the Glasgow section of the Inst. of Elec. Engs. The probability of a large demand for motors and how the manufacturers are to meet it, the kinds of motors desired, etc. 2400 w. Elect'n, Lond—June 15, 1900.

The Commercial Value of Independent Electric Driving (Elektrischer Einzelantrieb und seine Wirthschaftlichkeit). O. Lasche. Showing the great advantages in handling materials and conducting work by use of electric driving. 2000 w. Stahl und Eisen—Sept. 15, 1900.

The Direct Connection of Electric Motors with Machines of Various Types. William Baxter, Jr. A consideration of the advantages and disadvantages. Serial. Elec Wld—March 21, 1896.

The Electric Motor in Shop and Mine. Clarence M. Barber. Notes points interesting to the engineer who is not an electrician, but who is interested in electrical power transmission, and on the present status of the machine. 5000 w. Jour Assn of Engng Soc's—Nov., 1898.

The Generation and Electrical Distribution of Motive Power. John S. Raworth. Read before the Manchester Assn. of Engs. An explanation of the extent to which electric power may be economically applied to the driving of machines, and how the various problems may be solved. 3860 w. Engng—Nov. 3, 1899.

The Value of Independent Electric Driving (Elektrischer Einzelantrieb und seine Wirtschaftlichkeit). O. Lasche. Showing especially the great advantages in the clearing of belts, etc., from workshops by the use of electric driving. Serial. Zeitschr d Ver Deutscher Ing—Sept. 8, 1900.

**A. E. G., Berlin.**—Electric Driving at the Machine Works of the General Electric Company of Berlin (Die Elektrische Kraftverteilung in den Maschinenbauwerkstätten der Allgememen Elektricitäts-Gesellschaft, Berlin). O. Lasche. A description of this important manufacturing establishment showing the great advantages which have been derived from the introduction of independent electric driving for machine tools. Serial. Zeitschr d Ver Deutscher Ing—Feb. 4, 1899.

Electric Power Distribution in a German Workship. D. Lasche, in "Zeitschrift des Vereins Deutscher Ingenieure." Abstract translation, with illustrations, describing the power distribution of the Allgemeine Elektricitäts Gesellschaft. and also individual driving. 1700 w. Elect'n, Lond—July 21, 1899.

**Amalgamator.**—An Amalgamator Operated by Electric Motors. Illustrated description of an application of electricity interest to the mining industry. 450 w. Elec Rev—Dec. 4, 1895.

**American Ordnance Works.**—Electric Power in the American Ordnance Company's Works, Bridgeport, Conn. Illustrated detailed description of a factory said to be the best equipped of its kind in the country. 1100 w. Elec Eng—Sept. 30, 1897.

**Baldwin Locomotive Works.**—Additional Tests of Power Absorbed by Electrically-Driven Machine Tools at the Baldwin Locomotive Works. Tests made by C. W. Pike, including three-spindle drilling machine, two-spindle drilling machine, radial drilling machine, vertical boring and turning mill, lathe, planers slotting machine, double-head locomotive frame-slotting machine, double-head frame-slotting machine, and shaping machine. 1000 w. Am Mach—Sept. 24, 1896.

Electric Motors at the Baldwin Locomotive Works. Describes a change in machine shop practice. In place of the long line shafting to which the machines were belted, independent electric motors are used. Information in regard to the present status of the work of changing the shop methods. 2200 w. R R Gaz—April 2, 1897.

**Bicycle Works.**—Electrically Operated Bicycle Works. Illustrated description of the Miami Cycle & Mfg. Co., of Middletown, O. In addition to the load at the works the generator supplies current to lights throughout the town. 800 w. Ir Trd Rev—April 23, 1896.

**Boring and Milling.**—Boring and Milling Machine, Electrically Driven (Bohr und Främaschine mit Elektrischem Antriebe). Giving plan and elevation of a large and conveniently arranged tool, showing the adaptability of the electric motor to machine tool driving. 1000 w. Zeitschr d Ver Deutscher Ing—Oct. 7, 1899.

**Bridge.**—See **BRIDGE—Lift, Electric; BRIDGE MACHINERY—Electric.**

**Bristol Wagon Works.**—See **Wagon Works.**

**Bullock Works, Cincinnati.**—See **ELECTRIC WORKS.**

**Calender.**—A 50 Horse-Power Electromotor for Directly Driving a Calender Press (50 P S Elektromotor zum Direkten Antrieb eines Kalanders). K. Schindler. Illustrated description of direct current motor for driving a 12-roll calender at highly variable speeds, with the controlling apparatus. 600 w. Elektrotech Zeitschr—May 17, 1900.

**Calico Machinery.**—Electrically-Driven Calico Printing and Finishing Machinery. Presents the advantages of electric power in this work and gives illustrations of a plant established in one of the largest Lancashire print works, noting some of the difficulties met. 800 w. Engr, Lond—May 27, 1898.

**Chadwick Factory.**—Electric Power Transmission in Factories. Describes the recent installation of Messrs. Chadwick, Limited, with remarks. The plant is considered very complete. 2500 w. Elec Rev, Lond—April 16, 1897.

**Continuous vs. Polyphase.**—Continuous and Multiphase Power Plants for Factory Use. Examines the advantages and difficulties of multiphase power plants, concluding that from the plants inspected it was difficult to perceive any advantage over the continous system. 2500 w. Elec Rev, Lond—Jan. 26, 1900.

**Cotton Mill.**—A Cotton Mill Electrical Transmission Plant. A. F. McKissick. Illustrated description of the installation of the Pelzer Mfg. Co., of Pelzer, S. C. 1300 w. Elec Wld—March 14, 1896.

The Electrically Driven Mills of the Pelzer Manufacturing Co., Pelzer, N. C. Illustrated description with the advantages incident to the driving by electricity. 1600 w. Elec Eng—Sept. 16, 1896.

Electricity at Lyman Cotton Mills. Describes an auxiliary two-phase installation used to drive four large mills when the hydraulic plant is inadequate. 600 w. Eng Rec—March 3, 1900.

Electricity in Cottou Mills. A letter from W. B. Smith Whaley on the advantages of electric operation. 1200 w. Eng Rec—Feb. 12, 1898.

Electricity in Cotton Mills. W. B. Smith McNally. Describes two plants, working under as nearly identical conditions as possible, one operated by rope transmission, the other by means of motors. 1300 w. Trans Am Soc of Mech Engs—Dec., 1897.

Induction Motors at Lancaster Mills. Frank C. Perkins. Illustrates and describes the electric motors installed in mills at Clinton, Mass., stating some of their advantages. 900 w. W Elect'n—March 31, 1900.

The Development of the Electric Drive for Cotton Mills. Extracts from a paper by Sidney B. Paine, read before the Southern Cotton Spinners' Assn., giving facts of general interest to engineers. 1100 w. Eng News—May 17, 1900.

See also **Polyphase.**

**Drawbridge.**—See **BRIDGE MACHINERY—Electric.**

**Factory.**—Electrical Driving of Factories from the Public Point of View. Alfred H. Gibbings. Read before the Northern Soc. of Elec. Engs., Manchester, Eng. Gives tabulated list showing the extent to which the electric motor has been adopted in England, with remarks on the economy effected. 3500 w. Elec Rev, Lond—March 30, 1900.

Electrical Power-Equipment for General Factory Purposes. Dugald C. Jackson. A summary of the more recent results, and a résumé of the views held in a number of the great manufacturing establishments where experience has been had with electrical transmission and distribution of power. 4500 w. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

Some of the Economic and Practical Aspects of Electrical Power Distribution in Factories. H. A. Mavor. Abstract of a paper read before the Inst. of Engs. & Shipbuilders. Considers factories where the power required is upward to 50 h. p., and where it is produced on the consumer's premises. 2300 w. Ir & Coal Trds Rev—April 29, 1898.

Systems and Efficiency of Electric Transmission in Factories and Mills. William S. Aldrich. Considers the conditions where electric driving is an advantage and the fields it best serves, its efficiency, systems of distribution, and economies effected. 4200 w. Trans Am Soc of Mech Engs., No. 858—May, 1900.

The Equipment of Manufacturing Establishments with Electric Motors and Electric Power Distribution. Dngald C. Jackson. Summary of views held in various great establishments where experience has been had, dealing especially with conditions existing in concerns owning and operating their own plant. Compares mechanical and electrical distribution. 7400 w. Jour of W Soc of Engs—Dec., 1896.

The Equipment of Manufacturing Establishments with Electric Motors and Electric-Power Distribution. Leland L. Summers. Conclusions from results obtained in fourteen different establishments, as given in Prof. Jackson's paper read before the W. Soc. of Engs. 800 w. Elec Engng—May 15, 1897.

Transmission of Power in Factories. Discusses points relating to the application of motors for machine driving. 2400 w. Elec Rev, Lond—Nov. 3, 1899.

Transmission of Power in Factories. J. J. Flather. A consideration of the subject favoring the driving of machines by means of electric motors. 1300 w. W Elec—April 18, 1896.

**Fly-Wheel Power of Motors.**—Fly-Wheel Power of Motors. E. K. Scott. The need of thought and judgment in driving certain types of machines. 1000 w. Elec Rev, Lond—Sept. 8, 1899.

**General Electric Works.**—The Electric Motor at Home. An illustrated account of a few of the uses made of these motors in the shops of the General Electric Company, at Schenectady, N. Y. 1500 w. Ir Age—Feb. 3, 1898.

**German Workshop.**—See **A. E. G., Berlin.**

**Grain Elevator.**—See **GRAIN ELEVATOR—Buffalo.**

**Heavy Machinery.**—Heavy Machinery Driven by Electric Motors. Illustrated description of power plant of the Farrel Foundry and Machine Co., at Ansonia, Conn. 600 w. R R Gaz—July 23, 1897.

**Iron and Steel Works.**—Economy of Electrical Power in the Iron and Steel Industries. A general article showing the growing application of electricity to machinery. Serial. Ir & Coal Trds Rev—Jan. 31, 1896.

Electricity in Iron Working. Discussing economy in motors, and examples of their use in iron works, with the methods of connecting. 2500 w. Ir Trd Rev—Jan. 2, 1896.

Electric Motors at the Ramapo Iron Works. An account of the introduction of small electric motors for driving machinery. 1000 w. R R Gaz—Aug. 20, 1897.

Electric Power as a Factor in Steel Mills. Some of the appliances for handling the metal in its various stages are illustrated and described. The plant is that of the Illinois Steel Co., at South Chicago. 1600 w. Am Elect'n—Oct., 1899.

Electric Power in the Parkgate Steel Works, England. Illustrates and describes a recent installation in works of large capacity. 2300 w. Elec Wld & Engr—Aug. 4, 1900.

Some Notes on the Application of Motors in an Iron and Steel Plant. Illustrates and describes interesting heavy applications in operation at the National Steel Co.'s works at Youngstown, Ohio. 3000 w. Elec Wld & Engr—July 14, 1900.

The Economy Effected by the Use of the Electric Motor Around Steel Plants, Furnaces and Foundaries. Andrew E. Maccoun. States the requirements of power stations of this class, and describes some of the labor-saving devices, showing the advantages gained by the use of electric motors. 2800 w. Elec Wld & Engr—Sept. 9, 1899.

The Economies of Electrical Transmission of Power. Walter Dixon. Part first reviews the methods for distributing power in iron and steel works, and shows that the results can be immeasurably improved by the application of electricity. Serial. Ir & Coal Trds Rev—Jan. 22, 1897.

The Use of Eectricity as a Motive Power 'n Modern Steel Works and Blast Furnaces. Andrew Ellicott Maccoun. Notes some of the uses to which motors are applied, and their advantages. 1100 w. Elec Wld & Elec Engr—April 15, 1899.

See also **Rolling Mill.**

**Lancaster Mills, Clinton, Mass.**—See **Cotton Mill; ELECTRIC PLANT.**

**Lathes.**—Motor-Driven Lathes. Illustrates and describes different methods in use. 800 w. Elec Rev, Lond—Sept. 28, 1900.

**Lift Bridge.**—See **BRIDGE—Lift, Electric.**

**Linotype Works, England.**—Electric Transmission at the New Works of the Linotype Company. Illustrates and describes the works at Broadheath, Eng., also the electric plant, system of transmission, etc. 6500 w. Engr, Lond—Nov. 25, 1898.

**Machine Shop.**—Electrical Shop Transmission. H. G. Dimick. Read before the Chicago Elec. Assn. Describes a plain two-wire 220-volt system, and motors belted to line shafting in the various departments of the shop in question. 2700 w. W Elect'n—Jan. 29, 1898.

Electric Distribution of Power as Applied to Works and Factories. George Harland Bowden.

Read before the Glasgow Univ. Engng. Soc. Discusses the economy and increased efficiency, giving results obtained in important works. Serial. Elec Eng, Lond—April 27, 1900.

Electric Driving for Works. Daniel Adamson. Paper read before the Manchester Assn. of Engineers. The application of electricity to various kinds of engineering work is ably discussed. 2800 w. Col Guard—March 20, 1896.

Electricity in the Modern Machine Shop. Louis Bell. Setting forth the reasons that determine the choice of electric motive-power. Ill. Serial. 1st part. 3600 w. Eng Mag—June, 1897.

Electricity in the Modern Machine Shop. Louis Bell. Cost reduction and labor saving by electric applications. Ill. Serial. 2d part. 3200 w. Eng Mag—July, 1897.

Electricity vs. Shafting in the Machine Shop. Charles H. Benjamin. Showing the economic advantages of the newer system. 4800 w. Trans Am Soc of Mech Engs, Vol. XVIII.—May, 1897.

Electric Power in Workshops. Alex. Siemens. Traces the progress made in generating, transmitting and utilizing the energy, and shows its suitability for driving machinery. 1500 w. Engng Mech—Nov., 1896.

Electric Power Transmission in Workshops. Daniel Adamson. The bulk of this paper is devoted to a description of, and remarks upon applications of electric power in a large workshop in England. Though thus restricted, useful hints upon such applications are presented. 8000 w. Prac Eng—March 20, 1896.

Power for Machine Tools. Leland L. Summers. Problems connected with the application of electric motors to the driving of individual machine tools; results of tests, experiments, etc. 1800 w. Elec Engng—Aug., 1896.

Recent Practice in the Application of Electricity to Engineering Tools. F. J. Rowan. Read before the Inst. of Engs. and Shipbuilders. Illustrations with a short record of results obtained with electro-magnetic machine tools. 1200 w. Ir & Coal Trd Rev—April 2, 1897.

The Application of Electric Motors to Machine Driving. Andrew Stewart. Part first considers the commercial possibilities of electric power. Serial. Elec, Lond—June 2, 1899.

The Local Distribution of Power in Workshops, etc. Ernest Kilburn Scott. Presents the advantages of electric transmission in factories and workshops. Serial. Elec Eng, Lond—Jan. 1, 1897.

The Use of Electric Motors in Machine Shops. Charles H. Benjamin. Discusses the application of electricity to machine tools from the standpoint of the manufacturer and of the mechanical engineer, with a view of determining under what circumstances it is profitable to use that system of power-transmission. 4400 w. Jour Assn of Engng Soc—April, 1897.

**Milling Machine.**—See **MILLING MACHINE—Locomotive Cylinders.**

**Mine.**—See **ELECTRIC EQUIPMENT.**

**Motor Form and Speed.**—The Form and Speed of Electric Motors Direct Connected to Machines. Alton D. Adams. Considers the possibility of making the motor a symmetrical part of the driven machine, the relation of speed of motor to the work, etc. Ill. 1000 w. Eng News—Aug. 10, 1899.

**Navy Yards.**—The Advantages of Electrical Distribution in Navy Yards. O. G. Dodge. Letter setting forth the advantages to be gained by the distribution of power in the navy yards by electricity from one central point. 1400 w. Elec Wld—Nov. 13, 1897.

See also **Shipbuilding; Woodworking Machinery.**

**Northern Elec. Mfg. Co.**—Model Factory Electrically Operated. An illustrated description of the power plant of the Northern Electrical Manufacturing Co., at Madison, Wis. 700 w. W Elec—April 18, 1896.

**Nut and Bolt Works.**—Nut and Bolt Works Operated by Electricity. Describes and illustrates the factory of Messrs. Plumb, Benedict & Bernard, at North Tonawanda, N. Y., which is to be operated by power from Niagara. 900 w. R R Gaz—Jan. 29, 1897.

**Oil Refinery.**—Means Adopted for Saving Fuel in a Large Oil Refinery. Charles E. Emery. Presented at the N. Y. meeting. An account of economies secured by electrical transmission to outlying points to which the conveyance of steam from installed boilers was uneconomical on account of condensation in pipes, and by the additional installment of high pressure, non-condensing engines operating power pumps. 1800 w. Trans Am Soc of Mech Eng—Dec., 1895.

**Ordnance Works.**—See **American Ordnance Works.**

**Paper Manufactory.**—Use of Electric Motors in Papermaking. Louis Bell. Extract from a paper read before the New York meeting of American Paper and Pulp Assn. aiming to show the reduction in cost of power and other advantages. 2000 w. Elec Wld—Feb. 26, 1898.

**Pelzer, S. C.**—See **Cotton Mill.**

**Polyphase.**—Electric Driving with Polyphase Currents (Elektrischer Einzelantrieb mit Drehstrom). O. Lasche. With especial reference to the application of polyphase currents to the independent driving of machine tools as installed at the Allgemeine Elektricitäts Gesellschaft in Berlin; very fully illustrated. 5000 w. Zeitschr d Ver Deutscher Ing—March 18, 1899.

The Direct Driving of Machine Tools by Means of Polyphase or Multiphase Currents. Extracts from paper by O. Lasche, presented to the Berlin Soc. of Civ. Engs. Part first gives an illustrated description of the motor. Serial. Prac Engr—Nov. 10, 1899.

The Polyphase Power Distributing System of the Deering Harvester Company. Illustrated description of an isolated plant unique on account of its size and its use of induction motors on a large scale. 5000 w. Am Elect'n—Aug., 1900.

Three-Phase Transmission. F. C. Armstrong. Illustrated description of three-phase transmission plant in the Montreal Cotton Company's mills, Valleyfield, Que. 800 w. Can Eng—March, 1897.

Utilisation of Multiphase Currents in Electric Driving. Percy Nicholls. Deals with the advantages of, or objections to, the system for short distance transmission, and the principles underlying the construction and action of these machines. Ill. 3600 w. Prac Engr—April 9, 1897.

See also **Cotton Mill.**

**Polyphase vs. Continuous.**—Independent Electric Driving (Elektrischer Einzelantrieb). O. Lasche. A discussion upon the relative advantages of continuous and polyphase currents for electric driving. 4500 w. Zeitschr d Ver Deutscher Ing—July 1, 1899.

**Power Consumption.**—Electric Driving for Heavy Machine Tools. Statements of power found by direct experiment to be absorbed by certain heavy machine tools, with diagrams. The investigations were made at the Atlas Works, Sheffield. 2000 w. Engr, Lond—March 23, 1900.

Power Consumption of Machine Tools (Kraftverbrauch von Arbeitsmaschinen). H. Loch. An article giving the power consumed by a great variety of machines, driven by electric motors, in the railway shops at Gleiwitz, Germany. 1200 w. Glaser's Ann—April 1, 1900.

Electric Power in Shops (Les Transmissions Electriques dans les Ateliers). A. Hillairet. Registering instruments employed to indicate power used by motors driving saws, drills, planers, etc. Serial. L'Eclairage Electrique—Oct. 17, Nov. 7, 1896.

Power Tests of Motor Driven Machines. L. E. Lemon. Describes arrangements and methods of testing under various conditions. 2000 w. Mod Mach—Jan., 1899.

See also **Baldwin Locomotive Works.**

**Printing.**—A Complete Electrical Printing Establishment. Illustrated description of the motor plant of the Lakeside Press Building, Chicago. 900 w. W Elec—July 3, 1897.

A Modern Electrically Driven Printing Establishment. Some of the difficulties of applying the electric motor to press machinery are noted, and an illustrated description of a recent installation in the printing rooms of M. B. O'Loughlin & Co., New York. 1500 w. Elec Wld—Sept. 25, 1897.

Electrical Control and Operation of Newspaper Presses in the News and Record Office, Chicago. Describes the methods adopted. 1500 w. Elec Eng, N Y—Feb. 24, 1898.

Electrical Equipment of the Printing Plant of the St. Louis "Republic." Illustrated description. 1700 w. Eng News—July 5, 1900.

Electricity in Printing, Binding and Engraving. Illustrates and describes special application of the electric motor. 2500 w. Am Elect'n—March, 1899.

Motor Installation at the Chicago "Daily News" Office. Charles A. Dresser. Read before the Chicago Elec. Assn. Describes the equipment and operation, with some comments on the improvement, and on other devices used in the press room. 3000 w. Elec, N Y—Feb. 22, 1899.

The Electrical Equipment of a Model Printing Establishment. George A. Damon. Slightly abstracted reprint of a paper read before the Chicago Elec. Assn., describing and illustrating the model printing establishment of the W. B. Conkey Co., at Hammond, Ind. 4800 w. Elec Wld—Nov. 12, 1898.

The Electrical Equipment of the Printing Establishment of the "St. Louis Republic." George A. Damon. Illustrated detailed description of the plant. 2500 w. Am Elect'n—Feb., 1900.

The Practical Application of Electric Motors to Printing Press Machinery. W. H. Tapley. Considers what is the best known motor and how it shall be applied. 7000 w. Jour Fr Inst—Oct., 1899.

See also **ELECTRIC PLANT—Printing Office, Berlin.**

**Printing and Binding.**—Electrically Driven Printing and Binding Machinery. A. N. Rathbun. Describes and illustrates the plant of the S. S. McClure Company, publishers of McClure's Magazine. 1600 w. Am Elect'n—Nov., 1897.

Electric Power for Operating Printing and Binding Machinery. Reed R. Bishop. Abstract of a thesis presented to the faculty of Applied Science of Columbia University, New York City, for the degree of Electrical Engineer. Details in reference to the use of electric power for operating printing presses, cutters, folders, etc., including all machinery necessary for the production of a complete book. Ill. Serial. Elec Wld—Oct. 9, 1897.

**Pump.**—See **PUMP—Electric; Triplex Torque.**

**Railway Shop.**—Electric Distribution of Shop Power. George Gibbs. Read before the N. Y. R. R. Club. Describes different types of motors on the market and comments on their suitability for railway shop work, with suggestions on the manner of laying out the system. Also discussion. 11500 w. N Y R R Club—March 17, 1898.

Electric Power Station at Laun, near Prague (Elektrische Kraftvertheilungsanlage zu Laun bei Prag). A very full account of the plant at the Government Railway Shops, including electric cranes, transfer table, hoists, etc., with many illustrations. 2500 w. Elektrotech Zeitschr—June 23, 1898.

**Rolling Mills.**—Electric Driving in Machine Works and Rolling Mills (Elektrischer Antrieb in Hütten nnd Walzwerken). O. Lasche. With especial reference to the driving of the mills for rolling copper rod and wire for the Allgemeine Electricitäts-Geselschaft at Berlin. 4500 w. Stahl und Eisen—Oct. 1, 1899.

Electric Power in Rolling Mills. Eugene B. Clark. From a topical discussion conducted by the Western Society of Engineers. Mentions some of the uses to which the power is applied, and the results. 1600 w. Ir Age—July 21, 1898.

The Electric Driving of Iron Works and Rolling Mills. O. Lasche. Abstract from "Technisches Centralblatt." An illustrated account of the driving at the rolling mills of the Oberspree cable works, and a discussion of the advantages as compared with steam driving. 2200 w. Elect'n, Lond—Aug. 31, 1900.

The Electric Motor in Rolling Mills and Steel Works. A brief description of rolling mill work, showing the necessity of having power of some sort available almost everywhere, followed by a review of the wide range of application which electric power has already found. 1800 w. Am Mach—May 28, 1896.

See also **Iron and Steel Works; ROLLING MILLS—Micheville.**

**Sandycroft Works.**—Electric Power Distribution at Sandycroft. Illustrates and describes some parts of the system in use by the Sandycroft Foundry and Engine Works Co. 1000 w. Elec Rev, Lond—June 18, 1897.

**Saw Mill.**—Electric Saw Mill at Folsom, Cal. Illustrated description of the application of electric power to the driving of saw mills. 600 w. Elec Eng—April 28, 1897.

**Shipbuilding.**—Application of Electrical Transmission of Power in Marine Engineering and Shipbuilding. F. Von Kodolitsch. Read before Inst. of Naval Arch'ts. Shows the usefulness of light portable machine tools in marine engineering, when electrically driven. Serial. Ind & Ir—April 15, 1897.

Electrical Transmission of Power. F. Von Kodolitsch. Read before the Inst. of Naval Arch'ts. Application of electrical transmission of power in marine engineering and shipbuilding. 3500 w. Engng—April 30, 1897.

See also **Navy Yard.**

**Siemens' Works, England.**—The Electric Equipment of Messrs. Siemens' Works. Albion T. Snell. From a forthcoming work entitled "Electric Motive Power in Practice." An illustrated description of these works, with tests which seem to prove that power distributed from an electric central power station costs less than when derived from independent steam engines. 3600 w. Elect'n—Nov. 15, 1895.

**Single v. Group.**—See **Subdivision.**

**Slotting Machine.**—See **SLOTTING MACHINE—Portable.**

**Smelting Works.**—Electrical Power Transmission in Smelting Works. A well illustrated description of a plant for generating electricity for power purposes in a large smelting works. 3200 w. Elec Rev, Lond—Sept. 14, 1900.

**Subdivision.**—On the Subdivision of the Motor Equipment in Electrically-Driven Workshops. Short discussion of the subject, with some examples of European practice. 1200 w. Elect'y, Lond—Sept. 7, 1900.

The Limitations of Power Subdivision by Electric Motors in Manufacturing Establishments. A topical discussion considering economy of power, economy of cost, convenience, etc. 16800 w. Trans Am Inst of Elec Engs—April, 1899.

The Relative Efficiency of Single and Group Electric Driving and Transmission (Vergleich der Wirtschaftlichkeit von Elektrischem Einzelbetrieb, Elektrischem Gruppenbetreib und Transmissionsbetrieb). E. Hartmann. A discussion of the various conditions under which the different methods give the best results. 3500 w. Die Elektrizität—Aug. 20, 1898.

**Tanneries.**—Electrical Transmission in Tanneries. An account of a number of tanneries which have been electrically equipped. Ill. 2300 w. Elec Eng, N. Y.—April 7, 1898.

**Textile Factories.**—Application of Electric Motors to the Textile Industry (Les Applications des Moteurs Electriques a l'Industrie Textile). Shows motors operating line shafting and also independent looms as applied in Switzerland and France. 2500 w. La Rev Tech—March 25, 1897.

Transmission of Power in Factories by Electricity. S. V. Clirehugh. Read before the Northern Society of Electrical Engs. Points in connection with power distribution, especially in factories devoted to the textile trades. 4000 w. Ind & Ir—May 21, 1897.

See also **Cotton Mill; Factory; WEAVE SHED—Grosvenordale, Conn.**

**Textile Factories, Ghent.**—The Electrical Transmission of Power (Transmission de Force par l'Electricité). An illustrated account of the use of "group driving," as installed in the "Louisiane" spinning and weaving mills at Ghent. 2500 w. Génie Civil—Feb. 17, 1900.

**Turret.**—See **TURRET—Electic.**

**Ventilator Fans.**—See **FAN.**

**Wagon Works.**—Electrical Equipment in Fish Bros'. Wagon Factory. Illustrates and describes the equipment of an extensive factory in Racine, Wis. 1800 w. W Elect'n—Aug. 26, 1899.

Electric Power and Its Application on the Three-phase System to the Bristol Wagon and Carriage Works. W. Geipel. Read before the British Assn. Discusses the causes of waste of coal in workshops and factories and how it may be obviated by the use of electricity; also the economy in labor, and the attainment of the maximum output of machine tools. 4200 w. Elec Rev, Lond—Sept. 16, 1898.

**Wall Paper Factory.**—Eddy Motors in the Campbell Wall Paper Factory, New York City. Illustrated description of one of the most recent interesting examples of the substitution of electricity for the counter-shaft. 900 w. Elec Eng—Dec. 11, 1895.

**Washington Navy Yard.**—See **Wood-Working Machinery.**

**Wellington Foundry, Lincoln.**—Wellington Foundry, Lincoln. A general description of the large machine and engine works of William Foster & Co., which are equipped for the electric driving of the machinery. 2400 w. Engr, Lond—Sept. 7, 1900.

**Westinghouse Air Brake Works.**—Electric Power Distribution. An illustrated description of the works of the Westinghouse Air Brake Company. 3000 w. Am Engr & R R Jour—April, 1900.

**Wharton Works, Phila.**—Electric Driving at the Works of Wm. Wharton, Jr. & Co., Inc., Philadelphia, Pa. Illustrated description of a machine shop laid out with electric distribution as the key to the arrangement, with reasons which led to the introduction. 1400 w. Am Mach—Feb. 13, 1896.

**Wood-Working Machinery.**—Electrical Tests of Power required by Wood-Working Machinery at the Navy Yard, Washington, D. C. Reported by O. G. Dodge. Tests of circular rip saws, band saws, planers, boring machines, etc. 800 w. Am Mach—Aug. 6, 1896.

Power Required for Electrically Operated Wood-Working Machinery. Reports of tests made by O. G. Dodge at the navy yard at Washington, D. C. 1100 w. Sci Am Sup—July 31, 1897.

**Woolen Mills.**—Power for Woolen Mills. C. J. H. Woodbury. Read at meeting of the Nat. Assn. of Wool Mfrs. Presents the advantages of electric transmission. 2500 w. Bos Jour of Com—Jan. 14, 1899.

See also **Factory; Textile Factories.**

**ELECTRIC ELEVATOR.**

See also **CRANE—Electric; ELECTRIC HOIST; ELECTRICITY—Domestic Applications.**

Electric Elevator Problems and Some of Their Solutions. J. E. Woodbridge. Discusses the reasons for the increased economy of power of the electric elevator over the hydraulic, the difficulties encountered in elevator service, the Leonard system and its disadvantages, etc. 3500 w. Elec Wld—Aug. 7, 1897.

Electric Elevators, with Special Reference to Their Starting and Stopping. W. C. C. Hawtayne. Read before the British Northern Soc. of Engs. Part first describes the Otis passenger elevators, the precautions taken to secure safety. Serial. Elec, Lond—May 20, 1898.

Motors and Details for Electric Elevators (Motoren und Hülfsapparate für elektrisch betriebene Hebezeuge). Discussing the best forms of motors, regulators, controlling apparatus, etc., with numerous diagrams. Serial. 2 articles. 12000 w. Zeitschr d Ver Deutscher Ing—July 3, Aug. 7, 1897.

Standards of Practice in Electric Elevator Installation. P. R. Moses. With detailed descriptions of the latest type of the leading builders and a discussion of the essential features of successful design. Electric elevators are claimed to be the safest vehicles known to humanity. 4500 w. Engng Mag—Dec., 1897.

The Latest Improvements in Electric Elevators. Illustrated description of high grade electric passenger elevator used in fireproof buildings. 1100 w. Sci Am—Jan. 2, 1897.

**Automatic Operation.**—Automatic Starting and Stopping Devices for Electric Elevator Service (Selbstthätige Anlass-und Abstellvorrichtungen für Elektrischen Fahstuhlbetrieb). G. Speiser. German types and detailed methods of construction. 1000 w. Elektrotech Zeitschr—Oct. 15, 1896.

**Book.**—Electric Dumb Waiters in the Chicago Public Library. Illustrates and describes the arrangements for delivering books from one department to another in the building. 2000 w. Elec Eng, N. Y.—Oct. 6, 1898.

**Cars.**—The Electric Elevator for Cars at the Custom House Railway Station in Vienna (Die Elektrischen Waggonhebewerke am Bahnhof Hauptzollamt in Wien). Anton Freissler. An address before the Oest. Ing. und Arch, Verein, giving an illustrated description of elevators for lifting freight cars from the track level 19 feet to the main floor of the custom house. 3500 w. Zeitschr d Oest Ing u Arch Ver—June 1, 1900.

**Construction.**—Some Problems in Electric Elevator Work. H. Cochrane. Read before the Chicago Elec. Assn. A review of some of the details of practical construction, showing that the application of electricity to elevator service involves a great many engineering problems. Ill. 5800 w. W Elec—May 30, 1896.

Some Problems in Electric Elevator Work. H. Cochrane. The writer reviews some of the details of practical construction, showing that the application of electricity to elevator service involves a great many engineering problems. Ill. 5000 w. Sib Jour of Engng—Dec., 1896.

**Electro-Magnetic.**—Smith's Electro-Magnetic Elevator. Illustrated description of an elevator possessing features of interest. It makes use of the principle of the solenoid or coil and plunger to utilize the power to move the car. 3700 w. W Elec—Dec. 19, 1896.

**Elevated Railway Station.**—Electric Elevators in an Elevated Railway Station. Illustrated description of the western terminal station of the Lake St. Elevated Railroad Company, of Chicago. Highly appreciated by patrons, but expense prohibits their extension. 600 w. W Elec—June 6, 1896.

**Fraser.**—The Fraser Electric Elevator. A. E. Brooke Ridley. Briefly reviews various elevator systems, pointing out the disadvantages of each, and gives a somewhat detailed description of the invention of E. M. Fraser, which it claims, obviates most of the disadvantages mentioned. Also discussion. 3800 w. Jour Assn of Engng Soc's—Sept., 1898.

**History.**—Electric Elevators. A brief review of hoisting mechanisms used since the earliest ages is given, and the early history of the electric motor as applied to elevator machinery. Ill. Serial. Elec Wld—April 3, 1897.

**Hydraulic Compared.**—See **ELEVATOR—Electric vs. Hydraulic.**

**Leonard Control System.**—See **Otis.**

**New Brighton Tower, Eng.**—Electric Lifts for the New Brighton Eiffel Tower. Illustrates and describes an extensive system of lifts to be used in the highest tower yet built, to be constructed at a popular resort on the river Mersey. 1200 w. Engr, Lond—Jan. 6, 1899.

**Otis.**—Electric Elevators. William. A. Gibson. General information in regard to the Otis electric elevator. 1600 w. Elec Rev, Lond—Feb. 21, 1896.

Test of An Otis Electric Elevator with Leonard Motor Control System. W. H. MacGregor and R. T. Kingsford. Test of an elevator in the Fahys building, Maiden Lane, New York, undertaken as a graduation thesis, with the sole object of arriving at facts. 700 w. Elec Eng—July 29, 1896.

**Safety.**—A Safety Electric Elevator (Bahnartig Betriebener Elektrischer Sicherheits Aufzug). The car revolves around its vertical axis and screws its way up a spiral track carried around the interior of the circular shaft. 1500 w. Deutsche Zeitschr für Elektrotechnik—February, 1897.

**Sidewalk.**—A Type of Heavy Electric Sidewalk Elevator. Illustrated detailed description of hoists of the Ivins Syndicate Building of New York City. 700 w. Eng News—Sept. 28, 1899.

**Sprague.**—Electric Elevators, with Detailed Description of Special Types. Frank J. Sprague. An interesting paper, with lengthy discussion. 29500 w. Trans Am Inst of Elec Engs—Jan., 1896.

Electric Elevators, with Detailed Description of Special Types. Frank J. Sprague. Read before the Am. Inst. of Elec. Engs. 5000 in operation in New York City alone. Details of recent machines. 8000 w. Elec Eng—Jan. 29, 1896.

Ball Step Bearing and Magnetic Brake of the Sprague-Pratt Electric Elevator. Description. 1200 w. Am Mach—Oct. 22, 1896.

The Performance of the Sprague Electric Elevators in the Minneapolis City Hall and County Court House. Frank J. Sprague. Full report of the committee employed by the commissioners to test the machines. 1500 w. Elec Eng—May 12, 1897.

See also **GEAR—Worm, Sprague.**

**Tests.**—Tests of Electric Elevators. William S. Monroe. Gives data concerning the power used in starting and moving. 800 w. Eng Rec—Oct. 1, 1898.

**Underground Railway.**—Passenger Lift Equipment for the Central London Railway. States the general conditions for the tenders of these elevators, with an illustrated description of the equipment, which is of American design and make. Serial. Engng—March 3, 1899.

The Electric Elevator Equipment for the Central London Underground Ry. An illustrated description of an interesting electric elevator equipment being installed by the Sprague Electric Co., of New York City. 6000 w. Eng News—Nov. 3, 1898.

**ELECTRIC ENERGY.**

See also **ELECTRIC DISTRIBUTION; ELECTRIC POWER; ELECTRIC SUPPLY.**

**Cost.**—The Cost of Generation and Distribution of Electrical Energy. Robert Hammond. Full paper read before the Inst. of Elec. Engs., London. Discussion of the subject presenting a summary of the returns of undertakings in the United Kingdom. 55000 w. Pamphlet. British Inst of Elec Engs—1898.

The Cost of Generation and Distribution of Electrical Energy. R. Hammond. Abstract of paper read before the Inst. of Elec. Engs., London. Facts from the official returns of electric supply works. 2000 w. Col Guard—April 1, 1898.

The Cost of Generation and Distribution of Electrical Energy. Abstract of discussion by members of the Inst. of Elec. Engs. in connection with Mr. Hammond's paper. 7000 w. Elect'n. Lond—April 29, 1898.

The Cost of Electric Energy. Editorial discussion of the subject, referring to information in paper of Robert Hammond. 2000 w. Engng —April 29, 1898.

**ELECTRIC ENGINEER.**

See **ELECTRICAL ENGINEER.**

**ELECTRIC ENGINEERING.**

See **ELECTRICAL ENGINEERING.**

**ELECTRIC EQUIPMENT.**

See also **ELECTRIC APPARATUS; ELECTRIC DRIVING; ELECTRIC HEATING; ELECTRICITY; ELECTRIC LIGHTING; ELECTRIC MACHINERY; ELECTRIC PLANT.**

**British Military.**—The Electrical Equipment of the Electrical Engineers' (R. E.) Volunteer Corps. Illustrates and describes the novel equipment sent to South Africa, consisting of traction engines, searchlights, limbers, cable drum carriages and telephones. 2700 w. Elect'n, Lond—April 27, 1900.

**Coal Mines.**—Electrical Installation in Coal Mines. Harry N. Gardner. Comments on the conditions and causes that have deterred operators from installing electric plants, and describes work that has been efficient and profitable. Ill. 2500 w. Am Elect'n—Aug., 1899.

Electricity in Anthracite Coal Mining. Ellis E. Brown. Considers the advantages and disadvantages of using electric power in transporting the coal from the working face to the breaker, and for the removal of water from workings. Ill. 3000 w. Jour of Worcester Poly Inst—March, 1900.

Electricity in Coal Mining. John Price Jackson and Frank F. Thompson. Considers lighting, haulage, cutting or drilling, pumping and driving fans in soft coal mining. Also discussion. 4000 w. Trans Am Inst of Elec Engs—Oct., 1899.

Electricity in Coal Mining. John Price Jackson and Frank F. Thompson. Presented at Boston meeting of the Am. Inst. of Elec. Engs. Refers especially to the mining of soft coal, considering systems for lighting, haulage, cutting or drilling, pumping and driving fans. 3000 w. Elec, N Y—July 12, 1899.

Electricity in Collieries. Reviews its history, progress and present position, considering signalling, telephones, blasting and lighting. Ill. 6000 w. Col Guard—July 13, 1900.

On Electrical Transmission of Power in a Colliery. L. Gorchot. Translated from "Memoires de la Société des Ingenieurs Civils de France." A general account of a large electrical plant at a colliery in France, now in process of completion. 2800 w. Eng, Lond—June 11, 1897.

Running Collieries Entirely by Electricity from One Center. Sydney F. Walker. Abstract of paper read before the Brit. Soc. of Min. Students. On economy possible by the use of the electric motor. 3000 w. Ir & Coal Trds Rev—May 25, 1900.

Tests of an Electric Coal Mining Plant. Clifford Buck and Clay Belsley. Report presented as a thesis at Sibley College, Cornell Univ. An unusually fine piece of work of its class, showing the records of performance and efficiencies of electric driven apparatus under conditions of actual work in a coal mine. 2400 w. Eng News—Feb. 24, 1898.

The Applications of Electricity in Mining Operations. Roslyn Holiday. From the "Journal of the British Society of Mining Students." Deals with application of electricity to lighting, hauling, pumping and coal cutting. 3500 w. Col Guard—May 6, 1898.

The Application of Electricity to Coal Mining Operations. Frederick J. Platt. Brief review of electric power as applied to hauling, drilling, pumping, hoisting and lighting. 2500 w. Col Guard—Feb. 26, 1897.

The Application of Electricity for Work in Collieries. Clifford B. Buck. Brief account of current practice in the use of electric power for colliery installations. Ill. 7000 w. Sch of Mines Quar—April, 1899.

The Use of Electrical Power for Mining Purposes. The series of articles proposes to consider the suitability of the system to general mining conditions in competition with other power systems and the circumstances under which it is in actual practice, and may be applied to coal-cutting, haulage, pumping, lighting and other purposes. Serial. Ir & Coal Trds Rev—Jan. 15, 1897.

See also **Mine; COAL-CUTTING MACHINERY—COAL MINING—Thin Seams; COAL MINING MACHINERY; ELECTRIC LIGHTING.**

**Coal Mine, Austria.**—Electrical Transmission of Power in the Ziegler Shaft, Nürschan. From a paper by F. Holzner in the "Oesterr. Zeitschr. f. Berg-und-Hüttenwesen." Sections of the workings are given, and illustrations of the various applications of the motors. 2500 w. Col Guard—Sept. 9, 1898.

The Electric Power Transmission in the Ziegler Mine at Nürschan (Die Elektrische Kraftübertragungsanlage am Zieglerschachte bei Nürschan). Ferdinand Holzner. A very full account of this extensive plant in which electricity is used for pumping, ventilating, hauling, and lighting. Three articles. 5 plates. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 15, 20, 27, 1898.

See also **COAL MINE—Witkowitz; COAL PREPARATION—Witkowitz.**

**Coal Mine, British.**—Electric Mining Machinery in the British Collieries. Sydney F. Walker. A richly-illustrated review; this part is devoted to machinery for coal-cutting, pumping, and mine haulage. 3800 w. Eng Mag—Aug., 1900.

Electric Mining Machinery in the British Collieries. Sydney F. Walker. Mr. Walker's second paper discusses the details of lighting, signaling and working of surface plant, with many illustrations of most recent devices. 4000 w. Eng Mag—Sept., 1900.

**Coal Mine, France.**—New Electric Plant at the Blanzy Colliery. M. Goichot. From a communication to the Société de l'Industrie Minérale. Illustrated description of the plant and the appliances for utilizing the current for motive power. 3300 w. Col Guard—April 20, 1900.

**Coal Mine, Indiana.**—The Test of a Coal Mining Electric Power Plant. T. D. Phillips and J. G. Swain. Gives a series of tests made upon the electrical equipment of Shaft No. 1 of the Brazil Block Coal Co., of Brazil, Ind. The machine gave good results and proved well adapted to the work required. Ill. 3000 w. Elec Wld—July 24, 1897.

**Coal Mine, Pennsylvania.**—An Interesting Electric Mining Plant. Illustrated description of plant near Wilkesbarre, Pa. 1200 w. Elec Rev, N Y—March 6, 1898.

An Electric Mining Plant. Short, illustrated description of an 80 h. p. electric mine locomotive, which can haul daily 1200 tons of coal a distance of 3500 feet; a five foot capacity coal cutter, and a gearless electric mine drill. These are used in Pennsylvania. near Pittsburg. 400 w. Min & Sci Pr—Nov. 23, 1895.

Central Station Electric Coal Mining Plant in Pennsylvania, U. S. A. William Stukely Gresley. Paper giving an illustrated description of the plant and its operation, with an abstract of the discussion. 16500 w. Pamphlet. Published by Inst. of Civil Engs., London.

Electrical Equipment of the Columbia Gas Coal Company, at West Newton, Pennsylvania. George R. Wood. Illustrated description of pumping and coal-cutting machinery. 1700 w. Mines & Min—Dec., 1898.

Electric Plant at Essen Mines. A description of the largest electric mining plant in America. It is located at the Essen Mines, at Federal, Pa. 2400 w. Col Eng—Dec., 1896.

Electricity in Coal Mining. Harry N. Gardner. Illustrated description, showing the economical results of applying electricity to mining purposes, as exhibited in the anthracite mines of the New York and Scranton Coal Co., located at Peckville, Pa. 2800 w. Elec Eng—May 5, 1897.

Maltby Electric Plant. Frederic C. Whitmore. Illustrated description of a successful electric hoisting and pumping plant, showing how difficult conditions were overcome by the use of electricity as a means of transmitting power at the Lehigh Valley Coal Co.'s Maltby Mine. 2000 w. Col Eng—Feb., 1897.

The Largest Electric Coal Mining Plant in the World. Describes the Essen electric coal mining plant, about 17 miles from Pittsburg. 2000 w. Am Mfr & In Wld—March 19, 1897.

**Coal Mine Precautions.**—Precautions Necessary in the Use of Electricity in Coal Mines. H. W. Ravenshaw. Abstract of a paper read before the Federated Institution of Mining Engineers. A few suggestions the carrying out of which may serve to minimize the risk both from shock and fire. 2900 w. Elect'n—June 12, 1896.

Precautions Necessary in the Use of Electricity in Coal Mines. H. W. Ravenshaw. Read before the Federated Inst. of Min. Engs. A few suggestions the carrying out of which may serve to minimize the risk both from shock and fire. 3000 w. Col Guard—July 3, 1896.

Safe Use of Electricity in Mines. H. W. Ravenshaw. Some common causes of danger and how to guard against them. Suggestions regarding construction of electrical machinery to prevent shocks, sparks, firing of gas and other accidents. 4000 w. Col Eng—Jan., 1897.

Personal Safety in Electric Mining Plants (Die Persönliche Sicherheit bei Elektrischen Anlagen in Bergwerken). W. Philippi. With details as to the isolation of conductors, protection of generators and motors, and the ignition of fire damp. 4000 w. Glückauf—Aug. 18, 1900.

See also **FIREDAMP—Electric Ignition.**

**Coal Mine, Saxony.**—The Electric Plant in the Falck Coal Mines at Bockwa, near Cainsdorf, Saxony (Die Elektrische Anlage auf dem Steinkohlenwerk Karl G. Falck in Bockwa b. Cainsdorf i. S.). Describing an excellent application of electric power in coal mining, the plant having operated uninterruptedly from its start in Sept., 1898. The pit is 765 feet deep. 1200 w. Glückauf—Dec. 23, 1899.

**Coal Mine, Silesia.**—The Electric Plant of the Silesian Coal Mines at Gottesburg (Die Elektrischen Anlagen der Schlesischen Kohlen- und Kokswerke zu Gottesburg). Max Schmidt. An illustrated account of this extensive plant for underground lighting and pumping in the Silesian coal mines. 8500 w. Zeitschr d Ver Deutscher Ing—Dec. 24, 1896.

**Farm.**—See **ELECTRICITY—Agriculture.**

**Military.**—See **British Military; ELECTRIC APPARATUS; ELECTRICITY—Warfare.**

**Mine.**—Applications of Electricity in Mines (Les Applications de Electricité dans les Mines). With illustrations of hoists, ventilators, pumps, locomotives, etc. 2500 w. Rev Tech—June 25, 1897.

Electrical Equipment for Mines. Brief directions of points that should have attention in the introduction of this form of power, with estimates of approximate cost, motors used, and recent improvements. 2800 w. Ir & Coal Trds Rev—June 5, 1896.

Electric Transmission of Power in Mines. Illustrations from photographs taken in underground workings, showing applications made by Messrs. Siemens & Halske, of electrical energy to the driving of mine plant, and observations founded on a communication by Ingenieur C. Köttgen. 1800 w. Engr, Lond—July 3, 1896.

Electric Mining Machinery. J. N. Bulkley. Some investigations in regard to cost of operation in various mines. Figures obtained from mine officials. 5500 w. Mines & Min—Nov., 1897.

Electricity Applied to Mining. Harold Bentham. Read before the Manchester Soc. of Jun. Elec. Engs. Considers the advantages and disadvantages of steam and electricity as motive power, and the lighting of mines. Ill. Serial. Elec Engr, Lond—May 11, 1900.

Electricity as Applied to Mining. J. R. Bainton. Read before the N. S. W. Chamber of Mines. Gives a review of the applications made in the mining industry and the results, with comparison with results obtained by using compressed air. Discussion. Ill. 5000 w. Aust Min Stand—Aug. 31, 1899.

Electricity in Mining. William Maurice. Abstract of a paper read before the Chesterfield and Midland Counties Inst. Part first deals with electric blasting, mainly in its connection with coal mining. Serial. Aust Min Stand—March 9, 1899.

Electricity in Mining. R. B. Williamson. Considers the principle governing the calculation, construction, and operation of electrical installations, giving explanation of electrical units, circuits, resistances in series and multiple, electric wiring, etc. Serial. Mines & Min—May, 1900.

Electricity in Mining. Discussion of the papers on "Electric Mining in the Rocky Mountain Region," by Irving Hale, and "Addition to the Power Plant of the Standard Consolidated Mining Company," by Robert G. Brown. 8000 w. Trans Am Inst of Min Engs—March, 1897.

Electricity in Mining Engineering; Its Uses, Advantages and Defects. Philip Evans. Read before the British Soc. of Min. Students. Considers electricity as applied to lighting, signaling, pumping, haulage, blasting, drilling, coal cutting, and winding. 2000 w. Ir & Coal Trds Rev—May 5, 1899.

Electricity in Mining Operation. F. A. C. Perrine. A review of the present applications in this field and of the improvements needed. 2000 w. Engng Jour—Feb., 1896.

Electricity in Mining. F. B. Phelps. A review of the growth of the use of electricity in the mining industry. 1300 w. Elec Rev—Aug. 5, 1896.

Electricity in Mining. Sydney F. Walker. A review of the progress of the past twenty years. 2000 w. Elec Eng, Lond—Jan. 3, 1896.

Influence of Electricity in the Mining Industry. Illustrated review of the applications of electricity to mining and the merits which have popularised it with those who have used it in mining and milling operations. 1500 w. Min Ind & Rev—Dec. 31, 1896.

On the Employment of Electricity in Mines. Joseph Libert. Read before the Min. & Met. Cong., at Paris. Abstract. Information concerning the current most largely used, the applications, etc. 1200 w. Ir & Coal Trds Rev—July 6, 1900.

The Application of Electricity to Mining and Quarrying. J. Warren. Briefly describes the general details of a system suitable for use in mining operations. 2500 w. Elec, Lond—Aug. 6, 1897.

The Growing Efficiency of Modern Mining Machinery. Cyrus Robinson. Describing electrical coal-cutters, drills, mine pumps, and mine locomotives, and the conditions under which they may be used advantageously. Ill. 2700 w. Eng Mag—April, 1897.

See also **Coal Mine; ELECTRIC LIGHTING; ELECTRIC MOTOR—Portable; MINING MACHINERY; POWER TRANSMISSION.**

**Mine and Iron Works.**—Electric Power for Mines and Iron Works. Carl Pfankuch. Read at a recent meeting of the German Ironmasters' Association. Abstract giving the writer's idea of the saving that could be obtained by the adoption of electricity as motive power, and where it could be most advantageously applied. 1100 w. Am Mfr & Ir Wld—May 1, 1896.

**Mine, Austria.**—The Electric Power-Transmission at Bleiberg (Die Elektrische Kraftübertragung in Bleiberg). The stream Nötschbach furnishes 285 h. p., which is transmitted electrically among four mines for pumping, hoisting and lighting. Two articles, three plates. 10000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 16, 23, 1897.

**Mine, Bohemia.**—Electric Power Plant in the Julius Mine at Brüx (Elektrische Kraftübertragungsanlage auf dem Aerarischen Julius III. Schacht in Brüx). Describing the very complete plant used for pumping, lighting, hauling, and ventilating, in an important mining district in Bohemia. 2000 w. 2 plates. Oesterr f Berg u Hüttenwesen—Sept. 16, 1899.

**Mine, California.**—An Oerlikon Electric Mining Plant in Southern California. An illustrated detailed description of an electric plant for the distribution of power in and about the mines. 1800 w. Elec Wld & Engr—Sept. 23, 1899.

**Mine, Colorado.**—Electrical Appliances in Colorado Mines. Thomas Tonge in London "Mining Journal." Calls attention to the readily available power to be found in the mountain streams, and mentions a few of the leading instances where this power has been utilized for electrical purposes. 1200 w. N Z Mines Rec—April 16, 1898.

**Mine, Cripple Creek.**—Electricity in the Mines at Cripple Creek. Thomas Tonge. With many illustrations showing the wide range of applications of electricity for power in mining operations, as experienced in the gold mines of Colorado. 3500 w. Eng Mag—Sept., 1899.

**Mine, Galicia.**—Polyphase Electric Light and Power Plant at the Boryslaw Mine in Galicia (Elektrische Drehstromanlage für Kraftübertragung in Beleuchtung der Erdwachsgruben in Boryslaw, Galizien). A. Lukaszewski. Brief description of an important mining electric plant recently installed by Ganz & Co., of Budapest. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 5, 1898.

**Mine, Germany.**—Electric Power and Lighting Plant at the Hollertszug Iron Mine, near Herdor, Germany (Elektrische Kraftübertragungs und Beleuchtungsanlage der Eisenerzgrube "Hollertszug" bei Herdorf an der Sieg). C. Pfankuch. An illustrated description of this plant, in which the current is applied in various ways. 2000 w. Ill. Zeitschr f Klein u Strassenbahnen—April 1, 1900.

Electric Power Transmission and Lighting Plant at the "Hollertszug" Mine (Elektrische Kraftübertragungs und Beleuchtungsanlage der Eisenerzgrube Hollertszug"). An excellent example of the use of electricity in mine hoisting, pumping, air-compressing and lighting. 2000 w. Glückauf—April 29, 1899.

**Mine, Pacific Coast.**—Electricity in Mining on the Pacific Coast. F. A. Perrine. Statements showing the unsuitability of electrical mining apparatus to the particular conditions of the mines on the Pacific slope. 1400 w. Elec Engng—April 15, 1897.

**Mine, Polyphase.**—Electrical Transmission of Power in Mines. A. Bloemendal. From "Stahl und Eisen." Illustrates and describes several installations, and discusses the advantages of the polyphase system. 3700 w. Col Guard—Dec. 1, 1899.

Electric Power Transmission in Mining (Die Elektrische Kraftübertragung im Bergbau). A. Bloemendal. Especially discussing the successful installation of polyphase plants in German mines. 4000 w. Stahl und Eisen—Nov. 15, 1899.,

Latest Developments and the Practical Application of Alternating Multiphase Machinery for Electric Power Transmission. Walter Dixon. Paper read before the Federated Institution of Mining Engineers, discussing the applications to mining purposes. 2500 w. Ir & Coal Trds Rev—Oct. 1, 1897.

**Mine, Saxony, Potash.**—The Electric Plant of the "Glückauf" Mine at Sondershausen (Der Elektrische Centralbetrieb der Gewerkschaft "Glückauf" zu Sondershausen). A very complete account of the electric power station, distribution system, and various applications of electric power at the great potash mine at Sondershausen, Saxony. 8000 w. 4 plates. Glückauf—Dec. 3, 1898.

**Mine, South Africa.**—Mr. Heather's Paper on the Electric Transmission Plants at Moodie's Gold Mines. E. K. Scott. A review of paper concerning mines in South Africa. 1100 w. Elec Rev, Lond—Oct. 5, 1900.

**Mine, Standard Consolidated.**—Additions to the Power Plant of the Standard Consolidated Mining Company. Robert Gilmore Brown. Describes additions completed during the last year, interesting because of the engineering features involved and of the attainment of a high degree of flexibility with the two-wire, alternating system of electrical transmission. 4500 w. Trans Am Inst of Min Engs—Sept., 1896.

**Mine, Sumatra.**—The Electric Power Plant of the Redjang Lebong Gold Mine, Sumatra (Die Elektrische Kraftübertragungsanlage der Goldgrube Redjang-Lebong, Sumatra). W. Philippi. Showing the difficulties in conveying and erecting the plant and its successful installation. 2500 w. Glückauf—Oct. 6, 1900.

**Mine, Transvaal.**—Electrical Transmission of Power in Mining. William Beedie Esson. Read before British Inst. of Civ. Engs. Describes the plant at the Sheba Company's mines, Barbeton, Transvaal. Ill. 8000 w. Col Guard—June 9, 1899.

Electrical Transmission of Power in Mining. W. B. Esson. Abstract of paper read at meeting of Inst. of Civ. Engs. (England). Describes the plant erected at the Sheba Gold Mining Company's Mine. 1100 w. Col Guard—Nov. 18, 1898.

The Electric Power and Lighting Plant at the Transvaal Gold Mining Estates, Limited, at Pilgrim's Rest (Die Elektrische Kraft und Lichtanlage der Transvaal Gold Mining Estates, Limited, in Pilgrimsrest). F. Klonne. A fully illustrated account of this plant, one of the best among the Transvaal mines. 2000 w. 1 plate. Glückauf—Jan. 20, 1900.

**Mine, Woodward.**—Electric Equipment of the Woodward Mine. W. E. Culbertson. An illustrated description of the plant used for hoisting, haulage and pumping. 1800 w. Mines & Min—Aug., 1898.

**Quarry.**—See also **Mine.**

**Quarry, Belgium.**—Electricity in Stone Quarries. Consideration of the advantages, with an illustrated account of the electrical installation at the Hainaut Quarries, Soignies, Belguim. Ill. 1500 w. W Elec—Dec. 7, 1895.

**Quarry, Scotland.**—An Electrical Quarry Installation. Illustrated description of an electrical transmission plant for working a quarry in a mountainous district in the Lowlands of Scotland. 700 w. Elec Rev, Lond—Dec. 22, 1899.

**Railway.**—Electricity on the Cincinnati Southern Railway. Stephen L. Coles. Describes electric signals, lights, headlights and various devices in use on this road. Ill. 2400 w. Elec Rev—March 10, 1897.

**Refrigerating Plant.** — See **REFRIGERATING PLANT—Electric Equipment.**

**Ship.**—Electrical Apparatus on Shipboard (Ueber Elektrische Schiffseinrichtungen). A general description of marine electrical apparatus, including engine-room indicators, hoisting machines, steering devices, etc. 4500 w. Elektrotech Zeitschr—May 12, 1898.

Electrical Machinery on Board Ship. Alexander Siemens. Abstract of paper read before the British Assn. Also editorial. Describes prevailing practice. 3300 w. Engr, Lond—Sept. 22, 1899.

Electricity on Board Ship. S. Dana Greene. Considers principally the application to war vessels, but is equally applicable to merchant marine. Also discussion. 17500 w. Trans Am Inst of Elec Engs—Jan., 1899.

Electricity on Shipboard. W. F. Durand. Read before the Electrical Soc. of Cornell Univ. Describes in detail the various applications. 4000 w. Sib Jour of Engng—June, 1897.

Electricity on Board Ship, Principles and Practice. William Baxter, Jr. Part first explains the relation of electricity and magnetism. Diagrams. Serial. Marine Engng—July, 1897.

Electricity on Merchant Vessels (Die Electricität an Bord von Handelsdampfern). C. Arldt. A general discussion of the use of electricity on merchant vessels for lighting, power, and transmission of signals. Two articles. 5000 w. Der Electro-Techniker—March 15, 31, 1898.

Electricity on Merchant Vessels (Die Elektricität an Bord von Handelsdampfern). With details of the applications of electricity to lighting, hoisting, transmission of intelligence, etc., as used on modern ocean steamers. Two papers. 7500 w. Zeitschr d Ver Deutscher Ing—Oct. 30, Nov. 6, 1897.

Electric Power Transmission on Shipboard. F. W. Roller. Shows that auxiliary steam engines have a minimum of good qualities, although superior to hydraulic or pneumatic systems, and claims that an electrically driven installation would overcome most of the difficulties. 1800 w. Am Elect'n—June, 1898.

Materials Used in the Construction of Marine Dynamos and Their Engines. Alton D. Adams. Discusses the best material to use in the different parts. 2500 w. Marine Engng—Sept., 1900.

Suggestions for the Selection of Electric Lighting Sets for Ship Use. Alton D. Adams. Emphasizes durability and simplicity in design in selection of the plant, and gives valuable suggestions. 2800 w. Marine Engng—July, 1899.

The Exhibit of Electrical Novelties at Kiel (Die Ausstellung Elektrotechnischer Neuheiten in Kiel). Alfred A. Reimer. An illustrated description of various electric appliances for marine use, particularly telegraph indicators, exhibited on the occasion of the annual meeting of the Verband Deutscher Elektrotechniker. 2600 w. Schiffbau—July 23, 1900.

The Present Uses and Future Prospects of Electricity on Bord Ship. E. George Tidd. Read before the Glasgow Students' Assn. of the Inst. of Civ. Engs. Part first discusses position of the plant, type of plant, types of engines, etc. Serial. Elec Eng, Lond—April 8, 1898.

Use of Electricity on Board Ship. F. Eickenradt. Read at meeting of the Inst. of Naval Architects. The subject is treated from the point of view of the shipbuilder. Lighting, ventilation, heating, gun and turret turning, winches, hoists or lifts, etc., are considered. 4000 w. Eng, Lond—June 19, 1896.

See also Warship; ELECTRIC DISTRIBUTION; ELECTRIC LIGHTING; MARINE ENGINES—Central Power Plant; RANGE FINDER; SHIP TELEGRAPH.

**Ship "Bremen."**—Electricity on the Steamship "Bremen." Illustrated description of a vessel of the North German Lloyd line, which is said to be more fully equipped electrically, than any other vessel of the merchant marine. 900 w. Ir Age—Aug. 5, 1897.

See also CRANE—Electric, Steamship "Bremen."

**Ship "Kaiser Wilhelm der Grosse."**—The Lighting of the Steamship "Kaiser Wilhelm der Grosse." Illustrated description of the fine lighting equipment, and power appliances. Also the three powerful telephones. 700 w. Elec Wld—Oct. 2, 1897.

**Ship "Oceanic."**—The Electrical Equipment of the Largest Ship Afloat. An illustrated description of the electric lighting, electric motor and telephone systems on the steamship "Oceanic." 2000 w. Am Elect'n—Nov., 1899.

**Ship "Rotterdam."**—The Lighting Plant on the "Rotterdam." Illustrated description of interesting equipment, possessing some features unknown to American practice. 1000 w. Elec Wld—Sept. 11, 1897.

**Ship "St. Paul."**—Electrical Features on the "St. Paul." Interesting illustrated description. 2700 w. Elec Wld—Sept. 26, 1896.

**Ship Three Wire.**—Applications of Three-Wire System to Marine Electric Plants. Cecil P. Poole. Discusses several plans. describing the arrangements. Ill. 1600 w. Marine Engng—Nov., 1899.

**Ship Wiring.**—See ELECTRIC WIRING—Ships.

**Steamboat "Priscilla."**—Electricity on American Vessels. J. McGhie. Part first gives an illustrated description of the equipment of the "Priscilla," a passenger and freight steamor plying on Long Island Sound. Serial. 1st part. 1800 w. Elec Engr, Lond—April 7, 1899.

**Submarine Boat.**—Electricity in the Submarine Boat "Holland." R. McA. Lloyd. A brief description of the electrical apparatus. Ill. 1000 w. Elec Eng, N. Y.—May 12, 1898.

**Theatre.**—Electrical Stage Effects. Theodore Waters. An interesting illustrated account of what has been done in electrical stage work, and how the marvelous effects are produced. 6000 w. Elec Pow—May, 1896.

Electrical Stage Mechanism at Drury Lane Theatre. Illustrates and describes some of the arrangements for remodelling this stage, especially describing two sections of the stage floor worked by electric power. 2000 w. Engng—Dec. 23, 1898.

Electricity in the Theatre. George Hell Guy. Reviews the many ways in which electricity is utilised in stage craft. 3500 w. Chau—Dec., 1897.

See also ELECTRIC LIGHTING; ELECTRIC PLANT.

**Warship.**—Applications of Electricity on a Modern Warship. George H. Shepard. Discusses the wastefulness of auxiliary machinery, and the possible substitution of a central electric power plant, and shows that at the present time conditions of weight, bulk, and cost render such a system impracticable. 3500 w. Eng Mag—May, 1898.

Electrical and Engineering Work in the Navy During the War. W. D. Weaver. Reviews the various applications that would add to the efficiency and general comfort of a man-of-war, citing successful applications and those that have failed or not yet been tried. 1500 w. Elec Eng, N Y—Dec. 22, 1898.

Electric Auxiliary Machinery in the United States Navy. Alton D. Adams. An examination of the value of electric driving in warships showing most favorable results. 4400 w. Engr, Lond—Sept. 8, 1899.

Electricity in Naval Life. B. A. Fiske. An examination of the results of electricity in naval life, in which it is affirmed to have fulfilled all its promises. Serial. Elec Eng—Sept. 23, 1896.

Electricity in the United States Navy. Frank W. Roller. Consists chiefly of illustrated descriptions of marine electrical appliances. 2500 w. Am Elect'n—Aug., 1896.

Electricity for the Auxiliary Machinery on Warships. Lieut J. K. Robison. Showing the need of higher economy at the generating end of the plant before electrical auxiliary machinery can attain its full extension on naval vessels. 3500 w. Eng Mag—Nov., 1899.

The Electrical Equipment of Ships of War. Editorial review of the discussion before the Inst. of Elec. Engs. and showing that many appliances are useless in time of battle, and that radical changes in the equipment of ships of war is not now advisable. 2500 w. Engng—May 11, 1900.

The Electrical Equipment of Ships of War. C. E. Grove. A record of what has already been accomplished, and the developments where it is likely to be applied. The practice of the British Admiralty is taken as a basis of the discussion. Ill. 19000 w. Brit Inst of Elec Engs, Adv Proof April 5, 1900.

The Electrical Equipment of Ships of War. C. E. Grove. Read before the Inst. of Elec. Engs., England. A discussion of what has been accomplished, and the tendency of the developments. Part first considers dynamos and switchboards. Ill. Serial. Elect'n, Lond—April 20, 1900.

See also ELECTRIC LIGHTING—Ship; Torpedo Boat.

**Warship, British.**—Electric Light Plants for the British Navy. Illustrated description of a pattern of combined engine and dynamo set designed for the ships "Majestic," "Magnificent," "Terrible," "Powerful," "Diadem," and "Andromeda" class. 800 w. Elec'n—March 5, 1897.

**Warship "Chitose"**—The Electrical Equipment of the Cruiser "Chitose." G. W. Dickie. The equipment embraces not only a complete system of lighting, but also power hoists for the ammunition of both the main and secondary batteries, searchlights, fans for ventilation, etc. Ill. 1800 w. Elec Wld—April 9, 1898.

**Warship "Fuji."**—Electrical Equipment of the "Fuji." Charles E. Grove. Reprint from the "Thames Ironworks Gazette." Describes the electrical equipment of this Japanese warship in a way to indicate to general readers what the work is like. Ill. 2000 w. Elec Eng, Lond—July 16, 1897.

**Warship "Indiana."**—Some Electrical Features of the United States Battleship "Indiana." Illustrated detailed description. 2300 w. Elec Wld—Aug. 15, 1896.

**Warship, Italy.**—Electricity in the Italian Navy. Giulio Martinez. The first of a series of articles aiming to give a description of the most recent applications of electricity; the description beginning with the generators. Ill. Serial. Elec Wld & Elec Eng—March 18, 1899.

**Warship "Kearsarge."**—Electrical Features of the United States Battleship "Kearsarge." This is the first battleship to be provided with a complete electrical power transmission plant. Also editorial. Ill. 1500 w. Elec Rev, N Y—Sept. 27, 1899.

**Warships "Kearsarge" and "Kentucky."**—The Electric Plants of the Battleships "Kearsarge" and "Kentucky." J. J. Woodward. Description of the plants with a statement of the duties performed. 20 plates. 22000 w. Soc of Nav Archts & Marine Engs, No. 4—Nov., 1899.

**Warship "Newark."**—Electrical Equipment of the U. S. Cruiser "Newark." E. W. Countiss. An illustrated description of the electric plant recently installed. 2800 w. Am Elect'n—Nov., 1896.

**Warship "Oregon."**—Electrical Equipment of the

U. S. Battleship "Oregon." Alex. J. Dickie. Gives a summary of the features of the ship with detailed description of her electrical equipment. Ill. 1700 w. Am Elect'n—Dec., 1898.

**ELECTRIC EXHIBIT.**

See **ELECTRICAL EXHIBITION.**

**ELECTRIC EXHIBITION.**

See **ELECTRICAL EXHIBITION.**

**ELECTRIC EXPOSITION.**

See **ELECTRICAL EXHIBITION.**

**ELECTRIC FAN.**

See **FAN—Electric.**

**ELECTRIC FITTINGS.**

See **ELECTRIC APPARATUS; ELECTRIC LIGHT FIXTURE; GAS FITTING.**

**ELECTRIC FOUNTAIN.**

**Brooklyn.**—The Electric Fountain at the Prospect Park Plaza, Brooklyn, N. Y. Illustrated detailed description of the fountain and its operation. 1800 w. Elec Eng—Aug. 19, 1897.

**Budapest Exposition.**—The Luminous Fountain at the Millenium Exposition in Budapest, 1896. Josef Herzog. The origin of the project, how it was built, its special equipments and how it is operated. 2400 w. Elec Wld—Oct. 31, 1896.

**Munich.**—The Illuminated Fountains at the Munich Exhibition (Die Elektrische Leuchtfontaine auf der II. Kraft-und Arbeitsmaschinen Austellung in München). F. Uppenborn. With illustrations showing the arrangement of the illuminating apparatus, and the shifting of the colored glasses. 1500 w. Elektrotech Zeitschr—March 23, 1899.

**Paris Exposition.**—The Electric Fountains at the Paris Exposition. A well illustrated description of the Chateau d'Eau and the electric fountains. 2500 w. Elec Wld & Engr—Sept. 22, 1900.

**Siegel-Cooper, Chicago.**—Simple but Effective Electric Fountain. Illustrated description of the fountain in the large department store of Siegel, Cooper & Co., in Chicago. 600 w. W Elec—April 4, 1896.

**Willow Grove, Philadelphia.**—The Electric Fountain at Willow Grove, Philadelphia. Thornton B. Renwell. Illustrated detailed description. 2800 w. Am Elect'n—July, 1897.

The Electric Fountain in Willow Grove Park, Philadelphia. Illustrated description. 800 w. Elec Eng—Oct. 7, 1896.

**ELECTRIC FURNACE.**

See also **ELECTRO-METALLURGY; FURNACE—High Temperature.**

Contribution to the Study of the Electric Furnace (Contribution à l'Etude des Fours Electriques). A Memoir by MM. Gin and Leleux to the French Academy, discussing the relations between temperature and current, as well as notes upon the behavior of materials fused in the electric furnace. 1800 w. Comptes Rendus—Jan. 17, 1898.

Electrical Furnaces (Ueber Elektriche Oefen). A paper before the convention of the German Electrochemical Association by Herr Pfleger, with discussion. Interesting data concerning the production of calcium carbide and other products are given. 4000 w. Zeitschr f Elektrochemie—July 5, 1897.

Electric Furnaces. J. Warren. Description of some of the most notable furnaces constructed with a view to transforming ordinary carbon into its denser modifications. Ill. Serial. 1st part. 2000 w. Elec, Lond—March 12, 1897.

The Electric Furnace. F. Jarvis Patten. Part first is mostly historical with illustrations of the earliest patents. Serial. Elec Eng—Aug. 12, 1897.

The Electric Furnace. F. Jarvis Patten. Describes early historical forms and recent improvements. Ill. 2700 w. Elec Wld—Oct. 22, 1898.

The Electric Furnace. F. Jarvis Patten. Illustrates and describes different furnace systems, giving briefly the history of researches in this field. 3300 w. Am Elect'n—Jan., 1899.

The Electric Furnace. John Trowbridge. Reviews some of the processes affected by the electric furnace, and its great advantage over other furnaces in its power to localize the heat in a narrow compass. 2000 w. Chau—May, 1896.

The Use of Electricity for Crucible Fusions. F. H. Leeds. Shows that wherever there is water power available it is considerably cheaper to conduct crucible fusions by means of electricity than by direct coal firing; and that possibly in the future it may also be found advantageous to employ coal for the preparation of electricity, rather than to fire a crucible furnace with it direct. 2400 w. Elect'n—Jan. 22, 1897.

**Calcium Carbide.**—See also **CALCIUM CARBIDE—Electric Furnace.**

**Carbon.**—A Simple Form of Electric Furnace (Ueber eine geeignete Form des Elektrischen Ofens). A small furnace, suitable for the production of calcium carbide or carborundum, made of solid blocks of carbon. 1500 w. Zeitschr für Elektrochemie—Feb. 5, 1897.

**1897.**—The Principal Electric Furnaces of 1897 (I Principali Forni Elettrici del 1897). L. Belloc. A collection of illustrated descriptions of all the types of electric furnaces brought out in that year. 6000 w. L'Elettricita—Dec., 1898.

**Experimental.**—The Experimental Electric Furnace. Samuel Auchmunts Tucker. Explains its value in scientific research and illustrates and describes experiments showing the intensity of the heat. 1500 w. Am Elect'n—Sept., 1899.

**Graphite.**—See also **GRAPHITE—Electric Furnace.**

**Graphite from Carbon.**—Electric Furnaces and the Convention of Carbon into Graphite. Translated from "Le Génie Civil." Review of the principal models of electric furnaces, with illustrations. 2600 w. Sci Am Sup—Aug. 22, 1896.

**Iron and Steel.**—Notes on the Electro-Crucible Fusion of Steel and Iron. B. H. Thwaite. The writer shows that in the electric furnace 16.05 per cent. of the value of gas engine fuel is utilized, while in ordinary furnaces but 3.09 per cent. goes toward melting in the furnace. 2500 w. Ir & Coal Trds Rev—Jan. 31, 1896.

**Iron Industry.**—Applications of the Electric Furnace in the Iron Industry (Les Applications du Four Electrique dans l'Industrie du Fer). Emile Demenge. Giving many illustrations of historical furnaces, as well as projected devices for iron manufacture. Two articles. 3000 w. Le Génie Civil—July 30, Aug. 6, 1898.

**Laboratory.**—Description of Experimental Electric Furnace (Mitteilung über einen Versuchsofen). Dr. Borchers. An illustrated description of a convenient form of electric furnace for use in general laboratory research. 1200 w. Zeitschr f Elektrochemie—May 20, 1898.

**Lelièvre Furnace.**—A New Electric Furnace (Nouveau Four Electrique). The Lelièvre furnace is of the cupola type with carbons at bottom, and the escaping gases are used to heat the incoming material. 1000 w. La Rev Tech—May 10, 1897.

**Metal Distillation.**—Electric Furnace for Distillation of Metals (Elektrischer Destillierofen). A convenient laboratory furnace for distilling metals at very high temperatures. 800 w. Elektrochem Zeitschr—Jan., 1897.

**Metallurgy.**—Electric Furnaces for the Separation and Refining of Metals (Die Elektrischen Oefen zur Metallgewinnung und Metallraffination). Dr. W. Borchers. The first of a series of articles upon electric furnaces. This installment contains a classification and a brief description of some of the earlier types. Ill. 2000 w. Zeitschr für Elektrochem—Nov. 5, 1896.

Metallurgical Application of Electric Heating. H. Poisson, in "Revue Industrielle." Describing processes and furnaces. Ill. 2200 w. Sci Am Sup—March 20, 1897.

**Moissan.**—Making Diamonds. An account of the address of M. Henri Moissan, delivered at the College of Physicians and Surgeons, New York, Oct. 27. Diamonds produced, quartz converted into vapor, and other remarkable results shown. 2700 w. Elec—Nov. 4, 1896.

The Chemistry of High Temperatures. Report of the Franklin Institute through its committee on Sciences and the Arts, on the investigations of M. Henri Moissan, with the electric furnace. 2000 w. Jour Fr Inst—July, 1898.

The Chemistry of High Temperatures. An outline of the researches of M. Henri Moissan for which he has been awarded a Franklin Institute medal. 1200 w. Bos Jour of Com—Oct. 8, 1898.

The Electric Furnace in Chemistry. Henri Moissan. Translated from "La Nature." A review of the work accomplished by the use of the electric furnace, and showing that it is having an important effect on the industries. 1200 w. Pop Sci M—Jan., 1896.

The Electric Furnace and the Work of M.

H. Moissan (Le Four Electrique et les Travaux de M. H. Moissan). A general review of Moissan's recently published work, with illustrations and details of the results obtained by him. Three articles. 7000 w. Génie Civil—Aug. 21, 28, Sept. 4, 1897.

See also **CARBIDE.**

**Paris Exposition.**—See **ELECTRO-CHEMISTRY.**

**Smelting.**—Electric Smelting Furnaces (Elektrische Schmelzöfen). C. Hässermann. A general descriptive article of the various forms of electric furnaces which have been used up to the present time. 3000 w. Zeitschr d Ver Deutscher Ing—April 16, 1898.

**Thermo-Chemical Efficiency.**—See **CALCIUM CARBIDE—Electric Furnace.**

**110-Volt Circuits.**—The Utilization of 110-Volt Electric Circuits for Small Furnace Work. Nevil Monroe Hopkins. Describes and illustrates the construction of the furnace, with detailed instructions for making small quantities of calcium carbide, 3000 w. Sci Am Sup—Aug. 27, 1898.

## ELECTRIC FUSE.

See also **BLASTING; ELECTRIC CIRCUIT BREAKER; ELECTRIC CUT-OUT.**

The Rating and Behavior of Fuse Wires. W. M. Stine, H. E. Gaytes, and C. E. Freeman. A paper read before the Amer. Inst. of Elec. Engs., with discussion. Investigations of fuse wires. The experiments cover the entire subject and the results are presented in tabulated form, with numerous diagrams, illustrating curves of sensitiveness, curves of fusing points, and curves of fatigue. Seven fundamental conclusions were announced and discussed. Ill. 7500 w. Trans Am Inst of Elec Engs—Oct., 1895.

An Accurate and Reliable Fuse. Louis W. Downes. Describes a method that has been found most successful in eliminating the causes of failure. 3000 w. Am Elect'n—Oct., 1897.

Fuse Wires. R. S. McGowin. Gives the requirements of an efficient fuse, and discusses how to attain them, with further consideration of the subject. 1800 w. Sib Jour of Engng—Oct., 1897.

Study of the Fuse Problem and Solution. William McDevitt. Tests, lessons and remedy. 3200 w. W Elec—Feb. 22, 1896.

The Design of a Reliable Fuse. J. E. Woodbridge. Discusses the causes of their unreliability and the remedy. 3000 w. Am Elect'n—Aug., 1897.

The Electric Fuse. Alton D. Adams. Describes the electric fuse and the advantages gained through its use. 1000 w. Sci Am—March 4, 1899.

The Evolution of Safe and Accurate Fuse Protective Devices. Joseph Sachs. An illustrated description of the enclosed fuse and discussion of the principles on which it is based and operates. General discussion. 15000 w. Trans Am Inst of Elec Engs—Feb., 1900.

The Evolution of Safe and Accurate Fuse Protective Devices. Joseph Sachs. Discussion of this paper, which was published in the Feb. issue, both in New York and Chicago. 25500 w. Trans Am Inst of Elec Engs—June and July, 1900.

**Branch Circuits.**—Fuses for Branch Circuits. S. H. Sharpsteen. Considers the matter of fuse lengths for circuits of about 100 volts entering buildings for incandescent work. 1500 w. Elec Eng—April 21, 1897.

**Car.**—Electric Car Fuses: Why They Blow. P. E. Charles. Part first discusses some of the causes. Serial. Am Elect'n—June, 1900.

**Circuit Breaker Compared.**—See **ELECTRIC CIRCUIT BREAKER—Fuse, Compared.**

**Defects.**—Inherent Defects in Fuse Metals Experimentally Considered. Walter E. Harrington. Considers in detail, and demonstrates by tests, some of the defects in fuse metals which condemn them as a safe and reliable means for protecting electrical circuits from unusual and abnormal conditions. 3000 w. Jour Fr Inst—June, 1896.

The Gross Untrustworthiness of Fuse Metals and Appliances as a Means of Protection for Electric Circuits—The Remedy. William McDevitt. A paper giving an account of tests made in Philadelphia, and including parts of discussions following papers on this subject, with conclusion suggesting remedy. Ill. 6000 w. Elec Eng—Feb. 5, 1896.

**Design.**—Design of Fusible Cut-Outs. B. H. Glover. A statement of facts bearing upon the proper design. 2000 w. W Elect'n—Dec. 2, 1899.

**Enclosed.**—The Enclosed Fuse. D. J. Cartwright. A statement of the main features of various protective devices as they appear to the writer after careful study. Describes a new enclosed safety fuse designed by the writer. 1800 w. Am Elect'n—Feb., 1898.

**German.**—A New System of Safety Appliances (Ueber ein Neues System von Sicherheitsmaterialien). H. Dressler. Describing a variety of fuses designed to meet the requirements of the German Elektrotechnical Association. 5000 w. Elektrotech Zeitschr—May 4, 1899.

**Hundhausen Cut-Out.**—A New System of Electric Protection (Ein Neues System Elektrischer Sicherungen). The improved Hundhausen safety cut-out which throws in a suitable resistance when melted is now used by Siemens & Halske in the latest installations. Two articles. 5000 w. Die Elektrizität—May 22, June 5, 1897.

**Proper Use.**—On the Proper Use of Safety Fuses and Magnetic Circuit Breakers. William Baxter, Jr. Discusses the proper place for blow-out fuses, and shows that they are not necessary in the main circuits of central stations and isolated plants. 1500 w. Elec Eng—Aug. 12, 1896.

**Telephone Circuits.**—Fuses for Telephone Conductors (Schmelzsicherungen in Fernsprechleitungen). K. Strecker. Describing a system of fuses for the protection of telephone conductors from the currents of tramway systems. 3000 w. Elektrotech Zeitschr—Sept. 28, 1899.

**Testing.**—The Reasonable Method of Rating and Testing Safety Fuses. Frederic A. C. Perrine. Comments on the disagreement of experimenters and engineers in their understanding of the proper use of fuses in circuits, and suggests the true method of testing. 1700 w. Elec Wld—Jan. 30, 1897.

## ELECTRIC GENERATION.

See also **ELECTRIC ENERGY.**

How the Electric Current is Generated. Sydney F. Walker. Traces the generation from the energy stored in coal or water, through its various conversions. 1800 w. Am Gas Lgt Jour March 23, 1896.

## ELECTRIC GRAPHICS.

See also **ALTERNATING CURRENT—Curve; DYNAMO—Characteristic; ELECTRO-PHYSICS; MAGNETIC INDUCTION—Curve.**

**Speed-Voltage.**—Speed-Voltage Curves. J. Alfred Griffiths. A method of investigation useful to students and of interest to experienced electricians. 2500 w. Elect'n—Dec. 20, 1895.

**Vector Potential.**—The Graphic Representation of Vector Potential. H. N. Allen. The object of the paper is to show how the distribution of electro-magnetic vector potential can in certain cases be represented graphically. 900 w. Elect'n—April 3, 1896.

## ELECTRIC HEATING.

See also **CAR HEATING; ELECTRIC COOKING; ELECTRIC EQUIPMENT; HEATING.**

A Survey of the Possibilities of Electric Heating and Cooking. W. P. Adams. Aiming to give a better understanding of the possibilities of electric heating. Part first deals with electric cooking, especially the cost. Serial. Elec, Lond Jan. 28, 1898.

Construction of Electrical Heating Apparatus. R. Van Rensselaer Sill. Read at semi-annual meeting of the Am. Soc. of Heating and Ventilating Engs. The writer points out what he believes to be the mistakes in the construction of the electric heater and shows how they may be remedied. Also discussion. 1200 w. Heat & Ven—June 15, 1897.

Electric Heating. W. S. Hadaway, Jr. Electric heating is treated in this paper more particularly with reference to house heating, car heating, etc., than with reference to its technical side as a branch of electrical engineering, although the latter is not ignored. It is an exhaustive dissertation upon the subject, by an entirely competent author, and gives a full outline of progress to date, while it also in some measure forecasts the future of the art. 6000 w. Heat & Ven—Feb., 1896.

Electric Heating (Elektrische Heizung). An address by Dr. Voit before the German Society of Heating and Ventilating Engineers, giving data and methods for the proportioning and application of electric apparatus for warming; with discussion showing the cost of the method. 3000 w. Gesundheits Ingenieur—Oct. 15, 1898.

Electric Heating. Alton D. Adams. Discusses the energy from various heating devices, the cost, where electric heating can be used with advantage, etc. 1700 w. Sci Am—July 15, 1899.

Electric Heating of Niagara Falls Power Station. Orrin E. Dunlap. Illustrated description. An interesting study on the subject of electric heating. 900 w. W Elec—April 10, 1897.

Electricity vs. Hot Air. Some considerations on whether electricity will supplant hot air, by a practical furnace man. 1000 w. Dom Engng—Jan., 1896.

Heat from Electricity. J. E. Talbot. Electric heating is considered in this number largely in its application to cooking. Serial. Elec Rev—Feb. 26, 1896.

Heating by Electricity (Le Chauffage par l'Electricité). A theoretical investigation of the thermal and electrical conditions involved in heating by electricity, and a comparison with usual sources of heat, as regards cost. 2000 w. La Revue Technique—June 10, 1898.

Improved Apparatus for Heating and Cooking by Electricity (Noveaux Appareils de Chauffage et de Cuisine par l'Electricité). Description of the simple and portable cooking and heating devices for use with electric current, now being made in Paris. 2000 w. Le Génie Moderne. Feb. 15, 1897.

The Electric Heater. H. E. Stauffer. A general illustrated description of some of the more recent forms of heaters showing how they are applied are used. 3500 w. Sci Am Sup—April 24, 1897.

The Possibilities of Electric Heat as Limited by the Cost of Production. Alton D. Adams. Does not consider electric heat desirable from the economical point of view. 1200 w. Eng News—Aug. 23, 1900.

Warming by Electricity (Le Chauffage par l'Electricité).. A. Bainville. A general review of the progress which has been made in warming by electricity, describing various forms of apparatus, and indicating the probable development. 1800 w. L'Electricien—July 25, 1899.

**Alioth, Basel.**—Heating Appliances for Alternating Currents (Appareils Thermiques pour Courants Alternatifs). R. B. Ritter. Illustrating and describing devices of the Alioth Company, of Bâle, Switzerland, including kitchen and laundry apparatus. 1500 w. L'Elektricien—Jan. 21, 1899.

**Car.**—Electric Heating. Edward Puchta. Abstract of paper read before the Chicago Elec. Assn. Deals principally with car heating. 1800 w. Elec Eng—June 24, 1896.

See also **CAR HEATING—Electric.**

**Carmelite Hospice, Niagara.**—Electric Heating in a Carmelite Hospice. Illustrates and describes an interesting installation receiving its power from the Canadian Niagara Power Co. 1100 w. Sci Am—Aug. 5, 1899.

**Cloth Pressing.**—Cloth Pressing by Electricity. Report by Mr. Ch. Monchel, on a new process known as the "electro-calidor" process, which consists of pressing cloth by means of boards heated by electricity. 1000 w. U S Cons Repts, No. 357—Feb. 23, 1899.

**Dentistry.**—Electric Heat in Dental Practice. Dr. Levitt E. Custer, in the "Southern Dental Journal." The value of electric heat in dentistry is shown by explanation of its many applications. 1000 w. Sci Am—Feb. 22, 1896.

**England.**—The Position of the Electrical Heating Industry in This Country. Discusses the position in England, and the reasons why progress has not been more rapid. Also the advantages. Serial. Elec Rev, Lond—Dec. 15, 1899.

**Hat Factory.**—A Practical Application of Electric Heating. Illustrated description with general particulars relating to the plant in the straw-hat factories of Wm. Carroll & Co., located at Matteawan, N. Y. 1400 w. Am Elect'n—Dec., 1897.

The Use of Electric Heat in the Manufacture of Hats. Illustrated description of the electrically treated ironing appliances as adopted in the factory of Budish & Yudisky, of Newark, N. J. 1400 w. Elec Wld—July 31, 1897.

**Hydro-Electrothermic.**—Hydro-Electrothermic Heating. Paul Hoho. Of the production of heat by the direct conversion of electrical energy. Description of systems and industrial applications. 4000 w. Elec Wld—Dec. 7, 1895.

**Incandescent Lamps vs. Commercial Heaters.**—Incandescent Lamps vs. Commercial Heaters. E. Y. Porter and C. D. Warner. Experiments at the University of Nebraska. A comparison of the heating effect of incandescent lamps with that of the usual form of electric heaters. 1500 w. Elec Eng—Jan. 20, 1897.

**Le Roy.**—Heating by Electricity (Le Chauffage par l'Electricité). Describing the Le Roy apparatus in which blocks of silicium are raised to a red heat by the electric current for purposes of warming or cooking. 1500 w. La Revue Technique—August 10, 1897.

The Le Roy Process for Warming by Electricity (Le Chauffage Electrique par les Buches Le Roy). An illustrated description of this improved apparatus. The heat is produced by passing the current through rods of silicon in vacuum tubes. Radiators and other applications are shown. 800 w. L'Electricien—Feb. 25, 1899.

**Marquette, Water-Works.**—A Novel Application of Electric Heat. E. J. Hart. Brief account of a plan for warming the water of Lake Superior before admitting it to the city water-works system, Marquette, Mich., thus remedying the trouble occasionel by "needle ice." 600 w. Elec Wld & Engr—March 17, 1900.

**Metallurgy.**—See **ELECTRIC FURNACE; ELECTRO-METALLURGY.**

**Ougrimoff Water Heater.**—The Ougrimoff Electric Heater (Calorifacteur Electrique, Système Ougrimoff). J. A. Montpéllier. The water is heated by an electric arc enclosed in the center of the containing vessel. 1200 w. L'Electricien—Sept. 22, 1900.

**Parvillée.**—The Parvillée System of Electric Heating (Appareils de Chauffage par l'Electricité Systeme Parvillée). J. A. Montpellier. A description of electric cooking devices of the Parvillée design, in which the heating effect is produced by the introduction of a metallo-céramique resistance. 1200 w. L'Electricien—Feb. 11, 1899.

**Plumbing Ventilation.**—See **PLUMBING—Ventilation.**

**Water Pipe Thawing.**—See **WATER PIPE—Thawing by Electricity.**

## ELECTRIC HOISTING.

See also **ELECTRIC ELEVATOR; HOISTING.**

Generators, Motors, and Switching Apparatus for Electric Hoisting Machinery (Generatoren, Motoren. und Schaltapparate für Elektrisch Betriebene Hebezeuge). F. Niethammer. A very elaborate discussion of the arrangement of electrical machinery of cranes, elevators, conveyors and similar apparatus. Two articles. 10000 w. Elektrotech Zeitschr—Jan. 11, 18, 1900.

**Chimney.**—A Chimney Two Hundred and Thirty Feet High. An illustrated description of an interesting piece of engineering, in which an electric hoist rendered valuable service. 700 w. Elec Rev—Nov. 27, 1895.

**Mines.**—Electric Hoists for Mines. Illustrated description of several hoists which have been in constant service for months. 1000 w. Ir Trd Rev—April 1, 1897.

The Electric Motor for Hoisting in Mines. Illustrated description of the electrical hoist at the Free Silver Mine, at Aspen, Col., with account of test. 1000 w. Ir Age—April 1, 1897.

## ELECTRICIAN—Licensing.

See **ELECTRICAL ENGINEERING—Municipal.**

## ELECTRIC IGNITION.

**Blasting.**—See **BLASTING—Electric.**

**Firedamp.**—See **FIREDAMP—Electric Ignition.**

**Gas Burner.**—See **GAS BURNER—Electric Ignition.**

**Gas Engine.**—See **GAS ENGINE—Electric Ignition.**

**Gasoline Engine.**—See **GASOLINE ENGINE—Electric Ignition; GASOLINE VEHICLE—Electric Ignition.**

**Oil Lamps.**—Electric Lighting of Oil Lamps (Ueber Elektrische Fernzündung von Oellampen). A drop of oil is lighted by contact with an incandescent platinum wire and the resulting flame communicated to the wick. 2500 w. Elektrotechnische Rundschau—March 1, 1897.

## ELECTRIC INDICATOR.

See also **ELECTRIC INSTRUMENT; ELECTRIC**

METER; ELECTRIC SIGNAL; SHIP TELEGRAPH.

An Indicator for Magnetic Rotating Fields and for Alternating Pressures (Ein Indikator für Magnetische Drehfelder und für Wechselstromspannungen). H. Ebert and M. W. Hoffman. A description of an instrument depending for its action upon the effect of magnetic fields upon cathode rays. 2000 w. Elektrotech Zeitschr—June 23, 1898.

**Boston Subway.**—Electrical Indicators in the Boston Subway. Illustrates and describes an apparatus adopted to prevent accidents and facilitate the handling of crowds. 600 w. R R Gaz—March 23, 1900.

**Crank Positions.**—Electric Indicator for Determining the Relative Position of the Cranks of Engines in Operation (Elektrischer Indikator zur Bestimmung der Relativen Kurbellage Laufender Maschinen). P. v. Kowaleff. An illustrated description of an apparatus, consisting of a voltmeter in circuit with commutators and a source of current, which indicates the relative position of the cranks of engines deriving alternating and rotary current dynamos. 700 w. Elektrotech Zeitschr—June 21, 1900.

**Maximum Demand.**—Notes on Maximum Demand Indicators. Louis J. Steele. Illustrated description of the Halsey maximum demand indicator, stating its advantages. 2500 w. Elec Rev, Lond—Jan. 5, 1900.

**Synchronism.**—Synchronism Indicator for Use with Parallel Alternating Currents (Einige Anordnungen von Synchronismusanzeigern zum Parallelschalten zweier Wechselstromquellen). Hermann Müller. A combination of a fixed and movable rotary field, with a pointer, the displacement of which indicates any departure from synchronism. 1800 w. Elektrotech Zeitschr—June 15, 1899.

## ELECTRIC INDUSTRY.

See also ELECTRICAL ENGINEERING; ELECTRICAL EXHIBITION; ELECTRICITY.

Applications of Electrical Science. G. F. Fitzgerald. Abstract of address to the Dublin Section of the Inst. of Elec. Engs. Brief review of the history of applied electricity, its progress, etc. 2300 w. Nature—May 10, 1900.

Electrical Advance in the Past Ten Years. Elihu Thompson. Abstract from "The Forum." Review of progress made in different lines. 2000 w. Min Ind & Rev—Feb. 3, 1898.

Electrical Advance in the Past Ten Years. Elihu Thomson. Abstract from "The Forum." Reviews the condition of the art ten years ago, and traces the advances and new applications of electrical energy. 2000 w. Elec Rev, N. Y.—Jan. 19, 1898.

Electrical Advance in the Past Ten Years. Elihu Thomson. Interesting review of the great progress in the electrical industries, and in the science of electricity. 6000 w. Forum—Jan., 1898.

Recent Progress in the Electrical Industries. Henry L. Doherty. Abstract of a presidential address delivered at the convention of the Northwestern Elec. Assn. at Milwaukee. 2000 w. Eng News—Jan. 25, 1900.

The Progress Made in the Generation of Electric Energy and Its Application to the Operation of Motors During the Past Fifty Years. Illustrated review showing progress and extent of electrical industries. 3000 w. Sci Am—July 25, 1896.

The Shifting Lines of Industrial Interest in Electricity. George Herbert Stockbridge. Tracing electrical evolution, from the lightning rod, through the voltaic pile, to the telegraph, the telephone, and electrical transmission of power. 4200 w. Eng Mag—Sept., 1896.

**Allgemeine Elektricitäts-Gesellschaft.**—The History of a Great Electrical Company. Some interesting information concerning the past history and future projects of the Allegemeine Elektricitäts Gesellschaft, Berlin, obtained in an interview with Herr Rathenau. Serial. Elec Rev—Nov. 15, 1895.

**America.**—See United States.

**American in Europe.**—American Electrical Engineering in Europe. Robert P. Porter, in the Philadelphia "Inquirer." Statistics and general information relating to the rapidity with which American electrical engineering is pushing its way. 2000 w. Elec Rev, N. Y.—Nov. 17, 1897.

**America vs. England and France.**—Electrical Development in England and France Compared with American Practice. J. McGhie. Reports very favorably regarding these countries, while admitting that electricity is not used as freely as in the United States. 2200 w. W Elec—Sept. 4, 1897.

**America vs. Great Britain.**—The Electrical Industry in America and Great Britain. J. R. Bainton. Extract from a paper before the Elec. Assn. of New South Wales. Contrasts the methods of these two countries. Serial. Aust Min Stand—July 5, 1900.

**Australia.**—Activity in the Electrical Field in Australia. C. Paulo Rei. A review of the rapid development of electric light plants and the construction of tramways, etc. 2200 w. W Elect'n—Dec. 2, 1899.

**Austria-Hungary.**—The Condition of Heavy Electrical Engineering in Austro-Hungary (Die Lage der Starkstromindustrie in Oesterreich-Ungarn). A general review of the electrical engineering situation, taken from the Vienna "Electro-Technicker." 1900 w. Zeitschr f Klein-u Strassenbahnen—Aug. 1, 1900.

The Status of the Heavy Current Industry in Austro-Hungary (Die Lage der Starkstromindustrie in Oesterreich-Ungarn). Emil Honigmann. A review of the work of the year 1899, with a complete table of existing plants, giving commercial and technical data of value. 7500 w. Elektrotech Zeitschr—Feb. 8, 1900.

**Berlin.**—The Position and Development of the Electro-Technical Industry in Berlin, in 1900 (Die Lage und Entwickelung der Elektrotechnischen Industrie Berlins im Jahre 1900). A general article, giving accounts of various applications of electricity. 2800 w. Die Elektrizität—March 17, 1900.

**Boston.**—Electrical Boston Thirty Years Ago. Thomas A. Edison. An article prepared by Mr. Edison for a newspaper while he was a Western Union night operator in Boston, Mass. It gives a most interesting idea of the concerns making apparatus in Boston at the time, and of their specialities. 1800 w. Elec Eng, N. Y.—Nov. 18, 1897.

**British.**—Electrical Development in the United Kingdom. Discusses the effect of municipalization and legislation upon the development of electrical enterprise in England. 5500 w. Engr, Lond—March 2, 1900.

Electrical Engineering. Editorial review of the past year in Great Britain, showing a decided improvement in business over the two previous years. 3000 w. Eng, Lond—Jan. 1, 1897.

Electrical Engineering in 1897. A sketch of the work in this field in England, reviewing its various branches. 3000 w. Engr, Lond—Jan. 7, 1898.

Electrical Engineering in 1898. A view of the year's progress in all the branches of electrical work, forming a portion of a general review of the engineering progress of the year. 4300 w. Engr, Lond—Jan. 6, 1899.

**British Law.**—The Common Law Liabilities of Electrical Undertakings. A summary illustrating the more important rules which must guide in negotiations with the public in England. 2200 w. Engng—July 6, 1900.

The Rights of Electrical Companies. W. Clyde. Jones. The design of the paper is to outline the course of judicial decision in a manner to be of service as general knowledge to business men and engineers engaged in electrical pursuits. Serial. Elec—July 22, 1896.

**British Legislation.**—Recent Legislation in Relation to the Supply of Electricity for Light and Power. Frank Balfour Browne. A discussion of the effect of legislation on the development of the industry. 1800 w. Elec Rev, Lond—Jan. 6, 1899.

**British Regulations.**—Report on the Dangers of Electrical Generation. Second interim report to the Home Department, of the committee appointed to inquire into and report upon certain dangerous trades, with editorial comment. 7500 w. Elect'n—July 16, 1897.

The Electrical Regulations of the Home Office. Editorial consideration of the Report of the Department Committee, for the protection of those engaged in the electrical industries. 3500 w. Elec Rev, Lond—July 30, 1897.

**Buenos Ayres.**—See South America; ELECTRIC LIGHTING.

**China.**—Electrical Notes in China. Francis B. Crocker. Part first discusses the development of the telegraph and the difficulties arising from the hostility of the natives. Describes the process of sending a Chinese telegram. Serial. Elec Wld & Elec Eng—June 17, 1899.

**China and Japan.**—Electricity and Electrical Engineering in China and Japan. R. Van Bergen. The writer gives but little encouragement to American enterprise in Japan, but considers China more hopeful, making suggestions as to the best way to secure attention. 1000 w. Elec Eng—March 10, 1897.

**East.**—Electrical Possibilities in the Far East. Philip Jaisohn. This first article discusses electrical trade, electrical engineering and investments in Japan. Serial. Elec Wld & Engr—Aug. 4, 1900.

**Era of Extravagance.**—The Era of Extravagance in the Electrical Business. Burton E. Greene. Showing why electrical industries were so long unremunerative, and the reasons for believing them to be now on a sound business footing. 3100 w. Eng Mag—Aug., 1896.

**Commercial Exploitation.**—The Commercial Exploitation of Electricity. Burton E. Greene. Showing how the mania for speculation has prevented the electric light and power industries profitable commercial returns. 5000 w. Eng Mag—Feb., 1896.

**Future Development.**—Future Electrical Development. An interview with Prof. Amos E. Dolbear, in which he mentions a few of the things he considers may transform business methods and habits of society. 2000 w. W Elec—Jan. 9, 1897.

**General Electric Company.**—Fourth Annual Report of the General Electric Company. Reports of Pres. C. A. Coffin, 1st Vice Pres. Eugene Griffin, and 3d Vice Pres. E. W. Rice, Jr., with editorial 2800 w. Elec Wld—May 2, 1896.

General Electric's Sixth Annual Report. Full report of the company, showing the earnings for the year to be less than those of last year. 6500 w. Elec, N. Y.—May 4, 1898.

**German Regulations.**—Safety Regulations for Electric Currents of Moderate Pressure (Sicherheitsvorschriften für Elektrische Mittelspannungs-Anlagen). The full text of the regulations reported by the committee of the German Electrotechnical Society for use in connection with currents of pressure between 250 and 1000 volts. 6000 w. Elektrotech Zeitschr—May 18, 1899.

See also **ELECTRIC APPARATUS; ELECTRIC TRAMWAY; ELECTRIC FUSE; ELECTRIC STATION.**

**Ireland.**—Electric Development in Ireland. Brief review of the progress being made in tramways and lighting, with particulars of some of the larger projects. 1700 w. Prac Eng—May 13, 1898.

**Italy.**—Electrical Progress in Italy During 1899. Enrico Biginami. A survey of the progress for the year. 1200 w. Elec Rev, N. Y.—March 7, 1900.

Recent Italian Electrical Developments. Giovanni Georgi. An account of electrical enterprises of recent date. 900 w. Elec Wld & Engr—May 5, 1900.

**Japan.**—Electrical Notes from Japan. F. B. Crocker. Considers the telegraph, telephone, electric light, electric power, electric railway, electrical manufacturing and education. Part first considers the telegraph. Serial. Elec Wld & Elec Engr—May 20, 1899.

Electricity in Japan. A review of the progress made, giving tabulated information of the Japanese electric companies and stations. Ill. 700 w. Elec Wld & Engr—Dec. 2, 1899.

**Newcastle-on-Tyne.**—See **ELECTRICAL ENGINEERING—Address, Heaviside.**

**New York.**—Greater New York and Its Electrical Features. Reviews the many uses of electricity already established and those in prospect, for transportation, lighting, telegraphing and telephoning. Ill. 8300 w. Elec Wld—Jan. 1, 1898.

**Sault Ste. Marie.**—The Electrcal Industries of Sault Ste. Marie. F. H. Clerque. Abstract of an address delivered before the Northwestern Elec. Assn. Most of the industries considered are electro-metallurgical processes. 1800 w. Elec Wld—July 2, 1898.

**South America.**—Electrical Work in South America. Brief account of progress, especially in Buenos Ayres. 900 w. Elec Rev, Lond—Dec. 25, 1896.

**Supply House.**—The Electrical Supply House, Past and Present. W. H. McKinlock. A review of the industry. 1200 w. Elec Eng—Jan. 6, 1897.

**United Kingdom.**—See **British.**

**United States.**—American Electrical Progress During 1899. Charles T. Child. A year's history of the development of electrical engineering and industry in the United States. 3500 w. Elec Rev, N. Y.—Jan. 3, 1900.

A Review of American Electrical Progress During the Year 1897. No startling discoveries, but steady advance in means and methods. A review of the most prominent changes. 1700 w. Elec Wld—Jan. 1, 1898.

Electrical Manufacturing interests. Thomas Commerford Martin. Discusses electrical manufacturing development in the United States and the conditions which favor it, with the future outlook. 2000 w. Chau—Oct., 1898.

**U. S. Export.**—The Beginnings of Electrical Export. A. A. Knudson. Statistics claiming to be authentic, with information on the past and present condition and future possibilities. 2800 w. Elec Eng—Jan. 6, 1897.

**U. S., Southern.**—Electrical Development in the South. The record of the year 1895 comprehensively reviewed, interesting electrical installations; applications of electricity in industrial operations. 7500 w. Tradesman—Jan. 1, 1896.

Southern Electrical Progress as Evidenced by the Work Performed During the Past Year. F. W. Willcox. Review of all branches of electrical work for 1896. 4500 w. Tradesman—Jan. 1, 1897.

## ELECTRIC INSTRUMENT.

See also **ELECTRIC APPARATUS; ELECTRIC INDICATOR; ELECTRIC MEASUREMENT; ELECTRIC METER; ELECTRIC TESTING; ELECTRO-PHYSICS; GALVANOMETER; VOLTMETER; WATTMETER.**

**Chauvin and Arnoux Instruments.**—Electrical Measuring Instruments (Instruments de Mesures Electriques). Report of committee upon the instruments of MM. Chauvin and Arnoux, including volt meters, ampere meters, recording galvanometers, resistance coils, etc., etc., with many illustrations. 7500 w. Bull de la Soc d'Encour—June, 1899.

**Compensator.**—A Compensator for Measurement of Tension and Volume of Current (Ein Kompensator für Spannungs-und Strom Messungen). R. Franke. A convenient rheostat apparatus, explained in diagram and shown also in actual form. 2500 w. Elektrotechnische Zeitschr—June 3, 1897.

**Electrometer.**—See **ELECTROMETER.**

**Faradmeter.**—A Faradmeter. M. I. Pupin. Illustrated description, also discussion. 2500 w. Trans Am Inst of Elec Engs—April, 1900.

**Fault Localizer.**—A Direct-Reading Fault Localizer. F. Charles Raphael. Illustrated description of instrument to facilitate the localisation of faults in light and power cables. 1000 w. Elect'n—March 12, 1897.

**Fessenden.**—Some New Electrical Apparatus. Reginald A. Fessenden. Part first describes a new tachometer and a new alternating-current tracer, giving illustrations. Serial. Elec Wld—Dec. 5, 1896.

**Frequency Indicator.**—A Frequency Indicator. George J. Yundt. Illustrates and describes an instrument based on the using of the repulsive effect of a magnetic field upon a live conductor perpendicular to it. 800 w. Elec Wld & Eng—Sept. 2, 1899.

A New Frequency Indicator. Account of an instrument invented by G. W. Meyer, for indicating the frequency of oscillating currents, depending on the fact that the heat generated in a wire magnetized by these currents is proportional to their frequency. 800 w. Elec Rev, Lond—Feb. 19, 1897.

**Galvanometer.**—See **GALVANOMETER.**

**High Potential.**—A 100,000-Volt Testing Set. C. E. Skinner. Gives general plan of apparatus made by the Westinghouse Electric & Manufacturing Co., for the Catract Construction Co. of Niagara Falls, by means of which tests may be made at any E. M. F. from 1200 volts to 100,000 volts. Ill. 1800 w. Elec Wld—March 5, 1898.

**Induction Balance.**—Preliminary Trial of an Interferential Induction Balance. C. Barus. Describes a device capable of a variety of applications in relation to alternating currents and to magnetic induction. 3300 w. Am Jour of Sci —Feb., 1897.

**Insulation.**—See **INSULATION—Electric Instrument.**

**Insulation Indicator.**—Apparatus for Direct Indication of Loss of Current (Isolationskontrollsystem zur Direkten Anzeige von Stromentweichungen). Dr. M. Kallman. A description of a special form of ampère meter by means of which imperfections in the insulation of a distributing system may be detected. Two articles. 7000 w. Elektrotech Zeitschr—Oct. 18, 20, 1898.

**Insulation with Alternating Currents.**—Insulation Meter for Alternating Currents (Isolationsmesser für Wechselstrom-Betriebsspannung). Dr. Gustav Benischke. Illustrating and describing the convenient portable apparatus of the Allgemeine Elektricitäts Gesselschaft, and giving examples of its use. 2500 w. Elektrotech Zeitschr—June 8, 1899.

**Kelvin.**—The Electrical Measuring Instruments of Lord Kelvin. J. Rennie. The practical side of Lord Kelvin's work. The investigations suited to the needs of the workman and the instruments by which these methods could be conveniently applied. His opportunities as a teacher and the lasting effect of his influence. 3800 w. Elect'n—June 19, 1896.

**Lorenz Resistance Apparatus.**—A New Lorenz Apparatus for the Determination of Resistance in Absolute Measure. Illustrated description. 1800 w. Elec Rev, Lond—July 10, 1896.

See also **ELECTRIC MEASUREMENT—Standard Ohm.**

**Meterology.**—Electricity in the Weather Bureau. Illustrated description of interesting features of the electrical instruments in use in the U. S. Weather Bureau in the Manhattan Life Building in New York. 1800 w. Elec Wld—Dec. 26, 1896.

**Nalder Resistance.**—The Nalder Portable Apparatus for Measuring Feeble Resistances (Appareil Portatif Nalder pour la Mesure des Faibles Résistances). M. Aliamet. Describing an improvement over the Wheatstone bridge, which avoids the errors due to the resistances of contact. 1000 w. L'Electricien—Oct. 28, 1899.

**Oscillograph.**—See **OSCILLOGRAPH.**

**Percentage Bridge.**—A Percentage Bridge. Herschel C. Parker. Describes a method devised by the writer, useful in electrical laboratories. 900 w. Trans Am Inst of Elec Engs—April, 1900.

**Phasemeter.**—See **ELECTRIC METER.**

**Photographing Current Curves.**—A Portable Apparatus for Photographing Curves of Two Variable Currents Simultaneously. Describes and illustrates the apparatus and its uses. 1600 w. Elec Wld & Elec Engr—July 22, 1899.

**Portable Testing.**—Portable Direct Current Measuring Instruments for Station Tests. Harris J. Ryan and E. L. West. Part first treats of the details of construction of direct-current instruments. Ill. Serial. Sib Jour of Engng—April, 1900.

**Power Factor.**—See **ELECTRIC METER.**

**Review.**—Electrical-Instrument Making During the Period 1872-1897. W. A. Price. The general course of progress is reviewed with brief notice of some important inventions. 2800 w. Elec Rev, Lond—Nov. 12, 1897.

**Secohmmeter.**—The Secohmmeter as Used in the Electrical Engineering Laboratory. W. H. Freedman. Illustrated description of apparatus and its uses. 1800 w. Sch of Mines Quar—Nov., 1896.

See also **INDUCTANCE.**

**Siemens and Halske.**—New Universal Register, Galvanometer and Insulation Measure by Siemens & Halske (Ueber ein Universal Registririnstrument, Universal Galvanometer und Isolationsmesser von Siemens & Halske). Giving full details of construction and use of three new and valuable instruments. 5000 w. Elektrotechnische Zeitschr—April 1, 1897.

**Supports.**—Apparatus for Eliminating Vibration from the Supports of Delicate Instruments. A statement of the principal features of an apparatus devised by W. H. Julius, of Amsterdam. 1000 w. Elec Rev, Lond—Oct. 23, 1896.

**Testing.**—Construction of an Electrical Testing Set. James F. Hobart. Part first gives description and engravings of a measuring instrument constructed by the writer. The making is described. Serial. Am Elect'n—Oct., 1897.

**ELECTRIC INVENTION.**

See also **ELECTRIC PATENTS.**

The Status of Electrical Invention. William A. Rosenbaum. It is proposed to take up the main branches, and to call attention to the inventions in each. The present article deals with the telegraph and telephone. 3000 w. Jour Fr Ins—Dec., 1896.

**Patents.**—Patents and Electrical Inventions. Henry C. Townsend. A review of the difficulties and annoyances from which electrical inventors have suffered. 1600 w. Elec Eng—Jan. 6, 1897.

**Tesla.**—Some Novel Inventions of Nikola Tesla. J. Wright. Illustrates and describes an electrolytic meter, and other devices. 2000 w. Elec Engr, Lond—Aug. 10, 1900.

The Inventions of Nikola Tesla. From the N. Y. "Sun." A brief review of what he has accomplished. 1100 w. Prog of the Wld—June, 1896.

See also **ELECTRIC CONDENSER; ELECTRIC OSCILLATOR; ELECTRIC TRANSMISSION; ELECTRO-PHYSICS; INDUCTION COIL; INTERRUPTER.**

**ELECTRICITY.**

See also **ELECTRICAL ENGINEERING; ELECTRIC EQUIPMENT; ELECTRIC INDUSTRY; ELECTRIC PLANT; ELECTRO-PHYSICS.**

**Agriculture.**—The Application of Electricity to Agriculture. George E. Walsh. Some methods used to stimulate crops and to lessen the cultivation and transportation labor. 1500 w. Elec Rev, N. Y.—Oct. 10, 1900.

Application of Electrical Energy to Agriculture (L'Application de l'Energie Electrique à l'Agriculture). Paul Renaud. An illustrated general article on various applications of electric motors to farm work. Serial. Electricien—April 28, 1900.

Electric Energy in Agriculture (L'Energie Electrique en Agriculture). Paul Renaud. Chiefly devoted to the Zimmermann electric electric plow, with illustrations of construction, and details of performance. Serial, part I. 1500 w. Revue Technique—Dec. 10, 1899.

Electricity on a Farm. Brief illustrated description of the utility and advantages of electricity in farm and dairy operations as used on the dairy farm of Mr. Levi P. Morton. 1000 w. Elec Wld—Feb. 6, 1897.

Electricity on Farms. Description of an electrical plant as introduced on a farm in Mecklenburg. Shows a difference in expenses of $285.60 in favor of the electric plant. 1000 w. Cons Repts—Jan., 1897.

The Electric Lighting and Power Plant on the Lancken Estate (Elektrische Beleuchtungs und Kraftübertrangungsanlage auf dem Rittergut Lancken). An illustrated account of a complete agricultural plant on a large estate in Rügen, Prussia, showing numerous applications of electric power to agricultural work. 1200 w. Elektrizität—March 4, 1899.

The Borsig Electric Plow (Der Elektrische Pflug der Maschinenfabrik von A. Borsig in Berlin). F. Brutschke. Illustrating a system of transmission from a central point to a number of fields to deliver current to cable-drawn plows operated by electric motors. 1800 w. Elektrizität—Jan. 21, 1899.

The Electric Wagon on the Farm. Description, with two elevations, of an electric traction engine for plowing and general farm work, the product of the inventive skill of O. W. Ketchum, of Baltimore, Md. 1000 w. Can Eng—Aug., 1896.

The Applications of Electricity to Agriculture in Germany (L'Electrotechnie Agricole en Allemagne). Paul Renaud. A long review of the extent to which electricity has been used in agricultural work in Germany, and a discussion of its possible progress in France and her colonies. Many devices are illustrated. 15000 w. Bull de la Société d'Encour—Jan., 1899.

See also **Horticulture; Plant Growth.**

**Animal.**—Animal Electricity. W. S. Hedley. Considers various electrical results of excitation and the theories advanced. 2800 w. Elec Rev, Lond—Sept. 22, 1899.

See also **Muscular.**

**Atmospheric.**—Atmospheric Electricity. Arthur Schuster. Delivered before the Royal Inst. of Gt. Britain. A review of early experiments and observations, with explanation of various phenomena. 8000 w. Nature—Jan. 2, 1896.

The Electrification of the Atmosphere. An account of contribution to this subject made in recent years, and of researches. 3000 w. Engng —Jan. 5, 1900.

The Origin of Atmospheric Electricity. Prof. Cleveland Abbe, in the "U. S. Monthly Weather "Review." Notes the suggestions of many scientists, but considers the tests have given only negative results, and that the problem is still unsolved. 1400 w. Nature—March 9, 1899.

**Decorative Effects.**—Electricity in the Schilling Gardens. R. W. Lohmann. Illustrates and describes the private grounds of A. Schilling, in Oakland, Cal., with special reference to the electrical features. 2800 w. Jour of Elec—Oct., 1898.

**Dentistry.**—Electricity as Applied to Dentistry. J. Warren. Brief description of some of the devices by which electricity is made useful in dentistry. 1000 w. Elec, Lond—April 24, 1896.

Some Possibilities of Electricity in Dental Surgery. Editorial upon speech made by G. H. Guy at the gathering of the Central Dental Assn., at Newark, N. J., showing that the applications of electricity to dental work are constantly increasing. 800 w. Elec Rev, Lond—May 1, 1896.

See also **ELECTRIC HEATING.**

**Direct Production.**—See **ELECTRICITY DIRECT.**

**Domestic Applications.**—Unutilized Comforts of Electricity. R. S. Hale. A general description of various devices, which can be easily applied and do not add much to cost of wiring a house. 1000 w. Elec Wld & Engr—Sept. 22, 1900.

Electricity in Private Houses. Theodore Waters. Describes the use of electric elevators in private houses, and the arrangements for safety in operation, without the employment of attendant. Illustrates and briefly describes the fine facilities for lighting a country residence and other ingenious uses of electricity. 1800 w. Elec Wld—Aug. 8, 1896.

Electricity in the Household. George Hell Guy. A review of the various ways in which electricity has been adapted to the needs of domestic life, adding to the beauty, comfort and protection of the home. 3000 w. Chau—Oct., 1897.

See also **ELECTRIC LIGHTING—Residence.**

**Farm.**—See **Agriculture; Horticulture.**

**Franklin Experiments.**—Benjamin Franklin and His Electrical Experiments. Edward N. Saunders, Jr. Popular account of the early work of Franklin, and description of some of his experiments. 3000 w. Yale Sci M—Jan., 1898.

**Franklin Institute.**—The Seventy-fifth Anniversary of the Franklin Institute from an Electrical Standpoint. Edwin J. Houston. Reviews the progress and the part played by the Institute. 8000 w. Jour Fr Inst—Nov., 1899.

**Frictional.**—The Mechanics of Frictional Electricity (Die Mechanik der Reibungselektricität). J. F. Weyde. An endeavor to indicate mechanically the molecular action which occurs in the generation of frictional electricity. 2000 w. Elektrotech Zeitschr—April 28, 1898.

**History.**—A Biographical History of Electricity. Franklin's work is reviewed. 1300 w. Am Elect'n—Aug., 1896.

A Biographical History of Electricity. Introductory remarks, and biographical history of William Gilbert, of Colchester, are given in part first. Serial. Am Elect'n—May, 1896.

Epoch-Making Events in Electricity. G. H. Stockbridge. Arago's experiments and the beginnings of magneto-electricity. Serial. Eng Mag—June, 1897.

Epoch-Making Events in Electricity. G. H. Stockbridge. Describing Volta's experiments and the succession of electricity of motion to that of tension. Ill. 4200 w. First paper. Eng Mag—April, 1897.

Epoch-Making Events in Electricity. G. H. Stockbridge. Considering Oersted's discovery. and Ampere's work as a logical sequence thereof. Second paper. 4300 w. Eng Mag—May, 1897.

See also **ELECTRIC CURRENT—Centennial Address.**

**History Volta.**—The Centenary of Volta's Discovery of the Electric Battery. A brief review of Volta and his time, with illustrations. 2200 w. Elec Wld & Elec Engr—May 13, 1899.

**Horticulture.**—Electricity in Horticulture. Abstract of a report made by L. H. Bailey on the experiments carried on at Cornell University with a view of determining the influence of electricity in horticulture. Ill. 1800 w. W Elec—April 25, 1896.

**Machine Shop.**—Electricity in the Modern Machine Shop. Louis Bell. The new processes based on the use of the electric current. Ill. Serial. 3d part. 3100 w. Eng Mag—Aug., 1897.

See also **ELECTRIC DRIVING.**

**Muscular.**—Muscular Electricity. J. Wright. A study of the electrical phenomena attendant on a simple muscular contraction. Serial. Elec Rev, Lond—Oct. 15, 1897.

See also **Animal.**

**Navy.**—See **ELECTRIC EQUIPMENT—Warship.**

**Omaha Exposition.**—The Trans-Mississippi and International Exposition. An illustrated account of some of the electrical features of the Omaha fair, and the effects of the illumination. 1800 w. Elec Rev, N. Y.—July 20, 1898.

**Pan-American Exposition.**—Electricity at the Pan-American Exposition. Frank C. Perkins. Brief illustrated account of the electrical attractions to be carried out. 1700 w. Elec Wld & Engr —March 24, 1900.

See also **ELECTRICITY BUILDING.**

**Paris Exposition.**—Electricity at the Paris Exposition of 1900. An illustrated description of the nature and features of this Exposition, especially the electrical exhibits. 9800 w. Elec Wld & Engr—May 5, 1900.

See also **DYNAMO; ELECTRICITY BUILDING; ELECTRIC STATION.**

**Plant Growth.**—The Influence of Electricity upon the Growth of Plants (Einfluss der Elektrizität auf das Wachstum der Pflanzen). Giving an interesting résumé of the subject showing the effect to vary with the nature of the plant: also the use of electricity to destroy injurious germs. 2000 w. Die Elektrizität. Feb. 13, 1897.

The Action of Electricity on Plants. E. H. Cook. Abstract of a paper read before the British Assn. Deals with its influence on seed germination, growing plants, etc. 2000 w. Elect'n, Lond—Oct. 7, 1898.

Electro-Germination. Asa S. Kinney. Illustrated description of apparatus and methods. Serial. Sci Am Sup—May 15, 1897.

Amherst Experiments on the Electro-Germination of Plants. Extended abstract from a bulletin issued by the Hatch Experiment Station of the Massachusetts Agricultural College describing a series of experiments carried out by Mr. Asa S. Kinney. Ill. 2400 w. Elec Eng—March 17, 1897.

**Review.**—Electricity During the Last Five Years. Franz Bendt. Translated from the German "Ueber Land und Meer." Reviews briefly the history of the science and the most recent advances. 2200 w. Chau—Sept., 1897.

Electricity Simplified. Nelson W. Perry. The first of a series of papers, written in popular style, aiming to give a clear understanding of this subject. Serial. Sci Mach—Jan. 15, 1896.

The Present Development and Future Possibilities of Electricity. William Baxter, Jr. An article in two parts. The first number deals largely with the present and the causes that have retarded progress, but begins to examine the future prospects. 2000 w. Am Mach—Feb. 13, 1896.

A Year's Electrical Progress. Charles G. Armstrong. From the "Chicago Record." Reviews the progress in all the branches of electricity for 1895. 3400 w. W Elec—Jan. 11, 1896.

**Shipboard.**—See **ELECTRIC EQUIPMENT—Ship; Warship.**

**Spanish-American War.**—See **Warfare.**

**Tennessee Exposition.**—The Electrical Features of the Tennessee Centennial. Illustrated description of some of the beautiful effects in lighting. and of the plant and applications for power. 1700 w. Elec Wld—Oct. 9, 1897.

**Terminology.**—Practical Electrical Definitions. Louis Denton Bliss. Clear explanation of some of the electrical terms most frequently met with in reading electrical journals. 1300 w. Mach, N. Y.—Jan., 1898.

Torque and Counter-Torque, Electromotive Force and Counter-Electromotive Force. The terms given in title are explained, and examples of their action given. 600 w. Am Mach—May 7, 1896.

**Tesla Address.**—Tesla on Electricity. His address in full on the occasion of the commemoration of the introduction of Niagara Falls power in Buffalo. Given at the Endicott Club, Jan. 12, 1897. 6000 w. Elec Rev—Jan. 27, 1897.

**Theft.**—Theft of Electricity (Diebstahl an Elektrizität). A discussion by Dr. Dernberg as to the legal nature of electricity as a "product," in cases of stealing current from wires for power or lighting. 2000 w. Elektrotech Rundschau—Jan. 15, 1897.

**Warfare.**—Electricity in Modern Warfare. Editorial on the part played by the electrical engineers and manufacturers in the preparations for war. 700 w. Elec Rev, N. Y.—April 6, 1898.

Manifold Uses of Electricity in Time of War. From the "Boston Transcript." Discusses the urgency of the formation of an electrical corps for the army and navy, as electrical devices are unfamiliar to any but trained experts. 1800 w. Bos Jour of Com—March 26, 1898.

The Use of Electricity in the Spanish American War. Thomas G. Grier. Paper read before the Chicago Elect. Assn. Summary of the applications, describing the methods employed at Fort Wadsworth, just below New York, the mines in Boston harbor, and other devices. 3000 w. Elec Wld—Oct. 15, 1898.

See also **ELECTRIC APPARATUS—Military; ELECTRIC EQUIPMENT—British Military; Military.**

**ELECTRICITY BUILDING.**

See also **ELECTRICAL EXHIBITION.**

**Pan-American Exposition.**—Electricity at the Pan-American Exposition. A description and floor plan of the Electricity Building. 1500 w. W Elect'n—Sept. 22, 1900.

**Paris Exposition.**—Opening of the U. S. Sections in Electricity Building, Paris Exposition. An account of the opening and plans of the American Court of Honor, with illustrations. 2000 w. Elec Wld & Engr—June 30, 1900.

The Crest of the Palace of Electricity. From "L'Illustration." Illustrated description. 1200 w. Sci Am Sup—July 14, 1900.

The Electricity Palace at the Paris Exposition (Exposition de 1900. Le Palais de l'Electricité). J. A. Montpellier. A general description of the electrical building and the "Water Chateau," with a plan. 1100 w. Electricien—April 21, 1900.

The Palace of Electricity at the Exposition of 1900 (Exposition de 1900. Palais de l'Electricité). E. Weil. Giving details of the framework of the construction of this important building of the exposition, and interior and exterior views, including the Chateau d'Eau, or illuminated electric fountain. 3000 w. 1 plate. Génie Civil—Sept. 1, 1900.

See also **PARIS EXPOSITION.**

**ELECTRICITY DIRECT.**

See also **CARBON—Energy Transformation; ELECTRIC CELL—Coal Gas; Jacques Carbon; Thermo-Tropic; THERMO-ELECTRICITY.**

Electricity Direct from Carbon. C. J. Reed. An article written in refutation of the ideas set forth in a recent paper by Dr. Alfred Coehn. The writer claims that he did not prove electricity could be obtained direct from carbon, but rather that carbon was obtained from electricity, and points out errors. 900 w. Elec Wld—April 25, 1896.

Electricity Direct from Carbon. J. H. Hellweg, Jr. Reviews briefly the history of this subject tracing progress to the present time, and gives investigations of the writer. The experimenters think they have proved the production of electricity from carbon direct. 3500 w. Elec Wld—July 24, 1897.

Electricity from Carbon Without Heat. Willard E. Case. A lecture delivered before the N. Y. Elec. Soc., Feb. 24. A résumé of the subject, giving the essential features of the devices thus far employed to oxydize carbon without heat, and suggesting the line along which the writer thinks success most probable. 5000 w. Elec Eng—March 3, 1897.

Electricity Direct from Coal. A. J. Rogers. Read at the meeting of the Northwestern Elec. Assn. A review of what has been done in this field, and the importance of having the problem solved. 1800 w. Elec, N. Y.—Feb. 1, 1899.

Electricity Direct from Coal (Elektricität Direkt aus Kohle). A general review of the efforts which have been made during the past ten years to accomplish the direct generation of electricity without the intermediate conversion into mechanical energy. Two articles. 9000 w. Zeitschr f Elektrochemie—Sept. 5, 20, 1897.

Electricity Direct from Fuel. C. J. Reed. A criticism of work reported by Dr. Borchers in a paper read before the German Electro-Chemical Society, and published in "Zeitschrift für Elektrochemie." Serial. Elec Wld—Jan. 22, 1898.

Electricity from Coal—with and without Heat. Willard E. Case. A résumé of some of the efforts to solve this problem. 1700 w. Elec Eng—Jan. 6, 1897.

Electricity Generated Direct from Coal (L'Electricité Obtenue Directement par Combustion du Charbon). E. Lievenie. A review of the various methods which have been proposed since the time of Becquerel in 1855. 1500 w. Revue Technique—Feb. 25, 1899.

Fuel Energy into Electrical Energy. Elihu Thomson. Reviews the various types of apparatus for effecting the conversion, and concludes that there is not for the present any danger of boilers and engines passing out of use. 1500 w. Elec Wld—Jan. 2, 1897.

On the Oxidation of Carbon at Ordinary Temperatures by Means of Atmospheric Oxygen with the Production of Electrical Energy. Willard E. Case. Presented before the Royal Society. Investigations in which ferric chloride was used as the carrier of oxygen. 4000 w. Elec Wld & Elec Engr—July 22, 1899.

The Direct Conversion of Heat into Electricity. Harry Barringer Cox. Abstract of a lecture delivered before the N. Y. Elec. Soc. Describes his work in this field. Discussion follows. 3000 w. Elec Eng—June 2, 1897.

The Direct Production of Electrical Energy. Bertram Blount. Reviews a recent record of experiment by Herr Ernst Andreas in the "Zeitschrift für Elektrochemie," who has been revising and extending the work of Dr. Borchers. 1300 w. Elect'n—Nov. 20, 1896.

The Direct Transformation of Heat into Electrical Energy (Sur la Transformation Directe de la Chaleur en Energie Electrique). Marcel Depres. An account of a new method of generating an electric current direct from heat; based on the discovery by M. Guillaume upon the variation in magnetic properties, with heat, of certain alloys of iron and nickel. 1200 w. Comptes Rendus—Oct. 11, 1897.

The Electrical Transformation of the Energy of Carbon. An editorial review of the attempts, failures, and partial successes in this field of invention. 1200 w. Elect'n—Aug. 14, 1896.

The Energy of Carbon. C. J. Reed. Pure carbon alone is considered, and a study is made of the possibilities and limitations in transforming the energy of carbon into available forms of energy. Serial. Elec Wld & Elec Engr—Aug. 12, 1899.

The Inefficiency of the Direct Methods of Converting Heat into Electrical Energy. Leon Le Pontois. Paper read before the Engs. Soc. of W. Penna. The writer's reasons for believing that the most economical solution of the problem lies in the construction of a more perfect heat engine. Serial. Elec—Nov. 20, 1895.

The Present Status of the Direct Generation of Electricity from Fuel (Ueber die Bisherigen Bestrebungen, Elektricität Unmittelbar aus Brennstoffen zu Erzeugen). A historical review of the subject from the time of Mayer to the present day. Paper read before the Electrotechnic Society by Dr. Weber. 2500 w. Elektrotech Zeitschr—Feb. 25, 1897.

**Jacques Cell.**—See **ELECTRIC CELL—Jacques Carbon.**

**Short.**—Electricity from Coal. C. J. Reed. On the method of Sidney H. Short, giving figures from a patent issued Oct. 13, 1896. 1400 w. Elec Wld—Jan. 15, 1898.

**Tommasi.**—Electrical Energy Produced Directly from Carbon. D. Tommasi. Describes the writer's battery and its theory. 1000 w. Elec Rev, Lond—May 12, 1899.

**ELECTRICITY SUPPLY STATION.**

See **ELECTRIC STATION.**

**ELECTRIC LAMP.**

See also **ARC LAMP; ELECTRIC LIGHTING; INCANDESCENT LAMP.**

Development of Electric Lamps. André Blondel. Abstract of a paper read before the inter. Elec. Cong., at Paris. Reviews the progress and the improvements desirable in arc and incandescent lamps. 3300 w. W Elect'n—Sept. 29, 1900.

Electric Lighting. H. H. Norris. Illustrated description of the incandescent lamp and the arc lamp. 3300 w. Sib Jour of Engng—May, 1897.

**Arc.**—See **ARC LAMP.**

**Incandescent.**—See **INCANDESCENT LAMP.**

**Nernst.**—See **NERNST LAMP.**

**Safety.**—See **SAFETY LAMP—Electric.**

**Shades.**—Conical and Spherical Shades. I. C. Thompson. Gives results of experiments made for the purpose of comparison. 900 w. Elec Eng, N. Y.—May 12, 1898.

**ELECTRIC LAUNCH.**

See **ELECTRIC BOAT.**

**ELECTRIC LIGHT BATH.**

Electric Light Baths. Brief account of the appliances used in giving these baths, and their advantages. 800 w. Elect'n, Lond—May 5, 1899.

**ELECTRIC LIGHT CONVENTION.**

**Edison.**—The Association of Edison Illuminating Companies; Its Field and Work—Past, Present and Future. John W. Lieb, Jr. Presidential address before the Saratoga Springs Convention, Sept., 1900. 2000 w. Elec Rev, N. Y.—Sept. 12, 1900.

The Field and Work of the Association of Edison Illuminating Companies. J. W. Lieb, Jr. Presidential address at the Saratoga convention of the Association. 2100 w. W Elect'n—Sept. 22 1900.

The Twenty-first Edison Convention. An outline of the proceedings of this convention, with a general review of some of the work of past conventions. 4000 w. Elec Wld & Engr—Sept. 15, 1900.

Edison Lighting Interests. Reviews the history of the Association of Edison Illuminating Companies. 3800 w. W Elec—Sept. 11, 1897.

Eighteenth Convention of the Association of Edison Illuminating Companies. Address of President Insull at Niagara Falls, on Sept. 14. 2500 w. Elec Eng—Sept. 16, 1897.

**National.**—National Electric Light Association. Report of the proceedings of the convention held at Niagara Falls, June 8, 9, and 10, 1897. 6000 w. Elec Wld—June 12, 1897.

**ELECTRIC LIGHT FIXTURE.**

The Design of Electric Light and Gas Fittings. Criticism of an article published in "Lighting," on the adaptation of electric lamps to decoration as well as illumination of domestic interiors. 1800 w. Jour Gas Lgt—July 27, 1897.

The Evolution of Electric Lighting Fixtures. Richard N. Dyer. Read before the National Assn. of Gas and Electric Fixtures, Niagara Falls, Aug., 1897. A statement of the development of the electric fixtures and the combination fixtures. 2800 w. Elec Eng—Sept. 2, 1897.

**ELECTRIC LIGHTING.**

See also **ARC LIGHTING; ELECTRIC DECORATION; ELECTRIC LAMP; ELECTRIC LIGHT; ELECTRIC PLANT; ELECTRIC SIGN; ELECTRIC STATION; ELECTRIC TOWER; INCANDESCENT LIGHTING.**

Electric Lighting. Henry Stooke. Part first consists of an introduction of subject and definition of arc lamp. Ill. Serial. Ill Car and Build—Feb. 26, 1897.

Facts about the Electric Light. A. G. New and A. J. Mayne. The object of the paper is to place before readers, in simple language, a few leading facts about electricity as applied to the requirements of everyday life in order to remove the impression of danger, mystery and enormous cost. 2400 w. Ill Car & Build—Oct. 2, 1896.

The Importance of Proper Methods of Illumination. F. A. Bowman. Read at meeting of Can. Elec. Assn. Discusses means of increasing illumination and the necessity of trying to please customers, if competition is successfully met, and points to this end. 2500 w. Can Elec News—July, 1898.

**Aberdeen Harbor.**—Proposed Scheme for Electric Lighting of Aberdeen Harbor. Abstract of report as published in the "Aberdeen Journal." Description with estimate of cost. 800 w. Elec Eng, Lond—Sept. 11, 1896.

**Advantages.**—Some Advantages of Electric Light. George D. Shepardson. A paper read before the Minnesota Chapter of the American Inst. of Architects. Two various methods of using the electric light both for illumination and illumination appearance are dwelt upon and the advantages stated. 1600 w. Imp Bul—April 17, 1896.

**Advertising.**—See **ELECTRIC SIGN.**

**Albany Capitol.**—Electric Lighting in the Albany Capitol. Illustrates and describes the work. 2000 w. Arch Rec—Oct.-Dec., 1899.

**Apparatus.**—Modern Apparatus vs. Existing Conditions. W. J. Buckley. Abstract of a paper read before the Northwestern Elec. Assn., Milwaukee. Points of interest in electric lighting, with suggestions to buyers of new apparatus. 3500 w. Elec Eng—Jan. 22, 1896.

**Arc.**—See **ARC LIGHTING.**

**Arches, Columbus, O.**—Electric Light Arches at Columbus, O. Engraving showing the appearance and details of construction, with explanation of how they came to be erected. 700 w. Elec Eng, N. Y.—Nov. 11, 1897.

**Architecture.**—Electric Lighting as Applied to Architecture. Thomas Ekin. Read at meeting of the Archt. Assn. Discusses the use of the incandescent electric lamp and urges the consideration of each room separately with a view to the purpose for which it is to be used, general surroundings, etc. Also considers the wiring. 2200 w. Elec, Lond—Nov. 16, 1898.

**Art Club, Philadelphia.**—A Small Lighting Plant for a City Building. Illustrated description of plant installed in the Art Club, Philadelphia. 900 w. Eng Rec—July 24, 1897.

**Artistic, Glasgow.**—Artistic Electric Lighting. A criticism of the inartistic work often seen, and a description of a place recently opened in Glasgow, known as "Miss Cranston's New Lunch and Tea Rooms," which is highly praised. Ill. 2000 w. Elec Eng, Lond—June 18, 1897.

**Australia.**—Electric Lighting in Australia. Henry J. Spencer. A brief review of electric lighting matters,—which are not very largely developed in Australia. 3000 w. Elect'n—Aug. 21, 1896.

**Automatic Extinction.**—The Automatic Extinction of Lamps. Describes a device in use at Portsmouth, Eng., where each lamp pillar carries an arc lamp as well as two incandescent lamps, by which the arc lamps are automatically put out and the incandescent lighted at midnight. Ill. 1000 w. Elec Rev, Lond—March 26, 1897.

**Belfast, Ireland.**—Electric Lighting in Belfast. Victor A. H. McCowen. Abstract of paper read before the Inst. of Mech. Engs., at Belfast. An exhaustive description of the plant, distribution, gas-engine, power, etc., with some data and discussion. 6800 w. Elect'n—Aug. 7, 1896.

Electric Lighting in Belfast. Victor A. H. McCowen. Description of the system. Serial. Ind & Ir—July 31, 1896.

**Bolton, England.**—Electric Lighting at Bolton, England. Harold Lomas and Herbert C. Gunton. Illustrated description of a municipally controlled plant. 1800 w. Elec Wld—July 3, 1897.

**Boston Contract.**—The New Public Lighting Contract in Boston. Editorial review of an agreement making the lighting company merely an agent of the city, subject to arbitration. 1200 w. Eng Rec—Oct. 1, 1898.

**Brighton, England.**—The Electric Lighting of Brighton, England. Fred Bathurst. A brief illustrated description of the electric lighting features of this popular seaside resort. 5700 w. Am Elect'n—June, 1897.

**Bristol, Eng.**—Notes on the Electric Lighting System at Bristol, with Special Reference to Auxiliary Plant. H. Faraday Proctor. Read before the British Assn. An outline of the system with results of the working of some of the auxiliary plant. Alternating current is supplied to private customers, and continuous current is used for the public street lighting. 2500 w. Elec Rev, Lond—Sept. 16, 1898.

**British.**—Electric Lighting in 1895. The history of the electric light industry in the United Kingdom. 900 w. Jour Gas Lgt—Dec. 31, 1895.

The Commercial Aspects of Electric Lighting in Great Britain. Robert Hammond. A study of the cost of production of electrical energy in the United Kingdom. The curious Parliamentary regulations governing the establishment of electric lighting plants are described at length, and a comparison made between eleven stations showing low producing costs. The paper is highly instructive and of great interest. 4000 w. Eng Mag—Jan., 1899.

**British Guiana.**—Electric Lighting in British Guiana. Samuel Vyle. Brief account of the introduction. 1500 w. Elect'n—Jan. 29, 1897.

**British Legislation.**—Electric Lighting Acts, 1882 and 1888. Regulations issued by the Board of Trade for securing the safety of the public, and for ensuring a proper and sufficient supply of electrical energy. 4800 w. Eng, Lond—Feb. 7, 1896.

**British Taxes.**—The Rating of Electric Lighting. Editorial discussion, and outline of the principles upon which the assessments are now made. 1500 w. Engng—June 8, 1900.

**Buenos Ayres.**—The Electric Lighting and Tramways of Buenos Ayres. An illustrated detailed description. Serial. Elec Rev, Lond—July 13, 1900.

See also **ELECTRIC INDUSTRY—South America.**

**Buffalo, N. Y.**—Electric Lighting Progress in Buffalo, N. Y. Report of extensions being made which will make this city one of the best lighted in the United States. 1600 w. Elec Rev—Aug. 18, 1897.

**Calcutta.**—The Electric Lighting of Calcutta: Messrs. Kilburn & Co.'s Project. Discusses unfavorably the proposed low-tension scheme of Messrs. Kilburn & Co. 2000 w. Ind Engng—Aug. 15, 1896.

**Cape Town.**—Electric Lighting in Cape Town. From report of A. P. Trotter. The work seems to be very inferior and unsatisfactory. 2500 w. Eng, Lond—Nov. 20, 1896.

**Car.**—See **CAR LIGHTING—Electric.**

**Carlisle, Eng.**—Carlisle Electric Lighting. Charles D. Burnet. Read before a meeting of the Inc. Assn., of Munic. and Co. Engrs. Illustrates and describes the system, buildings, plant, etc. 2200 w. Elec Eng, Lond—June 8, 1900.

**Casino, Royan, France.**—Illumination of the Municipal Casino of Royan. Illustrated description. 1000 w. W Elec—Feb. 1, 1896.

**Chamber of Deputies, Paris.**—The Electric Lighting of the Palais Bourbon, Paris (Eclairage Electrique du Palais Bourbon, à Paris). An illustrated account of the isolated plant of the palace of the French Chamber of Deputies, with plan of the building. The generators are driven by double cylinder gas engines. 1500 w. 1 plate. Le Génie Civil—Sept. 10, 1898.

**Chicago Coliseum.**—The Lighting of the Coliseum. Illustrates and describes the arrangements for lighting an auditorium said to have a capacity of 10,000. 1700 w. W Elect'n—Sept. 8, 1900.

**Coal Mines.**—The Lighting of Collieries by Electricity. The rapidity with which the electric light is being adopted for this purpose, with account of installation and some difficulties, and examples where this mode of lighting is used. 2800 w. Ir & Coal Trds Rev—June 5, 1896.

The Lighting of Collieries by Electricity. The value of electricity for this purpose, the conditions of underground lighting, the difficulties and suggestions, with some examples. 2500 w. Can Min Rev—June, 1896.

See also **SAFETY LAMP—Electric.**

**Colombo, Ceylon.**—Municipal Lighting, Colombo. Reports new arrangements which will secure six times the quantity of light for less than the sum paid for the present supply. 1200 w. Ind Engng —July 16, 1898.

**Congressional Library.**—Tests of the Illumination of the Rotunda in the Building for the Library of Congress. Cary T. Hutchinson. Describes the arrangements of the lights and the manner of testing. Ill. 1800 w. Elec Eng, N. Y.—Nov. 4, 1897.

**Convention.**—See **ELECTRIC LIGHT CONVENTION.**

**Coöperative, Belgium.**—Coöperative Electric Lighting in the Village of Borsbeke, Belgium. H. Schoentjes. An account of the electric lighting system of this small commune. 1000 w. Elec Eng—April 28, 1897.

**Cost.**—Cost of Electric Light. Alton D. Adams. Considers some of the reasons for difference in cost as compared with gas, and the ways in which the charge is regulated. 1000 w. Sci Am —March 11, 1899.

**Country Residence.**—Lighting of a Country Residence. E. G. Bernard. Illustrated description of a simple system for residence lighting. 1000 w. Am Elect'n—Nov., 1896.

The Lighting of Country Residences. Illustrated description of a number of small lighting plants, with and without storage battery adjuncts, and a discussion of the essential features of such installation. 2000 w. Eng Rec—April 1, 1899.

**Crocker's Book.**—A Practical Exposition of Electric Lighting. Wm. A. Anthony. An elaborate review of Prof. Crocker's recent book. 3800 w. Eng Mag—July, 1896.

**Croydon, Eng.**—The Electric Lighting of Croydon. Brief illustrated description. 2800 w. Elec Rev, Lond—Nov. 6, 1896.

**Cumbuslang, Scotland.**—Combuslang Electric Lighting. Describes the installation at this small town on the Clyde. Ill. 2300 w. Elec Eng, Lond—Nov. 5, 1897.

**Darwen, Eng.**—Electric Lighting at Darwen. Report of E. M. Lacey. Gives the probable demand for current, the most suitable system, capital outlay necessary, probable profit, the desirability of combining the electricity works with a system of refuse destructors. 3500 w. Elec Eng, Lond—Nov. 20, 1896.

**Decorative.**—Decorative Lighting. E. J. Jenness. Read before the Chicago Elec. Assn., Dec. 16, 1896. Considers lighting effects as applied to scenic theatres and decorative work as applied to tower lighting for advertising and other purposes. 2300 w. W Elec—Jan 9, 1897.

Electric Lighting in the Chicago Peace Jubilee. An illustrated description of the fine effects wrought by the use of about fifty thousand incandescent lamps. 1800 w. Elec Wld—Oct. 29, 1898.

The Electrical Features of the Inaugural Ball. Louis Denton Bliss. Illustrated description of the electrical decorations. 2000 w. Am Elect'n —March, 1897.

The illumination at the Knights Templar Conclave. Illustrates and describes some of the features of the elaborate display at Pittsburg. 1100 w. Elec Wld—Oct. 22, 1898.

See also **ELECTRIC FOUNTAIN; ELECTRICITY; ELECTRIC SIGN; ELECTRIC TOWER.**

**Decorative, Chicago.**—Festoons of Incandescents on Chicago Business Streets. Illustrated account of the street illumination during the Peace Jubilee celebration, and its great success. 800 w. Elec Eng, N Y—Dec. 22, 1898.

**Decorative, Paris Exposition.**—Some Electrical Art Features at the Exposition. Illustrates and describes some electrical decorative features of interest. 1500 w. Elec Wld & Engr—May 26, 1900.

Special Lighting Effects at the Paris Exposition. Brief illustrated description of some of the striking night effects. 1000 w. Elec Wld & Engr—Sept. 8, 1900.

The Decorative Illumination of Electricity Building, Paris Exposition. Illustrated detailed description. 2500 w. Elec Wld & Engr—Sept. 1, 1900.

See also **ELECTRICITY BUILDING—Paris Exposition.**

**Detroit.**—Municipal Lighting in Detroit. A review of the year's operation which shows results favorable to municipal control. 900 w. Eng Rec—Aug. 13, 1898.

**Diffusion.**—Distribution and Diffusion of Light. E. L. Elliott. Abstract of a paper read before the N. Y. Elec. Soc. The problems of distribution and diffusion are discussed and the effect of various globes. 2800 w. Elec Wld—Jan. 23, 1897.

**Earl's Court, London.**—The Electric Lighting of the Theatre of Earl's Court Exhibition. Illustrated description of the arrangement of the lights. 1000 w. Eng, Lond—Nov. 6, 1896.

**Edinburgh.**—The Electric Lighting of Edinburgh.

Frank A. Newington. Read at meeting of the Incorporated Assn. of Munic. and County Engrs. Detailed description. 2300 w. Elec Eng, Lond—July 8, 1898.

See also **Portobello.**

**Europe.**—European and American Practice. J. McGhie. Impressions very favorable to the electric development in England and France. 2200 w. Jour of Elec—Oct., 1897.

**Extensions.**—Profitable Extensions of Electricity Supply Stations. Abstract of paper read before the convention of the National Electric Light Assn., by Arthur Wright. An endeavor to show the most profitable fields for extension and profit earning. 1800 w. Elec Wld—June 12, 1897.

**Fleet Illumination.**—How the Fleet at Spithead Was Illuminated. Describes the methods adopted in securing the desired end, with a copy of the admiralty instructions. 900 w. Eng, Lond—July 30, 1897.

**Fort William, Scotland.**—Notes on the Electric Lighting of Fort William. Illustrated description of the installation of a town in Scotland, the first in that country to be lighted by means of water power. 1300 w. Elec Rev, Lond—March 5, 1897.

**Franchise.**—See **FRANCHISE—Electric Lighting.**

**Frankfort-on-the-Main.**—The Municipal Electric Lighting Plant at Frankfort-on-the-Main. Describes the design of the station, the distributing system and the operation of the plant. Ill. 1900 w. Eng Rec—March 20, 1897.

**Fredereau Diffusers.**—The Lighting of Theatres by the Fredereau Diffusers (L'Eclairage des Theatres et les Globes Diffuseurs Fredereau). G. Mercier. An illustrated description of the installations of the Fredereau Diffusers at the Casino de Cabourg and at the Monte Carlo Theatre. 1000 w. La Rev Tech—Nov. 10, 1896.

**Gas Compared.**—See **LIGHTING.**

**Gas Engine.**—See also **GAS ENGINE—Electric Lighting.**

**Gibraltar.**—The Electric Lighting of Gibraltar. Illustrates and describes a recently inaugurated system for public and private electric supply, chiefly for lighting purposes. 1800 w. Elect'n, Lond—Jan. 20, 1899.

**Glasgow.**—The Electric Lighting of the City of Glasgow. Begins an illustrated description of the Glasgow electricity works at Port Dundas. Serial. Elec Engr, Lond—Sept. 21, 1900.

**Great Yarmouth.**—Electricity and Gas in Great Yarmouth. W. J. Carpenter. Read before the Eastern Counties Gas Managers' Assn. Describes the electricity works, reports progress in both electricity and gas. Discussion. 4000 w. Gas Wld—Sept. 11, 1897.

**Hastings, Eng.**—The Hastings Electric Light System. Illustrated description with details of unusual features. 3500 w. Elect'n—Nov. 13, 1896.

**Hawthorn, Victoria.**—Hawthorn (Victoria) Electric Lighting Scheme. From a report of the Electric Lighting Committee of the city of Hawthorn, Victoria, describing the system. 1500 w. Elec Rev, Lond—Sept. 23, 1898.

**History.**—The History of Electric Lighting. Francis B. Crocker. Review of the subject from its earliest beginnings to the present, showing progress. The three most prominent systems are briefly explained, and the possibilities of improvement considered. 3700 w. Elec Wld—May 9, 1896.

The Industrial Development of Electric Lighting. George R. Metcalfe. Historical review tracing improvements. 3000 w. Elec—May 20, 1896.

The Middle Age of Electric Lighting. Ralph W. Pope. Historical account of the early development of the electric lighting industry and of some of the difficulties encountered. 3400 w. Elec Power—May, 1896.

See also **ELECTRICITY.**

**Hospital.**—Electric Light Plant of the Columbus State Hospital. E. P. Roberts. States the conditions controlling the design, and gives illustrated detailed description. 1500 w. Am Elect'n—July, 1897.

The Construction, Installation and Performance of the Electric Lighting Plant at the Government Hospital for the Insane at Washington, D. C. G. W. Baird. Description and data of performance. 4400 w. Jour of Am Soc of Nav Engs—May, 1897.

**Hotel Cecil, London.**—The Electric Lighting of the Hotel Cecil. Account of the lighting system which will contain more than 15000 incandescent lamps, most of which are 16 candle-power. Some other facts of interest concerning this large hotel are also given. 2200 w. Elec Eng, Lond—May 1, 1896.

**Hotel, Palm Beach, Florida.**—Electric Lighting of the Royal Poinciana Hotel at Palm Beach, Florida. Illustrated description. 800 w. Elec Eng—Dec. 30, 1896.

**Hydraulic Mines.**—Lighting Hydraulic Mines. Illustrated article. W. W. Briggs. The use of incandescent lamps at night is described and their economy shown over bonfire illumination as being in the ratio of $3.18 to $11.50 per 12-hour shift. 600 w. Jour of Elec—Jan., 1896.

**Incandescent.**—See **INCANDESCENT LAMP; INCANDESCENT LIGHTING.**

**Isle of Man.**—Electricity in the Isle of Man. Extract from report of the Town Clerk of Douglas, in which the cost of electric lighting is dealt with. 2000 w. Gas Wld—Jan. 2, 1897.

**Isolated Plants.**—Can the Cost of Isolated Lighting Be Reduced? George R. Metcalfe. The importance of testing lamps, and of determining whether the maximum amount of light is being received for the power generated, etc. 2800 w. Elec—Feb. 26, 1896.

See also **ELECTRIC PLANT.**

**Johannesburg.**—Electric Lighting in Johannesburg. J. R. Cowell. Read at meeting of the South African Assn. of Engs. A few questions of local interest are discussed and regularity of supply, cost, etc., considered. 2000 w. Archt, Lond—April 20, 1900.

**Launceston, Tasmania.**—The Lighting of Launceston, Tasmania. Illustrated detailed description. 4200 w. Elec Rev, Lond—Jan. 1, 1897.

**Leith, Scotland.**—The Electric Lighting of Leith. Illustrated general description of this installation. 1300 w. Elec Rev, Lond—April 14, 1899.

**Lighthouses.**—See **LIGHTHOUSE—Electric.**

**Machine Shop.**—Lighting the Shop. Herbert Pratt. General suggestions aiming to aid in deciding the advisability of putting in a plant for one's own electric lighting. 1500 w. Mach—Feb., 1897.

**Malta.**—Malta Electricity Supply. A detailed description of the works which have been undertaken by the Government of Malta. 2500 w. Elec Eng, Lond—Dec. 25, 1896.

**Yokohama.**—An Interesting Isolated Plant at Yokohama, Japan. Lamar Lyndon. Illustrated description of a private plant for lighting a tea factory. 2400 w. Elec Eng—Aug. 26, 1897.

**ELECTRIC PLOW.**

See **ELECTRICITY—Agriculture.**

**ELECTRIC POLE.**

See **ELECTRIC LINE; POLE.**

**ELECTRIC POWER.**

See also **ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC ENERGY; ELECTRIC EQUIPMENT; ELECTRIC PLANT; ELECTRIC SUPPLY; ELECTRIC TRANSMISSION.**

Lines of Advance in the Near Future. H. H. E. Discusses the possibilities for the useful applications, cost, etc., efficiency and practicability. 1100 w. Eng & Min Jour—July 4, 1896.

See also **Coal Mines; Hydraulic Mine.**

**Municipal.**—Municipal Electric Lighting. John R. Commons. A paper advocating municipal electric lighting, reviewing what has been accomplished, criticizing investigations made, and studying the subject in general. 14000 w. Munic Affairs—Dec., 1897.

Municipal Electric Lighting.—A Reply to Prof. Commons. Horatio A. Foster. The writer favors private ownership, and defends his arguments, discussing opinions advanced by the writer named. 2500 w. Elec Eng, N Y—May 12, 1898.

Municipal Lighting in the United States. F. W. Cappelen. Read at the meeting of Engineers' Club of Minneapolis. Information obtained from replies to a set of sixty-six questions sent out by a committee, with a few suggestions as to the best method of street lighting. 3500 w. Jour Assn of Engng Soc—May, 1897.

Municipal Lighting. W. Worth Bean. Abstract of a paper read before the National Electric Light Assn. at Niagara Falls. Opposed to municipal lighting. 2200 w. Elec Eng—June 16, 1897.

Municipal Lighting Reports. George S. Thayer. Calls attention to some reasons why municipal ownership does not pay, and quotes reports from various places. 1500 w. Elec Eng—March 24, 1897.

Municipal Ownership. M. J. Francisco. Criticisms unfavorable to municipal ownership, and claiming that reports made are not reliable. 3300 w. Elec Wld—June 5, 1897.

Municipal Socialism. Fred De Land. Read before the Northwestern Electrical Assn. Statements concerning electric lighting in Des Moines, Ia., also in Detroit, Topeka, and Allegheny City, and an examination of the questions whether the mayor of the first named city was justified in fixing $75 per year for each arc lamp of 2000 candle power. 1600 w. Elec Eng, N Y—Feb. 10, 1898.

Report to the Special Investigating Committee on Commercial Electric Lighting, South Norwalk, Conn. A. E. Winchester. A favorable report of the success of various municipal plants. 10500 w. Elec Eng—Feb. 17, 1897.

The Agitation for Municipal Plants. A series of short articles giving a collection of data bearing on municipal electric light plants, with editorial. 11500 w. Elec Eng—Feb. 17, 1897.

The Commercial and Business Aspects of Municipal Electricity Supply. Alfred H. Gibbings. Discussing what has been attempted or accomplished toward increasing the advantages for consumers and at the same time reducing costs, with related matters of interest. Serial. Elect'n, Lon—April 8, 1898.

See also **Public; San Francisco; Street; MUNICIPAL OWNERSHIP.**

**New Egypt, N. J.**—An Experimental Two-Wire 220-Volt Lighting System. Louis E. Foulks. Describes a plant located in New Egypt, N. J., lighting its streets and business building. 1300 w. Elec Wld—Oct. 22, 1898.

**New York.**—See also **ELECTRIC STATION—New York.**

**Norwich, England.**—Electric Lighting in Norwich, England. Herbert C. Gunton and Harold Lomas. Illustrated detailed description. 1500 w. Elec Wld—April 10, 1897.

The Electric Lighting of Norwich, Eng. Description of the work with illustrations of the plant. 4000 w. Engng—May 29, 1896.

**Omaha Exposition.**—The Lighting of the Trans-Mississippi Exposition. Illustrates and describes the extensive electrical illumination. 800 w. Elec Wld—July 9, 1898.

See also **ELECTRICITY.**

**Oriental.**—Oriental Electric Lighting. Lester Betts. Part first deals with the selection of the most suitable estimate and specification submitted. The series seems to aim to give information that will insure the selection of good material and the installation of a successful plant. Serial. Ind & East Eng—Dec. 5, 1896.

**Paris.**—The Distribution of Electrical Energy in Paris. A summary of report recently presented by M. Charles Bos, municipal councillor, giving much information of electric lighting in France, with comparison with other countries. 2400 w. Elec Rev, Lond—Dec. 17, 1897.

**Paris Exposition.**—See also **Decorative; ELECTRIC DISTRIBUTION.**

**People's Palace, London.**—Electric Lighting at the People's Palace. Illustrated description of the plant. 2400 w. Elec, Lond—Oct. 23, 1896.

**Political Parades.**—Electrical Effects in Political Parades. Illustrated description of luminous devices adapted for use in parades. 1900 w. Elec Wld—Oct. 31, 1896.

**Polyphase.**—See **Salt Lake City.**

**Portobello, Edinburgh.**—The Electric Lighting of Portobello, Edinburgh. Report of Prof. Kennedy as prepared for the corporation. 1600 w. Arch, Lond—June 25, 1897.

**Primary Batteries.**—Electric Lighting from Primary Batteries. F. E. Woodford. On means of lighting residences in rural districts, and other uses of electricity. 1800 w. Am Elect'n—Feb., 1900.

**Public.**—See **Street.**

**Public Buildings.**—The Lighting of Public Buildings. H. W. Handcock and A. H. Dykes. Calling attention to the need of installing electric lighting in a more permanent way, if it is to give satisfaction. 2000 w. Elec Eng, Lond—Feb. 19, 1897.

**Public Institutions.**—See **INCANDESCENT GAS LIGHTING.**

**Railway Stations.**—The Lighting of the Great Eastern Railway Company's Stations. Illustrated description of system adopted. 500 w. Elec Rev, Lond—Sept. 18, 1896.

**Residences.**—Lighting Residences by Electricity. Augustus Wall. Showing the variety of conditions to be met in arranging electric lights for the different parts of a costly residence, the methods to be followed, and the precautions to be observed. 3000 w. Eng Mag—March, 1896.

See also **Country Residence.**

**Rochester, N. Y.**—The Electric Lighting System of Rochester, N. Y. George B. Muldaur. Illustrated description of the plants of the two companies whose united work has made this one of the best lighted cities of the United States. 2500 w. Elec Eng—Sept. 30, 1897.

**Russia.**—Lighting Systems in Russia. M. Lutoslawski. Presents the state of affairs with respect to electric lighting in this country. 1800 w. Elec Wld—July 10, 1897.

**St. Petersburg.**—The Electric Lighting of St. Petersburg. An illustrated description of the station and network of the Electricité et Hydraulic de Charleroi Company. Serial. Elec Rev, Lond—April 6, 1900.

**Salt Lake City.**—The New Three-Phase Electric Lighting System of Salt Lake City. Illustrated description. 1800 w. Elec Eng—April 22, 1896.

**San Francisco.**—Estimate for a 1537-Light Municipal Electric Lighting Plant for San Francisco, Cal. Abstract of a report submitted to the Mayor and Board of Supervisors of the city, by A. W. Hunt, the consulting engineer. 800 w. Eng News—May 25, 1899.

**Ships.**—Consideration of the Voltage Used in Electric Ship Lighting. Alton D. Adams. Advises the 100-volt pressure as best suited for a ship's plant at the present time. 1000 w. Marine Engng—March, 1899.

Naval Marine Electric Lighting. E. W. Countiss. Description of a warship electrical plant, method of installing, illustrations of fittings, fixtures, etc. 1500 w. Am Elect'n—May, 1898.

Notes on Electric Light in Sea-Going Vessels. E. Craig-Brown. The great difference between practices on sea and land. The difficulties and disadvantages of certain systems. 2200 w. Elec Eng, Lond—Sept. 11, 1896.

See also **Steamboat; Torpedo Boat; ELECTRIC EQUIPMENT; ELECTRIC WIRING.**

**Small Towns.**—Electrical Plants for Small Towns (Elektricitätswerke für Kleine Städte). A warning to small towns against the hasty adoption of electric lighting, and a review of the conditions under which such installations are likely to be successful. 700 w. Deutsche Zeitschrift für Elektrotechnik—Oct. 15, 1896.

**Stage.**—Electricity on the Stage. H. Bissing. Comments on the slow progress in adapting electricity to the stage, discusses the objections, and advocates the "bank of coils" in preference to the "individual coil" for traveling use. 1300 w. Elec Wld—July 3, 1897.

The Switchboard of Stage Lighting. H. Bissing. Some suggestions of points worth considering in the arrangements for stage lighting. 800 w. Elec Wld—Feb. 19, 1898.

See also **Theatre.**

**Steamboat "Adirondack."**—Electric Lighting on the Steamer "Adirondack." Illustrated description. 800 w. Elec Wld—July 11, 1896.

**Street.**—A Modern Street Lighting Plant. George A. Damon. Illustrated description of the municipal arc-light plant at Grand Rapids, Mich. 2400 w. Am Elect'n—Oct., 1900.

Chaotic Condition of Our Street Lighting System as to Cost, etc. D. Hunter. Read before the National Streets Lighting Assn., Columbus, O. Statistics of cost in a number of cities in various States are given and comparison made. 1300 w. Elec Eng, N. Y.—Oct. 7, 1897.

Electric Street Lighting. M. J. Francisco. Statements and arguments from a business standpoint. Reports and figures are from a personal examination of plants. Favors private ownership. 5000 w. Pro Age—July 1, 1896.

Electric Street Lighting. Albert Sheible. Read before the Chicago Elec. Assn. Reviews the causes that have affected street lighting in the past and recent changes due to electrical progress. 3500 w. Elec, N. Y.—April 5, 1899.

Public Electric Lighting. A consideration of the best method and the cost of obtaining satisfactory service from private companies. 900 w. Eng Rec—Oct. 21, 1899.

Public Lighting in Relation to Public Ownership and Operation. Alex. Dow. Abstract of a paper read before the Nat. Elec. Lgt. Assn., at Chicago. Sets forth a proposed policy applicable immediately to public lighting. 4000 w. Elec Wld—June 18, 1898.

Public Street Lighting. H. L. P. Boot. Street Lighting by Means of Rectifiers. C. D. Taite. Street Lighting by Electricity. S. E. Fedden. Abstracts of three papers read before the Municipal Electrical Association, with discussion. 4000 w. Eng, Lond—July 9, 1897.

Statistics on Electric Street Lighting. Report of F. W. Coppelen, based on statistics published by the U. S. Dept. of Labor. 1000 w. Munic Engng—Oct., 1900.

Street Lighting by Contract and by Municipal Ownership. John McVicar. Abstract of a paper read before the Mayor's Convention, Columbus, Ohio. Consists mostly of an account of experience in Des Moines, Ia. 1400 w. Elec Eng, N. Y.—Oct. 7, 1897.

Street Lighting by Electricity. F. J. Warden Stevens. The article is chiefly to show that, as the standard of illumination is increased, electric lighting comes to the fore as the cheapest and most satisfactory. 2000 w. Arch, Lond—April 30, 1897.

Theory of Public Lighting. Andre Blondel. From "Le Génie Civil." Discusses the use of electric lamps, the position in which they should be placed to obtain the best effect, etc. Serial. Ind & East Eng—July 3, 1897.

The Proper Illumination of City Streets. Henry Hopkins. Considers the requirements for satisfactory street lighting, giving illustrations. 900 w. Elec Eng, N. Y.—June 30, 1898.

See also **Municipal**; **INCANDESCENT LAMP**; **LIGHTING**.

**Telephone Combined.**—See **TELEPHONE—Electric Lighting Combined.**

**Theatre.**—Electric Lighting of Covent Garden Theatre. Illustrated detailed description of the alterations in lighting which are being made, changing from an antiquated gas service to electric lighting. 2400 w. Elec Eng, Lond—May 5, 1899.

The Grand Theatre, Fulham. Illustrated description of the electric lighting arrangements. 1800 w. Elec Eng, Lond—Aug. 20, 1897.

The New Grand Theatre at Fulham. J. F. Tester. Describes the private electric lighting installation in detail. 1800 w. Elec, Lond—Oct. 29, 1897.

The New Empire Palace, Glasgow. Brief description devoted mostly to the electrical installation. Ill. 1000 w. Elec Eng, Lond—April 23, 1897.

See also **Stage.**

**Torpedo Boats.**—Electric Light on Torpedo Vessels. B. Pontifex. Discusses the wiring, searchlights, fittings and other arrangements. Ill. 1800 w. Elec Eng, Lond—Oct. 7, 1898.

**Trains.**—See **CAR LIGHTING—Electric.**

**Trieste.**—Electric Lighting Plant and Street Lamps of Trieste, Austria. Josef Herzog. Brief illustrated description. 400 w. Elec Wld & Engr—Jan. 6, 1900.

**220-Volt.**—The 220-Volt System of Electric Lighting for Small Muncipalities. W. I. Gray. Presents the advantages of this system showing why it has been so well received and describes the construction work. 1600 w. Year Bk of Soc of Engs, Univ of Minn.—1898.

**220-Volt v. Alternating.**—The 220-Volt and Alternating Current Systems. George D. Shepardson. A comparison of the two systems, giving the arguments for and against the 220-volt system as advanced by its advocates and opponents. 3800 w. Am Elect'n—June, 1898.

**230-Volt.**—Electricity Supply at 230 Volts. Alfred H. Gibbings. Presents the results of a wholesale change of pressure at Bradford. The subject is considered in detail. Part first dealing with house terminal fuse boxes, meters, wirings and fittings. 2400 w. Elec—Feb. 17, 1897.

**250-Volts.**—Installations for Operation at a Pressure of 250 Volts (Ueber Installationen für eine Gebrauchsspannung von 250 Volt). Dr. Passavant. A general description of the details of the 250-volt lighting system as used by the German General Electric Company. 4000 w. Elektrotech Zeitschr—July 7, 1898.

**United Kingdom.**—See **British.**

**Vacuum Tube.**—See **VACUUM-TUBE LIGHTING.**

**Walsall, Eng.**—The Electric Lighting of Walsal. Illustrated descriptive article. 2000 w. Elec Rev, Lond—Jan. 3, 1896.

**Wimbledon, Eng.**—The Wimbledon Electric Lighting Scheme. A. H. Preece. Read at meeting of the Incorporated Assn. of Municipal and County Engs. Description of the system that has been adopted, plant, mains, cost, etc. 2500 w. Elec Eng, Lond—May 13, 1898.

**Windsor.**—The Electric Lighting at Windsor. Illustrates and describes the application of electricity to street lighting. 1700 w. Elec Engr, Lond—Dec. 8, 1899.

**Worcester, Eng.**—The Extension at Worcester Information from the report of Mr. Ruthven Murray, the city electrical engineer. Day plant. Switchboard, sliding scale and no meter rent. 1600 w. Elec Rev, Lond—April 2, 1897.

**York House, London.**—Electric Lighting at York House. J. F. T. Describes a private electric light installation in the premises which form the headquarters of the Junior Army and Navy Stores, London. 1400 w. Elec, Lond—Oct. 29, 1897.

**ELECTRIC LIGHT STATION.**

See **ELECTRIC STATION.**

**ELECTRIC LINE.**

See also **ELECTRIC CONDUCTOR**; **ELECTRIC TRAMWAY—Overhead Construction**; **ELECTRIC TRANSMISSION**; **POLE.**

Modern Construction and Maintenance of Electric Lines. William Brophy. Abstract of a paper read before the Mayor's Convention, Columbus, Ohio. Favors the underground construction, and discusses the overhead lines, fire and police telegraph apparatus, etc. 1800 w. Elec Eng, N. Y.—Oct. 7, 1897.

**Guard Wires.**—See **ELECTRIC TRAMWAY—Overhead Construction.**

**Pole-Spacing.**—The Most Advantageous Spacing of Poles for Supporting Wires (Ueber die Bestimmung der Günstigsten Masteninterwalle bei Fernleitungen). Discusses the question of the best economy of poles with the proper stresses upon the wires to be supported. 1500 w. Elektrotech Zeitschr—April 8, 1897.

**Railway.**—The February Snow Storm in Massachusetts. George W. Blodgett. Calls attention to the great damage done by this unusually heavy storm, and suggests the placing of the railroad wires underground, as rapidly as possible. 1800 w. R R Gas—March 25, 1898.

**Safety Suspension.**—Safety Appliance for High Pressure Transmission (Sicherungen für Hochspannungsanlagen). Conr. Hesse. A description of the Gould device, by which a broken section is automatically disconnected, and rendered harmless. 1000 w. Elektrotech Zeitschr—Aug. 31, 1899.

**Stresses.**—Tables for Designing Aerial Electric Wires in Tension (Abaques Pour le Montage des Lignes Electriques Aérinnes). Ed. Liégeois. Tables, formulae and explanation. 1000 w. Génie Civil—May 12, 1900.

The Mechanical Stresses on Overhead Electric Wires (Ueber die Mechanische Beanspruchung Elektrischer Luftleitungen). Max Jüllig. Discussing especially the case in which the poles are of unequal height, and showing by a mathematical examination of the catenary, that the greatest stress is at the highest point of attachment. 4000 w. Electrotech Zeitschr—Dec. 21, 1899.

The Sag and Tension of Line Wire. Cary T. Hutchinson. Discusses the problem to determine the sag or tension, showing an error in the procedure generally used, and that the wire can with equal safety be strung much tighter. 600 w. Eng News—Aug. 31, 1809.

The Support of Telegraph Wires of Iron and

Bronze (Durchhang von Telegraphendrähten aus Eisen und Bronce). A discussion of the strains upon telegraph wires for various temperatures and distances between poles. 2500 w. Elektrotech Zeitschr—March 11, 1897.

The Pole Line. Frederic A. C. Perrine. A study of the stresses sustained by a pole line. 4000 w. Elec Engng—July 15, 1897.

**Telephone.**—Pole Line Specification of the Federal Telephone Company, of Pittsburg, Pa., for Use When Contracting for the Construction of Telephone Trunk or Toll Lines. Prepared by F. J. Dommerque and Fred. de Land. Serial. Tel Mag —May, 1900.

**Transmission.**—Erecting a High Voltage Transmission Line. S. H. Dailey. First half of an article, the laying out of the line and placing of poles being treated. Ill. Serial. Am Elect'n—May, 1898.

The Construction of Transmission Lines. John S. Eastwood. Read before the Santa Cruz Convention of the Pacific Coast Electric-Transmission Assn. Discusses line location, materials, and construction. 2500 w. Jour of Elec—Sept., 1897.

**ELECTRIC LOCOMOTIVE.**

See also **ELECTRIC RAILWAY; LOCOMOTIVE —Motive Power Comparison; MINE HAULAGE.**

Electric Driving on Main Line Railways (Ueber Elektrischen Betrieb auf Vollbahnen). C. P. Faldman. An important discussion of the requirements and possibilities of electric traction as applied to main line service. 7000 w. Zeit d Ver Deutscher Ing—Feb. 18, 1899.

Electric Locomotives. J. J. Swann. Deals principally with their use in elevated and suburban traffic, in which the motors are almost universally placed on the trucks. Serial. Mech Wld—Aug. 20, 1897.

Electric Locomotives. J. J. Swann. Deals principally with elevated and suburban traffic. 1500 w. Sib Jour of Engng—May, 1897.

Electricity as a Motive Power on Railways (Die Elektricität als Zugkraft auf Eisenbahnen). H. Frahm. An illustrated account of the application of electric power for heavy railway work, with descriptions of some electric locomotives. Two articles. 8500 w. Stahl und Eisen—April 15, May 1, 1900.

Modern Electric Locomotives (Moderne Elektrische Lokomotiven). A. Tischbein. A very comprehensive discussion of the present practice, including heavy locomotives, as well as those for shifting and local service, and for use in mining. Two articles. 7500 w. Glaser's Annalen—Jan. 15, Feb. 1, 1900.

New Electric Locomotives (Neuere Elektrische Lokomotiven). An illustrated description of some new electric locomotives doing heavy work in everyday practice. 1600 w. Zeitschr d Ver Deutscher Ing—March 24, 1900.

Speed, Power and Efficiency of Electric Motors for Locomotives. D. L. Barnes. Abstract of a paper read before the Western Railway Club. Exhibits the extreme simplicity of the principles governing the action of the direct current series motor, and of the relation between speed, power and efficiency. 2500 w. Ry Rev—Aug. 8, 1896.

**Accumulator.**—See **Paris-Mediterranean Ry.**

**Allg. Elek. Ges., Berlin.**—An Electric Railway Locomotive. Illustrated description of a locomotive adapted to be used on ordinary railways for shunting and other miscellaneous work, recently constructed by the Allgemeine Elektricitäts-Gesellschaft, Berlin. 1300 w. Elec Rev, Lond—Sept. 17, 1897.

**Shifting.**—Electric Shifting Locomotive (Elektrische Rangier-Lokomotive). Illustrating and describing an overhead trolley locomotive arranged to shift from one track and wire to another, for use in yard service. 2000 w. Schweizerische Bauzeitung—Dec. 4, 1897.

Four-Wheel Electric Locomotive for Maine Line Service (Zweiachsige Elektrische Lokomotive für Vollbahnen). Illustrated description of 20-ton electric locomotive for overhead trolley, designed by the "Allgemeine Elektricitäts Gesellschaft" of Berlin. 2000 w. 1 plate. Glaser's Annalen —Nov. 15, 1897.

The Standard Gauge Electric Locomotive Exhibited by the Allgemeine Elektricitäts-Gesellschaft at the Paris Exhibition. Illustrated description of a locomotive designed for the haulage on branch lines and for shunting purposes. 2000 w. Elec Engr, Lond—Sept. 28, 1900.

Electric Locomotive for Main Railway Lines, Built by the Allgemeine Elektricitäts-Gesellschaft (Elektrische Vollbahn-Lokomotive der A. E. G. auf der Pariser Weltausstellung). An illustrated description of a locomotive which can haul a 800-ton train at the rate of 30 kilometers an hour. 1800 w. Zeitschr f Klein-u Strassenbahnen—Aug. 1, 1900.

**Baldwin-Westinghouse.**—A New Type of Mining Locomotive. Timothy W. Sprague. Illustrated description of a new type of mining locomotive built by the combined Baldwin and Westinghouse Companies. 800 w. Eng & Min Jour—July 4, 1896.

The Westinghouse-Baldwin Electric Locomotive. Illustrated description. 500 w. Elec Eng—Feb. 26, 1896.

The Baldwin-Westinghouse Electric Locomotive. A careful account, with illustrations, of the truck and general plan of the framing of the standard electric locomotive designed for, and built by the Baldwin-Westinghouse combination. This is apparently one of the most important steps yet taken towards the development of an electric locomotive for use on trains of considerable weight and speed. 3000 w. R R Gaz—March 6, 1896.

**Baltimore.**—Testing the B. & O. Electric Locomotive. Extracts from a report by Mr. Lee H. Parker, engineer in charge of electric installation, on some of the performances of the heavy electric locomotive recently built for service in the Baltimore tunnel, with diagrams showing current and draw-bar pull. 1500 w. R R Gaz—March 6, 1896.

Through the Baltimore Tunnel on an Electric Locomotive. A. M. B. Describing the power plant, the general arrangement and practical working. Ill. 1500 w. Ry Wld—April, 1896.

Experience with the Electric Locomotive in Baltimore. Lee H. Parker. Considerable itemized data is given along with the considerations causing electricity to be adopted. 3200 w. St Ry Jour—March, 1896.

**Coal Mine.**—See **Mining; ELECTRIC EQUIPMENT; MINE HAULAGE—Electric.**

**Design.**—Electric Locomotive Design. Editorial discussion of the paper of P. V. McMahon, read before the London Inst. of Engs., London. 1700 w. Engng—May 26, 1899.

**Freight.**—Some Recent Electric Freight Locomotives. Burcham Harding. Describes and illustrates a novel type for hauling freight cars over electric lines. 600 w. Eng News—Jan. 25, 1900.

**Heilmann.**—A Combination Steam and Electric Locomotive. This engine is unique in design. It consists of a box-car-like structure on wheels containing an engine run at high economy, which drives dynamos furnishing current to the motors attached to the driving wheel axles. It is intended for main line work and does away with the trolley system. 500 w. Eng News—March 12, 1896.

Electrical Locomotives—Systéme Heilmann. A sharp criticism of the engineering conceptions embodied in the construction. 700 w. Elec Rev, Lond—July 10, 1896.

The Heilmann Electric Locomotive (La Locomotive Electrique. Systéme J. J. Heilmann). A detailed description, with illustrations of the completed machine as well as the engines and motors, and an account of the preliminary trials. 2500 w. 1 plate. La Rev Tech—Dec. 25, 1897.

The Heilmann Electric Locomotive. Description of the electric locomotive presented five years ago, and also of the improved designs recently built. 1500 w. Eng News—Nov. 24, 1898.

The Heilmann Locomotive. H. Ward Leonard. An illustrated description of the type, with some dimensions and performance figures. 1700 w. Elec Wld—Oct. 24, 1896.

The Heilmann Electric Locomotive (Die Elektrische Lokomotive von Heilmann). Detailed description of the 115-ton electric locomotive, of which design two have just been completed for the Western Railway of France. 3500 w. 1 plate. Glaser's Annalen—April 15, 1897.

The Heilmann Electric Locomotive. Illustrated description of this locomotive since recent improvements have been made. 1400 w. Sci Am —Sept. 4, 1897.

The Heilmann Locomotive. A brief descriptive account of the locomotive and the experimental results attained with it in France. It is to be tried in the United States. 900 w. R R Gaz—Aug. 21, 1896.

The Improved Heilmann Locomotive (Die Neueren Heilmann Lokomotiven). E. Wasowsky. A general illustrated description of the Heilmann electric locomotive, with photographic views, plan, elevation and section of truck. 3500 w. Elektrotech Zeitschr—Jan. 27, 1898.

The Latest Heilmann Electric Locomotive. Illustrated description of the new locomotive, with brief recapitulation of the leading features of the designer's first engines, and the reasons for so radical a departure. 1700 w. Ry Wld—July, 1897.

The New Heilmann Electric Locomotive. L. Bayly, in "Ingenieur Electrique," Paris. Detailed description of the latest type of this machine, with illustrations. 1300 w. Elec Eng, N Y—Jan. 20, 1898.

The New Heilmann Electric Locomotive. Description with illustration. 1100 w. Elec Rev—April 21, 1897.

**Hoboken.**—Electric Locomotive on the Hoboken Shore Road. Describes and illustrates the new locomotive recently put into service for hauling trains of loaded and empty freight cars between the docks and the Erie track. 600 w. Elec Rev, N Y—Jan. 5, 1898.

**Lockport, N. Y.**—The Substitution of Electricity in Place of Steam on a Branch of the Erie R. R. Two 36-ton electric locomotives, of 640 horsepower each, are used to haul freight and passenger traffic over 29 miles of track. The overhead trolley system is employed. 1200 w. Eng News—Sept. 8, 1898.

**London Underground.**—Electric Locomotives. Abstract of a paper by Mr. McMahon read before the Inst. of Elec. Engs (England). The paper was based on figures obtained over a period of two years of daily working on the City and South London Ry. Serial. Elec Rev, Lond—May 12, 1899.

Electric Locomotive for the London Central Underground Railway. Gives the revised plans of the locomotives to be used on this railway. Ill. 800 w. Eng News—June 9, 1898.

Specifications for Motors Used on the Central Underground Railway of London. Letter from E. D. Priest of the Gen. Elec. Co. sent in response to a request for further details of these electric locomotives. 900 w. Eng News—June 16, 1898.

See also **Tunnels.**

**Mine.**—See **ELECTRIC EQUIPMENT; MINE HAULAGE—Electric.**

**Mining and Railway.**—The Electric Locomotive in Mining and Railway Work. Historical review with illustrations. 2200 w. Ir & Coal Trds Rev—Nov. 12, 1897.

**Narrow Gauge.**—Austrian Narrow Gauge Electric Locomotive. Illustrates and describes a locomotive built for the brewery of Dr. Schaup, intended for hauling two or three freight trailers, as well as conveying passengers back and forth from the brewery to the railroad station. 1100 w. Elec Eng, N Y—March 3, 1898.

**Paris-Lyons-Mediterranean.**—Applications of Electric Traction on the Paris-Lyons-Mediterranean Railway (Applications de la Traction Electrique sur le Reseau de la Compagnie Paris-Lyon-Mediterranée). With a number of illustrations of electric locomotives operated by storage batteries, charged from hydraulic power plants in the Alps. 2000 w. 1 plate. Génie Civil—July 22, 1899.

The Electrical Locomotive of the Paris, Lyons & Mediterranean Railroad. Illustrates and describes the locomotive, giving the results obtained on the main line between Paris and Melun. 2000 w. Elec Wld—Feb. 4, 1899.

The Electric Locomotive of the Paris-Lyons-Mediterranean Company (Locomotive Electrique de la Cie P.-L.-M.). A very complete account of the high speed express locomotive of the P.-L.-M. Railway in France. Speeds of 60 miles per hour, with a train of 100 tons, were attained; storage batteries of the Fulmen type being employed. 4500 w. Energie Electrique—Jan. 1, 1899.

The Paris-Lyons-Mediterranean Co.'s High Speed Electric Locomotive (Locomotive Electrique à Grande Vitesse de la Compagnie Paris-Lyon-Méditerranée). M. Auvert. A very complete and elaborately illustrated description of the machine and account of tests. For the trials current was obtained from a large battery of accumulators hauled in a special car, but a conductor system will be used. All the levers and switches are handled by a compressed air auxiliary system. 8000 w. Rev Gen des Chemins de Fer—Nov., 1898.

The Storage Battery Locomotive of the P.-L.-M. Railway, France. From La Nature. Illustrated description. 700 w. Elec Eng, N Y—Feb. 23, 1899.

**Potsdam, Germany.**—Electric Locomotives at Potsdam. Illustrated description of a locomotive which has for two years been operated in the railway repair shops near Berlin, Germany. 400 w. Ry Wld—Jan., 1898.

**Rack Railway.**—The Paris Exhibition—Electric Locomotive. Illustrated description of an electric locomotive intended for working a rack railway, as well as on smooth rails. 900 w. Engr, Lond—Sept. 28, 1900.

**Switching.**—An Electric Switching Locomotive. Illustrated description, with dimensions, of an electric locomotive in constant service switching freight cars between the main line of the N. Y., N. H. & H. R. R., and a number of factories located along the river front. 600 w. R R Gaz—Jan. 8, 1897.

See also **Allg. Elek. Ges., Berlin.**

**Truck.**—See **TRUCK—Electric Locomotive.**

**Tunnels.**—Electric Locomotives in Practice and Tractive Resistance in Tunnels. An abridgment of a paper by P. V. McMahon, read before the London Inst. of Elec. Engs. It is based on experiments made on the locomotives and trains of the City & South London Ry. 4700 w. St Ry Jour—June, 1899.

**Underground.**—See **London.**

**Westinghouse-Baldwin.**—See **Baldwin-Westinghouse.**

**ELECTRIC MACHINERY.**

See also **ALTERNATOR; DYNAMO; ELECTRIC APPARATUS; ELECTRIC EQUIPMENT; ELECTRIC MOTOR; ELECTRIC POWER STATION; ELECTRIC STATION; HYDRO-ELECTRIC PLANT.**

How to Calculate, Design and Construct Electrical Machinery. William Baxter, Jr. The first of a series of articles which proposes to explain in a simple manner the principles upon which electrical machinery acts, and also to give such rules as may be necessary to enable one to calculate the various parts of such machines. Serial. Mach, N. Y.—June, 1897.

**Air Gap.**—The Apparent Increase in the Air-Gap of Dynamos and Motors Due to Toothed Armatures. C. F. Guilbert. Translated from "L'Industrie Electrique." Describes method of calculating the apparent increase. 700 w. Elec Rev, N. Y—Oct. 10, 1900.

**Alkali Works, Niagara.**—The Electrical Equipment of Mathieson Alkali Works. J. R. Haskin. Confined to a description of the electrical machinery of the latest addition to the plants surrounding the great power house of the Niagara Falls Power Company. Ill. 900 w. Elec Wld—Nov. 27, 1897.

**Alternating.**—Alternating Current Machinery. Edwin G. Houston and A. E. Kennelly. It is proposed in this series of articles to discuss the development, laws and properties of alternating currents and the methods of their practical application to the transmission of power. Part first is introductory. 1000 w. Elec Wld—Jan. 2, 1897.

Notes on General Electric Alternating Current Machinery. Illustrated description of the latest types of alternating machinery. Serial. Elec Wld—April 4, 1896.

See also **Ganz; Polyphase.**

**Alternating, Budapest.**—Alternating Current Machinery at the Budapest Millennium Exhibition. Alfred O. Dubsky. Illustrated description. The first part describes the single-phase current machinery. Serial. Elec Eng—July 22, 1896.

**Brown, Boveri & Co.**—The Electrical Machinery of Brown, Boveri & Co., Baden. A. E. Levin. Illustrated detailed description of works and machinery manufactured. Serial. Elec Wld—Jan. 8, 1898.

**Budapest Exposition.**—See **Alternating.**

**Capacities.**—Relative Dynamo and Motor Capacities. Alton D. Adams. On the method of determining the capacity of a given dynamo when used as a motor and vice versa. 1500 w. W Elect'n—April 29, 1899.

**Care.**—Hints on the Care of Electrical Machinery. William Baxter, Jr. Difference between the two electric systems, the alternating and the continuous, and their relative merits. Ill. 3000 w. Power—Oct., 1897.

Hints on the Care of Generators and Motors. John H. Hertner. An illustrated article giving practical points. 1500 w. Engr, U. S. A.—Sept. 15, 1900.

**Design and Testing.**—The Designing and Testing of Dynamos and Motors (Beiträge zur Berechnung und Beurtheilung von Dynamomaschinen und Motoren). Dr. F. Niethammer. A discussion, partly mathematical, of the design of dynamos and motors, with diagrams. Serial. 2 parts. 3200 w. Elektrotech Zeitschr—June 28, July 5, 1900.

**Eddy Currents.**—Losses Due to Eddy Currents in the Pole Pieces of Eectric Machines. William Baxter, Jr. Explains the cause of the difficulty and the best way to avoid it. Ill. 1700 w. Am Mach—March 17, 1898.

See also **ARMATURE; HYSTERESIS.**

**Efficiency.**—Theoretical v. Practical Efficiency. Sydney F. Walker. Considers what is meant by efficiency, discussing what he calls the efficiency of transformation and the commercial efficiency. 2000 w. Elec Rev, Lond—Sept. 1, 1899.

**Fort Wayne Co.**—Electrical Apparatus of the Fort Wayne Electric Corporation. Illustrated description. 4000 w. Elec Wld—Oct. 3, 1896.

**French.**—Some French Electrical Machinery. Illustrates and describes products manufactured by Fabius Henrion, Nancy, France, showing how they differ from American designs. 3000 w. Elec Wld—Nov. 19, 1898.

**Ganz Alternating.**—Recent Developments in Alternate Current Machinery, with Special Reference to the Ganz System. Alfred Dubsky. A short description of the newer alternating current machinery which has been constructed at the Ganz works at Budapest during the last few years. Serial. Elect'n—April 16, 1897.

**Lock Gates.**—See **LOCK GATES—Ymuiden.**

**Losses.**—The Separation of Hysteresis, Foucault Current and Friction Losses in Electrical Machines (Die Trennung von Hysteresis, Foucault-Strom, und Reibungsverlusten in Elektrischen Maschinen). K. Dettmar. An elaborate discussion of the method of separating these losses, which must be measured together and subsequently analysed. Two articles. 6000 w. Elektrotech Zeitschr—March 16, 23, 1899.

**Multipolar.**—Advantages of Multipolar Construction. Alton D. Adams. Compares the multipolar and bipolar machines, discussing the advantages of the former. 2700 w. W Elect'n—April 14, 1900.

**Polyphase.**—Multiphase Electrical Machinery. Andrew Stewart. Abstract of a paper awarded the Gold Medal of the Glasgow and West of Scotland Technical College Scientific Society. Information regarding the leading features of the multiphase system, with special reference to the generators and motors, their efficiency and regulation. Serial. Elec, Lond—Nov. 25, 1898.

Polyphase Alternate-Current Machinery. Explains the action and construction. 3000 w. Serial. 1st part. Col Guard—Aug. 10, 1900.

Some Work with Polyphase Apparatus. J. L. Thomas. Illustrates and describes the plant operated by the Consolidated Lighting Co., of Montpelier, Vt., and the satisfactory working of the three-phase apparatus. 1800 w. Elec Wld & Engr—April 14, 1900.

Polyphase Electrical Apparatus. Cecil P. Poole. Illustrates and describes various forms and their operation. 4400 w. Power—May, 1899.

Three-Phase Machinery. William Mayo Venable. Facts about polyphase circuits with description of types of three-phase machinery. Ill. 1600 w. W Elect'n—April 9, 1898.

See also **DYNAMO—Double Current; Polyphase; ELECTRIC MOTOR.**

**Polyphase, A. E. G.**—Multiphase Generators and Motors (Die Drehstrom-Dynamomaschienen und Drehstrom-Motoren). A general explanation of the principles together with an illustrated description of the machines of the Allgemeine Elektrizitäts-Gesellschaft of Berlin. Three articles. 7500 w. Die Elektrizität—Feb. 27, March 13, 27, 1897.

**Repairs.**—Electrical Shop Practice. B. F. Fells. Calls attention to slight repairs often needed in running electrical machinery. Ill. 1200 w. W Elect'n—Feb. 25, 1899.

Repairs of Electrical Machinery. A. R. Harris. Illustrated directions designed to make ordinary repairs of this character possible to a man of ordinary intelligence. Serial. Am Mach—Jan. 14, 1897.

Repairs of Electrical Machinery—Field Coils. A. R. Harris. How to remedy defects and the temporary expedients that may be resorted to in case of failure of field coils, is the subject of part first. Serial. Am Mach—April 22, 1897.

Repairs of Electrical Machinery. False Alarms. A. R. Harris. Shows that when a machine behaves abnormally, there is often simply some part slightly out of adjustment, or an accumulation of dirt at some point where it can interfere with the proper action. Ill. 2000 w. Am Mach—June 10, 1897.

**Speed.**—The Mistakes That May Be Made in Consequence of the Prevailing Tendency to Reduce the Speed of Electrical Machinery. William Baxter, Jr. A review of the subject in its various applications. 1000 w. Elec Wld—June 20, 1896.

**Standardisation.**—On the Necessity of Uniformity in Plant and Apparatus. C. H. Wordingham. Read before the Munic. Elec. Assn., London. On the importance of restriction of the number of types and sizes of the articles produced. Argues that the electrical industry has reached that point in its development that makes this economy desirable. Discussion. 5000 w. Elec Eng, Lond—June 17, 1898.

The Necessity for a Normal Rating of Capacity, Temperature and efficiency of Electrical Machines (Ueber die Nothwendigkeit der Aufstellung von Normen für die Bestimmung und Angabe von Leistung, Erwärmung und Wirkungsgrad Elektrischer Maschinen). G. Dettmar. A paper read before the German Engineers urging the adoption of standards. 10000 w. Elektrotech Zeitschr—Aug. 30, 1900.

The Standardisation of Electrical Engineering Plant. R. Percy Sellon. Read before the Inst. of Elec. Engs., England. Presents the importance and advantages from an English standpoint. 3000 w. Ind & Ir—Feb. 9, 1900.

See also **ELECTRIC APPARATUS.**

**Testing.**—Commercial Dynamo and Motor Testing. W. H. Radcliffe. Illustrates and describes methods of testing. 2000 w. Am Elect'n—July, 1898.

Dynamo and Motor Testing. John H. Hertner. Points out a number of shop and laboratory tests, showing how they are applied, and gives a few practical methods of discovering and curing dynamo and motor diseases. Ill. 2500 w. Engr, U. S. A.—Oct. 1, 1900.

**Walker Company.**—Electrical Machinery of the Walker Company. Illustrated description. 2000 w. Elec Wld—Oct. 10, 1896.

See also **ELECTRIC MOTOR.**

## ELECTRIC MANUFACTURING.

See **ELECTRIC INDUSTRY.**

## ELECTRIC MEASUREMENT.

See also **ELECTRIC CONDUCTIVITY; ELECTRIC INSTRUMENT; ELECTRIC METER; ELECTRIC RESISTANCE; ELECTRIC TESTING; ELECTRO-PHYSICS; INSULATION.**

Electrical Measurement of Work and Energy. G. L. Addenbrooke. A clear and concise presentation of the principles, methods, and apparatus of electrical measurement, and of their importance in the study of mechanical economy. 4500 w. The Eng Mag—July, 1900.

A Simple Method for the Measurement of Electric Current. Ichiro Goto. Method for measuring current requiring only a scale, and magnetic needle. 800 w. Elec Wld—March 28, 1896.

A Systematic Treatise on Electrical Measurements. Herschel C. Parker. The subject is treated in a systematic manner and the classification thoroughly worked out. Ill. Serial. Elec Pow—Jan., 1896.

Electrical Measurements. W. A. Anthony. Review of advances in the art of electrical measurements, the more important of which is the final establishment of the values of the fundamental electrical units. 2000 w. Elec Eng—Jan. 6, 1897.

Electrical Measurements. John Hertner. Makes comparison of the action of current in a wire with the flow of water in a pipe, explains the fundamental units, etc. 2000 w. Engr, U. S. A.—April 15, 1900.

Electrical Measurement. H. E. Wimperis. A statement of the most fundamental facts of how electrical quantities are measured. 1000 w. Automotor Jour—Sept. 15, 1899.

Methods of Using a Wattmeter, a Voltmeter, and an Ammeter. Frederick Bedell. Gives four methods for connecting and reading the instruments. 1200 w. Sib Jour of Engng—Oct., 1898.

The Construction and Use of Simple Electrical Measuring Apparatus. Howard B. Little. Describes instruments that may be made by electricians with which they can undertake research work. Part first describes the tangent galvanometer. Serial. Elec, Lond—Sept. 30, 1898.

**Absolute.**—Absolute Measurements. A. Gray. Traces the system of electrical measurements in its progress, and the benefits from the adoption of the absolute system of units. 2800 w. Elec Rev, Lond—Nov. 12, 1897.

**Absorption.**—Electrical Measurements. Henry A. Rowland and Thomas Dobbin Penniman. An account of experiments performed and methods used, with a method for the direct measurement of the effect of electric absorption in terms of resistance. 5800 w. Am Jour of Sci—July, 1899.

On Rowland's New Method for Measuring Electric Absorption, and Losses of Energy Due to Hysteresis and Foucault Currents, and on the Detection of Short Circuits in Coils. Louis M. Potts. Describes investigations made with the object of testing these methods. 6800 w. Am Jour of Sci—Aug., 1900.

**Alternating Currents.**—Electrical Measurement by Alternating Currents. Henry A. Rowland. Treats mainly of inductances, self and mutual, and of capacities together with their ratios and values in absolute measure as obtained by alternating currents. 5500 w. Am Jour of Sci—Dec., 1897.

Measurement of Alternating Current Power. A. F. McKissick. Directions for measuring single-phase, two-phase and three-phase circuits. Ill. 800 w. Am Elect'n—July, 1897.

Measurement of Alternating Currents by Current and Pressure Meters (Methode sur Bestimmung des Effektes im Wechselstromkreise mittels Strom-und Spannungsmesser). E. Reiss. An improvement on the ordinary method, requiring only two measuring instruments. 1200 w. Elektrotech Zeitschr—Aug. 23, 1900.

The Accurate Measurement of Alternating and Multiphase Currents. G. L. Addenbrooke. Abstract of paper read at the International Congress, at Paris. Gives results of experience, describing the method and the design of the apparatus and instruments, and the manner of using them. 3700 w. Elect'n, Lond—Oct. 5, 1900.

The Measurement of Alternating Current Effects by the Three-Voltmeter Method (Zur Messung von Wechselstromeffekten nach der Drei-Voltmeter Methode). F. Niethammer. A mathematical demonstration, showing that the three-voltmeter method is independent of curve form or phase. 3000 w. Elektrotech Zeitschr—Oct. 5, 1899.

The Use of Hot-Wire Shunt Instruments as Alternating Ammeters. E. A. Wagner. Explanation of method. 600 w. Am Elect'n—April, 1900.

See also **ALTERNATING CURRENT.**

**Alternating Current Curves.**—Tracing Alternating Current Curves by Instantaneous Contact Methods (Die Punktweise Aufnahme von Wechselstromkurven). Dr. F. Niethammer. Criticising different methods and expressing preference for that of Joubert, with condenser and ballistic galvanometer; with diagrams. 400 w. Elektrotech Zeitschr—April 19, 1900.

Curve Construction (Ueber Kurvenaufnahmen). Describing Joubert's method of plotting the curves of alternating currents. 2000 w. Elektrotech Zeitsch—April 15, 1897.

See also **ALTERNATING CURRENT—Curve; ELECTRIC INSTRUMENT — Photographing Current Curves.**

**Alternations.**—Device for Measuring the Number of Alternations (Instrument sur Ermittelung der Wechselzahl). E. Stöckhardt. The number of vibrations is determined by the tone emitted from a tuning fork fitted with adjustable weights and actuated by the alterations of the current. 1000 w. Elektrotech Zeitschr—Dec. 14, 1899.

**Bridge Wire Calibration.**—The Calibration of a Bridge Wire. W. M. Stine. Describes method, devised by the writer, aiming to give a simple, direct and accurate system. 700 w. Elec Wld—Nov. 7, 1896.

**Cable Capacity.**—Notes on the Ballistic Determination of the Capacity of Coiled Cables. Arthur Dearlove. Discusses "double-ending" the cable, and the satisfactory results, giving details of experiments made. 900 w. Elect'n, Lond—April 8, 1898.

The Determination of the Electrical Capacity of Telephone Cables with Double Conductors (Ueber die Bestimmung der Elektrischen Kapacität von Fernsprechkabeln mit Doppelleitungen). F. Breisig. A mathematical discussion of the practical methods used by the Imperial postal telegraph system. 6000 w. Elektrotech Zeitschr—Feb. 9, 1899.

See also **ELECTROSTATIC CAPACITY; SUBMARINE CABLE.**

**Cable Faults.**—See **Faults.**

**Cable Resistance.**—Modified Bridge Method of Measuring Resistances Containing Earth Currents. R. R. Black. Describes a method of measuring the resistance of a cable by reversals when earth currents are strong and variable. 450 w. Elect'n, Lond—Jan. 13, 1899.

**Capacity.**—Measurement of Capacity with the Balance (Messung von Kapacitäten mit der Waage). An adaption of Lang's method, weighing the attraction between two copper spirals, one of which is connected with the condenser. 2000 w. Elektrotech Zeitschr—Jan. 20, 1898.

See also **Cable Capacity; ELECTROSTATIC CAPACITY.**

**Chronograph.**—The Application of Recording Apparatus in Electrical Measurements (Anwendung des Registrirapparates bei Elektrischen Messungen). W. Marek. An illustrated description of the use of the chronograph in electrical experiments, with tables of observations. 2000 w. Elektrotech Zeitschr—Aug. 2, 1900.

**Commercial.**—Commercial Electrical Measurements and Prices. William D. Marks. Explains a simple system for determining the cost and selling price of electricity. Serial. 1st part. 3200 w. Elec Wld & Engr—April 28, 1900.

**Commutator Potential.**—See **COMMUTATOR—Potential Measurement.**

**Conductivity.**—Conductivity Measurements with a Direct Reading Conductivity Bridge. Elmer G. Willyoung and H. P. Harth. Describes a method and apparatus devised by the writers, with a brief statement of its advantages. Ill. 2800 w. Elec Wld—Nov. 13, 1897.

**Earth Currents.**—See **Faults, Submarine.**

**Earth Resistance.**—Measurement of Earth Resistance in Power Circuits by Means of Line Potential (Die Messung des Erdwiderstandes von Starkstromanlagen mittels der Betriebsspannung). Dr. Oscar May. Accompanied by a table of energy losses due to leakage. Elektrotech Zeitschr—Oct. 22, 1896.

**Electro-Metallurgy.**—See **ELECTRO-METALLURGY—Meter.**

**Fault Resistance.**—The Measurement of Fault Resistance with a Voltmeter. Stuart A. Russell. Describes several applications of the use of the voltmeter and calls attention to the results that may be obtained. 1800 w. Elec Rev, Lond—Feb. 25, 1898.

**Faults, Submarine.**—A Method of Detecting the Arrival of Faults on Board When Picking Up Submarine Cables. Walter J. Murphy. Illustrates and describes devices experimented with by the writer but not tested by actual practice to any great extent. 1000 w. Elect'n, Lond—April 28, 1899.

A New Method of Finding an Insulation Fault in a Submarine Cable While Raising for Repairs. E. Jona. Illustrates and describes a method that has given good results. 1600 w. Elect'n, Lond—April 28, 1899.

Localizing Earth Faults in Submarine Cables by Tests from One End Only. J. Rymer. Explains a test, capable of great accuracy, where results from one end only have to be relied upon to determine the position of a partial earth or broken conductor. 3000 w. Elec Rev, Lond—Jan. 1, 1897.

Localizing Faults in Submarine Cables. Herbert E. Cann. Tables showing different strengths of currents, comparison of results, testing through an artificial cable and through wire resistance, are given and explained, and conclusions from a series of experiments are given. 1800 w. Elec Rev, Lond—Dec. 18, 1896.

Some Interesting Points in the Theory and Practice of "Loop" Testing for Cable Faults. J. Wright. Calls attention to certain modifications and conditions for testing which may assist in obtaining accurate results. Ill. 2000 w. Elec Eng, Lond—Sept. 8, 1899.

Improvements in the Localization of Faults in Submarine Cables by Null-Method Bridge Measurement. C. W. Schaefer. Examines sources of error, explains improved methods, and gives suggestions. 2400 w. Elect'n—Oct. 29, 1897.

Practical Examples of Simultaneous Testing, as Applied to Fault Localization in Submarine Cables. C. W. Schaefer. Describes applications of theoretic methods to actual work. 2700 w. Elect'n, Lond—June 8, 1900.

Short Method of Correcting Schaefer's Break Test for Earth Currents. Walter J. Murphy. Rules enabling observers to calculate rapidly, or estimate mentally, the influence of the E. C. upon results obtained by Schaefer's method of localizing breaks in submarine cables. 500 w. Elect'n, Lond—Sept. 23, 1898.

Localization of Breaks and Partial Earth Faults in Submarine Cables. Gives a short description of Kennelly's alternative methods, the laws governing the same, and also the modified laws advanced by Mr. Schaefer, and discusses the relative merits of the two tests. 2500 w. Elec Rev, Lond—Dec. 31, 1897.

See also **SUBMARINE CABLE; SUBMARINE TELEGRAPH.**

**Faults, Underground.**—The Localization of Faults in Underground Mains. Robert C. Quin. Read before the Municipal Electrical Assn., at Manchester, Eng. Results from the large experience of the writer, methods used and the reasons why he adopted the final method. Discusses and illustrates, with editorial. 6500 w. Elect'n—July 30, 1897.

The Localization of Faults in Underground Mains. Robert C. Quin. Discussion of methods and results of large experience. Read before the Municipal Electrical Assn. Serial. Elec Eng, Lond—July 23, 1897.

See also **ELECTRIC INSTRUMENT.**

**Feed Wire Pressure.**—An Accurate Method and Apparatus for Measurement of Pressure in Feed Wires (Ueber ein Verfahren und einen Apparat zur Fehlerfreien Messung der Speisepunktspannungen in Leitungsnetzen). Dr. J. Teichmuller. A mathematical discussion of the causes of error, and a description of a volunteer with adjustable resistance to enable accurate measurements to be made. 2500 w. Elektrotech Zeitschr—April 6, 1899.

**Galvanometer.**—See **GALVANOMETER.**

**German Law.**—The Law for the Measurement of Electricity (Das Gesetz betreffend die Elektrischen Maasseinheiten). F. Uppenborn. A discussion of recent legislation in Germany, regarding the measurement of electricity for sale. 4000 w. Elektrotech Zeitschr—Feb. 15, 1900.

**Grounds Alternating Circuits.**—On Determination of Grounds on Alternating Current Circuits. R. O. Heinrich. The use of an electrostatic voltmeter for this purpose is explained, also the direct reading voltmeters of the electro-dynamometer type, such as the Weston, and the advantages of the latter are shown. A numerical example is given to illustrate the operation. 2000 w. Elec—May 6, 1896.

**High Potential.**—On an Apparatus for Measuring Very High Pressures. A. de Forest Palmer, Jr. Describes the method adopted, which gave very satisfactory results. 900 w. Am Jour of Sci—Dec., 1898.

Some Methods of Measuring High Potentials with Low Potential Instruments. Samuel J. Barnett. Illustrates and describes two methods found to be useful. 900 w. Elec Wld & Elec Engr—June 17, 1899.

The Measurement of High Electric Voltages (Ueber die Messung Hoher Elektrischer Spannungen). W. Peukert. A method of measuring high voltages by means of condensers in a portion of the circuit, instead of measuring the potential at the terminals. 2000 w. Elektrotech Zeitschr—Sept. 29, 1898.

See also **ELECTRIC INSTRUMENT; ELECTRIC SWITCH.**

**Incandescent Lamp Resistance.**—See **INCANDESCENT LAMP—Resistance.**

**Inductance.**—A Method of Measuring the Coefficient of Self-Induction of a Conductor. Lawford H. Fry. Describes a simple method, due to Herr Thiermann, of the Hanover Polytechnikum, which has been used with very good results in the laboratory. 850 w. Elec Rev, Lond—Sept. 24, 1897.

See also **INDUCTANCE.**

**Instruments.**—See **ELECTRIC INSTRUMENTS.**

**Insulation.**—Insulation Resistance and Leakage Currents. Alexander Russell. A method of testing the wiring of a building in a two-wire installation and a three-wire installation, and a discussion of the importance of accurate testing. 3000 w. Elect'n, Lond—June 10, 1898.

Insulator and Cable Testing, with Suggestions for New Apparatus. N. Monroe Hopkins. Describes some methods of insular and cable testing, with suggestions which may prove of assistance to those who wish to experiment. Ill. 1200 w. Am Elect'n—Nov., 1897.

The Insulation Resistance of an Electric Installation. Explains the theory of insulation testing. 2000 w. Builder—Feb. 20, 1897.

See also **ELECTRIC INSTRUMENT; ELECTRIC TESTING.**

**Insulation and Resistance.**—Investigations Upon Electric Plants (Untersuchung von Elektrischen Anlagen). A brief outline of the methods of measuring the insulation and resistance of electric lighting systems. 1000 w. Glaser's Annalen—Feb. 15, 1897.

**Insulation, Street Railway Cables.**—On the Measurement of the Insulation Resistance of Street Railway Cables. Edwin J. Houston and A. E. Kennelly. Describing a method which is said to eliminate the usual difficulties experienced in testing underground cables. 1000 w. Elec Wld—Aug. 8, 1896.

On the Measurement of the Insulation Resistance of Street Railway Cables. Charles Hewitt. Describes a method of testing instituted by the author for the Electric Traction Co., of Philadelphia. 1300 w. Elec Wld—Oct. 31, 1896.

**Insulation, Three-Wire.**—Insulation Measurements in Three-Wire Circuits with Insulated Middle Wire (Isolationsmessungen an Dreileiteranlagen mit Isolirtem Mittelleiter). Dr. J. Kollert. The method is described, and an example in its application fully worked out. 1200 w. Elektrotech Zeitschr—March 2, 1899.

Measurement of Insulation in Systems of more than Two Conductors (Ueber Isolationsmessungen auf Systemen von mehr als Zwei Leitern, etc.). A mathematical treatment, giving analytical relations for a great variety of combinations. 7500 w. Elektrotech Zeitschr—March 11, 1897.

On the Measurement of the Insulation Resistance of Continuous Current Three-Wire Systems While at Work. Edwin J. Houston and A. E. Kennelly. A response to criticism of method of the writers by Maurice Travailleur in "L'Eclairage Electrique." 1500 w. Elec Wld—March 6, 1897.

On the Measurement of the Insulation Resistance of Continuous Current Three-Wire Systems While at Work. Edwin J. Houston, and A. E. Kennelly. It is shown (1), how the individual leakage conductances may be approximately determined by varying the working pressure on one side of the system and observing the corresponding variation of potential to ground on the other. (2) How the resistance in and up to the ground of a grounded conductor under load may be measured from the central station. 1400 w. Elec Wld—July 25, 1896.

**Insulation, Voltmeter.**—Weston Voltmeter Resistance Curves. Describes tests of insulation resistance made with this instrument, and manner of driving curves. 1700 w. Am Elect'n—Aug., 1897.

**Interrupter Circuits.**—The Indications of Commercial Instruments on Wehnelt Interrupter Circuits. George T. Hanchett. An account of experiments made and conclusions reached, showing how deceptive are measuring instruments, and explaining the conditions in a direct-current circuit including a Wehnelt interrupter. 2500 w. Elec Wld & Engr—May 5, 1900.

**Joint Tests.**—Joint Test; Supplement to Raymond Barker's Accumulation Mill Method. A. D. Constable. Investigations made on this method with a view to determininig whether in all cases it would prove a satisfactory test. Ill. 1400 w. Elec Rev, Lond—July 8, 1898.

**Leakage.**—A Direct Reading System for Measuring

Current Leakage. Dr. M. Kallmann. Abstract of a paper read before the Verband Deutscher Elektrotechniker. Describes the system and enumerates its most important applications. 2200 w. Elect'n, Lond—Dec. 23, 1898.

**Magnetic Field.**—See MAGNETIC FIELD.

**Magnetic.**—See MAGNETIC TESTING.

**Phase Angles.**—Phase Angle Measurements. Edwin Place. A report of the writer's investigations in this field, and the conclusions reached. Ill. 3300 w. Elec Wld & Elec Engr—May 13, 1899.

**Polyphase.**—A Graphical Method of Determining the Current and Pressure in Connected Polyphase Systems (Eine Graphische Methode zur Bestimmung der Strom-und Spannungswerthe in Verketteten Mehrphasensystemen). F. Blanc. Giving the derivation of graphical diagrams, with examples of their practical application. Two articles. 5000 w. Electrotech Zeitschr—Aug. 30, Sept. 6, 1900.

Measurement of Power in Polyphase Systems. Aug. J. Bowie, Jr. Considers the cases of unbalanced and balanced loads usually encountered in practice. 1500 w. Elec Wld—Aug. 19, 1899.

Measurement of Power in Two and Three-Phase Circuits by Means of Wattmeters. Dugald C. Jackson. A résumé of the various ways in which wattmeters may be applied to the measurement of the power in polyphase circuits. 1300 w. Elec Wld—Sept. 26, 1896.

On the Determination of Current Strength in Three-Pointed Star Resistance Systems. A. E. Kennelly. Explains a manner of computing these current strengths, and of producing two-phase currents from a three-phase system and vice versa. 2000 w. Elec Wld—Aug. 19, 1899.

Polyphase Electric Testing. Harris J. Ryan. Read at Boston meeting of the Am. Inst. of Elec. Engs. Treats of a method that employs a polyphase source for making instantaneous measurements of alternating currents or pressure without the use of a contact-maker. 2000 w. Elec Rev, N. Y.—July 5, 1899.

Three-Phase Current Measurement. Lawford H. Frye. Describes the method in use in the electrical laboratory of the Hanover Polytechnikum. It is simple and very economical in the number of instruments required, and in the time needed for a measurement. Ill. 800 w. Elec Rev, Lond—Dec. 10, 1897.

**Potentiometer.**—Measurement of the Resistance of Cables. Arthur C. Heap. Describes the potentiometer, and the method of measuring for the use of manufacturers. Ill. 2000 w. Elec Rev, Lond—Oct. 5, 1900.

**Precise.**—Dr. Sheldon on Electrical Measurements of Precision. Synopsis of lecture delivered before the Electrical Department of the Brooklyn Institute. Advance and improvement in methods. 700 w. Elec Eng—Nov. 11, 1896.

See also **Resistance, Low.**

**Quantity.**—The Direct Measurement of a Quantity of Electricity in Electromagnetic Units (Sur la Mesure Direct d'une Quantite d'Electricite en Unites Electromagnetiques). A communication to the French Academy by M. Blondlot, with suggestions as to the construction of an electric meter. 1200 w. Comptes Rendus—June 13, 1898.

**Railway Feeders.**—Methods of Determining the Resistance of the Railway Feeder Circuits and the Ground Return Losses. Albert B. Herrick. Describes methods of making these determinations without a pressure wire. 1600 w. St Ry Jour—April, 1898.

**Resistance.**—A Method for Measuring Resistance. H. Beinborn. Describes a method depending upon the value of the current becoming a maximum or minimum when the resistance is changed according to a certain law. 900 w. Am Elect'n—Dec., 1896.

A Universal Carey-Foster Bridge. Charles V. Drysdale. An illustrated description of the writer's method of using the Carey-Foster bridge in Resistance work. 1800 w. Elect'n, Lond—Oct. 5, 1900.

See also **Potentiometer.**

**Resistance Field Coil.**—A Simple Way of Testing the Resistance of a Field Coil When Instruments Are Not Available. Frank B. Porter. A simple device for testing the electrical resistance of a field. 600 w. Elec Wld—March 13, 1897.

**Resistance, High.**—Experiments on High Electrical Resistance. Ogden N. Rood. Explanation of methods and account of experiments. 4200 w. Am Jour of Sci—Oct., 1900.

**Resistance, Low.**—A Method for the Accurate Measurement of Low Resistance. Wilbur M. Stine. The method described is a modification of the Cary-Foster method. The essential idea is the employment of the standard of low resistance as the bridge wire. 1300 w. Elec Wld—Feb. 26, 1898.

Notes on the Practical Measurement of Low Electrical Resistances. J. Warren. Investigations as to what constitutes the difference of potential. Serial. 1st part. 1000 w. Elec, Lond—Nov. 25, 1898.

On the Bridge Method of Comparing Low Resistances. H. L. Callendar. Some remarks on this method and its great advantage, with illustration of its capabilities. 1200 w. Elect'n, Lond—July 8, 1898.

The Precise Comparison of Very Small Resistances. Samuel Sheldon. Outlines a method used with great success at the Polytechnic Institute for determining low resistances. Ill. 900 w. Elec Wld—March 5, 1898.

**Rowland's Method.**—See **Absorption.**

**Secohmmeter.**—See ELECTRIC METER; INDUCTANCE.

**Standard.**—The Facilities Afforded by the U. S. Office of Standard Weights and Measures for the Verification of Electrical Standards and Electrical Measuring Apparatus. Frank A. Wolff, Jr. Describes what has been accomplished, and gives a brief history of the units of reference. 4800 w. Elec Wld & Engr—March 10, 1900.

Electrical Standards. Frank A. Wolff, Jr., in "Science." Concerning the facilities afforded by the office of standard weights and measures for the verification of electrical standards and electrical measuring apparatus. Serial. Elec Rev. N. Y.—April 4, 1900.

**Standard Ampere.**—Redetermination of the Ampere. Report of the committee on Standards of Measurement to the Am. Assn. for the Adv. of Science. 700 w. Elec Rev, N. Y.—Oct. 5, 1898.

**Standard Cell.**—See ELECTRIC CELL—**Standard.**

**Standard Ohm.**—On a Determination of the Ohm made in Testing the Lorenz Apparatus of the McGill University, Montreal. W. E. Ayrton and J. V. Jones. A mean of 9 measurements, when carefully corrected, shows that 1 Board of Trade Ohm equals 1.00026 true ohms. The details of the tests are given. 2500 w. Ind & Ir—Nov. 19, 1897.

The Standard Mercury Ohm of the Physikalisch-Technische Reichsanstalt. Wilhelm Jaeger. A summary of investigations undertaken with a view toward the preparation of legal mercury standards of electrical resistance for Germany. 4000 w. Elect'n—Aug. 28, 1896.

See also ELECTRIC RESISTANCE—**Standard.**

**Telephone.**—The Sensitiveness of the Telephone, and its Applicability to Electric Measurements Die Empfindlichkeit des Telephons und Seine Verwendung in der Messtechnik). Devoted to an investigation of the precision which may be obtained by the use of the telephone in connection with a Wheatstone bridge for electric measurements. Two articles. 5000 w. Elektrotech Zeitschr—Sept. 30, Oct. 7, 1897.

**Telephone Conductors.**—Measurements on Telephone Conductors (Messungen an Fernsprechverbindungsleitungen). F. Breisig. A mathematical discussion of the method used on the Berlin telephone system; employing alternating currents. 5000 w. Electrotech Zeitschr—March 9, 1899.

**Units.**—See **Standard;** ELECTRIC UNIT; WEIGHTS AND MEASURES—**Metric, Electric Industries.**

**Voltameter, Copper.**—The Copper Voltameter (Ueber das Kupfer-Voltameter). Describing the practical use of the voltameter for electrical measurements by the decomposition of copper solutions. Two articles. 6000 w. Zeitschr f Elektrochemie—May 5, 20, 1897,

**Voltameter, Hydrogen.**—The Hydrogen Voltameter and its Reliability (Das Wasserstoff Voltameter und seine Zuverlässigkeit). H. A. Naber. Reviewing the investigations of Faraday and later physicists, and illustrating and describing a decomposition voltameter for precise work. 1800 w. Elektrochem Zeitschr—June 1, 1896.

**Voltameter Mercury.**—A New Quicksilver Voltameter (Ueber ein Neues Quecksilber-Voltameter). Dr. L. Gurwitsch. The determination is effected by measuring the influence of the current on the volume of mercury flowing through a capillary aperture. 1500 w. Zeitschr f Elektrochemie—Jan. 5, 1899.

## ELECTRIC METER.

See also **ELECTRIC INDICATOR; ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC STATION MANAGEMENT; ELECTRIC TESTING; ELECTROMETER—Quadrant; ELECTRO-PHYSICS.**

Commercial Instruments for Indicating and Recording Electrical Quantities, with a note on the New Aron Meter. G. S. Shoults. Condensed paper read before the Northern Society of Elec. Engs. The requirements of such instruments are considered and the accuracy attainable. Ill. 1500 w. Elec Eng, Lond—Feb. 10, 1899.

Electrical Measuring Instruments. J. Franklin Stevens. A discussion of commercial direct reading indicating instruments, such as are found in everyday use, and the requirements. 7000 w. Jour Fr Inst—July, 1900.

Electric Metering from the Station Standpoint. Caryl D. Haskins. Discusses the accuracy, durability and other essential qualities of meters, and the desirability of their use. 4000 w. Trans Am Inst of Elec Engs—June & July, 1897.

Electric Meters. R. T. MacKeen. Read before the Maritime Elec. Assn., at Halifax. On the service and care of meters, the need of inspection, etc. 2000 w. Can Elec News—May, 1899.

Electricity Meters. T. P. Wilmshurst. Considers the essential conditions of a perfect meter, and discusses some of the most important points. Paper read before the Municipal Electrical Assn. and followed by discussion. 5000 w. Elec Eng, Lond—July 9, 1897.

Meters. Jas. Milne. Touches on some of the more important meters in practice, making comparison with some of these meters from actual results. 7500 w. Can Elec News—July, 1896.

Simple Volt, Ampere and Wattmeters. Charles T. Child. Illustrates and describes several forms of such instruments that can be easily made by the amateur, at small cost. Serial. Am Elect'n—Oct., 1898.

The Meters of To-day. R. F. Schuchardt. Read at meeting of the Northwestern Electrical Assn. Investigations show that meters are not all that might be desired. Points to be considered in selecting a meter are given. 1600 w. Elec Wld—July 31, 1897.

Volt and Ampere Meters. J. Warren. Describes various instruments. Serial. Elec, Lond—Jan. 10, 1896.

**Accumulators.**—Electric Meters for Use with Accumulators (Elektrizitätszähler für Akkumulatorenbetrieb). H. Aron. An illustrated article showing various forms of the author's pendulum meter as applied to accumulator driving. 2000 w. Elektrotech Zeitschr—Aug. 18, 1898.

**Allg. Elek. Ges.**—Measuring Instruments of Precision for Alternating Currents of the Allgemeine Elektricitäts-Gesellschaft (Präcisionsinstrument für Wechselstrom der Allgemeinen Elektricitäts-Gesellschaft). Dr. G. Benischke. An address before the Elektrotechnische Verein, describing volt, ampere and watt meters, with illustrations; and the discussion ensuing. 4000 w. Elektrotech Zeitschr—May 17, 1900.

**Alternating.**—A New Form of Alternating Current Instrument. Arthur C. Heap. Describes a method of construction designed by the writer to overcome sources of error in amperemeters and voltmeters. Ill. 800 w. Elec Rev, Lond—Sept. 23, 1898.

New Measuring Instruments for Alternating Currents (Neue Wechselstrommess-Instrumente). Dr. G. Benischke. A discussion of the construction and operation of the measuring instruments made by the Allgemeine Elektricitäts-Gesellschaft, of Berlin. 10000 w. Elektrotech Zeitschr—Jan. 26, 1899.

**Alternating Recording.**—The Care and Testing of Alternating Current Recording Meters. R. H. Sterling. Deals with the Shallenberger type of the recording ampere-hour meter for alternating current. Ill. 2000 w. Am Elect'n—May, 1898.

**Aron.**—Improved Electric Power Meter (Nouveau Compteur d'Energie Electrique). M. Aliamet. An illustrated description of the new Aron meter, with automatic electric regulator. Details of the mechanism are given. 2500 w. L'Electricien—June 3, 10, 1899.

New Electric Meter (Neuer Elektrizitätszähler). A description of the electricity meter of Dr. H. Aron; an electric pendulum and escapement system is used. 1200 w. Elektrotech Rundschau—April 15, 1898.

Perfected Clockwork Electric Meter (Vervollkommneter Uhrenzähler). Aron's improved electric meter, operates by the electric control of a clockwork escapement system. 4500 w. Elektrotech Zeitschr—July 1, 1897.

The New Aron Meter. A résumé of Dr. Aron's paper describing his new meter, with illustrations. 1700 w. Elec Eng, Lond—July 9, 1897.

**Calibration.**—The Calibration of Meters for Multiple Circuits (Die Aichung von Mehrleiterzählern). W. Marek. A simple method of calibration by comparing a rotary meter with a pendulum meter. 1500 w. Elektrotech Zeitschr—March 1, 1900.

**Cauderay.**—New Multiple Electric Hour Meter (Nouveau Compteur Electrique Horaire Multiple). M. Aliamet. Illustrated description of the Cauderay meter, which is a clock meter with multiple circuits and a totalizing device. 2000 w. L'Electricien—Dec. 17, 1898.

**Charging Systems.**—See **ELECTRIC STATION MANAGEMENT—Rates.**

**Distant Points.**—Meters for Showing Conditions at Distant Points (Fernstromzeiger). Dr. Carl Michalke and Dr. O. Martienssen. An article describing a method by which, with the use of suitable connections, only one wire between two stations will enable the current consumption of each to be observed at the other. Diagrams. 1500 w. Elektrotech Zeitschr—June 7, 1900.

**Dividends.**—The Meter's Relation to the Dividend. Caryl D. Haskins. Abstract of paper read before the Ohio Elec. Lgt. Assn., August, 1898. Gives advice on the size of meters for valuable loads, emphasizes the importance of overload accuracy, and considers other points of interest. 3000 w. Elec Wld—Sept. 3, 1898.

**Dynamometer.**—See **ELECTRO-DYNAMOMETER.**

**Electrolytic.**—See **ELECTRIC CURRENT RECORDER.**

**Electro-Metallurgy.**—See **ELECTRO-METALLURGY—Meter.**

**Electrometer.**—See **ELECTROMETER.**

**Faradmeter.**—See **ELECTRIC INSTRUMENT.**

**Faults.**—Faults in Measuring Instruments. Considers the faults of the voltmeter, the ammeter, the recording wattmeter, and recording ammeter. 2500 w. Am Elct'n—May, 1897.

**Frictionless Motor.**—A Frictionless Motor Meter. S. Evershed. Describes an attempt to remove some of the defects of this particular class of meter, and the outcome. Ill. 8800 w. Brit Inst of Elec Engs—May 10, 1900.

**Galvanometer.**—See **GALVANOMETER.**

**Holden.**—The Holden Electric Meter (Compteur d'Energie Electrique, Système Holden). J. A. Montpellier. A motor meter operating on the principle of discontinuous integration. The details of construction and operation are fully described. 2000 w. Electricien—Aug. 11, 1900.

**Hysteresis.**—The Hysteresis Errors of Electricity Meters, Containing Soft Iron Armatures. Wilbur M. Stine. Discusses the variable potential rheostat, designed by the writer, and the method of using it in the study of this subject. 2000 w. Elec Wld—Feb. 18, 1899.

**Integrating.**—A Combination Integrating Wattmeter and Maximum-Demand Indicator. J. H. Barker. Paper read before the British Association, discussing maximum demand and describing combined meter and indicator. 1800 w. Elec Eng, Lond—Sept. 7, 1900.

Switchboard Instruments—Integrating Wattmeters and Ammeters. Wm. Baxter, Jr. An illustrated description of some electrical measuring instruments. 2700 w. Am Mach—Sept. 27, 1900.

**Lighting.**—Meters and Meter Rates. A. A. Dion. A consideration of the importance of meters in connection with electric-light plants, discussing the desirable characteristics, testing, methods of charging, etc. 6500 w. Can Engr—July, 1899.

**Macrea's Recording.**—Electric Light and Power Station Records. Illustrates and describes Macrea's apparatus and its operation. 1200 w. Elec, Eng, N. Y.—May 5, 1898.

**Management.**—Haskins on Electric Metering. Discussion of paper by Caryl D. Haskins on "Electric Metering from the Station Standpoint." 3700 w. Trans Am Inst of Elec Engs—Oct., 1897.

The Management of Central Station Meter Systems. Caryl D. Haskins. Considers that meters should always be installed in as small units as possible. Discusses their care and intelligent management and the effect upon revenue. 4500 w. Elec Wld—Jan. 1, 1898.

See also **ELECTRIC STATION MANAGEMENT.**

**Maximum Demand.**—See also **Integrating.**

**Motor.**—Care and Management of Electric Motor-Meters. Thomas Duncan. Remarks and hints on their management, calling attention to the requirements necessary for the successful installing of meters. 3500 w. Am Elect'n—Sept., 1896.

See also **Vulcain.**

**Non-Integrating.**—Some Non-Integrating Electric Meters. William Edward Ayrton. Read before the British Inst. of Civ. Engrs. Considers the construction of meters, the materials used, improvements in galvanometers, ammeters, voltmeters, etc. Short discussion. 2000 w. Elec Eng, Lond—June 9, 1899.

**Phasemeter.**—A Direct Indicating Phasemeter (Ueber einen Direkt Zeigenden Phasenmesser). Th. Burger. Describing the Hartmann & Braun apparatus, which resembles a double watt-meter, with two movable bobbins. An illustration of the instrument and diagrams of the windings are given. 1500 w. Elektrotech Zeitschr—July 14, 1898.

An Apparatus for Illustrating Phase-Differences. Louis Derr. Describes an apparatus devised by the writer for showing phase-relations on a scale suited to lecture-room illustration, its operation depending on the principle that when an electric current is sent through a wire lying perpendicularly across a magnetic field, a force is developed which urges the wire at right angles to both the direction of the field and the current. Illustration. 800 w. Tech Quar—Dec., 1896.

Dobrowolski's Phasemeter (Phasemètre de von Dolivo Dobrowolski). M. Aliamet and E. J. Brunswick. Illustrated description of a simple and ingenious instrument which gives direct readings of phase displacement. 800 w. L'Electricien—Oct. 29, 1898.

Dr. Th. Burger's Direct Reading Phasemeter (Phasemètre à Lecture Directe du Dr. Th. Burger). M. Aliamet and E. J. Brunswick. A dynamometer type phasemeter of very simple construction described and illustrated. 1000 w. L'Electricien—Nov. 26, 1898.

Means of Attaining Larger Phase Differences, and Their Application to Various Measuring Instruments. Johannes Görner. From the "Elektrotechnische Zeitschrift." Describes arrangements adopted by Hartmann and Braun, of Frankfort a|M for the construction of instruments in which such displacements of currents or fields are necessary. Ill. 1200 w. Elect'n, Lond—Dec. 22, 1899.

The Theory and Application of the Phasemeter (Theorie und Anwendung des Phasometers). A full analytical investigation of the conditions involved in the production of polyphase currents and a description of a new instrument for investigating them. 5 articles. 15000 w. Elektrotechnische Zeitschr—Sept. 16, 23, Oct. 7, 21, 28, 1897.

**Power Factor.**—Power Factor Indicator. Aug. J. Bowie, Jr. Describes an instrument that will indicate the power factor directly on a scale suitably calibrated. 1500 w. Elec Wld & Engr—Oct. 27, 1900.

**Practice.**—General Meter Practice. Lyman C. Reed. Deals with the practical arrangement of a modern meter department. Ill. 1700 w. Am Elect'n—Jan., 1899.

General Meter Practice. Lyman C. Reed. On the testing of electric meters in the consumers' premises. 1800 w. Am Elect'n—Feb., 1899.

**Prepayment.**—Prepayment Meters. H. W. Couzens. Read before the Municipal Electrical Assn. Considers the essential features of a prepayment electricity meter, and endeavors to show that its adoption would open important fields for electric lighting. 3000 w. Elec Rev, Lond—July 16, 1897.

**Rate.**—Rate Meters. Howard Hendrickson. Read before the Pacific Coast Trans. Assn. Discusses the requirements of a perfect rate meter, and describes a mechanical device which is said to be accurate and not liable to get out of order. Ill. 3200 w. Jour of Elec—July, 1900.

**Recording.**—Switchboard Improvements. Recording Ammeters, Voltmeters, and Wattmeters. William Baxter, Jr. Illustrates and describes several instruments. 1700 w. Am Mach—Oct. 4, 1900.

**Schuckert.**—The Meters of the Electrical Company, formerly Sckuckert & Co. of Nuremberg (Zähler der Elektrizitäts A. G. vormals Schuckert & Co., Nüremberg). J. A. Möllinger. A very complete account of the meters made by this well-known concern, for various currents and uses. 5000 w. Elektrotech Zeitschr—Sept. 8, 1898.

**Small Currents.**—Registration of Small Currents Used for Electric Lighting or other Purposes. Alfred H. Gibbings. Abstract of a paper read before the Inst. of Elec. Engs., England. Describing a meter which the writer claims will register accurately from 1-10 ampere to its range-limit, dealing with its principle of action and registration, construction and probable cost, tests, etc. Discussion. Ill. 4400 w. Elect'n, Lond—May 20, 1898.

**Small Switchboard.**—The Construction of a Voltmeter and Ammeter Suitable for a Small Switchboard. Nevil Monroe Hopkins. Directions for making simple forms of indicating instruments, and instruction for their calibration and care. Ill. 5700 w. Sci Am Sup—April 15, 1899.

**Switchboard.**—How to Check Station Instruments While on the Switchboard. A. O. Beneke. Directions, with precautions to be taken. 1500 w. Elec—Oct. 21, 1896.

Switchboard Instruments—Ammeters and Voltmeters. William Baxter, Jr. Diagrams illustrating the principles upon which nearly all the ammeters and voltmeters in actual use are constructed are given and explained. 2000 w. Am Mach—March 8, 1900.

**Testing and Handling.**—Meter Testing and Handling. James E. Judd. Illustrates and describes the method and equipment of a testing department. 900 w. Am Elect'n—March, 1899.

**Tests.**—Notes on Some Central Station Meter Tests. William D. Ennis. Reports of recent test of the meter system of a small lighting and power station near New York, with recommendations adopted. 1400 w. Elec Eng, N. Y.—July 7, 1898.

Some Tests on the Variation of the Constants of Electricity Supply Meters, with Temperature and with Current. G. W. Donald Ricks. Presented at the Toronto meeting of the British Assn. Describes tests made to afford a means of studying variations in the accuracy of the indications under varying conditions of temperature, current and potential difference. Ill: Serial. Elec Wld—Aug. 28, 1897.

The Practical Testing of Electricity Meters for Central Stations. C. A. L. Prusmann. Deals somewhat exhaustively with the process and methods of testing electricity meters. Considers the equipment of the meter-room, different types of modern meters, and testing. Serial. Elec Eng, Lond—Jan. 13, 1899.

**Tramways, Nashville.**—See **ELECTRIC TRAMWAY—Meter System, Nashville.**

**Villy.**—Multiple Dial Electric Meter (Compteur Horaire d'Electricité à Cadrans Multiples). M. Aliamet. A description of the Villy meter. One clock work mechanism is provided with a number of dials, each of which may be connected with a different circuit. 1200 w. L'Electricien—Jan. 20, 1900.

**Volt-Hour.**—The Volt-Hour Meter of O'Keenan (Der Volt-Stunden-Zähler von O'Keenan). From a paper before the Société Internationale des Electriciens, at Paris, describing this meter and various uses to which it may be applied, with illustrations. 1200 w. Elektrotech Zeitschr—May 31, 1900.

**Voltmeter Mirror.**—Reflecting Voltmeter of Large Range (Spiegel-Voltmeter mit Weitem Messbereich). W. Thiermann. A description of an instrument constructed for the Technical High School at Hanover, with a range from 750 volts down to 0.0007 volt. 3500 w. Elektrotech Zeitschr—March 15, 1900.

**Voltmeter Series Arc.**—The Voltmeter in Series Arc Stations. Alex Dow. Discusses the various uses to which a voltmeter can profitably be put in a series arc lighting station. 4400 w. Elec Engng—Aug. 1, 1897.

**Vulcain.**—The Vulcain Electric Meter (Compteur d'Energie Electrique, Type Vulcain). M. Aliamet. An improved meter of the so-called "motor" type, consisting of a motor, a braking device, and a totaliser. 2500 w. L'Electricien —April 1, 1899.

**Wattmeter.**—See also **Aron; Integrating; Vulcain.**

**Wattmeter, Differential.**—Experiments with a Differential Wattmeter. A. B. Reynders, in the "Scientific Magazine," of the Univ. of Tenn. The making of a differential wattmeter is described and the method of using it. 1200 w. Am Gas Lgt Jour—Sept. 21, 1896.

**Wattmeter Hot-Wire.**—A Hot-Wire Combined Ampere-Volt Wattmeter. Michael B. Field. Describes a hot-wire instrument devised by the writer for use in testing rooms, laboratories, etc., as a handy and accurate appliance for determining the conditions obtaining in any circuit, viz., the current strength, voltage, power, and power factor. Serial. Elec Rev, Lond—Nov. 25, 1898.

**Wattmeter Polyphase.**—Effect of Inequality of Voltage in Three-Phase Wattmeters in Measuring Motor Loads. August J. Bowie. Reports of six tests made to determine to what extent the readings would be affected. 700 w. Elec Wld & Elec Eng—April 22, 1899.

Rotary Current Meters (Ueber Drehstrom-Zähler). J. A. Möllinger. A mathematical discussion of rotary current wattmeters. Serial. Elektrotech Zeitschr—July 12, 1900.

See also **ELECTRIC MEASUREMENT—Polyphase.**

**Wattmeter Railway.**—See **Wattmeter Recording.**

**Wattmeter Recording.**—The Recording Wattmeter in Railway Practice. Caryl D. Haskins. A description of the Thomson recording wattmeter and exposition of the value of a meter in street railway work. 1900 w. St Ry Jour—May, 1896.

**Wattmeter, Siemens-Halske.**—The New Siemens & Halske Wattmeter (Ueber ein Neues Wattmeter der Firma Siemens & Halske, A. G.). Dr. A. Raps. A paper before the Elektrotechnical Society, with numerous illustrations showing the construction of the instrument. 3000 w. Elektrotech Zeitschr—Sept. 14, 1899.

**Wattmeter Verification.**—A Rapid Verification of the Correctness of the Indications of a Watt Meter (Vérification Rapide l'Exactitude des Indications d'un Watt métre). M. Aliamet. Intended to enable the correction factor to be obtained for a watt meter which has already been calibrated. 2000 w. Electricien—June 18, 1898.

**Wright Discount.**—The Wright Discount Meter and Its Use in Central Station Management. Illustrated detailed description of what is claimed to be a very useful instrument. 2000 w. Elec Eng, N. Y.—Nov. 24, 1898.

See also **ELECTRIC STATION MANAGEMENT.**

### ELECTRIC MINING MACHINERY.

See also **ELECTRIC EQUIPMENT—Mine; MINE HAULAGE—Electric; MINING MACHINERY.**

**Coal Cutting.**—See **COAL CUTTING MACHINERY —Electric.**

### ELECTRIC MOTOR.

See also **DYNAMO; ELECTRIC APPARATUS; ELECTRIC CAR; ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC MACHINERY; ELECTRIC POWER; ELECTRIC RAILWAY; ELECTRIC TRAMWAY; ELECTRIC TRANSMISSION.**

I. Power Supply by Single-Phase Motors. T. P. Wilmshurst. II. Notes on the Maintenance of Motors on Hire from an Electricity Works. C. A. L. Prussman. Two papers read before the Huddersfield Convention of the Munic. Elec. Assn. and discussed together. 7800 w. Elec Eng, Lond—June 29, 1900.

**Alternating.**—Alternate Current Motors. Bernard V. Swenson. Descriptive of the different varieties of alternate current motors. 4200 w. Tech—May, 1896.

Alternating-Current Motors. Dugald C. Jackson. Read before the Northwestern Electrical Assn. Careful comparative tests of alternating-current motors, made in the laboratory of the writer by J. H. Perkins and W. H. Williams, with results and explanations. 1600 w. Elec Wld—Aug. 8, 1896.

Alternating-Current Motors. E. E. Tasker. Read at the students' meeting of the Inst. of Elec. Engs., London. Illustrated explanation of the working of an alternating-current generator and motor, and the various devices used. Serial. Elec Eng, Lond—April 1, 1898.

Alternating Current Motors of Great Starting Power (Wechselstrommotoren mit Grosser Anlaufskraft). Max Déri. A paper read before the Electrotechnical Society of Vienna, discussing the best armature windings for the purpose. 3000 w. Elektrotech Zeitschr—Sept. 15, 1898.

Alternating-Current Power Motors. W. A. Layman. Discusses the difference between direct and alternating currents, and between direct and alternating-current motors, considering in detail the motor brought out by the Wagner Elec. Mfg. Co., of St. Louis. Ill. 5000 w. Jour Assn. of Engng Soc's—Nov., 1899.

Alternating Current Synchronous and Induction Motors. Ernst Julius Berg. On the construction and use of these motors, dealing in this part mostly with synchronous motors. 1500 w. Am Elect'n—Jan., 1899.

Comparative Commercial Qualities of Alternating Current Motors. W. H. Williams and J. H. Perkins. Synopsis of thesis submitted for the degree of Bachelor of Science in Electrical Engineering. Describes a series of tests of 5 H. P. alternating current motors of various makes. A table of comparative qualities and efficiency curves of several of the latest type direct current motors are given. 1300 w. Wis Eng—Oct., 1896.

See also **Asynchronous; Induction; Polyphase; Single-Phase; Synchronous.**

**Alternating Railway.**—Some Applications of Alternating Motors. Albert Gould Davis. Considers the advantages and disadvantages of alternating motors, the question of speed regulation, and their use in long-distance electric railway work. Ill. 3500 w. Elec Wld—Jan. 1, 1898.

**Asynchronous.**—Asynchronous Alternating Motors (Ueber Asynchrone Wechselstrommotoren). A mathematical investigation of the conditions of best action and efficiency of one- and three-phase electric motors. 2500 w. Elektrotechnische Zeitschr—March 25, 1897.

A Non-Synchronous Two-Phase Alternate Current Motor. Ernest Wilson. Experiments with the object of investigating the currents in the armature conductors and their effects upon the magnetic field of the motor. 2500 w. Elect'n —Aug. 28, 1896.

The Theory of Asynchronous Motors (Zur Theorie der Asynchronmotoren). Julius Heubach. A general graphical study of single and polphase motors, with diagrams and tables of coefficients for practical use. Two articles, 6000 w. Elektrotech Zeitschr—April 27, May 4, 1899.

The Experimental Determination of the Time Relation between Current and Pressure in Rotors of Asynchronous Motors (Ueber die Experimentelle Bestimmung des Zeitlichen Verlaufes von Strom und Spannung im Rotor von Asynchronmotoren). H. Rupp. Giving a detailed description of apparatus and experiments. 3000 w. Elektrotech Zeitschr—Oct. 4, 1900.

The Theory of Asynchronous Motors (Zur Theorie der Asynchronmotoren). Julius Heubach. A graphical treatment of the general theory of non-synchronous motors; both three-phase and single-phase motors being considered. Two articles, 10000 w. Elektrotech Zeitschr—Jan. 25, 1900.

Theory and Calculations of Asynchronous Alternate Current Motors. A. Heyland. This method of calculation is based upon the practical adaptations of certain peculiar results, at which the author arrived in submitting the phenomena of mutual induction to a graphical treatment. The first part deals with polyphase motors,—deduction of theory and practical applications of the deduction. Serial. Elect'n—Feb. 14, 1896.

See also **Induction; Polyphase; Single-Phase.**

**Automobile.**—See **ELECTRIC VEHICLE—Motor.**

**Brooklyn Elevated.**—See **ELEVATED RAILWAY—Brooklyn Electric.**

**Cable Trains, Chicago.**—Economy of a 600-Horse-Power Electric Motor. Describes the remarkable work accomplished by the motor which moves the cable trains on the south side of the city of Chicago. 900 w. Bos Jour of Com—July 2, 1898.

**Compressed Air Compared.**—See also **COMPRESSED AIR—Electric Motor—Compared.**

**Condenser.**—See **Induction Single-Phase.**

**Constant Speed Compounding.**—The Theory of

Constant Speed Direct Current Motors. W. G. Rhodes. Investigates the compounding of motors so as to maintain a constant speed under all loads, up to a certain limit. 800 w. Elec Rev, Lond—Feb. 26, 1897.

**Constant Speed Design.**—The Determination of the Size and Number of Turns of Wire in a Constant Speed Motor. William Baxter, Jr. Considers the principles of operation and the winding of the wire of a constant speed motor. Diagrams. 2000 w. Am Mach—March 31, 1898.

**Control.**—Electrical Devices for Changing the Speed of Series Motors. William Baxter, Jr. Showing how much variation in velocity is possible by the use of devices independent of the motor. 1400 w. Am Mach—Oct. 29, 1896.

Motor Speed Regulation. Alton D. Adams. Calling attention to the need of efficient means of regulation in variable speed motors. Discussion. 1400 w. Trans Am Inst of Elec Engs—Ang. and Sept., 1899.

Regulation of Variable Speed Motors by Varying Impressed and Counter E. M. F.'s. L. B. Mather. Illustrates and describes several systems that may be used advantageously. 1200 w. Am Elect'n—May, 1900.

Rheostat, Double Commutator and Multi-Voltage Control. Alton D. Adams. Illustrates and describes various means of special regulation and the work to which they are suited. 4500 w. Am Elect'n—May, 1900.

Speed Control of Motors Driving Printing Presses and Machine Tools. Illustrates and describes satisfactory methods. 1000 w. Am Elect'n—May, 1900.

Speed Regulation of Electrical Motors. Allan D. Adams. Considers speed changes that originate in the motor. 900 w. Am Mach—Jan. 26, 1899.

See also **Protection; CONTROLLER; ELECTRIC RAILWAY—Multiple-Unit; Train Control.**

**Crocker-Wheeler.**—Considerations Governing the Design of the Crocker-Wheeler Direct-Connected Motors. Gano S. Dunn. Description of the construction adopted with a view to obtaining the desired output without too great an increase of size. Ill. Serial. Elec Eng, N. Y.—March 31, 1898.

**Design.**—Calculation of Electrical Motors. Alfred E. Wiener. Part first deals with finding the capacity of a generator corresponding to a motor of a given output, and speed calculations of electrical motors. 1500 w. Elec Wld—Dec. 5, 1896.

Design for a Three Horse-Power Motor. Cecil P. Poole. Illustrates and describes a design prepared with a view to simplifying the work without sacrificing the efficiency, or making the machine unduly heavy. 1500 w. Am Elect'n—Sept., 1900.

Designs for Small Motors. Cecil P. Poole. Part first gives working drawings for the construction of a 1-6 h.-p. motor with drum armature, for operation upon a 110-volt continuous-current circuit, with descriptions. Serial. Am Elect'n—Feb., 1897.

**Differential Compounding.**—Practical Method of Differential Compounding a Shunt Motor for Constant Speed at All Loads. Reese Hutchison. A practical and reliable way is described. 600 w. Am Electn—Jan., 1897.

**Differentially Wound.**—The Action of the Differentially-Wound Motor. William Baxter, Jr. An instructive study. 1200 w. Am Mach—July 2, 1896.

**Dynamometers.**—Electric Motors for Measuring Power in Place of Transmission Dynamometers. E. B. Raymond. Extract from discussion at meeting of the New England Cotton Mfrs. Assn. Also extracts from discussion by Calvert Townley. Describes methods. 2300 w. Power—Aug., 1898.

**Efficiency.**—Efficiency of Small Motors. Alton D. Adams. Considers the character and location of losses in motors under the heads of loss in armature and magnet winding, losses in iron cores and poles, and losses by friction of bearings, commutator and air. 1300 w. Am Elec—May, 1899.

See also **Railway; DYNAMO.**

**Enclosed.**—The Enclosed Electric Motor. Sydney F. Walker. Discusses the advantages and disadvantages, and things of importance in designing these motors. 2000 w. Elec Rev, Lond—Dec. 15, 189.

See also **Sayers.**

**Enclosed vs. Open.**—Open vs. Enclosed Motors for Stationary Work. Charles Leven. Discusses both types and favors the open motor. 1200 w. Elec Rev, Lond—March 9, 1900.

**Evolution.**—The Evolution of an Electric Motor. Edward B. Rosa. A sketch of the evolution of the motor, as shown by a series of lecture experiments. Ill. 4000 w. Chau—Jan., 1896.

**Fan.**—Fan Motor Problems and Some of Their Solutions. Technical description of many of the various makes of fan motors. Ill. 3000 w. Elec Wld—April 2, 1898.

Fan Motor Selection. Alton D. Adams. Discusses the relation between speed and capacity. Ill. Serial. Heat & Ven—April, 1899.

See also **FAN.**

**Friction.**—The Friction Losses of Induction Motors when Unloaded (Ueber die Leerlaufreibung von Induktionsmotoren). R. Braun. A mathematical investigation of the methods of measuring the friction losses when no external work is being done. 2500 w. Elektrotech Zeitschr—Sept. 28, 1899.

The Friction of Unloaded Induction Motors (Ueber die Leerlaufreibung bei Induktions Motoren). F. Blanc. A mathematical discussion of Braun's method, showing how possible errors in its application may be avoided. 2500 w. Elektrotech Zeitschr—Feb. 15, 1900.

**Induction.**—Steinmetz on Induction Motors. Discussion of paper read by Charles P. Steinmetz, at Eliot, Me. 3000 w. Trans Am Inst of Elec Engs—Oct., 1897.

The Alternating Current Induction Motor. Charles Proteus Steinmetz. Discusses load curves, speed curves, regulation and stability. 7000 w. Trans Am Inst of Elec Engs—May, 1897.

The Induction Motor. Alfred E. Wiener. The principles of the rotary field are clearly and accurately explained without the aid of mathematics. Ill. 1400 w. Am Elect'n—May, 1898.

The Polyphase Induction Motor. Ralph D. Mershon. Read at the Milwaukee meeting of the Northwestern Elec. Assn. Explains the salient points in the theory of the induction motor without using mathematics or complicated diagrams, but making clear the underlying principles. Ill. Serial. Elec Wld & Engr—Feb. 3, 1900.

Some Points About Induction Motors. W. T. Morrison. Facts as to current, etc., showing what can be expected of these motors. Ill. 1600 w. Am Elect'n—June, 1900.

Testing Three-Phase Induction Motors—Transformer Connections—Full-Load Currents—Faults and How Located. W. T. Morrison. The subjects named are briefly treated in part first. Serial. Elec Eng, N Y—Nov. 11, 1897.

Alternating Current Induction Motors. A. C. Eborall. Read before the Inst. of Elec. Engs. Discusses points connected with the construction, design and performance of modern single and polyphase induction motors, and considers some recent developments. Ill. Serial. Elec Eng, Lond—July 20, 1900.

Alternating Current Induction Motors. A. C. Eborall. Considers points connected with the construction, design and performance of modern single and polyphase induction motors, and recent developments. Ill. Serial. Elect'n, Lond—Aug. 17, 1900.

Alternating Current Induction Motors. A. C. Eborall. The full report of the discussion on the above paper, reprinted from the journal of the Institution of Electrical Engineers. 7000 w. Elect'n, Lond—Sept. 7, 1900.

The Action of the Polyphase Induction Motor Graphically Explained. An analysis of the interaction of the currents and magnetizations produced. 7000 w. Elec Wld & Engr—Sept. 30, 1899.

Induction Motors. R. F. Markill. Describes the action of the induction motors and briefly reviews their history. 1100 w. Jour of Elec—Nov., 1899.

See also **Alternating Current; Asynchronous; Friction; Langdon-Davies; Polyphase; Two-Phase.**

**Induction Design.**—Design of a ¼-horse-power

Single-Phase Induction Motor. P. M. Heldt. Describes a motor designed to be built by amateurs. 2700 w. Am Elect'n—March, 1899.

Design for a One Horse-Power Two-Phase Induction Motor. Cecil P. Poole. Illustrated instructions for building such a motor. 2000 w. Power—July, 1899.

Induction Motor Design. Harris J. Ryan and J. J. Macomber. Analysis of the induction motor. Serial. Sib Jour of Engng—Nov., 1897.

**Induction Diagram.**—Diagrams for Induction Motors (Diagramme für Induktionsmotoren). R. Goldschmidt. Deriving diagrams for showing the performances for various kinds of induction motors. 4500 w. Elektrotech Zeitschr—Aug. 16, 1900.

Induction Motor Diagrams. C. C. Hawkins. A detailed description of the graphical method, with illustrations. Serial. Elect'n, Lond—Jan. 27, 1899.

**Induction Regulation.**—Speed Regulation of Induction Motors. P. M. Heldt. The writer shows that the speed of such motors may be varied through wide limits. A number of methods are described for producing variation of speed. 1500 w. Am Elect'n—Sept., 1896.

**Induction, Single-Phase.**—Notes on Single-Phase Induction Motors and the Self-Starting Condensor Motor. Charles Proteus Steinmetz. Theoretical discussion and calculation. 6000 w. Trans Am Inst of Elec Engs—Jan., 1900.

Notes on Single-Phase Induction Motors and the Self-Starting Condenser Motor. Discussion of paper by Charles Proteus Steinmets. 500 w. Trans Am Inst of Elec Engs—March, 1900.

Single-Phase Induction Motor. Charles Proteus Steinmetz. Considers load and speed curves; starting devices of various forms are investigated and the effect they have upon the action of the motor. Discussion. 18500 w. Trans Am Inst of Elec Engs—Feb., 1898.

The Single-Phase Induction Motor (Der Einphasen-Induktionsmotor). C. P. Steinmetz. With a mathematical analysis of the action, and curves to aid in design, and tables of constants. Two articles. 4500 w. Elektrotech Zeitschr—June 22, 29, 1899.

**Induction Slip.**—A Method for Measuring the Slip of Induction Motors. W. Hand Browne, Jr. Describes a method in which the slip is measured directly, and which has been found entirely satisfactory during a year's use. 1800 w. Elec Wld & Engr—Oct. 13, 1900.

**Induction, Starting.**—Methods of Starting Induction Motors. P. M. Heldt. A review of the different methods. 1200 w. Am Elect'n—June, 1896.

A Simple Method of Starting Alternating Single Phase Induction Motors. Riccardo Arno. A paper read before the Associazions Elettrotechnia Italiana. 1700 w. Elec Rev, Lond—Nov. 26, 1897.

**Induction, Variable Speed.**—Induction Motors with Variable Speeds (Ueber Induktions Motoren mit Veränderlicher Umlaufzahl). F. Niethammer. A discussion of methods of winding by means of which rotary field motors may be arranged to run at different speeds merely by moving a switch. 2500 w. Elektrotech Zeitschr—Nov. 10, 1898.

**Intermittent Work.**—The Electric Motor for Intermittent Work. Explaining the steps by which a motor which at first was entirely inadequate to the work of reversal, was made to do the work with entire success—the expedients adopted having the effect of reducing the current at the peak to a point which the motor could carry without difficulty. 2200 w. Am Mach—May 14, 1896.

**Langdon-Davies.**—The Langdon-Davies Alternate Current Motor. Description of a machine in which such improvements have been made in the magnetic arrangements, that the motor has an efficiency, according to Dr. Thompson's report, of 91 per cent. at overload, and also at half-load, while between these limits it rises to 95 per cent. Ill. 2800 w. Engng—June 19, 1896.

The Langdon-Davies Self-Starting Mono-Phase Induction Motor. Illustrated description. 1800 w. Elec Rev, Lond—June 26, 1896.

See also **ELECTRIC WORKS.**

**Launch.**—A Design for an Electric Launch Motor. Charles T. Child. Illustrated description of a motor of simple construction which can be built at small cost. It is of a four-pole inclosed type, waterproof and intended to be attached directly to the screw shaft. 4500 w. Sci Am Sup—Jan. 14, 1899.

See also **ELECTRIC BOAT.**

**Leonard Control System.**—See also **CONTROLLER; ELEVATOR—Electric.**

**Maintenance, Indianapolis.**—See **Railway Repair.**

**Mining.**—Some Considerations Affecting the Design of Mining Motors. F. C. Caldwell. Read before the Ohio Inst. of Mining Engs. Calls attention to some points to be borne in mind in deciding on the claims to excellence of any machine. 2300 w. Am Mfr & Ir Wld—March 25, 1898.

See also **Portable; ELECTRIC EQUIPMENT—Mine; MINE HAULAGE—Electric; MINING MACHINERY.**

**Organ.**—Electric Motor Applied to Organ. Albert Siebert. Describes the manner of applying the power, and the advantages of the arrangement. 1000 w. Mod Mach—March, 1900.

How to Install an Electric Motor for Blowing Church Organs. S. H. Sharpstein. The problems about such plants are discussed, and explanations of means used to overcome many difficulties. 3800 w. Elec Eng—Feb. 26, 1896.

**Polyphase.**—Alternating Current Motors. Dugald C. Jackson. Abstract of a paper read before the Northwestern Electrical Association, in July, with data and curves of tests of polyphase motors. 1500 w. Am Elect'n—Aug., 1896.

A Practical Method of Determininig the Diagrams of Polyphase Motors (Praktische Vorausbestimmung der Drehstrommotoren). A. Rothert. A geometric method of calculating the complete diagram in advance of the construction of the motor. 2000 w. Elektrotech Zeitschr—Nov. 3, 1898.

A Study of a Three-Phase Motor. C. W. Van Law and H. S. Simpson. An abstract of a test conducted in the laboratories of Sibley College. 2000 w. Sib Jour of Engng—June, 1896.

On the Drehstrom Motors with Reduced Speeds. Hans Gorges in "Elek. Zeitschr." Describes a new and interesting phenomenon, which the writer considers only a special case of a much more general group of phenomena, which may have a practical value as well as a theoretical interest. 800 w. Elec Rev, Lond—Nov. 27, 1896.

Polyphase Asynchronous Motors. W. G. Rhodes. A description of the Boucherot motor, showing its high starting torque. 1000 w. Elec Rev—Sept. 2, 1898.

Polyphase Motors of Great Starting Movement and Capacity (Ueber Drehstrommotoren mit Grossem Ansugsmomente und Grosser Beanspruchungsfähigkeit). T. Marcher. A mathematical analysis of the conditions involved, and graphical representations, giving curves for the various elements. 4500 w. Elektrotech Zeitschr—March 30, 1899.

Polyphase Motors with Single Phase Armature Winding (Ueber Drehstrommotoren mit Einphasiger Ankerwickelung). Hermann Cahen. A discussion of a paper by H. Görges, describing a motor in which a reduced number of coils are used in the armature. 2500 w. Elektrotech Zeitschr—Dec. 8, 1898.

The Application of Three-Phase Currents (Application des Courants Triphasés). Description of the installation of a series of three-phase current motors at the Pernot biscuit bakery at Dijon. 1200 w. Génie Civil—April 23, 1898.

The Design and Testing of Rotary Current Motors with the Aid of the Polyphase Motor Diagram (Ueber Entwurf und Prüfung von Drehstrommotoren mit Hülfe des Diagramms des Mehrphasen-Motors). Dr. M. Breslauer. A paper before the Elektrotechnischer Verein, giving the theory of polyphase motors and confirmatory tests, with diagrams, tables and curves. 6000 w. Elektrotech Zeitschr—June 7, 1900.

See also **Alternating; Asychronous; Induction; Two-Phase.**

**Polyphase Ferraris.**—Electrodynamic Rotations Produced by Means of Alternate Current. The classical paper by Galileo Ferraris, read before the Turin Academy in 1888, and translated at this late date because of its importance to many readers. Also editorial comment. 4500 w. Elect'n—Dec. 27, 1895.

**Polyphase Losses.**—The Separation of the Losses of Three-Phase Motors and a Comparison of the Losses on Balanced and Unbalanced Circuits.

Ernest B. True. Gives method of testing and the results. 2000 w. Wis Eng—Jan., 1897.

**Polyphase Railway.**—The Use of Polyphase Motors on Electric Railroads. Charles Proteus Steinmetz. Discusses the use for the operation of railroad cars, reviewing the three methods for controlling polyphase railway motors, and comparing the relative advantages of polyphase and continuous-current motors. 2000 w. Elec Wld—Jan. 1, 1898.

**Polyphase Regulation.**—Regulation of Rotary Current Motors. H. Behn-Eschenburg. Formulas for this regulating, with reasons. 1200 w. Elec Wld —June 6, 1896.

**Polyphase Theory.**—Theory of Asynchronous Polyphase Motors (Theorie der Asynchronen· Mehrphasen motoren). G. Ossanna. A graphical derivation of the theory of the polyphase motor. 2500 w. Elektrotech Zeitschr—Aug. 23, 1900.

**Polyphase Variable Poles.**—Rotary Current Motors with Variable Number of Poles (Drehstrommotoren mit Variabler Polzahl). The phases can be divided into groups by a peculiar system of connections, practically corresponding to a change of winding. 1500 w. Elektrotech Zeitschr—May 6, 1897.

Theory of Multiphase Motors with Variable Number of Poles (Zur Theorie der Drehstrommotoren mit Variabler Polzahl). A graphical and analytical discussion of the theory of the Dahlander multipolar motor. 3500 w. Elektrotech Zeitschr—Sept. 2, 1897.

**Portable.**—Portable Electric Motors. Protected Against Dust and Dirt (Fahrbare, gegen Staub und Schmutz geschützte Elektromotoren). Ernest Schulz. A short illustrated description of a portable motor. 500 w. Glückauf—May 12, 1900.

**Protection.**—The Regulation and Protection of the Electric Motor. Harry H. Cutter. Paper read before the Chicago Elec. Assn. Discusses various methods for the regulation of motors and the means of properly protecting from damage. 4800 w. Elec, N. Y.—April 13, 1898.

See also **Control.**

**Railway.**—Electric Motor Design for Ordinary Street Railways. E. C. Sickles. Considers some of the problems connected with the design of the electric motor for street railway service. Part first gives a brief review of the main causes of present practice. Serial. Sib Jour of Engng—Feb., 1898.

Electric Railway Motors. George T. Hanchett. Part first illustrates and describes forms of field magnets. 2000 w. St Ry Jour—July, 1897.

General Electric Company's New Street Railway Motor. Illustrated description. 900 w. Elec Rev—July 14, 1897.

How to Increase the Working Efficiency of Railway Motors. William Baxter, Jr. A review of the progress, statement of principles, and account of the operation of motors of the writer's own design, in which the principles referred to were adopted. 2500 w. Elec Wld—Nov. 7, 1896.

Motor Axles and Motor Sizes (Ueber Motoraxen und Motor Grössen). Max Schiemann. A discussion of the relative advantages of driving one or more axles, together with the commercial advantages of various sizes of motors. 1200 w. Deutsche Zeitschr f Elektrotechnik—April 1, 1898.

Notes on Railway Motor Rating. John Lundie. Suggests a rating based upon average output. Also editorial. 900 w. Elec Wld & Engr—Oct. 21, 1899.

Railway Motor Design. Alfred E. Wiener. States the conditions desirable in a railway motor, considering each separately. Also gives calculations connected with railway motor design. 2500 w. Am Elect'n—Oct., 1897.

The Design of Electric Railway Motors for Rapid Acceleration. Charles A. Carus-Wilson. Read at meeting of Inst. of Elec. Engs., England. A mathematical study. 6200 w. Elec Eng, Lond—May 27, 1898.

The Efficiency of Tramway Motors (Ueber den Wirkungsgrad von Strassenbahnmotoren). E. G. Fischinger. The results of a number of tests are given, with tables and curves; the action of the gearing is especially considered, also the lubricants. Oil is preferred to grease for this service. 1500 w. Elektrotech Zeitschr—Dec. 23, 1897.

The Evolution of the Street Railway Motor. Charles T. Child. Historical review, with description and illustrations of successive types. 3500 w. Am Elect'n—Oct.. 1896.

The Service Performance of Railway Motors. W. B. Potter. A discussion of the horse-power, tractive effort, etc. 1600 w. St Ry Jour—Oct., 1899.

The Electric Railway Motor. John Lundie. Sketches the duty required of an electric motor applied to railway traction, and discusses the method of rating the horse-power. 4200 w. St Ry Jour—Oct. 13, 1900.

See also **Shunt Railway; Testing Railway; ELECTRIC CAR; ELECTRIC TRAMWAY; ELECTRIC RAILWAY.**

**Railway Repair.**—Cost of Motor Maintenance. Part I is devoted to review of figures and records of Cleveland and Elyria, Springfield (Mass.), Nashville, Ogden, Montgomery (Ala.), Madison, Wis., Salt Lake City and some smaller roads. Serial. St Ry Rev—May 15, 1896.

Cutting Down the Cost of Electrical Repairs of Railway Motors. M. R. McAdoo. Explains a system of simple electrical tests which will indicate electrical weaknesses. Ill. 1800 w. St Ry Jour—Jan., 1898.

Motor Car and Repair at Indianapolis. Scientific testing methods in daily practice—Improvements in armature coils. 3000 w. St Ry Rev —Jan. 15, 1896.

Repair of Electric Railway Machinery. Describes methods and appliances for comparing two motors in order to determine their adaptability for mutual operation. 1700 w. Am Elect'n—Feb., 1897.

Repair of Street Railway Apparatus. Relates to repairs of the electric motor and its connected mechanism. Instructions for motormen, illustrated by diagrams. The most frequent breakdowns and failures are named. 1500 w. Am Elect'n—Aug., 1896.

See also **ELECTRIC RAILWAY SHOP.**

**Railway Shunt.**—See **Shunt Railway.**

**Regulation.**—See **Control; Protection.**

**Rotary Current.**—See **Polyphase.**

**Sayers'.**—Sayers' Electric Motor and Generator. An illustrated description of a new inclosed motor for direct connection to centrifugal machine. Also of generator for supplying current. 500 w. Engng —Nov. 22, 1895.

**Series.**—Series Reversing Motor and the Switch and Wiring Connections Used Therewith. William Baxter, Jr. Explains the series type of motor, and the operation of the switch. 1700 w. Am Mach—Sept. 24, 1896.

The Action of the Series Motor and Generator. The machine is first considered as a motor, and the action of the current explained, followed by a brief explanation of the action of the series machine as a dynamo. 2200 w. Am Mach —June 4, 1896.

**Sewing Machine.**—How to Make a Sewing Machine Motor Without Castings. Cecil P. Poole. Drawings and instructions for building an efficient motor that will operate the heaviest family sewing machine with a consumption of electrical energy only slightly greater than that required for an incandescent lamp. 5500 w. Sci Am Sup —March 11, 1899.

**Shunt.**—Shunt-Wound Reversing Motor, and the Switch and Wiring Connections Used Therewith. William Baxter, Jr. Changes in the reversing switch from the one used in the series machine. Explanation and diagram. 1000 w. Am Mach—Oct. 1, 1896.

The Action of the Shunt Motor. William Baxter, Jr. Explanation of the principles upon which the close regulation of speed in shunt-wound motors depend. 1300 w. Am Mach—June 18, 1896.

See also **Differential Compounding.**

**Shunt Railway.**—Shunt Motors for Car Propelling (Zur Frage der Nebenschlussmotoren für Bahnbetrieb). Claiming a higher efficiency and steadier motion, together with better commercial results for the shunt motor. 1500 w. Elektrotech Zeitschr—May 27, 1897.

Shunt Motors for Railway Work. William Baxter, J. The objections and advantages are given and the subject discussed, showing that shunt-wound motors arranged so that the fields may be commuted have many desirable features and may possibly be made as reliable as series motors. 2500 w. Elec Wld—Dec. 12, 1896.

**Single-Phase.**—Single-Phase Motors. Ernst J. Berg. Discusses the different types and their disadvantages. 1500 w. Am Elect'n—June, 1897.

Some Notes on the Practical Use of Single-Phase Alternating Motors. E. E. Hoadley. Facts about the behavior of alternating motors under actual working conditions. 2500 w. Elec Rev, Lond—July 8, 1898.

Some Notes on Single-Phase Motors. A. C. Eborall. Classifies and discusses the motors of this type now in the English and Continental markets. Ill. Serial. Elec Rev, Lond—Jan. 14, 1898.

The Modern Single-Phase Alternating-Current Motor. T. M. Meston. On the high efficiency of these machines, and the uses to which they are applied. 1500 w. Elec Wld—Feb. 4, 1899.

See also **Alternating**; **Asynchronous**; **Induction**; **Langdon-Davies**; **MAGNETIC FIELD—Rotary.**

**Single and Polyphase.**—The Resolution of the Oscillating Field of a Single Phase Motor into Rotary Fields (Ueber die Zerlegung des Oscillirenden Feldes des Einphasenmotors in Drehfelder). F. Eichberg. An article giving the theory, with confirmatory experiments on single phase motors. Diagrams and curves. 2000 w. Elektrotech Zeitschr—June 14, 1900.

**Single-Phase, Heyland**—Alternating Current Motor for Heavy Initial Load (Wechselstrommotor mit Anlauf unter Hoher Belastung). The Heyland motor is so wound that great initial starting power is obtained, as shown by test diagrams. 2500 w. Elektrotech Zeitschr—Aug. 26, 1897.

Alternating-Current Motors to Start Under Heavy Loads. Translation of a paper read by A. Heyland at the annual meeting of the Verband Deutscher Elektrotechniker at Eisenach. Describes the principles on which the motor is built and the action, stating the advantages. 1600 w. Elec Eng, Lond—Sept. 3, 1897.

Some Notes on Single-Phase Motors, with Special Reference to the Heyland Motors. A. C. Eborall. Briefly discusses what takes place in single-phase motors during starting and running, and describes the fundamental principles and construction of the Heyland motors. Ill. 3200 w. Elec Rev, Lond—Sept. 29, 1899.

**Single-Phase Starting.**—A Simple Method of Starting Single-Phase Alternating Current Motors (Ein Einfaches Verfahren, um Asynchrone Einphasige Wechselstrommotoren zum Anlauf zu Bringen). Riccardo Arno. Describes the use of an auxiliary resistance in connection with the armature. 2000 w. Elektrotech Zeitschr—Feb. 17, 1898.

**Small.**—On the Use of Small Electric Motors. N. S. Stevenson. An excellent practical article of value to purchasers of small electric motors. 1700 w. Am Mach—Aug. 20, 1896.

**Speed Regulation.**—See **Control.**

**Standardization.**—Selecting an Electric Motor. G. H. Zahn. Difficulty in the selection due to the imperfect manner of rating electrical machinery. 2300 w. W Elec—Jan. 18, 1896.

See also **ELECTRIC APPARATUS.**

**Storey.**—A Steel Cased Motor. Illustrated description of a machine claimed to be practically devoid of external magnetic field, and on this account well adapted to shipwork. Test runs are given. 400 w. Elect'n—Jan., 1896.

The Storey Motor or Dynamo. Illustrated description of a machine not only transmitting power in the ordinary way, but specially adapted for direct driving and an enormous range of work. 1200 w. Can Eng—Jan., 1896.

**Synchronous.**—Some Characteristics of Synchronous Motors. E. Kolben. From the "Elektrotechnische Zeitschrift." A contribution to practical knowledge. 1200 w. Elec Eng, Lond—Jan. 31, 1896.

See also **Alternating**; **Single-Phase**; **ELECTRIC DISTRIBUTION—Synchronous Motor Compensation.**

**Tesla Patents.**—See **ELECTRIC TRANSMISSION.**

**Testing.**—Some Methods of Testing Motors. Frank B. Porter. Gives some of the most useful tests that are ordinarily used by electrical engineers, and can be easily applied to the equipment of street railway motors. Ill. 1800 w. St Ry Jour—June, 1897.

Testing Motors at Schenectady. Illustrated description of method in use at General Electric Company's Schenectady factory. 150 w. St Ry Rev—May 15, 1896.

**Testing, Railway.**—A Running Test on Street Car Motors. E. C. Parham. Discusses the causes that help to make the drops across the two motors to differ. 1400 w. Am Elect'n—Sept., 1900.

A Suggestion for Testing Street Railway Motors. George T. Hanchett. Illustrated description of an apparatus which is designed to effectively accomplish a thorough electrical testing of the car in a systematic manner, the amount of time consumed being neglible. 800 w. Elec Ry Gaz—March 14, 1896.

Some Methods of Making Efficiency Tests of Street Railway Motors. Frank B. Porter. Describes a simple method of efficiency test which will give good results when applied to the street railway motor in the repair shop. Ill. 1800 w. St Ry Rev—Oct. 15, 1897.

**Theory.**—Counter Electromotive Force, Torque, Current and Field Strength. The relations between electromotive force, counter-electromotive force and the strength of the field magnets are discussed. 1300 w. Am Mach—May 21, 1896.

Electromotive Force, Counter Eectromotive Force and Speed. The terms explained and their relation traced. 1800 w. Am Mach—May 14, 1896.

How Is Motion Given to the Armature of a Direct Current Motor? Townsend Wolcott. The action of motors is explained and questions relating to it are discussed. 1800 w. Am Elect'n—July, 1896.

Theory of Constant-Speed, Direct-Current, Constant-Potential Motors. William Baxter, Jr. Considers the multiplication of formulae for the calculation of motors a step in the wrong direction. Ill. 2200 w. Elec Wld—Nov. 27, 1897.

Why the Armature of An Electric Motor Revolves. D. L. Barnes. From the Baldwin-Westinghouse catalogue of electric locomotives. Explanation of the cause of the movement. 2500 w. Elec Rev—Sept. 2, 1896.

See also **Polyphase Theory**; **DYNAMO.**

**Truck Suspension.**—Traction Motor Suspensions. Ernest Kilburn Scott. Part first illustrates and describes various forms of supension used to avoid shock to the motor in electric traction. Serial. Elec Rev, Lond—April 13, 1900.

**Walker.**—The 200 Horse Power Walker Electric Motor (Moteur Walker de 200 Chevaux). Describing the application of the Walker Motor to cars for regular or suburban railway traffic. 3500 w. La Rev Tech—Aug. 25, 1897.

See also **ELECTRIC MACHINERY.**

**Westinghouse.**—See also **Dynamo—Westinghouse.**

**Worm Gearing.**—Worm Gearing and Railway Traction. A defence of the method of connecting railway motors to car axles by means of worm gearing. 1100 w. Am Elect'n—Feb., 1898.

**ELECTRIC MOTOR CONTROLLER.**

See **CONTROLLER**; **ELECTRIC MOTOR—Control.**

**ELECTRIC MUSEUM.**

**Washington.**—The Electrical Collections in the Smithsonian Institution and the National Museum. George C. Maynard. The first part of this serial is a brief history of the Smithsonian Institution and its organization. Ill. Serial. Elec Rev, N. Y.—Jan. 3, 1900.

See also **ELECTRICAL EXHIBITION.**

**ELECTRIC NOMENCLATURE.**

See also **ELECTRO-CHEMISTRY—Nomenclature.**

Nomenclature of Electrical Apparatus. Charles P. Steinmetz. Discusses needed improvements in terminology and nomenclature. 1500 w. Elec Wld & Engr—Oct. 20, 1900.

**German.**—A Nomenclature for the Characteristic Magnitudes for Alternating Currents (Zur Benennung der Charakteristischen Grössen des Wechselstromkreises). C. P. Feldmann. An attempt to derive a distinctly Teutonic nomenclature, to replace the terms derived from classical roots and used by all other scientific nations. 4000 w. Electrotech Zeitschr—Oct. 20, 1898.

**ELECTRIC OSCILLATOR.**

See also **ELECTRO-THERAPEUTICS.**

**Tesla.**—Tesla's Electrical Oscillators. Illustrated description of Mr. Tesla's perfected transformers or oscillators. The description is largely in the exact language of the inventor. 2400 w. Elec Rev—Sept. 30, 1896.

## ELECTRIC PATENTS.

See also **ELECTRIC INVENTION—Patents; TELEPHONE PATENT; TROLLEY PATENT.**

**1894.**—The Electrical Patents of 1894. Electrical patents granted in that year by the United Kingdom, United States and Germany, number 3315. The number granted in each country is given, with classification in groups. 700 w. Engng—Dec. 20, 1895.

## ELECTRIC PLANT.

See also **ELECTRIC EQUIPMENT; ELECTRIC STATION; HYDRO-ELECTRIC PLANT; MECHANICAL PLANT; POWER PLANT; STEAM PLANT.**

Electrical Installations. F. J. Warden-Stevens. The author's aim is to place before architects and others information which will prove a source of help when having such matters under consideration. Part first is devoted largely to motive power. Serial. Arch, Lond—Nov. 6, 1896.

Electricity in Modern Buildings. Illustrated description of the various uses to which electricity is put in buildings, and of the apparatus needed to get the best results. 5200 w. Eng Rec—Dec. 2, 1899.

Isolated Plants. Cost of Electric Lighting from Public and Private Supply. F. J. Warden-Stevens. Curves, with explanation, showing cost of lighting from supply mains and from a private plant, given in order to show approximately when it is advisable to adopt a separate plant. 1300 w. Elec Rev, Lond—Jan. 8, 1897.

Saving in Isolated Plants. Alton D. Adams. Estimates of cost are discussed, and the difference in cost between light from isolated plants and public supply. 1400 w. Sci Am—Aug. 19, 1899.

Small Lighting Plants. Frederick C. Reeve. Discusses whether lighting companies can materially lower the present rates; whether small plants are practical; and under what conditions they can be made a financial success. 1100 w. Elec Wld—Dec. 4, 1897.

The Evolution of the Isolated Electrical Plant During the Last Fifteen Years. Charles Henry Davis. Treats of the isolated plant located in the building which it serves. Part first describes the generating plant. Serial. Elec Eng—Jan. 6, 1897.

Two Interesting Small Electric Lighting Plants. C. G. Robbins. Describes two plants containing many features of interest. The plant of F. & R. Lazarus, at Columbus, O., and the plant known as No. 1 plant of the Block Lighting and Power Co., located in New York City. Ill. 3800 w. Power—Dec., 1896.

**Agricultural Hall, Islington.**—A Large Isolated Plant. Illustrates and describes the plant at the Royal Agricultural Hall, Islington. 1500 w. Elec Rev, Lond—Dec. 9, 1898.

**Aluminum Works.**—See **ALUMINUM WORKS—Niagara.**

**Arc.**—See **ARC LIGHTING—Isolated.**

**Armour Institute.**—Power Plant of Armour Institute of Technology. Illustrated description of the new equipment made necessary by the increased demands for lighting and motor service. 1000 w. W Elec—Feb. 27, 1897.

**Armour Packing House.**—Electrical Equipment of a Mammoth Packing House. J. E. Smith. Illustrated description of the motive power and refrigerating plant of the Armour establishment. 3700 w. Am Elect'n—May, 1900.

The Electrical Power Plant of the Armour Packing Houses in Chicago. Stephen H. Goddard. Brief illustrated description of an isolated plant. 1500 w. Elec Rev, N Y—April 25, 1900.

**Arsenal, Watervliet.**—The Electrical Equipment of the Watervliet Arsenal. Brief account of the plant for supplying light and power for these mammoth gunshops of the United States. Ill. 1000 w. Elec Wld—May 7, 1898.

**Asylum.**—See also **Hospital.**

**Asylum, Beauport, Canada.**—Electrical Plant at the Beauport Insane Asylum. Illustrates and describes a complete plant of small size which furnishes light and power. 1000 w. Can Elec News—Jan., 1899.

**Asylum, Wakefield, Eng.**—Wakefield Asylum Electrical Installation. An installation embracing the lighting, heating and ventilating, and the electric driving of the machinery in the workshops and laundry is illustrated and described. 1800 w. Elec Rev, Lond—June 15, 1900.

**Berlin Exposition.**—Electric Power Plant at the Berlin Exposition (Elektrische Starkstromanlagen auf der Berliner Gewerbeausstellung). Ludwig Mittelmann. Details of all power and lighting machinery furnished by the different manufacturers. Serial. Elektrotech Zeitschr—Oct. 15, 1896.

**Bloomhill, Eng.**—The Bloomhill Electrical Installation. Sir David Salomons. A brief outline of the history of the plant and a general survey, with illustrations. Describes the installation and laboratories. 4000 w. Am Elect'n—May, 1897.

**Building.**—Electricity Connected with Building. W. H. Preece. A lecture with the purpose of showing how electricity can aid in supplying pure air, pure water, pure food, warmth, light, and the things needed to maintain health. 3000 w. Arch, Lond—March 20, 1896.

Electricity in Connection with Building. W. H. Preece. Serial. Elec Eng, Lond—March 6, 1896.

**Capitol, Washington.**—Electricity at the National Capital. George H. Drayer. An account of changes recently made, or soon to be made, in the Capitol at Washington, for utilizing electricity in many ways. 1100 w. Elec Rev—Dec. 18, 1895.

Electricity in the United States Capitol. Bushrod C. Washington, Jr. An illustrated account of the electric light and power plant in operation in the Capitol Building at Washington. 2500 w. Elec Wld—Sept. 10, 1898.

**Chamber of Deputies, Paris.**—A Gas Engine Electric Lighting Plant for the French Chamber of Deputies. Description, with illustrations of a very large gas engine plant comprising no fewer than 4610 lamps, aside from the Chamber itself. 900 w. Elec Eng, N Y—Dec. 8, 1898.

**Board of Trade, Chicago.**—The Reconstruction of the Plant of the Chicago Board of Trade. Bion J. Arnold. Abstract from a paper presented at meeting of Amer. Inst. of Elec. Engs. Illustrated description. 2000 w. Elec Eng—May 27, 1896.

The Reconstruction of the Plant of the Chicago Board of Trade. Bion J. Arnold. Illustrated description of the general plan of the plant for producing light and power in building named. 6000 w. Trans Am Inst of Elec Engs—Aug. & Sept., 1896.

**Church, Knoxville, Tenn.**—Test of an Isolated Electric Lighting Plant. S. A. Beyland, in the "Scientific Magazine" of the Univ. of Tenn. The results of tests of the gas engine and lighting plant belonging to the First Methodist Episcopal Church of Knoxville, Tenn. 600 w. Am Gas Lgt Jour—Sept. 21, 1896.

**City Hall, Milwaukee.**—Electrical and Mechanical Equipment of the Milwaukee City Hall. Illustrated description of a very completely equipped building. 2000 w. W Elec—May 2, 1896.

**City Hall, Philadelphia.**—Extensive Isolated Electric Station. Brief illustrated description of the electric lighting plant of the Philadelphia City Hall. 600 w. Elec Rev, N Y—April 19, 1899.

**Clinic.**—Electricity at the Polhemus Memorial Clinic. Illustrates and describes a plant of exceptional thoroughness, and unique applications. 4300 w. Am Elect'n—Feb., 1899.

**Club House.**—The Electrical Equipment of the New York Athletic Club House. Illustrated description of the electrical and mechanical equipment, with criticisms. The building is located at the southeast corner of Sixth avenue and Fifty-ninth street. 2200 w. Elec Wld—April 16, 1898.

**Coal Mine.**—See **ELECTRIC EQUIPMENT; ELECTRIC STATION.**

**Country House.**—A Model Isolated Plant. Illustrated description of a modern and complete plant installed for H. N. Higinbotham, at his country home near Joliet, Ill. 2300 w. W Elect'n—Oct. 2, 1897.

I. Some Practical Hints on the Production and Use of Electricity for Lighting Country Houses. Bernard M. Drake. II. Practical Applications of Electric Power. H. R. J. Burstall. The first paper considers the different methods, treatment of rooms, etc. The second paper discusses the general principles and the question of cost, describing typical forms of apparatus. Both papers are illustrated, and are discussed together. 10500 w. Jour Roy Inst of Brit Archts—Dec. 24, 1898.

Typical Electric Plant for Country Residences. Maurice Barnett. The writer aims to show that electric lighting can be carried on economically in the country, and light be had at any hour of the day or night without the necessity of running the engine more than a few hours three or four times a week, except when the full capacity of the dynamo is wanted nightly. 1600 w. Am Elect'n—Nov., 1896.

**Custom House, New York.**—The 220-Volt Light and Power Plant at the New York Custom House. An illustrated description of the first and only plant in the East using this pressure. 1500 w. Elec Wld—July 18, 1896.

**Department Building, Washington.**—Test of an Electric Generating Set in the State, War and Navy Building, Washington. G. W. Baird. The experiments were made on a 60 K. W. direct current compound condensing plant. 1000 w. Eng Rec—Feb. 17, 1900.

**Department Stores.**—The Power Plants of Two Large Department Stores. Illustrated detailed description of the power and electric plants of the Chicago and New York Stores of Siegel, Cooper & Co. 3500 w. Power—March, 1897.

**Department Store, N. Y.**—The Electrical Plant in the Siegel-Cooper Co.'s "Big Store," New York City. Illustrated description. Electricity is utilized for light, heat, power, ventilation and as a means of attraction. 3800 w. Elec Eng—May 6, 1896.

**Dock, Itasca, Wis.**—Electric Light and Power on a Railway Dock. H. C. Hope. Read before the Assn. of Ry. Telegraph Supts. Equipment of the dock C., St. P., M. & O. Ry. at Itasca, Wis. 500 w. Elec Rev—June 24, 1896.

**Drainage.**—See **DRAINAGE—Niemen Delta.**

**Electric Factory.**—The Power Plant of the New York Factory of the Western Electric Company. An illustrated description of a fine isolated plant, probably the largest delivering its output to one building in the world. 2500 w. Am Elect'n—July, 1900.

**Factory.**—Electric Light, Power and Heating Plant at the Rothschild Shirt Factory, Trenton, N. J. Illustrated description. 2400 w. Elec Wld—April 17, 1897.

Electricity in an Oilcloth Factory. S. Ashton Hand. Illustrated description of the power and lighting plant recently installed in the factory of the Farr & Bailey Mfg. Co., of Camden, N. J. 1000 w. Mach, N Y—May, 1897.

See also **ELECTRIC DRIVING.**

**Failures.**—Causes of Failure in Electrical Plant. Sydney F. Walker. Considers the causes by means of which an electrical apparatus either refuses to do its proper work at all or does it imperfectly. 3200 w. Col Guard—Aug. 20, 1897.

**Farm.**—See **ELECTRICITY—Agriculture.**

**Fine Arts Building, Chicago.**—Electrical Features of the Fine Arts Building. Illustrated description of interesting features in a fine Chicago building. 200 w. W. Elect'n—Dec. 23, 1899.

**Fire Headquarters, London.**—See **GOVERNOR—Expansion.**

**Frank Jones, Portsmouth, N. H.**—See **ELECTRIC STATION.**

**Grocery.**—The Isolated Plant of a Wholesale Grocer's Establishment. An interesting description of the plant of the Garrett Building, Chicago. It includes novel features for solving the problems of a wholesale grocer's business. 3000 w. Am Elect'n—Oct., 1899.

**Hat Factory.**—Electricity in Hat Manufacture. Illustrates and describes an installation for furnishing heat, light and power for use in the manufacture of hats. 1800 w. W Elect'n—Aug. 12, 1899.

**Hearst Hacienda, Cal.**—Isolated Lighting and Power Plant at Hearst Hacienda, Sunol, Cal. Illustrated description. 700 w. Am Elect'n—Nov., 1896.

**Hebrew Technical Institute, N. Y.**—Electricity at the Hebrew Technical Institute, New York. Illustrated detailed description. 1500 w. Elec Eng—March 3, 1897.

**Heinrichenburg Canal Lift.**—Steam Engines and Dynamos at the Heinrichenburg Canal Lift. Brief illustrated description of engines forming a part of the electric generating plant at a lift on the Dortmund-Ems Canal. 500 w. Engr, Lond—Oct. 6, 1899.

**Hillside House, Scranton, Pa.**—The Isolated Plant at the Hillside House, Scranton, Pa. H. B. Coho. Illustrated detailed description of the interesting features of this plant. 1800 w. Elec Eng—March 31, 1897.

**Hospital.**—Electricity at St. Elizabeth's United States Hospital for the Insane. Illustrated description of the uses made of electricity in this large institution. 2800 w. Elec Eng—Nov. 4, 1896.

Electricity at St. Luke's Hospital. Illustrated description of an interesting installation. 800 w. Elec Wld—Sept. 18, 1897.

Electric Sad Irons in a Hospital for the Insane. Illustrated description of the equipment of the Central Indiana Hospital for the Insane, at Indianapolis, Ind. 800 w. Elec Rev—Nov. 25, 1896.

The Electric Lighting Plant of the Boston City Hospital. H. W. Weller. Illustrated detailed description. 2200 w. Elec Eng, N Y—March 31, 1898.

**Hotel.**—The Electric Lighting of an Hotel. Illustrates and describes an interesting plant in England. 900 w. Elec Rev, Lond—Dec. 29, 1899.

**Hotel Cecil.**—The Electric Plant at the Hotel Cecil. Illustrated description of the electric lighting arrangements, with particulars of the costs of production for various months. 2800 w. Elec Eng, Lond—June 4, 1897.

**Hotel Manhattan.**—The Electrical Equipment of the Hotel Manhattan. Brief illustrated description of the complete electrical equipment which has been installed in this hotel. 2500 w. Elec Wld—Jan. 9, 1897.

**Hotel Waldorf-Astoria.**—The Electric Plant of the Astoria Hotel. Illustrated detailed description of this interesting isolated plant, which probably carries the greatest load of any isolated plant in existence. The lamps number over 25000, there are 21 electric elevators, and an amount of auxiliary electrically driven apparatus. 3800 w. Elec Wld—Dec. 25, 1897.

The Largest Isolated Electric Light Plant in the World. Illustrated description of the plant of the Waldorf-Astoria, in New York. 3200 w. Power—June, 1899.

Isolated Plant. Electric Lighting at the New Waldorf Hotel, N. Y. Brief description of what will be one of the most extensive plants of its kind in the country. 600 w. Elec Rev—Jan. 13, 1897.

**Industrial School, Rochester, N. Y.**—Electricity at the New York State Industrial School. Joseph T. Freeman. Illustrated description of the electrical plant at the school in Rochester, N. Y., which supplies light and power, and furnishes the means by which practical information is given the boys in the care and construction of electrical machinery. 3500 w. Elec Wld—Oct. 30, 1897.

**Infirmary, Glasgow.**—Electric Light Installation at the Western Infirmary, Glasgow. Illustrated detailed description. 2300 w. Elec Eng, Lond—Jan. 7, 1898.

**Iron Works, Hofors, Sweden.**—Electric Light and Power at the Hofors Iron Works, Sweden. Illustrated description of the plant. 1400 w. Elec Eng, Lond—Sept. 30, 1898.

**Isolated vs. Central.**—Are Electric Central Stations Doomed? Max Osterberg. Showing how isolated plants may be economical in electric lighting. 1900 w. Eng Mag—Dec., 1896.

Electric Central Stations versus Isolated Plants. R. S. Hale. Controverting analytically the claim of Max Osterberg, that the isolated plant will gradually displace the general station. 4800 w. Eng Mag—Feb., 1897.

Does It Pay to Generate Electricity or Buy It? An examination of this subject for the purpose of laying down some general rules under which separate plant would be justified. 1300 w. Mach, Lond—Dec. 15, 1897.

Isolated Electric Plants vs. Central Stations. Percival Robert Moses. Showing that the private plant is more economical in large installations where the load is continuous. Serial. 2d part. 3700 w. Eng Mag—Sept., 1897.

Isolated Plants vs. Central Stations. Percival Robert Moses. Analytical and classified comparison of results of the two methods, as observed in hotels, office buildings, etc. Serial. 1st part. 3500 w. Eng Mag—Aug., 1897.

The Cost of Electricity in Some Typical Buildings in New York City. Percival Robert Moses. Shows that the isolated plant can be operated at a profit at rates lower than central station rates. Also discussion. 16800 w. Trans Am Inst of Elec Engs—June & July, 1899.

The Steam Driven Isolated Plant — Does It Pay? W. D. Ennis. Comparisons of the cost with isolated plants and the cost of buying current from central stations. 3000 w. Elec Wld & Engr—Sept. 22, 1900.

**Knowsley Hall, Eng.**—The Electric Lighting Equipment at Knowsley Hall. Illustrates and describes the buildings, generating plant, fittings and methods of lighting. 4500 w. Elec Eng, Lond—Dec. 9, 1898.

**Laboratory, Zürich.**—The Heavy Current Plant in the Electrochemical Laboratory of the Zürich Polytechnic (Die Starkstromanlage im Electrochemischen Laboratorium des Eidg. Polytechnikums in Zürich). F. Largiader. With plant and photographs of the building showing arrangement of the switches, converter, instruments, etc. 1800 w. Schweizerische Bauzeitung—Nov. 11, 1899.

**Lancaster Mills, Clinton, Mass.**—New Power Plant for the Lancaster Mills. Illustrated description of a three phase electric power station for a large cotton mill, with a statement of the efficiency of the plant and an editorial on the remodeling of old mills. 3800 w. Eng Rec—Sept. 2, 1899.

**Landonviller Castle, Metz.**—The Lighting Plant at the Landonviller Castle, near Metz (Beleuchtungsanlage des Schlosses Landonvillers bei Metz). G. Klingenberg. A description of a small isolated plant in which a water power nearly a mile distant is utilized. 4000 w. Elektrotech Zeitschr—July 8, 1899.

**Library, Chicago.**—The Lighting and Power Plant of the Chicago Public Library Building. Illustrated description of an interesting plant. 2200 w. Elec Wld—Dec. 17, 1898.

**Library, Washington, D. C.**—Electrical Features of the New National Library at Washington, D. C. George H. Draper. Description of the electrical installation, together with some observations on the boiler plant and other apparatus in the building. 1600 w. Elec Rev—June 10, 1896.

The New Congressional Library Building, Washington, and Its Lighting Plant. N. Monroe Hopkins. Brief illustrated description of this building with its substantial lighting plant. 1300 w. Elec Eng—Oct. 14, 1896.

**Linotype Works, Brooklyn.**—Electric Power and Lighting Plant of the Mergenthaler Linotype Co., Brooklyn, N. Y. Illustrated detailed description. 2000 w. Elec Eng, N Y—Nov. 18, 1897.

**Lock, Ymuiden.**—See LOCK GATE.

**Marine.**—See ELECTRIC EQUIPMENT—Ship; Warship.

**McGill University.**—Electrical Plant of Macdonald Engineering Building, McGill University, Montreal. Illustrated description of this plant, which has been extensively enlarged and altered. 1200 w. Can Elec News—May, 1898.

**Mine.**—See ELECTRIC EQUIPMENT.

**Niagara.**—Niagara Falls as an Electrical Center. Orrin E. Dunlap. Describes the changes wrought and calls attention to the installations of special interest to electricians. Ill. 2400 w. W Elec—June 12, 1897.

The Electrical Features of Niagara. Illustrated description of the Niagara Falls Power Co., the Power Transmission Line, the Railway, Hydraulic Power & Manufacturing Co., the Carborundum Co., and other industries. 7000 w. Elec Wld—June 5, 1897.

See also ELECTRO-CHEMICAL WORKS; HYDRO-ELECTRIC STATION.

**Office Buildings.**—Electrical Equipment of Modern Office Buildings. Joseph Sachs. An explanation of the various applications of the electric current considered essential in such buildings. 2600 w. Elec Pow—Dec., 1895.

Power Equipment of the Tall Office Building. R. P. Bolton. A discussion of the economies of a new class of small central stations, in the light of the latest storage battery practice, and of the demands of lighting and elevator service. 3500 w. Eng Mag—June, 1900.

The Electric Plant of the Modern Tall Building. Frank A. Pattison. Suggestions as to boiler, steam piping, switchboard, storage battery, etc. 2300 w. Eng Mag—Aug., 1897.

See also MECHANICAL PLANT; POWER PLANT.

**Office Building, Buffalo.**—The Plant of the Ellicott Square Building. F. L. Wilson. Illustrates and describes the mechanical and electrical plants of this large building in Buffalo, N. Y. 3500 w. Elec Wld—April 30, 1898.

**Office Building, Chicago.**—Electrical Equipment of a Model Commercial Building. Illustrated detailed description of the electrical equipment of the Silversmiths' building in Chicago. 2200 w. W Elec—June 12, 1897.

**Office Building, Cleveland, Ohio.**—Electrical Equipment of the New England Building in Cleveland. Brief illustrated description. 800 w. Elec Wld—Sept. 12, 1896.

**Office Building, New York.**—Electric Plant of the St. Paul Building, New York City. General description of the building, with illustrated detailed description of the electrical plant. 2800 w. Elec Wld—March 27, 1897.

Lighting Plant of the Empire Building, New York City. Illustrated description of a 350 k. w. plant in a 21-story building. 1400 w. Eng Rec—Nov. 26, 1898.

Some New Isolated Plants. Part first illustrates and describes some of the plants recently installed in New York, including the Exchange Court Building, Washington Life Ins. Building, Cushman Building, and Singer Building. Serial. Elec Wld—July 30, 1898.

The Electric Equipment of the American Lithographic Company Building, New York City. Illustrated detailed description of a well-designed plant. 4500 w. Elec Eng, N. Y.—Dec. 30, 1897.

The Electrical Features of the Bowling Green Building. Illustrated detailed description of construction and equipment. 5800 w. Elec Wld—July 17, 1897.

The Electrical Plant of the Syndicate Building, New York. Illustrated description of the light and power service, operated on the same 110-volt circuit. 2400 w. Elec Wld—Aug. 29, 1896.

The Generating Plant, Distributing System and Transportation Facilities of the Highest Office Building in the World. Illustrated detailed description of these features of the Ivins Syndicate or Park Row Building of New York. Serial. Elec Wld & Elec Engr—July 1, 1899.

The Electric Lighting of the Metropolitan Life Insurance Company's Building, New York. Description, with illustrations, of one of the finest plants in the city. 1600 w. Elec Eng—July 15, 1896.

The Electric Lighting Plant in the American Surety Building. Illustrated description. 1200 w. Elec Wld—April 4, 1896.

The Power and Lighting Plant of the New York Life Building. Illustrated detailed description of one of the latest and finest of New York's office buildings, especially the machinery plant. 2500 w. Elec Wld—July 10, 1897.

**Office Building, Philadelphia.**—The Fidelity Mutual Life Building. Illustrated description of the power plant of one of Philadelphia's largest office buildings. 1100 w. Elec Wld—Aug. 1, 1896.

**Ohio University.**—Electrical Plant of Ohio State University. Burcham Harding. Illustrated detailed description. 1500 w. Elec Wld & Engr—Dec. 30, 1899.

**Oil Company.**—The Three-Phase Plant of the Tide-Water Oil Company. Illustrates and describes a plant which has been in use two years for the purpose of transmitting power to points where an inflammable mixture of oil fumes and air was likely to occur, and which has been giving as good results as the direct current systems. 1000 w. Elec Wld—Jan. 22, 1898.

**Paris Compressed Air Co.**—The Electric Plant of the Paris Compressed Air Company (Les Nouvelles Installations Electriques de la Compagnie Parisienne de l'Air Comprimé). A fully illustrated description of the fine new power house on the Quai de Jemmapes, with details of the construction of the building, steam and electric plant. Two articles. Four plates. 10000 w. Génie Civil—Dec. 18, 25, 1897.

**Polyphase.**—See Oil Company.

**Portable.**—A Portable Generating Plant (Wagon Porteur d'un Groupe Electrogène). Brief description of a car containing boiler, engine and electric generator, the whole adapted to be hauled to any point on the track of a railway system. 500 w. 1 plate. Génie Civil—Aug. 12, 1899.

**Portable, "Wild West."**—Portable Electric Plant for Show Lighting. Describes the electrical equipment and illustrates the plant used by "Buffalo Bill's Wild West." 1000 w. W Elec—Dec. 12, 1896.

**Portable Wagon.**—Electric Light Wagon (Elektrischer Beleuchtungswagen). Illustrated description of a neat combination of petroleum motor and dynamo, mounted on wheel and readily moved from place to place. 1000 w. Electrotech Zeitschr—August 12, 1897.

**Post-Office, N. Y.**—The Lighting of the New York Federal Building. Illustrated description of the isolated plant lately installed in the United States custom house and post-office in New York. 1400 w. Elec Wld—March 26, 1898.

**Post-Office, Washington.**—Lighting and Power Installation of the New Post-Office Department Building, Washington, D. C. J. P. Alexander. Brief illustrated description of an extensive installation. 1100 w. Elec Wld & Engr—Jan. 6, 1900.

**Powder Works.**—The Light and Power Plant of the California Powder Works. Wyatt H. Allen. Illustrated description. 2400 w. Elec Wld & Engr—Nov. 11, 1899.

**Powder Works, Indian Head.**—Electrical Equipment of United States Government Powder Factories. Illustrates and describes the plant being installed at the Indian Head factory. 1800 w. Engng—Jan. 26, 1900.

Electricity in the Manufacture of Smokeless Powder. Describes the government electrical plant at Indian Head. Ill. 1200 w. Elec Rev, N. Y.—Sept. 27, 1899.

The Electrical Equipment at the Indian Head Naval Proving Grounds. Illustrates and describes probably one of the most flexible equipments ever designed. 2800 w. Elec Wld & Engr—Aug. 25, 1900.

**Printing Office.**—See also **ELECTRIC DRIVING.**

**Printing Office, Berlin.**—The Electric-Power and Light Plant in the Printing Office of Rudolph Mosse, Berlin (Die Elektrische Kraft und Lichtanlage in der Buchdruckerei von Rudolf Mosse in Berlin). B. Stein. An illustrated description of this important establishment; 88 motors of capacity from ½ to 20 h. p., are used to operate printing presses, etc. 8000 w. Zeitschr d Ver Deutscher Ing—July 16, 1898.

**Printing Office, Washington.**—Electricity in the Government Printing Office. Abstracts of reports of Chief Engineer George E. Reid and Chief Electrician W. H. Tapley, giving valuable details of the operation and economy of the plant. 4000 w. W Elec—Jan. 30, 1897.

The Electric Plant of the Government Printing Office. Illustrated detailed description of the new electric light and power plant in operation at Washington, D. C. Serial. Elec Wld—Jan. 15, 1898.

**Protectory, Philadelphia.**—Power Plant of the Roman Catholic Protectory, Philadelphia. Illustrated description of the mechanical plant for lighting a large group of buildings. 1300 w. Eng Rec—Jan. 8, 1898.

**Quarry.**—See **ELECTRIC EQUIPMENT.**

**Railway Station.**—Railroad Station Lighting Plant at Syracuse, N. Y. Illustrated description. 500 w. W Elec—April 11, 1896.

**Railway Station, Boston.**—Electric Lighting, Heating and Power Plant of the New Boston & Maine and Fitchburg Union Station, Boston. Illustrated description. 3300 w. Safety V—June, 1896.

**Reichstag, Berlin.**—The Electric Power Plant of the New Reichstags Buildings in Berlin (Elektromotorische Antriebe im neuen Reichstagshause zu Berlin). Describing the elaborate electric driving system for ventilators, and pumps, with illustrations. 2500 w. Zeitschr d Ver Deutscher Ing—May 29, 1897.

**Sanitarium, Monticello, N. Y.**—The St. Joseph Sanitarium Electric Plant. H. B. Coho. An illustrated detailed description of a plant containing features of special interest, located six miles from Monticello, N. Y. 600 w. Elec Eng, N. Y.—Sept. 29, 1898.

**Ship.**—See **ELECTRIC EQUIPMENT.**

**Shipyard, Altofen, Danube.**—Light and Power Station at the Altofen Shipyards (Elektrische Kraft und Lichtzentrale auf der Altofner Schiffswerft). An illustrated account of the plant of the Danube Steam Navigation Company. Over 400 h. p. is distributed over the yards among small motors, besides 400 h. p. in lighting. 3500 w. Zeitschr d Ver Deutscher Ing—Feb. 27, 1897.

**Steel Works.**—An American Electric Power Plant at the Frodingham Steel and Iron Works, England. Illustrated detailed description. 7000 w. Jour Fr Inst—Oct., 1899.

**Steel Works, Duquesne.**—Electrical Plant of the Duquesne Steel Works and Blast Furnaces. Describes the power house, generators, switchboards, etc. 2200 w. Elect Eng—Sept. 2, 1896.

**Telegraph Office, India.**—Electrical Plant, Indo-European Telegraphs, Karachi. Some particulars in regard to the electric plant sent to light the offices, with the object of giving a cooler and better light to the signalers. 1300 w. Ind Engng—Oct. 8, 1898.

**Theatre.**—See also **ELECTRIC EQUIPMENT; ELECTRIC LIGHTING.**

**Theatre, N. Y.**—A Theatre Electrical Plant. Illustrated description of the installation of the new Olympia Theatre, of New York. 1400 w. Elec Wld—March 7, 1896.

**Tiffany Factory.**—Electric Power Plant of the Tiffany Factory at Forest Hill, N. J. Illustrated description of this recent installation. 1100 w. Elec Wld—April 10, 1897.

**University of Michigan.**—The Electric Lighting Plant of the University of Michigan. Henry S. Carhart. Brief illustrated description of interesting features. 1100 w. Elec Wld—May 7, 1898.

**Vehicle Battery Charging.**—See **ELECTRIC VEHICLE—Station.**

**Warehouses, Hamburg.**—Continuous and Three-Phase Current Plant (Gleichstrom-Drehstrom-Speicheranlage). The plant is installed in Hamburg warehouses, the three-phase current being used for motors, and the continuous current in connection with accumulators. 1200 w. Elektrotech Zeitschr—April 21, 1898.

**Warship.**—See **ELECTRIC EQUIPMENT.**

**Wind Power.**—See **WINDMILL—Electric.**

**Wisconsin University.**—Electrical Equipment of the University of Wisconsin. Illustrated description. 1800 w. W Elec—Aug. 22, 1896.

Malta Electricity Supply. Illustrated detailed description of works undertaken by the government of Malta. Interesting to engineers and members of local authorities. 1200 w. Eng, Lond—April 2, 1897.

Malta Electricity Supply. Illustrated detailed description. 2400 w. Elec Rev, Lond—Jan. 22, 1897.

**Marine.**—See **Ship; ELECTRIC EQUIPMENT—Ship; Warship.**

**Mazarron, Spain.**—Electrical Engineering in Spain: The Electric Lighting of Mazarron. Illustrated description of the system. 900 w. Elect'n, Lond—Feb. 25, 1898.

**Mines.**—The Electric Light in Mining Operations. William Baxter, Jr. The advantages and displication of the electric current, predicting that it will find its greatest activity in industrial establishments. 800 w. Ir Tr Rev—Jan. 21, 1897.

The Wonderful Expansion in the Use of Electric Power. Louis Bell. Tracing the development of electrical applications to the problems of transportation and transmission. Ill. 3700 w. Eng Mag—Jan., 1897.

**Address.**—Presidential Address of John S. Raworth before the Northern Society of Elec. Engs. of England. Deals with the problem of supplying electric power. 4000 w. Engng—Jan. 21, 1898.

**Agriculture.**—See **ELECTRICITY.**

**Arsenal.**—See **Spezia Arsenal.**

**Bakery.**—See **ELECTRIC DRIVING.**

**Belgium.**—The Future of the Distribution of Electric Energy in Belgium (L'Avenir des Distributions d'Energie Electrique en Belgique). M. Eric Gerard. A comparison of the possibility of the competition of steam with water power in generating electricity, and a suggestion as to the use of blast furnace gases for power. 2000 w. Moniteur Industriel—Nov. 18, 1899.

**Brick Yard.**—Electric Power in Brick Yard and Foundry. F. M. Tait. Illustrated description of the power plant lately installed in the works of the Lehigh Fire Brick Co., at Catasauqua, Pa., with brief mention of plant installed at the works of the Davies & Thomas Co., East Catasauqua, Pa. 800 w. Elec Eng—April 22, 1896.

**British.**—Electrical Energy in Bulk. Editorial comment on the large number of engineering projects before Parliament, and the attitude of English municipalities. 2700 w. Engng—Feb. 16, 1900.

Electric Power Distribution in Great Britain. W. H. Booth. A review of the consequences of the recent decisions of the Parliamentary Commission, showing the difficulties due to municipal intermeddling. 4000 w. Eng Mag—Oct., 1900.

Electric Current for Lighting and Power on the Midland Railway, and Driving Machinery Direct by Electric Motor Without Shafting. W. E. Langdon. Paper read before the Institution of Mech. Engs., England. Detailed description of the installations, with output and costs. 3000 w. Elect'n, Lond—Sept. 30, 1898.

Electric Energy in Bulk. An editorial on the proposed changes in electric light and power stations in England and the economy sought. 2200 w. Engng—Oct. 7, 1898.

**British Legislation.**—Electrical Power Distribution. W. E. Ayrton. Discusses the four Electric Power Distribution Bills, recently before the British Parliament, and the benefits to follow. 5000 w. Nature—July 26, 1900.

**Centralization.**—The Future of Electrical Power. Summary of a popular lecture by Prof. S. P. Thompson, advocating the substitution of large steam engines for small ones, and the establishment of large central stations using coal fuel. 700 w. Ir & Coal Trds Rev—Sept. 14, 1900.

**Cost.**—Matters Affecting the Cost of Electric Power. H. P. Elliott. Digest of a paper showing the great influence of the variable load upon the cost, and the relation of the various items that enter into the cost of production. 1600 w. Can Elec News—April, 1898.

The Cost of Electric Energy in 1895. A. P. Haslam. Estimates of the progress of the industry. The results are classified and tabulated. Serial. Elec, Lond—May 29, 1896.

The Cost of Electric Power Production. Philip Dawson. Considers what connection exists between the first cost of a plant and that at which power can be produced. Serial. Engng—June 1, 1900.

**Cripple Creek.**—Electric Power in Cripple Creek District. J. W. Dickerson. Illustrated description of the generating equipment, steam plant, and electrical features. Serial. Mod Mach—July, 1900.

Electric Power in Cripple Creek District. J. W. Dickerson. Illustrated detailed description of the power equipment. 1500 w. Mod Mach—Aug., 1900.

**Cyanide Process.**—Electric Power at the Golden Gate Mill, Utah. Describes the installation for operating the largest cyanide mill in the world. Ill. 1400 w. Eng & Min Jour—June 25, 1898.

**Dennison Manufacturing Co.**—Electric Power of the Dennison Manufacturing Company. With plans showing the use of electric transmission for a manufacturing plant occupying a number of detached buildings. 1800 w. Eng Rec—Sept. 17, 1898.

**Economy.**—The Economies of Electric Power Plant. C. C. Longridge. Instances of power economy effected by the use of electricity, calling attention to the mechanical principles on which the economy is based. 1300 w. Min Jour—Nov. 21, 1896.

**Foundry.**—See **Brick Yard.**

**Grosvenordale, Conn.**—See **WEAVE SHED.**

**Indian Head Proving Ground.**—See **ELECTRIC PLANT—Powder Works, Indian Head.**

**Meat Dressing.**—Electric Power in Meat Dressing Establishment. Describes two plants installed in packing houses at St. Joseph, Mo. Ill. 1600 w. W Elect'n—July 16, 1898.

**Milwaukee Harvester Co.**—Westinghouse Two-Phase Power Plant in the Milwaukee Harvester Co.'s Works. Illustrated description. 1200 w. Elec Eng—Feb. 12, 1896.

**Mine.**—See **ELECTRIC EQUIPMENT.**

**Munich.**—An Industrial Object Lesson. An editorial describing a water-power electric plant near Munich, and discussing the industrial and economic effects of this plant and of electric power in general. 1100 w. Elect'n, Lond—Sept. 7, 1900.

**Niagara.**—Diversified Uses of Electrical Power at Niagara. Extracts from a paper of Charles F. Scott, recently read before the Engineers' Club of Philadelphia. A diagram of circuits is also given. 3000 w. W Elec—Sept. 25, 1897.

See also **ELECTRIC PLANT; HYDRO-ELECTRIC STATION.**

**St. Etienne, France.**—Domiciliary Electric Power Distribution in the St. Etienne Region (Le Transport Electrique de la Force Motrice à Domicile dans la Région de St. Etienne). Edouard Simon. A very complete description of the distribution of electric power among the ribbon weavers of the Et. Etienne (France) district. There are 30000 ribbon looms, not grouped in factories, but mostly by twos and threes in the houses of workmen or small dealers. The distribution occupies 110 kilometres of lines, worked at 5200 volts, three-phase. About 2500 looms, each absorbing about ¼ horse-power are connected, and 8000 incandescent lamps. The paper minutely describes the contract method of charging for power used by this installation. Ill. 3500 w. Bulletin de la Société d'Encour—Dec., 1898.

**Shipyard, Chicago.**—Electric Power in a Shipyard. Illustrated description of features of the Chicago Shipbuilding Co.'s plant. 2000 w. Am Elect'n—Oct., 1899.

**Small Consumers.**—Electric Power Distribution and the Small Consumer. Dr. Louis Bell. Showing how electric distribution may become a corrective of the centralization due to steam, and giving examples from recent continental practice of the redistribution of industry. 3500 w. Eng Mag—Nov., 1899.

**Small Industries.**—The Applications of the Electric Motor to Small Industrial Purposes and Its Effects on Trade and on the Community Generally. Alfred H. Gibbings. Read before the British Assn. Considers the reasons why its application has been confined to a few trades, and showing how large a sphere of influence it is destined to fill. 2800 w. Elec Rev, Lond—Sept. 16, 1898. See also **St. Etienne, France.**

**Small Units.**—The Use of Electric Power in Small Units. William Elmer, Jr. A consideration of the conditions under which the employment of electric motors in small units may be advantageous to producer and consumer. Ill. 4100 w. Eng—March-Nov., 1896.

**Social Influence.**—The Social Influence of Electric Power. Editorial discussion of the influence due to electric traction and to electric motors. 1800 w. Elect'n, Lond—Nov. 18, 1898.

**Spezia Arsenal.**—The Application of Electric Energy at the Royal Arsenal at Spezia (L'Energia Ellettrica pel Regio Arsenale Militaire Marittimo della Spezia). A. Raddi. An argument in favor of the utilization of the River Magra as a source of power to be transmitted electrically to the arsenal at Spezia. 2500 w. Giord Lav Pub e d Str Ferr—Nov. 15, 1899.

The Installation of Electric Power at the Arsenal at Spezia (L'Energia Elettrica pel Regio Arsenale Militaire Marittimo della Spezia). A. Raddi. A general account of the proposed plan to supply the arsenal with electric power and light derived by the River Magra. 2000 w. L'Elettricita—Feb. 10, 1900.

**Switzerland.**—Electric Power in Switzerland. W. Cotgrave Betts. Some facts are given showing the rapid progress already made in the application of electric power to industrial purposes, but concluding that considering the natural conditions, electricity has not gained favor as rapidly as expected. 900 w. Power—Jan., 1899.

**United States.**—See also **ELECTRIC TRANSMISSION.**

**Vienna.**—Electric Power in Vienna (Der Elektromotoren-Betrieb in Wien). Johann Pere. A description of the electric power supply companies in Vienna, together with tabulated statement of the extent to which power is used and the various trades among which it is divided. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—July 29, 1898.

**Windmills.**—See **WINDMILLS—Electric.**

## ELECTRIC POWER STATION.

See also **DYNAMO FACTORY; ELECTRIC PLANT; ELECTRIC RAILWAY; ELECTRIC STATION; ELECTRIC TRAMWAY; HYDRO-ELECTRIC PLANT.**

Notes on Electric Railway Power Stations. Henry A. Lardner. Stations operating five, twenty-five and one hundred cars respectively are considered. 3000 w. Wis Eng—Jan., 1897.

Some General Conditions Governing Power Station Design. Philip Dawson. Read before the Tramways and Light Rys. Assn. Considers the question from the economical point of view, calling attention to the differences in a station designed for lighting, and one designed for traction. 2000 w. Elec Rev, Lond—July 6, 1900.

Some Statistics Relating to Electric Power Production. Philip Dawson. The first of a series of articles showing the importance of properly laying out and working electrical stations, comparing various systems and the practice in different countries. Serial. Engng—April 6, 1900.

The Generation of Power for Electric Traction. J. Gray Scott. Considers the combined supply for lighting and traction, giving special attention to the practical working of a tramway power station. Serial. Elec Rev, Lond—June 16, 1899.

The Modern Power House. Richard McCulloch. Paper read before the Am. St. Ry. Assn., St. Louis. The first part discusses location, building and steam generating apparatus. Serial. Elec Eng—Oct. 28, 1896.

The New Power Station of the Chicago City Railway. Illustrated detailed description of the new station at Forty-ninth street and Oakley avenue. 3000 w. St Ry Jour—March, 1897.

The Supply of Electric Energy for Traction Purposes. Philip Dawson. Discusses the best method of generating for this purpose and the differences between lighting and traction, offering suggestions of value. 2500 w. Elec Rev, Lond—Nov. 24, 1899.

**Accumulators.**—See also **ACCUMULATOR—Electric Power Station.**

**Accumulator Tramway.**—See also **ACCUMULATOR TRAMWAY.**

**Akron, O.**—New Power Plant at Akron, Ohio. Illustrated detailed description of a first-class plant. 1500 w. St Ry Jour—Sept., 1898.

**Albany, N. Y.**—Recent Improvements in the Albany Street-Railway Power House. Advances in engineering worthy of study. 700 w. Elec Wld—July 11. 1896.

**America.**—Electric Railway Power Stations in America and the Economic Results of Their Operation. L. D. Tandy. A table gives in detail the operation of a number of stations of various types, including the triple expansion and compound engines, direct connected and belt driven generators, condensing and non-condensing. Also a table of percentage comparison of stations, with additional information. 1700 w. St Ry Jour—Jan., 1897.

**Arnold System.**—See **ELECTRIC STATION.**

**Baltimore.**—Power Plant of the City and Suburban Railway Co., Baltimore, Md. Illustrated description. 3500 w. Power—July, 1896.

See also **ELECTRIC LOCOMOTIVE—Baltimore.**

**Bazacle.**—See **Toulouse, France.**

**Boston.**—A New Power House for Boston, Mass. Illustrated description of the new Harvard station, which represents the West End Ry. company's idea of the most economical railway generating station. Explains building and machinery. 1400 w. Eng Rec—Dec. 18, 1897.

Recent Work of the Boston West End Street Railway Company. The installation possesses many interesting features, among which are wrought steel fly-wheels, and the use of direct connected generators. Drawings of fly-wheel, stack and power-house arrangement accompany the articles. 1400 w. St Ry Jour—March, 1896.

The Harvard Power Station of the Boston Elevated Railway Company. H. W. Weller. Illustrated description of this new power house, including the present plant and the plans for future extension. 2500 w. Elec Engr, N. Y.—Sept. 8, 1898.

The Harvard Power Station of the Boston Elevated Railway Company. H. W. Weller. Brief review of street railway history in Boston, with illustrated detailed description of the Harvard Power Station and its equipment. 8500 w. Ry Wld—Dec. 8, 1898.

The Metamorphosis of an Electric Power Station. Illustrated description of changes made in the Albany street station in Boston. 1000 w. Power—June, 1898.

The Central Power Station of the Boston Elevated Railway. H. W. Weller. Brief historical sketch and detailed description of the arrangement and equipment of this station. 4500 w. Ry Wld—April 13, 1899.

**Brockton, Mass.**—Test of the Brockton Street Railway Plant. Illustrates a plant representing the most advanced practice and describes an unusually complete test. 1800 w. Eng Rec—March 5, 1898.

**Brooklyn.**—Electrical Engineering on the Brooklyn Heights Railroad. Information concerning the building of the power houses and the keeping up the line voltage. Ill. 1000 w. R R Gaz—March 16, 1900.

**Brooklyn Bridge.**—The Brooklyn Bridge. New Electric Power Plant. Illustrated detailed description, with a few statistics relating to the construction and operation of the bridge. 4300 w. Elec Wld—Jan. 23, 1897.

**Buffalo Test.**—Test of the Power Plant of the Buffalo Street Railway. R. C. Carpenter and H. J. Ryan. An outline of the test, explanation of its object, with summary of results and general information. 8800 w. Sib Jour of Engng—June, 1900.

**By-Products.**—By-Products of the Power House. M. M. Fenner. Read at meeting of the N. Y. State St. Ry. Assn. The writer's experience for four years in the utilization of exhaust steam. Discussion. 5000 w. St Ry Rev—Sept. 15, 1898.

Profitable Disposition of the Waste Product of a Power Plant. Considers some of the means of economising and of utilising seeming waste. Serial. Engr, Cleveland, O.—Oct. 15, 1899.

See also **HEATING—Hot Water, Electric Station; STEAM HEATING—Exhaust.**

**Charleston, S. C.**—The Charleston, S. C., City Railway Company. A description of its power-house and car barn. Ill. 2500 w. Elec Rev—Sept. 1, 1897.

**Chicago.**—A Railway Power House Transformed. Illustrated description of the plant of the Cicero and Proviso Street Railway Co., in the western suburbs of Chicago. 600 w. W Elec—Nov. 14, 1896.

Chicago City Railway Company's New Electric Power Plant. Illustrated description of interior of plant. 1400 w. W Elec—July 17, 1897.

Chicago Electric Railway Power Houses. Illustrations with brief descriptions. 1600 w. Elec Wld & Engr—Oct. 14, 1899.

Power Station Controversy in Chicago. An abstract of the reports of Messrs. Peirce, Richardson & Foster, and R. J. Hill on the Chicago city plants, after critical examination. 6000 w. St Ry Jour—May, 1897.

The Largest Electric Plant in the Country. Illustrated description of Power House No. 2 of the Chicago city railway. 1300 w. Power—June, 1897.

Power Station of the Northwestern Elevated Railway of Chicago. Illustrates and describes a plant nearing completion. 1400 w. St Ry Jour—July, 1899.

Power Station of the Northwestern Elevated Railroad, Chicago. Illustrates and describes a recently built plant, embodying the latest and best practice in all that is conducive to economical operation. 8000 w. St Ry Rev—July 15, 1900.

Power Station of the South Side Elevated Railroad. Illustrated description of this Chicago station for furnishing power to the Sprague multi-unit system recently adopted. 1600 w. St Ry Rev—May 15, 1898.

South Side Elevated Railroad Power House. Illustrated description of additions and improvements which make this one of the largest and best equipped electric power stations in Chicago. 2000 w. W Elect'n—April 14, 1900.

The Cicero and Proviso Plant of the West Chicago Street Railroad Co., at Chicago, Ill. Illustrated description. The equipment consists of cross compound direct connected engines and dynamos and water tube boilers. 1000 w. Power—Sept., 1897.

Union Elevated Railroad Power House, Chicago. Illustrated detailed description of this recently completed station. 1800 w. Elec Eng, N. Y.—Dec. 15, 1898.

See also **Philadelphia; ACCUMULATOR TRAMWAY.**

**Cincinnati, O.**—The Hunt Power Station, Cincinnati, Ohio. Bert L. Baldwin. Illustrated description of a plant, showing what can be done in the way of remodeling an old plant. 1700 w. St Ry Jour—May, 1898.

**Cleveland.**—Power Station and Repair Shops of the Cleveland Electric Railway Co. Illustrated detailed description of a plant having many interesting features. 4000 w. St Ry Jour—April, 1899.

**Coblenz.**—The Power House of the Coblenz Street Railway Company (Das Elektrizitätswerk der Coblenzer Strassenbahn-Gesellschaft in Coblenz). A brief description, with illustrations. 1800 w. Elektrotech Zeitschr—Sept. 7, 1899.

**Colorado.**—Colorado Electric Power Co.'s Station at Cañon City. Bert E. Wade. Illustrated detailed description of a plant designed to supply power and light to mines. 1200 w. Elec Eng, N. Y.—Oct. 20, 1898.

The Plant of the Colorado Electric Power Company. Ralph D. Mershon. An illustrated detailed description of a plant designed with the object of supplying power to the gold mines. 2500 w. Am Elect'n—Dec., 1898.

**Design.**—Design and Construction of Electric Power Plants. Bion J. Arnold. Part first discusses the possible sources of energy. 5500 w. W Elec—April 3, 1897.

Some General Conditions Governing Power Station Design. Philip Dawson. From a paper before the Light Railway and Tramway Conference, London, with tables. 2000 w. St Ry Rev—Sept. 15, 1900.

**Development.**—Some Recent Developments in Electro-Traction Appliances. A. K. Baylor. Part first is a comparison of a modern traction generating plant with one of seven or eight years ago. Ill. Serial. Elec Eng, Lond—April 9, 1897.

**Direct-Coupling vs. Belt-Driving.**—Direct-Coupled versus Belt-Driven Units for Electric Traction. Alfred H. Gibbings. Considers briefly the advantages of direct-coupled engines and dynamos as compared with those which are coupled by rope or belt gearing. Serial. Ry Wld—April, 1897.

**Dorchester, Mass.**—The Dorchester Power Station of the West End St. Ry. Co., Boston, Mass. H. W. Weller. Illustrated detailed description. 2500 w. Elec Eng—March 24, 1897.

**Dublin.**—The Power Station of the Dublin United Tramway Co., Limited, Dublin, Ireland. Illustrated detailed description of a station designed to furnish power for an extensive system. 900 w. Power—Jan., 1899.

**Expedients.**—Some Expedients in Power Station Practice. J. H. de Gruchy. Discusses the causes of short circuits, and other matters, with devices for rapid work and for convenience. Ill. 1800 w. St Ry Rev—April 15, 1898.

**Extension.**—How Shall We Arrange Electric Trolley Plants with View to Further Extension? (Wie Sollen wir Unsere Elektricitätswerke Bauen?) A comprehensive discussion of the arrangement of street railway power plants, taking into account the extension to additional lines. Two articles. 10000 w. Deutsche Zeitschr f Elektrotechnik—April, May, 1897.

**Gas Engines.**—See also **GAS ENGINE—Electric Power Station.**

**Glasgow.**—Data on Electric Power Generation, Glasgow. Reviews a report by H. F. Parshall on the expense of generating current for the Glasgow street railway; a single central station with three phase distribution to transformer stations is recommended. 1800 w. Eng Rec—April 22, 1899.

**Harvard.**—See **Boston.**

**Hull, Eng.**—New Steam Dynamos for Electric Traction at Hull. Illustrated description of two generating sets recently installed in the Hull Corporation Tramway Power Station. 1000 w. Elec Rev—March 16, 1900.

**Installation.**—The Installation of a Power Plant. U. Grant Kirn. The writer aims to give such information as would enable an engineer capable of taking charge of a plant, to also erect it. Ill. 7000 w. Engr, Cleveland, O.—Dec. 1, 1898.

**Johannesburg.**—The Electric Power Plant of the Rand Central Electric Works (Die Elektrische Kraftübertragungsanlage der "Rand Central Electric Works"). Walter Klug. A very fully illustrated account of the plant at Johannesburg, S. A. R., including map of the distribution of current to the gold fields. 6000 w. Elektrotech Zeitschr—Aug. 4, 1898.

**Kansas City.**—Central Avenue Station, Metropolitan Street Railway, Kansas City, Mo. Illustrated description of a good example of modern power house construction. 2200 w. St. Ry Rev—Sept. 15, 1897.

**Kingsbridge, N. Y.**—See **New York.**

**Lafayette, Ind**—Test of the Lafayette, Ind., Street Railway Power Plant. G. W. Munro. Abstract of a thesis presented to the Faculty of Purdue Univ. Describes the plant and the conditions of schedule and grade, reporting the tests and results. Ill. 2000 w. St Ry Rev—Oct. 15, 1898.

**Lausanne, Switzerland.**—See **GAS ENGINES—Electric Power Station.**

**Leipzig.**—The Power Plant of the Leipzig Tramway System (Die Einführung des Elektrischen Betriebes auf der Grossen Leipziger Strassenbahn). An excellent illustrated description of this fine new power house. 5000 w. Elektrotech Zeitschr—Aug. 5, 1897.

**Load Factors.**—Load Factors on Traction Stations. William H. Booth. States the conditions of working in the power house of an electric tramway, and the means of determining the load factor. 2000 w. Elec Rev, Lond—Aug. 31, 1900.

**London.**—The Electrical Plant of the Waterloo and City Railway. R. W. Weeks. An illustrated account of the general arrangement of the works. 2200 w. Elec Eng, Lond—Nov. 1, 1895.

The City and South London Railway. A well illustrated account of the new generating station of this underground road. 2400 w. Elec Rev, Lond—Sept. 7, 1900.

**Louisville, Ky.**—Power Station and Shops of the Louisville Railway Co. Illustrates and describes the electrical repair shop and its branches, also the power house. 1400 w. St Ry Jour—July 15, 1899.

**Management.**—Practical Operation and Maintenance of Electrical Equipment in the Power House. J. D. de Gurchy. Some of the troubles that have occurred in the writer's experience are discussed showing how serious losses may be averted. Ill. Serial. St Ry Rev—Dec. 15, 1897.

See also **ELECTRIC STATION MANAGEMENT.**

**Metropolitan, N. Y.**—See **New York.**

**Montreal.**—Power Station Records of the Montreal Street Railway Company. A tabulated statement, with explanation, for the year ending Sept., 1895. 800 w. St Ry Jour—Dec., 1895.

**Municipal Ownership.**—Electric Power Companies and Their Relation to Municipalities. Abstract of an address by Albion E. Long, delivered at Purdue University. Considers the relation of the company to the station producing the current and to the public. Does not approve municipal ownership. 1800 w. St Ry Rev—May 15, 1898.

**New Haven, Conn.**—A Model Electric Railway Plant. Illustrated description of a very complete plant located in New Haven, Conn., and belonging to the Fairhaven and Westville R. R. Co. 1400 w. Sci Am Sup—Nov. 14, 1896.

**New London, Conn.**—New Power House of the New London, Conn., Street Railway Co. Illustrated detailed description. 2000 w. Elec Eng—Jan. 27, 1897.

**New York.**—Construction of a Large Power House Building. Illustrated description of the methods followed by the builders of the 70000 horse-power station of the Metropolitan Street Railway Co., New York. 2000 w. Eng Rec—July 28, 1900.

Foundations and Chimney for 45000 Horse-Power Electric Power Station. Metropolitan Street Railway Co., New York City. Illustrated description of the details of the chimney and foundations of one of the two largest power stations in the world. 1800 w. Eng News—March 2, 1899.

Main Power Station and Transmission System of the Metropolitan Street Railway Company of New York. Illustrated detailed description of the main power station and its equipment and the distributing system. 8500 w. St Ry Jour—March 3, 1900.

Power Station of the Metropolitan Street Railway Company. Brief illustrated description of the Ninety-sixth street station, with map showing location of this and the sub-stations. 800 w. St Ry Jour—Sept., 1899.

Temporary Power Stations of the Metropolitan Street Railway Company. A description of the two substantial temporary power houses of the New York Metropolitan Railway, with illustrations of switchboards and automatic stokers. 1800 w. Elec Wld—Sept. 10, 1898.

The Largest Steam Plant in the World. Brief illustrated description of the proposed power station of the Metropolitan Street Railway Co. of New York. 1100 w. Power—Dec., 1897.

The Mammoth Central Power Station of the Metropolitan Street Railway Company, New York. Brief illustrated description of a power house of a 70000 horse-power capacity, designed to supply power to all the electric lines of this company. 1500 w. Sci Am—Nov. 12, 1898.

The New 70000 Horse-Power Central Power Station of the Metropolitan Street Railway Company, New York. Brief illustrated description of the proposed structure. 1100 w. Elec Eng, N Y—Oct. 7, 1897.

The New Power Station for the Metropolitan Street Railway Company. Illustrated description of a station containing 11 engines developing 60000 horse-power, with accessory boiler plant, generators and minor apparatus for furnishing alternating current to the sub-stations of 220-mile railway system, at which it will be transformed to direct current. The details of the building as well as the power plant are described. 6200 w. Eng Rec—Dec. 23, 1899.

The Ninety-Sixth Street Power Station of the Metropolitan Street Railway Company, of New York City. L. G. Montony. Illustrated detailed description. 7000 w. Pro Am Soc of Civ Engs—Aug., 1900.

The Ninety-Sixth Street Power Station of the Metropolitan Street Railway Company, of New York City. Discussion of paper by L. G. Montony. 1700 w. Pro Am Soc of Civ Engs—Oct., 1900.

The New Street Railroad Power Station in New York City. Brief illustrated description of the stations of the Metropolitan Co., and the Third Ave. R. R. Co., 1200 w. R R Gaz—Jan. 12, 1900.

A One Hundred Thousand Horse-Power Plant. Illustrated detailed description of the power station of the Third Avenue Railroad Company of New York. 5700 w. Power—Feb., 1900.

New Main Power Station of the Third Avenue Railroad Company, New York. Illustrated detailed description of the structure, which will be the largest station in the world, and the main features of the steam plant. 9000 w. St Ry Jour—Jan. 6, 1900.

The Kingsbridge Power Station of the Third Avenue Ry., New York City. Burcham Harding. Illustrated description of interesting features. 4000 w. Eng News—March 22, 1900.

The Mammoth Generating Plant of the Third Avenue Railroad Co., New York City. Brief account of this power house, which will be the largest ever projected. Ill. 600 w. Elec Eng, N Y—Jan. 5, 1899.

The New Power Station of the Third Avenue Railroad Company. Illustrated description of a 72000 horse-power station in New York, used for distributing 2-phase current from railway service. 2200 w. Eng Rec—Jan. 6, 1900.

See also **FOUNDATION.**

**Para, Brazil.**—The Electrical Plant at Para, Brazil. (Das Elektricitätswerk Pará Brasilien). Christen G. Host. An interesting account of the electric power plant and trolley lines recently constructed in the city of Para. 4000 w. Elektrotech Zeitschr—Feb. 2, 1899.

**Paris Exposition.**—The Traction Power Plant of the Paris Exposition. Illustrated description of the sub-station on the Quai d'Orsay. 1200 w. Elec Wld & Engr—Oct. 20, 1900.

See also **ELECTRIC STATION.**

**Performance.**—Power House Performance. Tabulation of results of twenty plants, with comment on condensing engines and economy of condensing water. 800 w. St Ry Rev—April 15, 1896.

**Philadelphia.**—Destruction of the Philadelphia Traction Company's Mount Vernon Street Station. Illustrated description, with diagram giving an idea of situation. 1200 w. Elec Wld—March 13, 1897.

**Philadelphia and Chicago.**—Modern Electric Railway Plants. Brief illustrated descriptions of the plants of the Union Traction Company of Philadelphia, and of the South Side Elevated Railroad of Chicago. 2000 w. Engr, Cleveland, O—June 1, 1899.

**Pittsburg, Pa.**—Design and Construction of the 20th Street Power Station of the Consolidated Traction Company, Pittsburg, Pa. G. F. Greenwood. A statement of the existing conditions which made necessary the construction of this new station, with description of the plant. 5800 w. Pro of Engs' Club of W. Penna—Dec., 1898.

New Power Station, Repair Shops and Car Houses of the Consolidated Traction Company of Pittsburg. An illustrated study of the reconstructed system of this company, which presents many interesting features. 8400 w. St Ry Jour—March, 1899.

Some Electrical Features of the Power Station of the Consolidated Traction Company of Pittsburg. Details of interest in regard to station equipment are described, a number of them differing from standard practice. Ill. 900 w. St Ry Jour—Aug., 1899.

See **ELECTRIC TRAMWAYS—Pittsburg.**

**Portland, Oregon.**—The System of the Portland Railroad Company. The power station is fully described and illustrated by views and sections. It was intended as a model of its kind. 2500 w. St Ry Jour—March, 1896.

**Primitive.**—See **DYNAMO FACTORY.**

**Rates.**—See **ELECTRIC STATION MANAGEMENT—Tramway Power Charges.**

**Rating.**—Notes on Rating Electric-Power Plants upon the Heat-Unit Standard. William S. Aldrich. A second paper on this subject, the first having been read at the Hartford, Conn., meeting (May, 1897). Discusses progress shown in the past four years, etc. 3000 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Reading, Pa.**—The Electric Power Plants in Reading, Pa. N. Monroe Hopkins. Illustrated description of the combined power plant of the Metropolitan Electric Co. and the United Traction Co. 2000 w. Elec Eng, N. Y.—March 10, 1898.

**Richmond, Va.**—A Modern Power Plant. Edward J. Willis. Calls attention to the power house of the Richmond Traction Co., Richmond, Va., showing the difficulties under which such plants sometimes operate, and how good results can be obtained in spite of unfavorable conditions. Ill. 2000 w. Mach—April, 1897.

**Rio del Monte, Mexico.**—See **ELECTRIC TRANSMISSION—Hidalgo, Mexico.**

**Safety Stop.**—See **STEAM ENGINE—Safety Stop.**

**St. Louis.**—St. Louis Electric Railway Power Stations. Plans and descriptive accounts of several power stations. 1500 w. Elec Eng—Oct. 21, 1896.

**San Francisco.**—Power House of the Market Street Railway, San Francisco. Illustrated detailed description of the largest system in the far west. 1400 w. St Ry Rev—Sept. 15, 1897.

Power Station of the Market Street Railway Company, San Francisco, Cal. Illustrates and describes the station supplying current for the operation of the electric system. 700 w. Power—March, 1899.

**Shafts.**—Shafts. E. Debus. The importance of this subject to the street railway engineer, with extracts from paper by G. W. Manuel, and from the discussion of the same. 2000 w. St Ry Rev—Sept. 15, 1897.

**Steam Piping.**—See **STEAM PIPING—Electric Power Station.**

**Storage Batteries.**—Storage Batteries in Electric Railway Power Stations. Edward L. Reynolds. Cites results now being obtained in the operation of several railways, thus showing the advantages. 1300 w. Am Elect'n—Oct., 1900.

**South London.**—See **London.**

See also **ACCUMULATOR—Electric Power Station.**

**Test.**—Test of a Direct-Connected Railway Unit at Different Loads. Gives the results of tests of a 800-K. W. plant comprising water-tube boiler, horizontal compound condensing engine with double eccentrics, and a 6-pole generator. 900 w. Eng Rec—Dec. 23, 1899.

Test of an Electric R. R. Power Station. F. W. Phisterer. A statement of what such a test consists and what may fairly be expected in such work in the way of difficulties and arrangements. 2400 w. Sib Jour of Engng—Dec., 1896.

Test of a 300-Kilowatt Direct-Connected Railway Unit at Different Loads. Edward J. Willis. A test of the steam, water, and coal consumption and electrical output. 1000 w. Trans Am Inst of Elec Engs—Oct., 1899.

**Toledo, Ohio.**—Toledo Traction Company's Power House. Illustrated detailed description. 2500 w. St Ry Rev—Jan. 15, 1897.

**Toulouse, France.**—The Basacle Electric Power Station at Toulouse. A brief description of station. 1500 w. Elec, Lond—May 1, 1896.

**Washington, D. C.**—Power House of the Capital Traction Company. Illustrated description of a 2000 k. w. station for a conduit electric road. 1500 w. Eng Rec—Dec. 31, 1898.

Test of the Power Plant of the Capital Traction Co., Washington, D. C. Data abstracted from theses of graduates of Cornell Univ., prepared from results of tests made by them. 800 w. Eng News—Dec. 28, 1899.

The New Power Station of the Capital Traction Co., Washington, D. C. Illustrated detailed description of the station and its equipment. 3700 w. St Ry Jour—Jan., 1899.

The Power Station of the Capital Traction Co., Washington, D. C. Describes and illustrates this new electric station, giving two-page plate. 2500 w. Eng News—Jan. 26, 1899.

See also **ELECTRIC CONDUIT TRAMWAYS—Washington, D. C.**

**ELECTRIC PROJECTORS.**

See **SEARCH LIGHTS.**

**ELECTRIC PROPULSION.**

**Canal Boats.**—See **CANAL HAULAGE—Electric.**

**ELECTRIC PUMP.**

See **PUMP—Electric.**

**ELECTRIC RAILWAY.**

See also **CITY RAILWAY; ELECTRIC CONDUIT TRAMWAY; ELECTRIC TRAMWAY; ELEVATED RAILWAY; LIGHT RAILWAY; LOCOMOTIVE—Motive Power Comparison; MOUNTAIN RAILWAY; SURFACE-CONTACT TRAMWAY; UNDERGROUND RAILWAY.**

Can Electricity Supplant the Steam Locomotive on Trunk Railways? William Baxter, Jr. The object of the writer is to present the merits upon which electricity can base a claim of superiority in a fair and impartial manner. The first part is largely introductory. Serial. Elec Eng—Feb. 19, 1896.

Electricity on Steam Roads. Extracted from the address of Charles P. Clark before the Railroad Committee of Connecticut. Gives an account of the experiments near Boston, the successful use of the third rail system and a general discussion of the problem. 2800 w. St Ry Rev—March 15, 1897.

Electricity on Trunk Railroads. William Baxter, Jr. The writer thinks it has been fully demonstrated that electric motors are capable of handling the heaviest traffic, and if the saving in operating expenses should prove to be greater than with steam, new roads, at least, would use electricity. 1200 w. Sci Am—April 18, 1896.

Electric Motive Power. W. H. Weston. The writer thinks where heavy trains are to be run on distances greater than a few miles, steam power is far preferable. On hauls of a few miles, hauling but one or two cars, electricity or compressed air may be an efficient motive power. 2000 w. Baker's Ry Mag—Nov., 1896.

Electric Motive Power. W. H. Weston. Thinks it is a mistake to use it in any extended way for motive power purposes. 2400 w. Ry Mag—Sept., 1897.

Electric Power for Railroads. Harris J. Ryan. A review of the advance of electricity for railway purposes during the past year. The writer gives a review of the engineering methods now in use for electric railroads and discusses those that will probably be given a trial in the near future. 1300 w. Sib Jour of Engng—Jan., 1896.

Electric Traction. Cloyd Marshall. Read before the Chicago Electrical Assn. Reviews the indications of growing importance and the promising outlook for the application of electricity to heavy traction. 2500 w. Elec Wld—Dec. 25, 1897.

Electric Traction. Edward Barrington. Treats the subject very fully, touching on nearly every form of electric traction now in use. The paper is followed by an extended discussion. 27800 w. Jour W Soc of Engs—December, 1896.

Electric Traction in Railway Work. Abstract of a paper read before the Glasgow and West of Scotland Technical College Scientific Society. Discusses the advisability of substituting electric traction on steam roads. 2700 w. Tram & Ry Wld—Jan. 11, 1900.

Electric Traction. M. H. Gerry, Jr. A brief discussion of some of the more important problems in the application of electric motive power to the heavier classes of railway service, with illustrations from the practice of the Metropolitan Elevated Road of Chicago. 5700 w. Trans Am Inst of Elec Engs—June and July, 1897.

Electric Traction on Important Lines and the Locomotives. Extracts from paper by Maurice Demoulin. Considers the advantages and disadvantages as compared with steam. 2800 w. Ind & East Engr—May, 1898.

Electric Traction under Steam Railway Conditions. Charles Henry Davis. Showing under what circumstances electric traction may be profitably substituted for steam locomotion. 4400 w. Eng Mag—May, 1897.

Electric Traction Under Steam-Railway Conditions. Charles Henry Davis. Comparing in detail electric and steam systems of installation and operation. Serial. Eng Mag—June, 1897.

Electric Traction Under Steam Railway Conditions. John C. Henry. The writer's convictions regarding the most desirable mechanical and electrical construction. 1000 w. Elec Eng—Jan. 6, 1897.

Engineering Code of the Application of Electricity to Standard Railroading. A topical discussion of this subject. 4000 w. N. Y. R R Club—Oct. 21, 1897.

Gerry on Electric Traction. Discussion of paper by M. H. Gerry, Jr., on "Electric Traction, Notes on the Application of Electric Motive Power to Railway Service, with illustrations from the Practice of the Metropolitan Elevated Road of Chicago." 3800 w. Trans Am Inst of Elec Engs—Oct., 1897.

Long Distance and Heavy Duty Electric Railways. F. W. Darlington. A paper read before the Pennsylvania Street Railway Assn. A brief review and forecast from both the mechanical and the commercial side. 4200 w. Elec Eng—Sept. 9, 1896.

Long Distance and Heavy Duty Electric Railways. F. W. Darlington. Paper read before the Penna. Street Ry. Assn. A discussion of established facts and mooted points as to general policy. 4000 w. St Ry Rev—Sept. 15, 1896.

Notes on Electric Traction Under Steam Railway Conditions. Edward C. Boynton. An interesting paper discussing the question of local passenger service, the increase in traffic, and reduction of operating expenses. 8500 w. Trans Am Inst of Elec Engs—Jan., 1900.

Notes on Electric Traction Under Steam Railway Conditions Edward C. Boynton. Discussions of this paper in New York and Chicago, and also a communication from M. H. Gerry, Jr. 12400 w. Trans Am Inst of Elec Engs—May, 1900.

Notes on Traction by Electric Power. A. C. Elliott. A paper setting forth the advantages of electric power for traction, and urging its wider extension to heavy traffic. 2500 w. Elec Engr, Lond—Aug. 26, 1898.

Some Difficulties of Heavy Electric Railroading. Louis Bell. Considers the possible limitations. Discusses economy of operation, repairs, labor, etc., danger of breakdown of the system from accident, voltage, etc., in part first. Serial. Elec Wld—Jan. 1, 1898.

The Application of Electricity to Railway Working. Review of a book by W. E. Langdon, superintendent and engineer of the electrical department of the Midland Railway. 2000 w. Trans —March 26, 1897.

The Application of Electricity to Steam Railroads. D. W. Brangs. Read before the Am. Ry. Master Mechs. Assn. Reviews the various methods by which electricity can be applied for heavy railroad work, and its advantages. 1800 w. Elec Rev, N. Y.—July 20, 1898.

The Application of Electricity to Steam Railroads. Paul H. Brangs. Abstract of Paper read at convention of the Master Mechanics Assn. Advocates the electrical equipment of branch lines and the use of electricity in many special cases. 1200 w. Elec Wld—June 26, 1897.

The Application of Electric Power on Trunk Line Railways. George Forbes. Showing that electric traction is advisable in underground railways, desert railways, and in all cases where water power is easily available or where power may be applied to every axre. 5300 w. Eng Mag—Oct., 1897.

The Application of Electric Traction to Existing Railways. Ed. C. de Segundo. Part first refers to the possibility of traveling from New York to Boston by trolley, and the application of electricity to suburban railways. Serial. Elec Rev, Lond—May 11, 1900.

The Coming Electric Railroad. Sidney H. Short. A discussion of the chief points in effecting a change from steam to electricity on trunk lines. Ill. 4000 w. Cos—Jan., 1899.

The Future of Electricity in Railroad Work. Dr. Louis Duncan. A lecture delivered before the Franklin Institute. A very full and able discussion of the case in all its relations. Electricity is regarded as specially adapted at present to suburban travel, and short feeder lines, but destined to supplant steam, first for through passenger travel; lastly, and perhaps doubtfully, for through freight. 5800 w. Jour Fr Inst—June, 1896.

The Influence of Electricity Upon Railway Locomotion. B. H. Thwaite. With especial reference to the practicability of applying electric traction to underground and main line railway service where steam locomotives are now in use. 4000 w. Eng Mag—June, 1899.

The Motive Power of the Future. Takes the ground that with advancing improvement in mechanical application, electricity will supplant steam, which, according to this article, has reached the limit of practicable perfection in the locomotive. 1200 w. Ry Age—Sept. 18, 1896.

The New Problem in Transportation. Editorial discussion of electric railroad competition for steam railroad business. 1700 w. Am Eng & R R Jour—Nov., 1897.

The Outlook for the Electric Railway. F. C. Armstrong. Read before the Canadian Elec. Assn. Reviews development of the past decade, discusses the suitability of the electric railway to replace the "light railways" of Europe, and the probability of electric traction being adapted to trunk railroads. 1800 w. Elec Rev—July 1, 1896.

The Present Status of the Electric Railroad. F. B. H. Paine. A reply to opinions expressed in this paper, and giving the writer's views. Thinks that electricity is not yet adapted for the moving of heavy trains for long distances, but thinks there are indications of a gradual change. Also editorial. 3700 w. R R Gaz—July 30, 1897.

The Status of Electric Railroading. Reviews editorially the progress in the substitution of electricity for steam, and the conditions to be met ere the advancement can satisfy those interested in railroad working. 2500 w. R R Gaz—July 9, 1897.

What Next in Electric Railway Work? J. R. Cravath. Read before the Chicago Elec. Assn. A brief outline of some of the new engineering features that will probably enter into electric railway work in the immediate future. Serial. Elec Rev—Jan. 8, 1896.

**Albany and Hudson.**—The Electrical Equipment of the Albany & Hudson Railway and Power Company. Illustrates and describes some features of the electrical equipment of the longest and most important third-rail electric system in the world. 1200 w. Elec Rev, N. Y.—Oct. 17, 1900.

**Alternating Currents.**—The Application of Alternating Currents to Electric Traction. C. H. Davis and H. C. Forbes. A completion of the article in the August issue, especially comparing the advantages of local power stations and distant natural sources. 4000 w. Eng Mag—Sept., 1898.

The Application of Alternating Currents to Electric Traction. Chas. Henry Davis and Howard C. Forbes. A discussion of the economic advantages to be gained by the use of alternating currents, and the methods of transforming and controlling them. Part I. 3500 w. Eng Mag—Aug., 1898.

**Am. Inst. El. Eng. Discussion.**—Electric Traction Under Steam Railway Conditions. Full discussions in New York and Chicago opened by Dr. Charles E. Emery. 23500 w. Trans Am Inst of Elec Engs—Oct., 1896.

The Institute Discussion on Electric Traction Under Steam Railway Conditions. Dr. Charles E. Emery. The writer discusses the various phases of the subject and concludes that the application to long trunk lines does not seem practicable under present conditions. 3600 w. Elec Eng—Nov. 18, 1896.

**Baltimore & Ohio.**—Some Results with Electric Power on B. & O. T. Fitzgerald. A brief review of the growth of the enterprise and a statement of its success. 900 w. Elec Eng—Jan. 6, 1897.

**Berlin.**—See **Wannsee—Berlin; ELEVATED RAILWAY.**

**Branch Lines.**—Electricity versus Steam for Branch Railroad Lines. Charles H. Davis. Continued discussion. 30600 w. Pro Am Soc of Civ Engs—Nov., 1899.

Electricity versus Steam for Branch Railroad Lines. Informal discussion of what are the economic conditions under which electricity may be profitably substituted for steam, and the engineering requirements. 6000 w. Pro Am Soc of Civ Engs—Aug., 1899.

**Brand System.**—The Brand Electric Railway System. Abstract of paper by Mr. Franklyn read before the Tramways Inst. of Great Britain and Ireland. Illustrated description with sweeping condemnation of the trolley system. The discussion following severely criticises the system described. 4000 w. Elec Eng, Lond—Aug. 7, 1896.

**Burgdorf—Thun.**—Important Three-Phase Electric Railway in Switzerland. Charles Rochat. Illustrates and describes the road connecting Burgdorf and Thun. 2500 w. St Ry Jour—Dec., 1899.

The Burgdorf-Thun Polyphase Electric Railway W. Rung. Translated from the Danish paper "Ingenioren." A statement of the advantages of alternating current for railway working, and an illustrated description of the new railway from Burgdorf to Thun. Serial. Elec Rev, Lond—Oct. 12, 1900.

The Burgdorf-Thun Railway. Illustrated description of an interesting electrically-driven heavy railway, 25 miles long, with 16,000-volt overhead transmission and overhead distribution to the train of three-phase current at 750 volts pressure. Serial. Elect'n, Lond—Sept. 8, 1899.

The Full-Gauge Electric Railway between Burgdorf and Thun (Die Elektrische Vollbahn Burgdorf-Thun). E. Thomann. With map and profile of the route, and views of the motor and trailer cars. The three-phase current is used. Serial. Schweizerische Bauzeitung—Jan. 6, 1900.

The Swiss Railway Between Burgdorf and Thun and Stanz and Engelberg (Die Schweizer Bahnen Burgdorf-Thun und Stanz-Engelberg). A discussion before the German Railway Association of two Swiss electric railways operated from hydraulic power and overcoming steep gradients. 2000 w. Glaser's Annalen—Dec. 1, 1899.

See also **Polyphase.**

**Canadian Pacific.**—The Aylmer Branch of the Canadian Pacific Railway Operated by Electricity. Description of the equipment and operation of a connecting link road handling considerable traffic. 700 w. Elec Eng—Oct. 7, 1896.

**Chicago.**—The Suburban Railroad Company, Chicago. Illustrated description of construction with other information. 1800 w. St Ry Rev—April 15, 1897.

**Chicago, Milwaukee.**—Chicago and Milwaukee Three-Phase Electric Railway. S. S. Sherman. Illustrated detailed description of the new Chicago and Milwaukee line. 4000 w. Elec Wld & Elec Engr—April 8, 1899.

The Chicago and Milwaukee Electric Railway. A brief description of this surburban or interurban line, a portion of which was recently opened for traffic. 2300 w. Elec Rev, N. Y.—Aug. 24, 1898.

**Chicago Steam Roads.**—The Electrical Equipment of Steam Roads in Chicago. Illustrated detailed description of construction and equipment, with editorial. 3500 w. Ry Rev—June 19, 1897.

**Chicago Suburban.**—The Suburban Railroad Company's System. Illustrated description of this electric railway system of lines, in and near Chicago. 2200 w. W Elec—July 31, 1897.

The Suburban Railroad of Chicago. Illustrated detailed description. Part of this system consists of sections of steam roads equipped for operation by electricity, and also used for street cars. 1400 w. St Ry Jour—Sept., 1897.

**Cleveland, Akron.**—The Akron, Bedford and Cleveland Electric Railway. Illustrated description of the road and its equipment. 2000 w. Elec Rev, N. Y.—Feb. 28, 1900.

**Cleveland, Lorain, O.**—Analysis of the Operation of an Interurban Railway. A study of the Lorain & Cleveland Railway Company's line, which has a length of 18.5 miles. Ill. 6500 w. St Ry Jour—May, 1899.

A High-Speed Road—The Lorain and Cleveland Electric Railway. E. P. Roberts. Illustrated detailed description of a completely equipped and thoroughly constructed American line. 2700 w. Elec Eng, N. Y.—Oct. 14, 1897.

Speed-Tests on the Cleveland-Lorain Railway. Statistics on the speeds secured during trial runs and in regular service. 900 w. St Ry Jour—June, 1899.

The Lorraine and Cleveland Electric Railway. Illustrated detailed description of an inter-urban road recently constructed. 2000 w. St Ry Jour—April, 1897.

**Colorado.**—Proposed Electric Railways in Colorado. J. W. Dickerson. Illustrated description of proposed road of the South Platte Railway and Power Co. intended to connect Denver with Cripple Creek. The current for the operation of the line is to be generated by water power at different points along the route. 2000 w. Elec Ry Gaz—March 7, 1896.

**Columbia and Maryland.**—The Columbia and Maryland Railway. S. W. Huff. A sketch of some of the plans and problems encountered in the construction of this railway. Part first states the conditions to be met, and the special form of three-wire system used. Ill. 1900 w. St Ry Rev—March 15, 1897.

**Combined Operation.**—Combined Operation of Trolley and Steam Systems on the Long Island Railroad. Illustrates and describes some features of the experiment in operating the Rockaway Beach division of this road. 1400 w. Elec Wld & Engr—Sept. 2, 1899.

**Conduit.**—See **ELECTRIC CONDUIT TRAMWAY.**

**Connecticut.**—Connecticut Steam Trolley Rivalry. Reviews the measure of success attained by the third-rail system, reports extension proposed, and discusses the subject generally. 1200 w. R R Gaz—Jan. 14, 1898.

The Steam Trolley Contest in Connecticut. Editorial comment on the decision rendered by Judge G. W. Wheeler in the Superior Court of Conn. 1500 w. R R Gaz—Nov. 20, 1896.

Third Rail versus Trolley in Connecticut. Editorial discussion of the rivalry, and the interesting phases of the situation. 1600 w. R R Gaz—May 6, 1898.

Trolley, Steam and Third Rail in Connecticut. Clarence Deming. Reviews the past ten years and the changes affected by improved facilities in transportation, touching upon the rivalries, and signs of progress. 2500 w. R R Gaz—Aug. 10, 1900.

See also **N. Y., N. H. & Hartford; Third Rail.**

**Cripple Creek.**—Cripple Creek District Railway. Illustrates and describes a road which has adopted the three-phase system with current generated at high pressure, transmitted, reduced and converted. The source of power is the flow from the different watersheds of Pike's Peak. 1700 w. St Ry Rev—Oct. 15, 1898.

Interurban Railroading at Cripple Creek. Illustrated detailed description of this three-phase system with current generated at high pressure, transmitted, reduced and converted. 1000 w. St Ry Jour—Nov., 1898.

The Cost and Advantages of Electrical Equipment for Railways. John C. Henry. Gives the results of investigations for the electrical equipment of the Florence and Cripple Creek Railway. The equipment proposed is quite a departure from the ordinary street railway practice. 2000 w. Elec Eng—June 2, 1897.

See also **RAILWAYS—Cripple Creek, Col.**

**Detroit.**—New Equipment for the Rapid Railway of Detroit. Illustrated description of this improved line, which carries not only passengers, but freight and express matter, and also provides electric light and power in the cities, towns and residences on the route. 2500 w. St Ry Jour—Feb. 3, 1900.

**Detroit—Ann Arbor.**—The Detroit, Ypsilanti & Ann Arbor Electric Railway. Illustrates and describes this example of modern practice in the equipment of an interurban traction system. 3500 w. St Ry Rev—Jan. 15, 1900.

**Detroit Interurban.**—The Detroit, Ypsilanti, and Ann Arbor Interurban Electric Railway. Illustrates and describes the road and its equipment. 1000 w. Elec Eng. N. Y.—Dec. 22, 1898.

The Interurban Electric Railways Around Detroit. An illustrated detailed description of an extended system of these railways. Also editorial. 5000 w. St Ry Jour—Jan., 1899.

**Detroit—Port Huron.**—The Rapid Railway—Detroit to Port Huron. Particulars concerning important extensions, and the facilities offered by this new road. 1500 w. R R Gaz—March 23, 1900.

**Detroit Suburban.**—The Detroit, Rochester, Romeo & Lake Orion Railway. Illustrated description of a recently completed electric railway, with information relating to its operation. 1800 w. St Ry Jour—April 7, 1900.

**Düsseldorf—Crefeld.**—High Speed Electric Railway Between Düsseldorf and Krefeld. An illustrated account of this road in Germany, the first installation of a high-speed electric railway in Europe. 2400 w. St Ry Jour—Aug., 1899.

The Electric Light Railway Between Düsseldorf and Krefeld. Abbreviation of a paper by Gustav Braun, published in the "Elektrotechnische Zeitschrift." An illustrated detailed description of a railway of interest on account of its high-speed working, and the deviation from ordinary practice in its construction. 2800 w. Elec Eng, Lond—July 7 1899,

The Electric Railway Between Düsseldorf and Krefeld (Die Elektrische Kleinbahn Düsseldorf-Krefeld). Gustav Braun. A fully illustrated description of this recently opened road, which passes over the new Rhine bridge at Düsseldorf, and which is used both for passenger and merchandise. 7000 w. Elektrotech Zeitschr—June 22, 1899.

**Düsseldorf-Duisburg.**—An illustrated description of the electric trolley road between Duisburg and Düsseldorf, with profile of the route and photographs of the trolley drawbridges. 2000 w. Ill. Zeitschr für Klein und Strassenbahnen—July 1, 1898.

**Electrolysis.**—See **STRAY CURRENTS.**

**Elmira-Seneca Lake.**—Elmira & Seneca Lake Ry. An illustrated description of a road in Chemung and Schuyler Counties, New York. 2200 w. St Ry Rev—Sept. 15, 1900.

**English, Expenses.**—Working Expenses of English Railways. Information of the City and South London Electric Railway and the Liverpool Overhead Railway. The other tramways do not issue records from which the expenses can be drawn. Tabulated statements are given. 750 w. Ry Wld —Sept., 1897.

**Equilibrium System.**—The Equilibrium System of Feeding Electric Railways. Charles Ernest Paolo Diana Spagnoletti. Describes a method of working long lines of railways by electricity. Read before the Civil Engineers' Conference. 800 w. Elec Eng, Lond—May 28, 1897.

See also **ELECTRIC DISTRIBUTION—Railway.**

**Equipment.**—How Electric Railroad Equipment May Be Simplified. Shows the irregular apportionment of recent improvements in design, and explains and illustrates the proposed simplification in arrangement of apparatus. 2800 w. R R Gaz—Oct. 16, 1896.

**Europe.**—Some New Street and Electric Elevated Railroads in Europe. Condensed information of the electric line in Vienna, the Jungfrau, Edinburgh cable roads, Budapest Intramural railroad, Liverpool overhead railway and improvements in the electric roads of Lyons. 1800 w. RR. Gaz—March 5, 1897.

**High Speed.**—Requirements of High Speed and Heavy Electric Traction. Hayward Cochrane and E. J. Swartout. The paper aims to present the practical conclusions of the best authorities and to suggest outlines of what the writers consider to be the best results obtainable from the use of electrical machinery as now manufactured. Read before the Chicago Elec. Assn. Ill. 3500 w. W Elect'n—May 1, 1897.

A Speed of One Hundred Miles an Hour. G. T. H. Consideration of the requirements to attain such speed, and the points of superiority of electricity presented. 1000 w. Elec Ry Gaz—Nov. 9, 1895.

The Enormous Possibilities of Rapid Electric Travel. Charles Henry Davis and F. Stuart Williamson. Showing in detail the possibility of bringing Philadelphia within thirty-six minutes of New York harbor. Ill. Serial. 1st part. 4900 w. Eng Mag—Oct., 1897.

The Enormous Possibilities of Rapid Electric Travel. Charles Henry Davis and F. Stuart Williamson. With full detailed estimate of cost for the construction of a three track electric railway between New York and Philadelphia capable of making the run in 36 minutes. Figures are given showing the probable expenses, receipts and profits. 4500 w. Engineering Magazine—Nov., 1897.

See also SINGLE—RAIL.

**High-Speed McGurty.**—The McGurty High-Speed Electric System for Mail and Express Service. Illustrates and describes the system. 800 w. Elec Eng, N. Y.—Aug, 25, 1898.

**Hull, Canada.**—The Hull Electric Railway. F. C. Armstrong. Illustrates and describes a branch road in Canada, recently equipped electrically. It has a considerable freight business in hauling lumber, grain, etc. 1800 w. St Ry Jour—July, 1898.

**Indiana.**—The System of the Indiana Railway Co. An illustrated detailed description of the lines, with review of the history. 8000 w. St Ry Rev —Aug. 15, 1900.

**Indiana Interurban.**—The Interurban Railway Between Anderson and Marion, Ind. Illustrates and describes the road and its equipment. 1200 w. St Ry Jour—Dec., 1898.

**Indianapolis Interurban.**—The Indianapolis, Greenwood and Franklin Interuban. Cloyd Marshall. Map, illustrations, and description. 2000 w. St Ry Rev—June 15, 1900.

**Interurban.**—Advice to Builders of Electric Railways. G. Whitefield Chance. Calls attention to important matters in the construction and operation of interurban roads. 1400 w. W Elec—June 5, 1897.

**Italy.**—Electricity for Operating Trains on Italian Railway (L'Energia Electtrica Applicata ai Treni delle Ferrovie Italiane). A study of the possibilities of utilizing the numerous Italian water-powers for the operation of the present stream railway system, containing some interesting data. 2400 w. Annali d Soc d Ing e d Archit Ital—Sept., Oct., 1898.

Electric Traction on a Main Line Italian Railway. Enrico Bignami. Illustrates and describes the electrical equipment of the Lecco, Sondrio and Chiavenna line in the north of Italy, with a three-phase traction system, using induction motors on the cars. 2000 w. Elec Rev, N. Y—Oct. 10, 1900.

Electric Traction on the Secondary Railways of Italy (Essais de Traction Electrique sur les Lignes de Chemins de Fer Secondaires en Italie). R. Godfernaux. Describing the various lines now in successful operation in Italy, with data concerning costs and returns of operation. 5000 w. 1 plate. Rev Gen des Chemins de Fer—Dec., 1899.

Schemes for the Application of Electric Traction to Railway Lines in Italy. Giovanni Georgi. Reports many roads now being equipped for electric traction. A system of trunk lines aggregating a length of 88 miles is being equipped, also mountain roads, and others. 1000 w. Elec Wld & Engr—April 21, 1900.

**Jungfrau.**—See MOUNTAIN RAILWAY.

**Kashmir.**—See RAILWAY PROJECT—Kashmir Electric.

**Lockport, N. Y.**—Heavy Electric Traction, Buffalo & Lockport Ry. Particluars of the most recent application of electricity to the steam railroad, in the United States, with illustrations. 2000 w. Ry & Engng Rev—Sept. 10, 1898.

Steam Railroad Conversion Near Lockport. Illustrates and describes the change made on a branch line of the Erie Railroad, running from Tonawanda to Lockport, N. Y. The service of a mixed type, the passenger traffic being carried on by trolley cars, and the freight service by electric locomotives. 3000 w. St Ry Jour—Sept., 1898.

The Buffalo and Lockport Electric Railway. Illustrated description of this railway operated by Niagara power for both freight and passenger traffic. 1500 w. Elec Engr, N. Y.—Sept. 8, 1898.

See also ELECTRIC LOCOMOTIVES—Lockport, N. Y.

**Long Island.**—The Electrical Equipment of the Suburban Service of the Long Island Railroad System. Illustrated description of the changes to be made by this road, and the equipment of a considerable part with electric traction apparatus. 1500 w. Elec Wld—Nov. 20, 1897.

**Maine.**—Three-Phase Transmission for Electric Railway Work in Maine. Describes the system of the Lewiston, Brunswick & Bath street railway. Ill. 1300 w. St Ry Jour—March, 1899.

**Marine.**—See ELECTRIC TRAMWAY—Brighton—Rottingdean.

**Massachusetts Report.**—Should a Railroad Adopt Electric Motive Power to Meet the Competition of Electric Suburban Lines? Extracts from report of Mass. R. R. Commission; the conclusions being that the province of each is distinct, and no advantage will result from an attempt on the part of either to invade the other's field. 2000 w. Am Eng & R R Jour—June, 1896.

**Meckenbeuren-Tettnang.**—The Auxiliary Electric Railway at Meckenbeuren-Tettnang (Die Elektrische Nebeneisenbahn Meckenbeuren-Tettnang). Illustrated description of a special "feeder" line operated in connection with steam road. Part 1, 4000 w. Zeitschr d Ver Deutscher Ing—Sept. 4, 1897.

**Missouri.**—Large Interurban Electric Railway in Southwestern Missouri. An illustrated account of the road connecting Carthage, Carterville, Webb City and Joplin. 2800 w. St Ry Jour—May, 1899.

**Missouri Southwest.**—Recent Improvements in the Southwest Missouri Electric Railway System. Illustrated detailed description of the equipment and operation of an interurban railway. 2800 w. St Ry Jour—Aug. 4, 1900.

**Mountain.**—See MOUNTAIN RAILWAY.

**Mt. Holly Branch P. R. R.**—Electrical Equipment —Mt. Holly Branch Pennsylvania R. R. Calvert Townley. Paper read before the New England R. R. Club, describing the partial application of electric traction to a road formerly wholly operated by steam. 1000 w. Ry Rev—April 18, 1896.

**Multiple Unit.**—A New System of Multiple Unit Control. Report of experiments being made in the subway, in Boston, with the electric-pneumatic system of train control. 1000 w. Elec Rev, N. Y.—May 2, 1900.

The Multiple-Unit System of Electric Railways. Frank J. Sprague. Describes the system, and its illustration in the South Side Elevated Railway of Chicago. Discussion and appendix. Ill. Full paper. 31500 w. Trans Am Inst of Elec Engs—May, 1899.

The Multiple Unit System on the South Side Elevated Railway of Chicago. Discusses the Sprague system, its interesting features and appliances, stating its advantages. Ill. 2800 w. St Ry Jour—Dec., 1898.

The Possibilities and Limitations of Electric Traction. Frank J. Sprague. Advocates the multiple unit system as opposed to the electric locomotive and train system, and predicts the entire displacement of the steam locomotive. 3000 w. Engineering Magazine—Jan., 1898.

The Possibilities and Limitations of Electric Traction. Frank J. Sprague. The concluding article emphasizes the value of the multiple unit system and asserts that motors or motor combinations can be built which will surpass in power, and in tractive and speed capacities, any locomotive which it is practical to construct and operate. 2800 w. Engineering Magazine—Feb., 1898.

The Sprague Multiple Unit Electric Railway System for the Chicago Alley Elevated Railroad. Illustrated description of this new departure in electric propulsion, with consideration of its possibilities. 4000 w. Elec Wld—Aug. 7, 1897.

The Sprague Multiple Unit System. Describes the main characteristics of train being experimentally operated on the track of the General Company at Schnectady. 1600 w. St Ry Jour —Aug., 1897.

The Tests of Train-Unit Controlling Systems in the Boston Subway. Particulars and views of the apparatus used in the tests of the Boston Elevated R. R. Co. to decide what make of apparatus to use for the equipment of the trains of the new elevated lines. 2500 w. St Ry Jour—May 5, 1900.

The Problem of Elevated and Suburban Electric Railway Transportation. Frank J. Sprague. Abstract of a lecture read before the Am. Inst. of Elec. Engs. Sets forth the advantages of the multiple unit system, giving results on the South-side Elevated of Chicago. Also an interesting chronology of modern electric railroad operation. 10500 w. St Ry Jour—July, 1899.

See also **CONTROLLER; ELEVATED RAILWAY—Boston; Chicago; Electric; UNDERGROUND RAILWAY—Boston.**

**New England Suburban.**—Electricity as a Motive Power for the Suburban-Railway Service of New England. Sidney H. Short. Considers the suburban service about Boston as representative of that of all the territory under discussion. Shows the operating expenses to be largely in favor of electricity. 3500 w. St Ry Jour—Oct., 1897.

**New York Central Tunnel.**—Where Electric Traction Is Badly Needed. Editorial calling attention to the need of equipping the tunnels through which trains pass to and from the Grand Central Station in New York with electricity. 1100 w. Elec Rev, N. Y.—July 25, 1900.

**N. Y., N. H. and Hartford.**—Application of Electricity to Railroads Now Operated by Steam Power. N. H. Heft. Abstract of paper read at convention of the American Street Railway Assn. Reviews the work of the New York, New Haven and Hartford Railroad Company in heavy electric railroading, giving the results. 3800 w. Elec Wld—Oct. 23, 1897.

Application of Electricity to Railroads Now Operated by Steam Power. N. H. Heft. Full paper, with discussion, as presented before the American Street Railway Assn. The experience of the New York, New Haven and Hartford R. R. Co., giving results and conclusions that have been reached as to the best methods of applying electricity to heavy railroad work. 5600 w. St Ry Rev—Nov. 15, 1897.

Electric Railroading on the New York, New Haven & Hartford System. N. H. Heft. An outline of what this company has been doing in its electrical department during the last three years. Ill. 4800 w. St Ry Jour—June, 1897.

Electric Traction on Main Railways. N. H. Heft. A portion of the report made to the International Tramway Congress at Paris in 1900, giving experience on the New York, New Haven & Hartford R. R. 6000 w. St Ry Rev—Sept. 15, 1900.

Insulation and Bonding of the Third-Rail Electric Conductor. H. K. Landis. Describes the construction of the new electric branch of the N. Y., N. H. & H. R. R. Ill. 1600 w. Elec Eng—June 9, 1897.

Recent Electric Construction of the New York, New Haven & Hartford Company. N. H. Heft. A report of the recent extensions of this system, and the changes made in the rolling stock. Ill. 1600 w. St Ry Jour—Sept., 1898.

The Third Rail Electric System of the New York, New Haven and Hartford R. R. Illustrated description. 600 w. Eng News—Oct. 22, 1896.

The Third-Rail Equipment of the N. Y., N. H. & H. Railroad Between New Britain and Hartford, Conn. Illustrated description of a section formerly operated by steam and recently equipped for electric traction, the third rail system being used. 1800 w. Elec Eng—May 19, 1897.

The Third-Rail System on the New Haven Railroad. Illustrated description, with editorial. 2800 w. Sci Am—June 12, 1897.

See also **Connecticut; ELECTRIC CONDUIT RAILWAY—New York.**

**Oberammergau.**—See **RAILWAY—Oberammergau.**

**Ohio.**—See also **Polyphase.**

**Paris.**—Electric Traction on the Extension of the Orleans Railway in Paris (La Traction Electrique sur le Prolongement de la Ligne D'Orleans dans Paris). J. A. Montpellier. A general description of the electrical equipment of this line along the Seine from the Place Valhubert to the Quai d'Orsay. 1200 w. Electricien—June 2, 1900.

Electric Traction on the Orléans Railways Extension (La Traction Electrique rul le Prolongement de la Ligne d'Orléans dans Paris). Short description of method of electric traction to be used in this tunnel line on account of difficulties of ventilation. 1800 w. Le Génie Civil—Dec. 17, 1898.

The Extension of the Orleans Railroad from its Walhubert Station to the Quai d'Orsay in Paris (Ueber die Verlängerung der Orléansbahn von ihren Endbahnofe Walhubert nach dem Quai d'Orsay in Paris). E. A. Ziffer. An illustrated account of the 2½ mile extension of the Orleans Railroad along the left bank of the Seine, in Paris. 5000 w. 1 plate. Mitt d Ver f d Förd d Loc-u Strassenbahnwesens—March, 1900.

See also **RAILWAY CONSTRUCTION; RAILWAY TERMINAL.**

**Paris Exposition.**—Competition for an Electric Railway in the Paris Exposition of 1900 (Concours pour un Chemin de Fer Electrique à l'Interieur de l'Exposition de 1900). Giving the conditions for the competition, and a brief description of the five plans already submitted. 1200 w. Le Génie Civil—Jan. 8, 1898.

See also **MOVING SIDEWALK—Paris Exposition.**

**Peoria-Pekin, Ill.**—A Combination Steam and Electric Railway in Illinois. An illustrated account of the Peoria and Pekin Terminal Ry., which combines a street railway, an interurban electric railway and a steam railroad, all using the same tracks in common. 5200 w. St Ry Jour—Feb. 3, 1900.

**Philadelphia Suburban.**—Electric Traction for the Pennsylvania Railroad Company's Suburban Service near Philadelphia. Charles T. Child. Discusses the engineering side of the problem of adopting electric means for this suburban system. Ill. 3500 w. Elec Wld—Oct. 16, 1897.

**Philadelphia-Westchester.**—Three-Phase Transmission for Railway Service Near Philadelphia. Illustrates and describes the line of the Philadelphia and Westchester Traction Co., and also its equipment. 1700 w. St Ry Jour—June, 1899.

**Polyphase.**—Polyphase Current Motors for Railways (Drehstrombahnen). Max Schiemann. A discussion of the applicability of polyphase currents for railway service and a description of the application to the Jungfrau mountain-road. 2500 w. Deutsche Zeitschr f Elektrotechnik—Feb. 15, 1898.

Polyphase Electric Traction. C. A. Carus-Wilson. Read before the Inst. of Mech. Engs. Deals with this system and its application to railways, with illustrations from the Burgdorf Ry. in Switzerland, in part first. Serial. Engng—July 20, 1900.

Polyphase Electric Traction. Prof. C. A. Carus-Wilson. Abstract of a paper before the Institution of Mechanical Engineers, giving an illustrated account of the Burgdorf-Thun railway, in Switzerland. 7000 w. St Ry Rev—Sept. 15, 1900.

Polyphase Railway Apparatus and Methods. Louis Bell. Treats of the latest American practice in polyphase distribution, and the use of polyphase motors for railway work. Ill. 4200 w. St Ry Jour—Oct. 13, 1900.

Polyphase Traction. Editorial discussion of the relative merits of the competing systems, their disturbance effects, and engineering or economic value. 1500 w. Elect'n, Lond—Oct. 28, 1898.

See also **Burgdorf-Thun; Italy; Maine; Philadelphia-Westchester; Siemens-Halske; Toledo-Norwalk, O.; MOUNTAIN RAILWAY—Jungfrau; Stansstadt—Engelberg.**

**Radial.**—The Hamilton Radial Electric Railway. F. C. Armstrong. Brief account of a recently constructed system. 1200 w. Can Eng—Dec., 1896.

**Repairs.**—See also **ELECTRIC MOTOR—Railway Repairs; ELECTRIC RAILWAY SHOP.**

**Right of Way.**—Right of Way, Grades and Grade Crossings of Electric Railways. Editorial discussion of the litigation over the proposed purchase of a right of way for a portion of the new Aurora & Geneva Electric Ry. in Illinois, giving particulars of the case. 5000 w. Eng News—May 18, 1899.

**Short System.**—Some Practical Suggestions for the Operation of Long Railway Lines. S. H. Short. Suggests using four smaller motors, one on each axle of the motor car, so arranged as to develop by grouping in parallel, a speed of 40 miles an hour, in series-parallel, 20 miles, and in series, 10 miles. 1400 w. Elec Eng—Jan. 6, 1897.

**Siemens-Halske Polyphase.**—Experiments with High Tension Rotary Currents for Electric Railway (Versuche über Verwendung des Hochgespannten Drehstromes für den Betrich Elektrischer Bahnen). Walter Reichel. A full and well illustrated account of experiments made by the Siemens-Halske Co. with line voltages up to 10,000 transformed down to 750 ,on the electric locomotive. 6000 w. Elektrotech Zeitschr—June 7, 1900.

**Single-Rail.**—See **High Speed; SINGLE RAIL.**

**Speed Cost.**—The Cost of Speed in Rapid Transit Service. J. R. Cravath. An investigation of the relative cost of various schedule speeds under a given set of conditions. Serial. Elec Wld & Elec Engr—April 1, 1899.

**Sprague Multiple-Unit.**—See **Multiple-Unit.**

**Suburban.**—Electricity for Suburban Traffic. Remarks on Mr. Wallace's paper and the discussion that followed. 1600 w. R R Gaz—Feb. 12, 1897.

Electricity on Steam Suburban Railroads. S. H. Short. Reviewing briefly some of the features of the paper by N. H. Heft, read before the Am. St. Ry. Assn., with editorial. 2400 w. Elec Eng, N. Y.—Oct. 28, 1897.

Suburban Competition. Charles J. Bates. Brief comparison of the economy of the central station with the locomotive as applied to suburban service. 1000 w. R R Gaz—Aug. 6, 1897.

The Substitution of Electricity for Steam as a Motive Power for Suburban Traffic. John Findley Wallace. A paper intended to introduce the subject for discussion. Investigations made by the writer five years ago are given, with results. Concludes that electricity is more desirable for handling a large number or small transportation units at frequent intervals over short distances, and steam power for handling large units of transportation at high speeds, at infrequent intervals and over long distances. 15500 w. Am Soc of Civ Engs—Dec., 1896.

**Surface-Contact.**—See **SURFACE-CONTACT TRAMWAY.**

**Suspended.**—See **SUSPENDED RAILWAY.**

**Switchboards.**—See **SWITCHBOARD—Electric Railways.**

**Switzerland.**—See also **RAILWAY—Switzerland.**

**Third Rail.**—Third Rail Conductors. Leo Daft. Illustrated account of a few experiences with third rails as conductors. 1200 w. Elec Eng—Aug. 5, 1896.

See also **Albany and Hudson; Connecticut; N. Y. N. H. & Hartford; ELECTRIC CONDUIT TRAMWAY—N. Y.; ELEVATED RAILWAY—Boston; Chicago.**

**Toledo-Norwalk, O.**—The High-Speed Three-Phase Railway from Toledo to Norwalk, Ohio. Illustrated detailed description. 3500 w. Elec Rev, N. Y.—July 25, 1900.

High-Speed Three-Phase Railway from Toledo to Norwalk, Ohio. An illustrated account of this new 60 mile railway, soon to be opened. 4000 w. St Ry Jour—March 3, 1900.

**Train Acceleration.**—Some Phases of the Rapid Transit Problem. Albert H. Armstrong. Discusses various methods of train acceleration to determine the methods of running with the least expenditure of energy. 4200 w. Trans of Am Inst of Elec Engs—May, 1898.

**Train Control.**—Prof. Elihu Thomson's System of Electric Train Control. Illustrated description. 900 w. Elec Eng, N. Y.—Jan. 19, 1899.

**United States.**—Notes on the Electric Traction of Trains in the United States (Notes sur la Traction Electrique des Trains aux Etats-Unis). An interesting paper containing the observations of a party of engineers of the Orleans Railway Company during a recent visit of inspection in America. 10000 w. Rev Gen des Chemins de Fer—Oct., 1898.

**Wannsee-Berlin.**—An Important German Rapid Transit Problem. Concerning an experimental electric train built for the Wannseebahn. 1500 w. St Ry Jour—Feb. 3, 1900.

A Plan to increase the Passenger Capacity of the Wannsee Railway (Ein Vorschlag zur Verbesserung der Verkehrsverhältnisse auf der Wannseebahn). A discussion of the various methods to provide for the rapid increase in travel on an electric road. 2500 w. Deutsche Zeitschr f Elektrotech—June 15, 1898.

Electric Traction on the Wannsee Railway (Ueber die Elektrische Zugförderung auf der Wannseebahn). A paper by Director Bork before the German Railway Society, with detail accounts of the operation of the section of road between Berlin and Zehlendorf by electricity. Data of construction, operation and cost for the past year are given. 6000 w. 1 plate. Glaser's Annalen—Aug. 15, 1898.

The Electric Testing Train on the Wannsee Road, near Berlin (Der Elektrische Versuchsbetrief auf der Wannseebahn bei Berlin). R. Rinkel. A full account of comparative trials between steam and electric driving, with description of the apparatus and results. 5000 w. Zeitschr d Ver Deutscher Ing—Sept. 8, 1900.

The Wannsee Railway Project (Das Kübler-Schimpff'sche Wannseebahn-Projekt). A description of the scheme of Kübler and Shimpff for an electric road from Berlin to the Wannsee with details of the plant. 1800 w. Elektrotech Zeitschr—June 2, 1898.

## ELECTRIC RAILWAY SHOP.

See also **ELECTRIC MOTOR—Railway Repair; RAILWAY SHOP.**

Electric Street Railway Repair Shops. Robert Dunning. Read before the N. Y. State Convention, telling of things which have proved most practical. 1200 w. St Ry Rev—Sept. 15, 1897.

Repair Shop Hints. C. B. Fairchild. Calls attention to points of frequent neglect and wrong policy in management. 2400 w. St Ry Jour—Feb., 1897.

Some Remarks on Street Railway Repair Shop Management. Frank B. Porter. Considers a few methods which have been adopted by some systems, and found to effect a saving. 2500 w. St Ry Rev—July 15, 1897.

**Brooklyn.**—The Repair Shops of the Brooklyn Heights Railroad Company. Illustrated detailed description. 2700 w. St Ry Jour—July, 1897.

**Chicago.**—Practice in the Repair Shops of the North Chicago Street Railway Company. Deals with the cutting of gears and pinions, use of copper, motor cranes, armature testing device, fenders and other safety devices. Ill. 1800 w: St Ry Jour—Sept., 1899.

Practice in the Repair Shops of the Chicago City Railway Company. Illustrates and describes a trolley-wheel turning device, a machine for splitting rattan, coil taping stands and bobbins, baking coils, etc., etc. 4800 w. St Ry Jour—Sept., 1899.

Repair Shop of the Chicago City Railway. Illustrated description of shop, tools, etc. 3600 w. St Ry Rev—Jan. 15, 1898.

Some Shop Hints. Illustrates and describes some interesting tools and methods used in the shops of the Calumet Electric Street Ry. Co., Chicago. 1400 w. St Ry Rev—Aug. 15, 1899.

**Cincinnati.**—The Chester Park Shops of the Cincinnati Street Railway Company. Illustrated description of the fine shops built since the consolidation of the street-railway companies into one system. 2000 w. St Ry Jour—Feb., 1898.

**Cleveland.**—See **ELECTRIC POWER STATION.**

**Louisville, Ky.**—See **ELECTRIC POWER STATION—Louisville, Ky.**

**Newark, N. J.**—Testing and Repairing Methods of the North Jersey Street Railway Company. Illustrated description of the methods used at the Plank Road repair shop in Newark, N. J. 1400 w. St Ry Jour—Aug. 4, 1900.

**Philadelphia.**—Electrical and Repair Shop Practices in Philadelphia. Illustrated description of the rearranged cables since the consolidation of the different companies, resulting in economy of current and copper, and facilitating examination. Also describes other improvements. 1000 w. St Ry Jour—Jan., 1899.

**Pittsburg.**—Shops of the Consolidated Traction Co., Pittsburg, Pa. Illustrated detailed description of finely equipped shops. 3400 w. St Ry Rev—July 15, 1899.

See also **ELECTRIC POWER STATION—Pittsburg.**

## ELECTRIC POWER STATION.

See **ELECTRIC POWER STATION.**

## ELECTRIC RESISTANCE.

See also **ELECTRIC CONDUCTIVITY; ELECTRIC**

INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC TESTING; RHEOSTAT.

Our Knowledge of the Value of a Resistance. W. E. Ayrton. Considers the degree of accuracy with which the resistance of any particular conductor may be stated in absolute measure, at the present time. 2000 w. Elect'n, Lond—Nov. 26, 1897.

Our Knowledge of the Value of a Resistance. W. E. Ayrton. From the London "Electrician." On the degree of accuracy with which the resistance of a conductor can be stated in absolute measure. 2000 w. Sci Am Sup—Aug. 27, 1898.

**Alloys.**—Electrical Alloys. Rollo Appleyard. A summary of the investigations made in Germany to determine the mechanical and electrical permanence of the cheaper alloys used for resistance coils. Serial. Elec Rev, Lond—April 22, 1898.

See also **ALLOY—Electrical Properties.**

**Alternating Currents.**—Conductor Resistance Me: by Alternating Currents. Dugald C. Jackson. A consideration of "skin-effect" and its importance with the development of formulae. 1200 w. Elec Wld—Jan. 16, 1897.

The Resistance of Iron Conductors to Alternating Currents Ueber den Widerstand Eiserner Wechselstromleiter). C. Feldmann and J. Herzog. A mathematical investigation, with practical applications to the use of rails as return conductors in tramways. 3000 w. Elektrotech Zeitschr—Oct. 11, 1900.

The So-Called "Skin Effect" or the Increased Resistance of Iron Wires to Alternating Currents. B. Hopps. Results of tests and curves. 400 w. Elect'n, Lond—Oct. 12, 1900.

Virtual Resistance. Irving A. Taylor. Considerations which lead to the conclusion that, in general, the virtual increase of resistance occurring in a conductor traversed by alternating currents is so slight that, when the other more important phenomena occurring in conjunction with it are considered, it may be safely left out of practical calculations. 4500 w. Elec Engng—May 15, 1897.

**Arc.**—See **ARC—Resistance.**

**Commercial.**—Commercial Forms of Electrical Resistances. Ll. B. Atkinson: Reviews the various types of electrical resistances used on light and power circuits, with special reference to a new material, "relugite." Ill. 3000 w. Elect'n, Lond—April 22, 1898.

**Contact.**—Electric Resistance at the Contact of Two Discs of the Same Metal (Résistance Electrique au Contact de Deux Disques d'un Même Métal). E. Branly. A detailed account of numerous experiments with disks of various metals. 1000 w. Comptes Rendus—July 25, 1898.

**Earth in Power Circuits.**—See **ELECTRICAL MEASUREMENT—Earth Resistance.**

**Films.**—On the Electrical Resistance of Thin Films. Isabelle Stone. Investigations suggested by the discrepancy between the resistance of a film of given thickness measured directly by the Wheatstone bridge, as compared with the resistance calculated from its weight, density and dimensions. The metal studied is silver. 3500 w. Phys Rev—Jan., 1898.

**Films Cathode Discharge.**—Electrical Resistance of Thin Films Deposited by Cathode Discharge. A. C. Longden. A report of investigations. 1000 w. Am Jour of Sci—June, 1900.

**Incandescent Lamp.**—See **INCANDESCENT LAMP—Resistance.**

**Load for Tests.**—See **RHEOSTAT—Water.**

**Lorenz Apparatus.**—See **ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT—Standard Ohm.**

**Measurement.**—See **ELECTRIC MEASUREMENT—Resistance.**

**Mechanical Pressure.**—Variation of Resistance Under Mechanical Pressure. Lawrence Birks. Discusses the results of experiments made by Prof. S. Lussana. 700 w. Elect'n, Lond—Jan. 12, 1900.

**Metals.**—The Electrical Resistance of Metals (Ueber den Elektrischen Widerstand der Metalle). C. Liebenow. A valuable investigation, including the effects of temperature, and of composition, with curves, tables of constants, and other useful data. Two articles. 12000 w. Zeitschr f Elektrochemie—Oct. 20, Nov. 5, 1897.

**Negative.**—On the Properties of a Body Having a Negative Electric Resistance. Silvanus P. Thompson. Read before the Physical Soc. Considers what are the properties of a body having a negative electrical resistance, if such a body can exist, and questions the validity of the reasoning employed in a recent paper by Messrs. Frith and Rodgers. 3500 w. Elect'n—July 3, 1896.

**Nickel.**—A Note on the Electrical Resistivity of Electrolytic Nickel. J. A. Fleming. Read before the Royal Society. Reports the result of researches. 1200 w. Elec Rev, Lond—Jan. 5, 1900.

**Ohm's Law.**—See **ELECTRO-PHYSICS.**

**Permanency.**—Permanency of Resistance Coils. W. E. Ayrton. A comparison of results in order to determine the change that may have occurred in the resistance of the four coils used by Prof. Viriamu Jones in 1894. 500 w. Elec Eng, Lond—Nov. 5, 1897.

**Plumbago and Clay.**—On the Electrical Resistivity of Mixtures of Plumbago and Clay. J. A. Clemming. Reports experiments by which the author found that by varying the proportions of clay and blacklead any required resistivity could be produced within very wide limits. 1800 w. Elect'n, Lond—July 28, 1899.

**Relugite.**—See **Commercial.**

**Reostene.**—Reostene; a New Resistance Metal. Dr. Harker and A. Davidson. Describes experiments made in a new alloy for commercial electrical resistances. 700 w. Elec Eng, Lond—Oct. 9, 1896.

**Standard.**—Otto Wolf's Standard Resistances in Electrical Measurement. Wallace M. Hill. Description of methods, with illustrations. 3500 w. Stevens Ind—Oct., 1900.

The Reichsanstalt Standard Wire Resistances. K. Feussner and St. Lindeck. Abstract from the "Wissenschaft Abhandl der Reichsanstalt. 4500 w. Elect'n—Feb. 14, 1896.

The Determination of Standards of Conductivity. Henry P. Harth. Remarks on the sources of error due to the method now used, with account of the method of using the Willyoung bridge adopted in the laboratory of John A. Roebling's Sons Co., at Trenton, N. J., and a description of new apparatus for determining standard bars of known conductivity. Ill. 1800 w. Elec Wld & Engr—Sept. 23, 1899.

**Standard Ohm.**—See **ELECTRIC MEASUREMENT—Standard Ohm.**

**Steel Alloys.**—The Electrical Resistance of Steel (Sur la Resistance Electrique des Aciers). A communication by M. Le Chatelier, showing the respective influences of carbon, silicon, manganese, nickel, chromium, tungsten and molybdenum upon the resistance of steel. 1000 w. Comptes Rendus—June 13, 1898.

**Steel Tempering.**—The Influence of Tempering Upon the Electric Resistance of Steel (Influes de la Trempre sur lar Resistance Electrique d l'Acier). A paper by M. Le Chatelier, showing the effect of tempering at various temperatures, both with and without the presence of other substances than carbon. 1000 w. Comptes Rendus—June 20, 1898.

**Temperature.**—The Permanent Modifications of Metallic Wires and the Variation in their Electric Resistance (Les Modifications Permanentes des Fils Metalliques et la Variation de leur Resistance Electriques). H. Chevalier. A communication to the French Academy, giving the results of experiments made at the Physical Laboratory at Bordeaux upon the influence of variations of temperature upon resistance. 1000 w. Comptes Rendus—Jan. 15, 1900.

**Temperature Coefficients.**—On the Determination of the Temperature Coefficients of Two 10-Ohm Standard Resistance Coils (Nos. 3,873 and 3,874) Used in the 1897 Determination of the Ohm. M. Solomon. Read before the British Assn. The results of tests made on the two 10-ohm coils to make as accurate a determination as possible of the values for the coefficients. Ill. 2000 w. Elect'n, Lond—Sept. 23, 1898.

**Thermometry.**—See **THERMOMETRY—Electrical Resistance.**

**Torsion.**—The Variations in Electrical Resistance of Metals and Alloys from Torsion (Sur la Variation de la Résistivite Electrique des Metaux et de leurs Alliages Due à la Torsion). Coloman de Szily. A note to the French Academy, giving the results of experiments with various metals and alloys. 1200 w. Comptes Rendus—April 10, 1899.

**ELECTRIC SEARCH LIGHT.**

See **SEARCH LIGHT.**

### ELECTRIC SHOCK.

Electric Shock. Describes the effect of the electric current on the human body, and illustrates the operation of resuscitation. 4500 w. Col Guard—Aug. 3, 1900.

**Cause of Death.**—Death by Electricity. R. H. Cunningham. Researches to determine the cause of death. Experiments were made on the lower animals and the results are stated. Also editorial notes. 8800 w. Elec Wld & Eng—Dec. 30, 1899.

Death by Electricity. W. S. Hedley. A study of the causes that produce death by electricity with account of experiments on animals. 2000 w. Elec Rev, Lond—Feb. 18, 1898.

The Cause of Death from Electric Lighting Currents. W. S. Hedley. The writer considers that in some instances death is due to arrested respiration and in others to stoppage of heart action. 1500 w. Elec Rev, Lond—Jan. 12, 1900.

**D'Arsonval Treatment.**—D'Arsonval's Treatment for Electric Shock. Abstract of report of committee of electrical experts appointed by the Paris Academy of Medicine. 1200 w. Elec Rev—Jan. 8, 1896.

**First Aid.**—First Help to the Injured in Electrical Accidents (Anleitung sur Ersten Hülfeleistung bei Unfällen in Elektrischen Betrieben). The rules issued by the German Elektrotechnical Society, with illustrations of the method of inducing artificial respiration. 1000 w. Elektrotech Zeitschr—Oct. 19, 1899.

**Physiological Effect.**—Death by Electric Discharges (La Mort par les Décharges Electriques). MM. Prevost and Battelli. A report upon experiments made upon dogs, rabbits and guinea pigs, at the University of Geneva, with details of the effects of currents of various kinds. Oct. 23, 1899.

The Physiological Properties of Electricity (Propriétés Physiologiques de l'Electricité). Dr. F. Mally. With especial reference to accidents in connection with the industrial applications of electricity, and instructions as to the aid of the injured. Two articles. 5000 w. Génie Civil July 29, Aug. 5, 1899.

### ELECTRIC SIGN.

See also **ELECTRIC LIGHTING—Decorative.**

Electric Advertising. Description, with illustrations, of some of the effects secured by simple means. 1700 w. Dom Engng—Nov., 1897.

New Features in Electric Advertising. Illustrated description of some of the ingenious devices produced by electricity. 1000 w. Elec Wld—Dec. 21, 1895.

**Election Returns.**—Electrical Projection of Election Returns. Illustrated description of some of the arrangements made to display the returns at the recent election in New York. 800 w. Elec Wld—Nov. 13, 1897.

**Interchangeable.**—Interchangeable Electric Signs. Theodore Waters. Illustrated description of electrical effects for advertising purposes, and the newest features in this business. 1600 w. Elec Eng—Dec. 9, 1896.

**Switching.**—Electrical Sign Switching. George T. Hanchett. Shows a few expedients in sign manipulation that have cheapness and adaptibility to recommend them. Ill. 1400 w. Am Elect'n—April, 1898.

### ELECTRIC SIGNAL.

See also **BLOCK SIGNAL; ELECTRIC INDICATOR; GRADE CROSSING; INTERLOCKING; RAILWAY SIGNAL; SEA SIGNAL.**

New System of Electric Signs and Signals. Illustrates and describes a device enabling electric signals to be spelled out on a large frame in lights visible several miles. 1000 w. Sci Am—June 4, 1898.

**Alarums.**—Electrical Alarums. J. Ebel. A general illustrated description of recent improvements. 1500 w. Elec Rev, Lond—Oct. 28, 1898.

**Balloon.**—The Use of Electric Balloon Signalling in Arctic and Antarctic Expeditions. Eric Bruce. Read before the British Assn. Describes a system invented by the author and adapted for war signalling purposes, and lately adapted to the wants of exploration. 800 w. Elec Eng, N. Y.—Oct. 20, 1898.

**Drake Selector System.**—The Drake Selector System. Thomas C. Drake. Describes this system as worked out by the writer. Ill. 8600 w. Elec Engng—Dec., 1898.

**Elevator.**—See **ELEVATOR SIGNAL.**

**Mine.**—Electric Signals at West Vulcan. A. W. Thompson. Read before the Lake Superior Mining Inst. Considers peculiarities in their construction and the experiences which showed their necessity. 1500 w. Mines & Min—May, 1900.

Electrical Communication in Mining Operations. W. E. Culberton. A description of an installment by the D., L. & W. R. R. Co. for connecting the engine room with the various slopes, shafts and veins. Ill. 2400 w. Mines & Min—March, 1899.

**Mine Hoists.**—Electric Signals for Mine Hoists (Electrische Förderschalensignal Vorrichtung). K. Dekanovsky. By using the hoisting rope in connection with a fixed conductor, a bell or telephone signal communication is maintained with the car at all times. 1200 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 18, 1899.

Electrical Signalling Appliance for Cages. K. Dekanovsky in "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrated description of the device. 1100 w. Col Guard—Feb. 24, 1899.

Multiphase Signalling Gear. C. Aridt. Abstract of a paper read at the Eisenach meeting of the Verband Deutscher Elektrotechniker. Illustrated description of instruments used at water works, on board vessels, etc. 1000 w. Elec Eng, Lond—Aug. 20, 1897.

**Station Annunciator.**—Improved Station Annunciator (Der Neue Stationsanrufer). The Wetzer annunciator enables any telegraph or other station to be called without affecting any other station in the same circuit. 1500 w. Elektrotech Zeitschrift—Aug. 26, 1897.

### ELECTRIC SPARK.

See **ELECTRIC DISCHARGE.**

### ELECTRIC STATION.

See also **ELECTRICAL ENGINEERING—Municipal; ELECTRIC ENERGY; ELECTRIC PLANT; ELECTRIC POWER STATION; ELECTRIC SUPPLY; HYDRO-ELECTRIC STATION.**

Are Central Stations Doomed? "Engineer." The writer does not think central stations are doomed, but thinks the prevailing methods of stock manipulation are. 800 w. Elec Eng—Dec. 23, 1896.

Electrical Engineering in Modern Central Stations. Louis A. Ferguson. A lecture delivered before the students in the College of Mechanics and Engineering, University of Wisconsin. The subject is opened by advice for the choosing of a site, and considers the construction of the buildings, equipment, and all phases of the subject. The Harriman St. Station in Chicago is described, and the value of storage batteries explained. 13000 w. Bul of Univ of Wis. Vol. I, No. 8, 1896.

Electric Lighting Works. Neville Appelbee. Some of the more important points in designing the mechanical portions of steam-driven electricity works, and the plant used in them. 2600 w. Prac Engr—Jan. 6, 1899.

Fifteen Years in Central Station Operation. Samuel Insull. A history of development and growth. 2200 w. Elec Eng—Jan. 6, 1897.

The Tendency of Central Station Development. Part first discusses the distribution systems, and the changes of the last few years. Serial. Elec Wld—Dec. 4, 1897.

**Accessories.**—Central Station Accessories. Part first is introductory, defining the scope of the articles to follow. They will deal with feed-water appliances, boiler appliances, feed-water heating and purifying, draining, condensing, lifting, etc. Serial. Elec, Lond—March 4, 1898.

**Accident.**—See **ELECTRIC STATION ACCIDENT.**

**Accumulators.**—See **ACCUMULATOR—Electric Stations.**

**Address.**—Topics of Interest to Central Station Men. F. B. Badt. Address delivered before the Northwestern Elec. Assn., Milwaukee. Discusses 220-volt lamps, enclosed arc lamps, alternating system, etc. 2200 w. W Elect'n—Jan. 29, 1898.

**Algeria.**—Electricity in Algeria. Illustrated description of interesting installation in Tlemcen, Algeria. 900 w. W Elec—March 28, 1896.

**Allegheny, Pittsburg.**—Allegheny County Light Company. An account of the works supplying the cities of Pittsburg and Allegheny with electric light. Ill. 2200 w. Engng—Nov. 10, 1899.

1500-k. w. Generators at the Station of the Allegheny County Light Company. P. H. Thomas.

Describes the construction and gives other information. Ill. 2000 w. Elec Wld—Nov. 20, 1897.

**Alternating.**—Alternating-Current Stations and High Voltage Lamps. H. W. Couzens. Read before Municipal Elec. Assn., England, a brief consideration of the subject, with discussion. 2500 w. Elec Rev—July 8, 1896.

A Modern Alternating Current Station. Illustrated description of the United Electric Light & Power Co. in New York. Station designers desiring to install new plants would do well to carefully study the numerous original methods in this installation. 1400 w. Elec Wld—Feb. 22, 1896.

**Alternating Current.**—Alternating Currents Plant (Ueber Wechselstromanlagen). H. S. Myer. A general discussion of the points to be considered in installing an alternating-current plant. 5000 w. Elektrotech Zeitschr—Oct. 18, 1900.

**Arnold System.**—Arnold Electric Power Station. System. Illustrated description of the central station of the Fort Dodge, Ia., Light and Power Company. It is the first plant built according to this system. 2000 w. Elec Wld—Jan. 25, 1896.

**Ashton, Eng.**—Ashton Corporation Electricity Works, and the Oldham, Ashton and Hyde Electric Tramway. Illustrates and describes an installation possessing features of interest. 4500 w. Elec Rev, Lond—July 14, 1899.

**Asnières, Paris.**—The Triphase Electric Company's Plant at Asnières. From "Le Génie Civil." Illustrated description of a 20,000 k. w. plant arranged in an unusual maner to secure short steam piping and completely independent units. 2500 w. Eng Rec—Aug. 11, 1900.

The Central Station of the "Tri-Phase" Company at Asnières. Seine (Usine Electrique de la Compagnie "Le Triphasé" à Asnieres, Seine). A very completely illustrated description of this large central station, which will furnish triphase currents to Paris. 4200 w. 4 plates. Génie Civil—June 9, 1900.

**Ayr, Scotland.**—Ayr Electricity Works. Illustrated description. 5500 w Elec Eng, Lond—Jan. 3, 1896.

**Baltimore, Md.**—The System of the Brush Electric Company of Baltimore. Illustrated description of the rebuilt station, which is one of the most complete and systematicaly arranged in the country. 1300 w. Elec Wld—Feb. 26, 1898.

**Barking, Eng.**—Barking Electricity Works. Illustrated detailed description of the works, with history of the undertaking. 2800 w. Elec Eng, Lond—June 2, 1899.

**Barnsley, Eng.**—Barnsley Electricity Supply Works. Historical and descriptive account, with illustrations. 4800 w. Elec Engr, Lond—Sept. 21, 1900.

**Barrow-in-Furness.**—Barrow-in-Furness Electricity Works. Illustrated description, with information concerning this seaport town of 60,000 inhabitants. The system of supply adopted is the high-tension, continuous-current generation, with motor-transformers. 4500 w. Elec Engr, Lond—Aug. 4, 1899.

**Belfast, Ireland.**—The Belfast Electricity Works. History of the undertaking with illustrated description of these new works. 4000 w. Elec Eng, Lond—Oct. 21, 1898.

**Birkenhead.**—Birkenhead Electricity Works. Illustrated detailed description. 3700 w. Elec Eng, Lond—Jan. 15, 1897.

**Blackheath and Greenwich.**—The Blackheath and Greenwich Electric Light Company's Central Station. Illustrates and describes a station for the supply of current for lighting and power in England. Serial. Engr, Lond—July 20, 1900.

**Bolton, Eng.**—Bolton Corporation Combined Lighting and Traction Works. Illustrated detailed description. Serial. Elect'n, Lond—March 30 1900.

Bolton Corporation Electricity Works. Illustrated description of plant for supplying power to tramways and to the direct-current lighting mains. 2300 w. Elec Rev, Lond—Jan. 19, 1900.

**Bombay.**—Electric Works in Bombay. Copy of the agreement which it is proposed should be adopted by any firm to whom permission for electric supply is granted. 1700 w. U. S. Cons Repts, No. 774 —July 7, 1900.

**Bonn.**—The Electric Plant of the City of Bonn (Das Elektrictätswerk der Stadt Bonn). Dr. Paul Bauer. With plan and section of the buildings, also details of the switchboard and the distribution. 7000 w. Elektrotech Zeitschr—Dec. 7, 1899.

**Bootle, Eng.** Bootle Electricty Works. Illustrated detailed description and historical account. 2 parts. 1300 w. Elec Eng, Lond—April 21 and 28, 1899.

See also **Liverpool.**

**Boston, Mass.**—Central Station of the Boston Electric Light Company. Illustrated and describes this station as a solution of the problem of alternating current and series arc generation and distribution on a large scale. 3000 w. Am Elect'n—June, 1899.

The Boston Electric Light Company's Central Station. Illustrated description of a modern steam driven plant, distributing direct current for series arc lighting and alternating current for incandescent lighting and power purposes. 4000 w. Elec Rev, N. Y.—May 16, 1900.

The Boston Electric Light Company's New Station. Illustrated description of a 9000 killiwatt plant generating three-phase current for public and private lighting service. The building measures 244x174 ft. and contains unusual structural and mechanical features. 2600 w. Eng Rec—Nov. 19, 1898.

The New Generating Station of the Boston Electric Light Company. Illustrates and describes a system in course of construction with the view of bringing an old installation up to date. 3000 w. Elec Wld—Nov. 19, 1898.

The New Station of the Boston Electric Light Company. Illustrates and describes the new plant, located in South Boston, from which current is distributed by the three phase system. 2500 w. Elec Eng, N. Y.—Nov. 24, 1898.

**Bradford, Eng.**—Bradford Corporation Electricity Supply. Robert Porter. Read before the Manchester District Institution of Gas Engineers. Descriptive of the Bradford electricity works. Followed by discussion. 3800 w. Jour of Gas Lgt —Nov. 30, 1897.

**Bristol, Eng.**—Bristol Municipal Electric Supply Station. Description of the details of the station, its outlying network of mains and sub-stations, with history and early stages of development. Ill. 5800 w. Elect'n—March 6, 1896.

The Bristol Central Electric Lighting Station. J. R. Blaikie. Description dealing with the principles as compared with other electric lighting stations, drawing attention to characteristic features of the present plant. 2700 w. Elec Eng, Lond—Oct. 2, 1896.

**British.**—See **England.**

**British Law.**—The Law of Electric Generating Stations. The text of the report agreed upon by the Select Committee of both Houses of Parliament. 2200 w. Elect'n, Lond—June 10, 1898.

**Bromley, Kent.**—An English Direct Current High Tension Central Station. Illustrated description of a plant recently installed at Bromley, Kent, distributing direct current at high voltage and transforming to service voltage by means of dynamotors. 2000 w. Elec Wld & Engr—Feb. 17, 1900.

The Bromley and Chislehurst Electric Lighting System. Illustrated detailed description. 8400 w. Elect'n, Lond—Jan. 26, 1900.

**Brooklyn.**—A Modern Arc Lighting Plant. Describes an interesting transformation being carried out in Brooklyn, by which a generating station dependent upon boilers and steam engines for motive power is being changed into one directly driven by high tension three-phase current. Ill. 2000 w. Am Elect'n—June, 1898.

Brooklyn's Modern Electric Light Station. Illustrates and describes the generating plant of the Kings County Electric Light and Power Company. 3400 w. Elec Rev, N Y—Nov. 22, 1899.

The Edison Electric Illuminating Co. of Brooklyn—Its Development and Its Present and Future Work. Jos. Wetsler. History of the work and equipment of this company. Describes the older stations, and also this latest three-phase system and the great Union Station. Ill. and map. 7200 w. Elec Eng, N Y—Jan. 6, 1898.

Enlargement of One of the Central Stations of the Municipal Electric Light Company, Brooklyn, New York. Illustrated description and data of the Rodney street station, which contains some of the latest improvements in electrical engineering. 1800 w. Elec Wld—May 29, 1897.

The Development and Operation of a Local Electrical Transmission System. W. S. Barstow. Abstract of a paper read before the Nat. Elec. Lgt. Assn., New York. An account of the station of the Brooklyn Edison Electric Co., with the distribution and operation. 5000 w. Eng News—June 1, 1899.

The New Station of the Kings County Electric Light and Power Co. George T. Hanchett. Illustrated detailed description. 1700 w. Elec Wld & Engr—Nov. 25, 1899.

The New Work of the Brooklyn Edison Company. Illustrates and describes the main generating station and its equipment, and the installation of a 6000-volt high tension system. 3000 w. Elec Wld—Dec. 3, 1898.

Three Thousand Horse-Power Direct Driven Steam Dynamo at the Station of the Edison Company, Brooklyn, N. Y. Illustrated detailed description of features deserving special mention. 1500 w. Power—Nov., 1898.

**Brussels.**—Brussels Electric Lighting Stations. Ernest Kilburn Scott. Describes what is considered to be a model electric light installation. 2400 w. Ind & Ir—Nov. 26, 1897.

**Budapest Polyphase.**—The Polyphase Station at the Budapester Allgemeine Electricitäts Gesellschaft. Francis Jehl. Illustrated description with information regarding efficiency. 2500 w. Elect'n—June 18, 1897.

**Buenos Ayres.**—The Plant of the General Electric Company of Buenos Ayres (Das Elektricitäts werk der Compania General de Elektricidad de Buenos Aires). W. Hulke. A very full description, with many illustrations showing the course of erection of the machinery. 4000 w. Elektrotech Zeitschr—Oct. 11, 1900.

**Bury, Eng.**—Bury Electricity Works. Illustrated detailed description. 3000 w. Elec Eng, Lond—Nov. 6, 1896.

**Burnley, Eng.**—Burnley Electricity Works. Illustrated detailed description of this English station, including the recent improvements. Serial. Elec Eng, Lond—Dec. 1, 1899.

**Cambridge, Eng.**—Cambridge Electricity Supply Works. Illustrates and describes the work of supplying current for lighting and power in this English university town. 4000 w. Elec Eng, Lond—Jan. 12, 1900.

**Canterbury.**—Canterbury Electric Light Works. Illustrated detailed description. 4000 w. Elec Eng, Lond—March 10, 1899.

**Canton, Pa.**—The Three 440-Volt Plant of the Canton Electric Light Company. A. H. Perkins. An account of the difficulties and of the considerations that led to the adoption of this system. Ill. 1400 w. Elec Wld—July 10, 1897.

**Carlisle, Eng.**—Carlisle Electricity Supply Station. Illustrated detailed description of a station designed by A. B. W. Kennedy. It is a three-wire system, with an earthed middle wire and 460 volts between the outers. Also editorial. 3000 w. Elect'n, Lond—Dec. 23, 1898.

**Centralization.**—The Centralization of Electricity Supply Supply for Lighting, Power, Tramways and General Purposes. Arthur Wright. Considers the question of adopting some combined arrangement for supplying electricity for various purposes, from one center. Also editorial. 4800 w. Elec Rev, Lond—Sept. 24, 1897.

**Central vs. Isolated.**—See ELECTRIC PLANT—Isolated vs. Central.

**Chamberlain, S. D.**—See HYDRO-ELECTRIC STATION—Artesian Well.

**Chester, Eng.**—Chester Electricity Works. Illustrated detailed description. 5500 w. Elec Eng, Lond—Dec. 18, 1896.

**Chicago.**—The Central Station Situation in the City of Chicago. Illustrated description of the arrangements for lighting the city and suburban districts, especially discussing the latter. Also editorial. 8800 w. Elec Wld & Engr—May 19, 1900.

The Harrison Street Electric Supply Station, Chicago. A full description of this latest and best representative of modern American practice, with illustrations. 3000 w. Engng—Feb. 21, 1896.

**Chicago Parks.**—A Public Park Lighting Plant. P. M. Heldt. Describes and illustrates the new plant in Chicago which supplies current for the chain of parks and boulevards on the west side. 2000 w. Am Elect'n—April, 1897.

Electric Lighting Station at Garfield Park, Chicago. Illustrated detailed description. 1700 w. Power—Oct., 1897.

The New Electric Lighting Plant of the City of Chicago. An illustrated description of the recently erected arc lighting plant at Halsted Street and Blue Island Avenue. 1600 w. Elec Ind—Nov., 1895.

West Side Park Lighting System. One of the largest arc lighting plants in Chicago, which will illuminate Humboldt, Garfield and Douglas parks and the connecting boulevards. An illustrated description, slightly abridged, from report of Mr. Forée Bain, who planned the system. 4800 w. W Elec—Nov. 23, 1895.

**City Road, London.**—City Road Electric Supply Station. Illustrated description of an English station. 3000 w. Engr, Lond—Feb. 23, 1900.

**Cleveland, Ohio.**—The Cleveland Electric Illuminating Company. Presents the chief features to be found in this plant, with illustrations. 1400 w. Elec Wld—Sept. 5, 1896.

**Coal and Coke Co.**—Central Electric Station of the Davis Coal and Coke Co. Timothy W. Sprague. Illustrated description of plant and its operation. 2200 w. Eng & Min Jour—Jan. 23, 1897.

Central Electric Station of the Davis Coal and Coke Company. Timothy W. Sprague. Describes an extensive plant in West Virginia installed for a company mining and shipping bituminous coal and manufacturing coke. 2200 w. Min Ind & Rev—Sept. 30, 1897.

Central Electric Station of the Davis Coal and Coke Company. Timothy W. Sprague. Illustrated detailed description with information regarding the operation of the plant. 2500 w. Elec Rev—March 10, 1897.

**Coal Mine.**—See also ELECTRIC EQUIPMENT.

**Coal Mine, Westphalia.**—The Electric Central Station for Power and Light at the Margarethe Mine at Sölde, Westphalia (Die Elektrische Centrale für Kraftübertragung und Beleuchtung auf der Zeche Margarethe bei Sölde i. Westf.). A short account of the plant, which furnishes power and light for the mine, and also for the surrounding district. 1000 w. Glückauf—May 5, 1900.

**Coatbridge, Scotland.**—Coatbridge: Old and New. Illustrations of the remodelled station, where a gas plant has been abandoned in favor of steam engines, with a study of the causes that led to failure. 3300 w. Elect'n—May 7, 1897.

**Cologne.**—Statistics of the Electric Plant at Cologne (Städtisches Elektricitätswerk zu Köln). A full report of the work of the Cologne station, both for light and power, fully tabulated in comparison with previous years. 2500 w. Elektrotech Zeitschr—April 6, 1899.

**Columbus, Georgia.**—The Electrical Equipment of a Southern City. W. E. Boileau. Illustrated detailed description of the combined power station of the Columbus (Ga.) Railroad Company and the Brush Electric Light and Power Company. 4000 w. Elec Wld—Sept. 4, 1897.

**Combined.**—Combined Lighting and Traction. Andrew Stewart. Notes on combined lighting and traction systems showing them to be both profitable and economical. 1800 w. Elec, Lond—July 30, 1897.

The Construction of Electric Plants in View of Future Tramway Service (Wie Soll Man Elektricitäts Werke Bauen um von Ihnen auch die Strassenbahnen treiben zu Können?) A discussion of a problem of frequent occurrence in Germany and elsewhere, with suggestive details. 2000 w. Deutsche Zeitschr f Elektrotechnik—July 15, 1897.

See also **Paterson, N. J.; Toledo, O.; Vienna Railway.**

Combined Electric Lighting and Traction Plants. John Hesketh and John H. Rider. Read before the Municipal Elec. Assn. Way in which electrical supply may be cheapened by judicious foresight and application of present knowledge. 2500 w. Ind & Ir—June 26, 1896.

Combined Electric Lighting and Traction Plants. John Hesketh and John H. Rider. Read before the Munic. Elec. Assn., England. In proof that a combined station is the right thing, though opinions may differ as to which system the combination should be carried out upon. 2000 w. Elec Rev—July 29, 1896.

Combined Light and Power Plants (Ein Beitrag zur Frage der Zusammenlegung von Licht und Kraft-Werken). Showing by diagrams of the relative demand at different hours, the advantage of using the same station for both kinds of service. 1000 w. Zeitschr f Elecktrotechnik—Dec. 15, 1897.

Combined Light and Power Plants. Ways in which a combination may be effected. First part describes and illustrates the Hamburg plant. Serial. Engng—July 10, 1896.

**Combined Plant.**—Electric, Gas and Heating Plants. Alton D. Adams. An article calling attention to the possibilities of saving by combination of electrical supply stations and gas works. 2000 w. Elec Rev, N Y—Sept. 19, 1900.

**Concord, Mass.**—See **SEWAGE PUMPING STATION—Storage Well, Concord, Mass.**

**Copenhagen.**—An Interesting Electric Power and Light Plant. An extract from circular issued by the Electric Company, Limited, of London, describing some of the more special features of the electric power and light plant constructed at the free docks of Copenhagen. 2800 w. Prac Eng—June 12, 1896.

The Vesterbro Municipal Electric Works at Copenhagen (Das Städtische Elektricitätswerk Vesterbro in Kopenhagen). C. G. Hoest. An illustrated description, partly abstracted from the Danish journal, "Ingeniören," of this central station, which has Siemens & Halske dynamos and a large accumulator plant. 2500 w. Elektrotech Zeitschr—May 10, 1900.

**Cork.**—See **ELECTRIC TRAMWAY—Cork.**

**Cornell Test.**—Test of the Lighting and Power Station of Cornell University. M. W. Buchanan and F. J. Folk. Abstract of thesis presented for degree of M. E. Describes the turbines, engines, boilers, and dynamos, and the tests made, with remarks on the plant. 2000 w. Sib Jour of Engng—Oct., 1900.

**Cost.**—Cost of Central Station Plant. Gives a table indicating what the writer considers should be sizes of the plant for towns of various populations, and the cost. Serial. Elec Rev, Lond—Nov. 17, 1899.

Some Figures on the Cost of Electric Power Plants. Philip Dawson. Examines the cost of the individual plant, and the relations between the power to be installed and the cost. 2400 w. Engng—July 27, 1900.

See also **ELECTRIC STATION MANAGEMENT.**

**Cripple Creek, Col.**—Electric Lighting in a Pioneer Town. J. W. Dickerson. Description of the plant which has made Cripple Creek a well lighted city and thus contributed to the order which prevails. An account is also given of the proposed installation of a power plant as an addition to the station. 1600 w. Elec Wld—April 11, 1896.

The La Bella Mill Water and Power Company's Plant. Describes a plant in the Cripple Creek region of Colorado for running railways and operating hoists, pumps, compressors, etc., in mines. 2000 w. Elec Rev, N Y—Aug. 23, 1899.

**Current Price.**—The Establishment of a Base Price for Current. J. B. Cahoon. Abstract of paper read before the N. E. L. A. Outlines a plan for determining the base price which should be charged per kilowatt hour. 1400 w. Elec Eng—June 16, 1897.

**Darwen, Eng.**—Darwen Electricity Works. Illustrated description of an English installation. 3500 w. Elec Eng, Lond—Sept. 29, 1899.

**Denver, Col.**—Large Central Station for Denver. Col. J. W. Dickerson. Information concerning a new station for supplying electric light to the entire city, the cost, etc. 1400 w. Elec Wld & Engr—April 21, 1900.

**Deptford, London.**—A 2000-H. P. Tri-Compound Engine Direct-Connected to a 10,000-Volt Ferranti Generator. Describes a novel design of steam engine in operation at Deptford, Eng., at the works of the London Electric Supply Corporation. 600 w. Eng News—Aug. 10, 1899.

650 K. W. Ferranti-Plenty Plant. Illustrated description of the latest unit which has been added to the equipment of the central station of the London Electric Supply Corporation at Deptford, Eng. 2300 w. Engr, Lond—April 18, 1900.

The New 2000-Horse-Power Engines and Alternator at Deptford. Illustrated detailed description. 1700 w. Engr, Lond—April 21, 1899.

See also **ALTERNATOR.**

**Design.**—Electric Station Design. I. J. Macomber. Read before the Electrical Soc. of Cornell Univ. Considers only the design of stations that use steam as a motive power. Ill. 3000 w. Sib Jour of Engng—June, 1897.

The Design and Construction of Central Stations. C. Stanley Peach. Explains briefly the origin and development, and reviews the use, significance and design, studying the subject in detail. 6000 w. Builder—March 10, 1900.

The Designing of Electrical Generating Stations. A. Roberts. Read before the Soc. of Archts., England. Describes a typical station, its construction, and arrangements. 4700 w. Arch't, Lond—Jan. 26, 1900.

Trend of Central Station Design. B. J. Arnold. Read at meeting of the Northwestern Elec. Assn., at Milwaukee. Notes the points in accepted practice, discussing each briefly. Serial. Elec, N. Y.—Feb. 8, 1899.

**Design and Construction.**—The Economical Generation of Power in Central Stations. C. J. Field. Abstract of a lecture delivered at Sibley College. The writer reviews the changes that have been wrought about in the design and construction of stations for the development of electric light and power, and the systems and practices that have brought the best results. 2700 w. Sib Jour of Engng—May, 1896.

**Detroit.**—The Detroit Municipal Lighting Plant. Description, with an account of the first year's financial operation. 1800 w. Elec Eng—July 29, 1896.

The Success of the Detroit Municipal Electric Lighting Plant. An analysis of the report for the year ending June 30, 1898, showing that the city has been most successful in operating its own plant. 2500 w. Eng News—Sept. 8, 1898.

The Detroit Municipal Street Electric Lighting Plant. Information abstracted from the report of the Public Lighting Commission. 1400 w. Eng News—Aug. 13, 1896.

**Doncaster, Eng.**—Doncaster Electricity Supply Works. Part first gives an account of the town, and begins an illustrated description of the works. Serial. Elec Engr, Lond—April 6, 1900.

**Dortmund, Germany.**—A Modern German Station. John R. Dick. Illustrates and describes the municipal station at Dortmund. Serial. Elect'n, Lond—May 4, 1900.

**Dover, Eng.**—Trials of Alternate-Current Plant at Dover Electric Supply Station. Extracts from a reports by Profs. A. B. W. Kennedy and S. P. Thompson. The tests had for their main object the determination of the capacity and efficiency of the plant. 2000 w. Elect'n—Jan. 17, 1896.

**Earl's Court Exhibition.**—The Electricity Station at the Earl's Court Exhibition. Details of the electric light installation at the India and Ceylon exhibition at Earl's Court, with report on test of high-speed engine. 4000 w. Eng, Lond—May 22, 1896.

**Economy Test.**—An Economy Test of a Central Station. W. E. Goldsborough. An account of a number of tests made at one of the large electric lighting stations of Baltimore, Md., to determine along what lines, if any, the method of operating the station could be modified to improve its efficiency. Ill. 15000 w. Trans Am Inst of Elec Engs—April, 1898.

**Efficiency.**—The Total Efficiency of Certain Central Stations. E. A. Merrill. A survey of the subject from the standpoint of actual practice. 2400 w. Elec Engng—June, 1896.

**Elizabeth, N. J.**—A Modern American Central Station. F. W. Roller. Illustrated description of the plant of the Suburban Electric Co., Elizabeth, N. J. 3000 w. Am Elect'n—June, 1897.

**England.**—Electricity Works. S. T. Harrison. Reviews the conditions under which such works operate, and pointing out some of the difficulties tending to limit further decrease in price, under the present methods of working. 3200 w. Prac Eng—July 23, 1897.

The Direction of Progress in the Design of Electric Lighting Plants. Considers the separate items of the plant and the forms modern experience is giving them in England. 4500 w. Engr, Lond—Nov. 25, 1898.

Some English Central Stations. Illustrates and describes features of central station engineering differing from American practice. 3800 w. Am Elect'n—June, 1899.

Statistics on English Electric Lighting Plants. Claud P. D'Oyly. Part first states the present conditions in England and some of the results of operation of various plants. Serial. Elec Eng, N. Y.—April 14, 1898.

See also United Kingdom.

**Equipment.**—Economic Equipment of Electric Stations. Alton D. Adams. Discusses the three general plans for the equipment of these generating stations. 3000 w. Elec Wld & Engr—March 3, 1900.

Electrical Equipment for Small Central Stations. L. B. Mather. Discusses various arrangements for varying conditions. 2200 w. Am Elect'n—June, 1900.

**Esslingen Works.**—Small Electric Stations by the Esslingen Machine Works (Einige Kleinere Elektrizitätswerke der Maschinen Fabrik Esslingen). Describing and illustrating several well arranged lighting and power plants of moderate size. 5000 w. Zeitschr d Ver Deutscher Ing—May 15, 1897.

**Europe.**—Statistics of the Association of the Elektricitätswerke for the Fiscal Year 1894-95. This extensive table gives the names of the principal European cities wherein electric installations have been placed, with their population, name of the electricity works, character of management,—municipal or private,—date of starting works, system of current distribution, charges for light and other uses, with statement of the municipal or private management of gas lighting, if used, in each city. Elec, N. Y.—Aug. 26, 1896.

The Development of Electric Power Stations (Die Entwicklung der Elektricitätswerke). Giving an account of the growth of light and power stations in various parts of the Continent, especially in Berlin and Vienna. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 17, 1897.

**Evolution.**—The Evolution in Central Station Practice. Charles F. Scott. Showing the development of the polyphase system, and its especial adaptability for the distribution of power from central stations; including numerous illustrations and diagrams. 8500 w. Eng Mag—Nov., 1898.

**Extension.**—See ELECTRIC DISTRIBUTION.

**Faribault, Minn.**—See GAS WORKS—Electric Consolidated, Faribault.

**Far Rockaway, N. Y.**—A Model Electric Light and Power Plant. Illustrates and describes notable features of the plant at Far Rockaway, now part of Greater New York. Ill. 1400 w. Eng News—Sept. 14, 1899.

**Fire Insurance.**—See FIRE HAZARD.

**Florence.**—The Central Station of the Società Toscana in Florence (La Stazione Centrale della Società Toscana in Firenze). Alberto Picchi. Short description of an important new Italian railway, lighting and power distribution station. Accumulators and a 8-wire 800-volt system are used. 1100 w. Rivista Gen delle Ferrovie—Nov. 6, 1898.

**Flushing, N. Y.**—The Flushing, L. I., Electric Light and Power Station. Illustrated detailed description of a small plant, the characteristic of the service being an extremely low load factor. 2300 w. Elec Eng, N. Y.—Dec. 2, 1897.

**Folkestone, Eng.**—The Folkestone Electricity Supply Works. Illustrated detailed description of electric-lighting plant. 2400 w. Elect'n, Lond—Nov. 11, 1898.

**Fort Dodge, Iowa.**—See ELECTRIC STATION—Arnold System.

**Frank Jones, Portsmouth, N. H.**—A Private Central Station. Illustrates and describes the monocyclic isolated plant of the Frank Jones Electric Light Station of Portsmouth, N. H. 1700 w. Am Elect'n—May, 1899.

**Gas Combined.**—See also GAS WORKS.—Electric Combined.

**Gas Consolidated, Faribault.**—See GAS WORKS—Electric Combined, Faribault.

**Gas Engines.**—See GAS ENGINES—Electric Station.

**Gas v. Steam Driving.**—See GAS ENGINES—Electric Stations.

**Georgetown, D. C.**—The Station of the Potomac Light and Power Company, Georgetown, D. C. N. Monroe Hopkins. Illustrated description. 400 w. Elec Eng—April 28, 1897.

**German Regulation.**—Safety Regulations for Electric Installations (Sicherheitsvorschriften für Elektrische Starkstromanlagen). A full reprint of the rules adopted by the German Society of Electricians at the Frankfort Convention of 1898. Two articles. 9000 w. Elektrotech Zeitschr—July 21, 1898.

See also ELECTRIC APPARATUS; ELECTRIC INDUSTRY; ELECTRIC TRAMWAY.

**German Statistics.**—Statistics of Electric Plants in Germany (Statistik der Elektricitätswerke Deutschlands). An editorial accompanied by very full tables giving valuable data for 388 separate plants up to March 1. 12000 w. Elektrotech Zeitschr—July 7, 1898.

Statistics of Electric Plants in Germany (Statistik der Elektricitätswerke in Deutschland). The annual tabulated statement of power and lighting plants in Germany, brought down to March, 1899, with editorial discussion. 15000 w. Elektrotech Zeitschr—July 8, 1899.

**Germany.**—German Central Station Statistics. From the "Elektrotechnische Zeitschrift." Recent statistics of German central stations giving a record of good work and affording an insight into the tendencies of electrical work in that country. 1200 w. Elec Eng—July 15, 1897.

Germany Central Station Statistics (Statistik der Elektricitätswerke in Deutschland nach dem Stande vom 1 März, 1900). General statistical tables of all the public central stations in Germany, either in operation or in course of construction on March 1, 1900. 10000 w. Elektrotech Zeitschr—July 5, 1900.

Review of German Central Station Statistics (Rundschau). Editorial review of the statistics of the public central stations in Germany on March 1, 1900. 2800 w. Elektrotech Zeitschr—July 5, 1900.

**Glasgow.**—Electric Power Station at Port Dundas, Glasgow. Plan, cross-section, and front elevation, with description. 1000 w. Engng—June 24, 1898.

Glasgow Corporation New Electric Supply Work. A short history of this enterprise, with illustrated description of the new works. 3500 w. Elect'n, Lond—Feb. 3, 1899.

The Electricity Supply of Glasgow. An illustrated general description of the new Port Dundas electricity works for lighting Glasgow. 3000 w. Engr, Lond—Sept. 14, 1900.

The Glasgow, Scotland, Municipal Lighting Plant, Port Dundas. Illustrates and describes a plant which will contain a great deal of American apparatus. 800 w. Elec Eng, N. Y.—July 21, 1898.

The New Electricity Works of the Glasgow Corporation. An historical review of the enterprise and an illustrated description of the new works. Serial. Electrician—Sept. 14, 1900.

**Gloucester, England.**—Gloucester Electricity Works. Illustrated detailed description of plant. 4500 w. Elec Eng, Lond—July 20, 1900.

Gloucester Electricity Works. Historical and descriptive account, with illustrations. 3300 w. Elec Rev, Lond—Aug. 3, 1900.

**Goldfield, Colo.**—The La Bella Power Plant, Goldfield, Colo. Illustrated description of a 8,600-h. p. plant built to supply electricity within a radius of 6 miles, compressed air within a radius of 2 miles, and water for ore washers near by. A number of interesting features concerning the distribution of air and the method of charging for electric current are explained. 2800 w. Eng Rec—June 2, 1900.

**Govan, Scotland.**—Govan Electricity Supply Works. Illustrated description of a three-wire continuous-current system with 250 volts on each side of the middle wire. 2300 w. Elect'n, Lond—Feb. 2, 1900.

**Grand Rapids, Mich.**—The Grand Rapids, Mich., Municipal Central Station. Edward James Hart. Illustrated description. 1000 w. Elec Wld & Engr—Dec. 23, 1899.

**Greenock, Scotland.**—Greenock Corporation Electricity Works. Illustrated detailed description of these works, and also of the Babcock and Wilson chain grate stoker and steam superheater in use. 2800 w. Elec Rev, Lond—March 30, 1900.

**Grenada.**—Steam-Driven Electric Station at Grenada, Spain (Usine Electrique à Vapeur de Grenade, Espagne). R. B. Ritter. Illustrated description of an interesting plant, using Niclausse boilers, simple engines and single-phase high-tension alternators. 4000 w. 1 plate. Génie Civil—Dec. 24, 1898.

**Hackensack.**—Polyphase Practice in Small Stations at the Plant of the Hackensack Gas and Electric Company. A description, with illustrations, of the equipment and service of the plant of the Hackensack Gas and Electric Co. 2200 w. Am Elect'n—Nov., 1898.

**Hamburg.**—The Electric Plant at the Hamburg Customs Warehouses (Das Elektrizitätswerk an der Zollvereinsniederlage zu Hamburg). J. H. Kinbach. A full description of this important plant, with data of tests of the engines. There are five triple-expansion vertical Corliss engines, of 1200 h. p. each, directly-connected to the generators. Atmospheric condensers with cooling towers are used. 5000 w. 1 plate. Zeitschr d Ver Deutscher Ing—March 12, 1898.

The Hamburg Combined Electric Power Station. Illustrated detailed description. 1500 w. Eng Rec—Aug. 15, 1896.

See also ELECTRIC STATION—Combined.

**Hammersmith, Eng.**—Hammersmith Electricity Works Extension. An illustrated account of the extension of these supply works. 2800 w. Elec Rev, Lond—April 21, 1899.

Hammersmith. Illustrated description of an English electric-light station, with history of the undertaking. 4200 w. Elec Eng, Lond—Oct. 1, 1897.

**Hamilton, O.**—The Hamilton, O., Municipal Plant. W. N. Gray. Remarks on the paper of W. W. Bean, and a correction of his statements in regard to city named. 1600 w. Elec Eng—July 8, 1897.

**Harrow, Eng.**—Harrow Electricity Works. Illustrated detailed description. 3300 w. Elec Eng, Lond—May 14, 1897.

**Harrowgate, Eng.**—Harrowgate Electricity Works. Illustrated detailed description. 5000 w. Elec Eng, Lond—April 9, 1897.

**Hartford.**—The Hartford Electric-Light and Power Plant. Illustrated description of the plant of a city using a large amount of electric light and power. 1600 w. Sci Am—Oct. 9, 1897.

**Hawaiian Islands.**—Electrical Plants in the Sandwich Islands. Illustrates and describes the plants of the Hawaiian Elec. Co., Ltd., the Hilo Elec. Lgt. Co., Ltd., and the government plant on the Island of Oahu. 1000 w. Elec Wld & Engr—Oct. 7, 1899.

**Hereford, Eng.**—Hereford Electricity Works. Illustrated description of the lighting plant recently installed. Serial. Elec Eng, Lond—Dec. 15, 1899.

**High Wycombe, Eng.**—High Wycombe Electricity Works. Illustrates and describes this installation. 4800 w. Elec Eng, Lond—March 3, 1899.

**Hull, Eng.**—Combined Engine and Dynamo. Brief illustrated description of the combined engines and dynamo of the Hull Electric Lighting Station. 900 w. Engr, Lond—March 23, 1900.

Hull New Central Station. Brief history of the work at this place since 1889, with an illustrated description of the new works. 1400 w. Elec Eng, Lond—Oct. 28, 1898.

**Insurance.**—See FIRE HAZARD—Electric Station.

**Islington, London.**—Islington Vestry Electrical Supply Works. An illustrated description of a new electricity supply undertaking, embodying the achievements of the highest technical skill. The principal feature is the provision that has been made for easy extension and increase in capacity of the station. 12000 w. Elec Rev, Lond—March 6, 1896.

Islington Electric Light Station. Illustrated description. 5000 w. Eng, Lond—May 29, 1896.

New Electricity Works at Islington. Descriptive. The principal feature is the provision that has been made for easy extension and increase in capacity of the station without any inconvenience or interruption to the supply. 5000 w. Elec Plant—April, 1896.

**Isolated.**—See ELECTRIC PLANT.

**Isolated Compared.**—See ELECTRIC PLANT—Isolated vs. Central.

**Jamaica, W. I.**—An American Light and Power Plant. Montego Bay, Jamaica, West Indies. Illustrates and describes a plant started recently and running satisfactorily. 900 w. Elec Eng, N. Y.—Jan. 5, 1899.

**Japan.**—Some Japanese Electric Light Stations. Brief illustrated description of outfits of Japanese make, giving exterior and interior views. 600 w. Power—Jan., 1898.

**Johannesburg.**—The Electric Power Plant at Johannesburg (Die Elektrische Kraftübertragungsanlage bei Johannesburg). Walter Klug. A description of the large plant of the Rand Central Electric Works, which supply light and power to the mines of the district. 6000 w. Glückauf—Feb. 18, 1899.

The Rand Central Electric Power Plant. Illustrated description of plant furnishing power for mining purposes. 1100 w. Elect'n, Lond—Dec. 24, 1897.

**Johnson, Vt.**—The Cheapest Electric Lighting Plant in the World. Illustrated description of the plant in Johnson, Vt., a village of only about 600 inhabitants. Figures of cost and full particulars are given. 4500 w. Eng News—Oct. 8, 1896.

**Kensington Court.**—Pioneer Electric Light Stations. Brief historical sketch of the Kensington Court Station, with a résumé of improvements already added or in course of construction. 2500 w. Elec Eng, Lond—Jan. 1, 1897.

**King's Lynn, Eng.**—The King's Lynn Electricity Works. Illustrated detailed description of a gas-driven electric-lighting installation in England. 4500 w. Elec Eng, Lond—Sept. 15, 1899.

**Leicester, Eng.**—The Leicester Electricity Works. Illustrated detailed description of the first works in England equipped entirely with the inductor type of alternator. 2400 w. Elec Eng, Lond—Oct. 20, 1899.

**Leith, Scotland.**—Leith Corporation Electric Supply Works. Illustrates and describes a successful station completed in very short time. 2200 w. Elect'n, Lond—Aug. 11, 1899.

**Leyton, Gas Driven.**—Leyton Electric Lighting. Illustrated description of a gas driven installation. 1800 w. Eng, Lond—Nov. 13, 1896.

**Light Fluctuations.**—Light Fluctuations and their Cure (Lichtschwankungen und ihre Beseitigungen). K. Schindler. A discussion of the causes of flickering and irregularity in electric lights, and means for remedying the trouble. 1500 w. Elektrotech Rundschau—June 15, 1900.

**Light-Load Losses.**—The Reduction of Light-Load Losses in Alternating Supply Works. Horace Boot. Read at Huddersfield convention of the Munic. Elec. Assn. Considers works losses and distribution losses, and means of reducing them. Discussion. 4800 w. Elec Eng, Lond—July 6, 1900.

**Limited.**—Limited Electric Stations. Alton D. Adams. Considers methods of distribution and gives facts showing the growing preference for direct electric distribution over moderate areas. 2500 w. Am Elect'n—June, 1899.

**Lincoln, England.**—Lincoln Corporation Electric Supply Works. Illustrated detailed description. 1800 w. Elect'n, Lond—March 3, 1899.

**Liverpool.**—The New Municipal Power Stations in Liverpool. Illustrated description of a plant to meet the rapidly increasing demand for electrical energy for lighting and for tramways. 1900 w. Elect'n, Lond—Oct. 19, 1900.

Three-Phase Power and Light Plant at Liverpool. Illustrated description of a plant installed for the Liverpool Grain Storage and Transit Company at Bootle, Eng. 2500 w. Elec Rev, Lond—July 23, 1897.

See also Bootle.

**Llandudno, Wales.**—Llandudno Municipal Electric Supply Works. Illustrates and describes a system of electrical supply for a North Wales watering place. 2200 w. Elect'n, Lond—Oct. 28, 1898.

**London.**—American Apparatus for the Metropolitan Electric Supply Company of London. Illustrations and description of the 2500 unit, generators and engines, as photographed while under construction. 1500 w. 1 plate. Am Elect'n—Sept., 1898.

London Electric Light Stations. Herbert C. Gunton. An analysis of some of the most important and representative systems, illustrating the methods of operation and the plant employed. Part first considers the system of the London Electric Supply Corporation. Ill. Serial. Elec Wld—March 5, 1898.

The Electric Lighting Stations at St. Luke's, Clerkenwell, and at Wandsworth. Editorial describing these two plants and the three entirely different types of generating plant in the same station. 3000 w. Engng—Feb. 16, 1900.

**London, Bankside.**—The City of London Electric Lighting Company. Part first gives an illustrated general description of the Bankside station, which is said to be the largest station for lighting purposes in the world. Serial. Engr, Lond—March 10, 1899.

The City of London Electric Lighting Company's Works. A brief account of the formation of the company and illustrated description of some of the details. Serial. Elec Rev, Lond—March 3, 1899.

**London Fire Brigade.**—See **GOVERNOR—Expansion.**

**London, Metropolitan.**—Plant of London Metropolitan Electric Supply Company. Illustrates and describes the steam engines and generators, and switchboard. 1600 w. Elec Wld & Engr—Feb. 3, 1900.

**Long Island City.**—The New Station of the Long Island City Electric Illuminating and Power Company. Illustrated description. 600 w. Elec Wld—Oct. 17, 1896.

**Los Angeles, Cal.**—A Pacific Coast Power and Light Stations—Los Angelos Street Railway Power Plant. Illustrated detailed description. 2000 w. Power—May, 1896.

**Luisenstrasse, Berlin.**—Vertical Steam Engine and Dynamo of 3000 Horse-Power (Stehende Dampfdynamomaschinen von 3000 PS.). A very fully illustrated account of the engines and generators built by Gebrüder Sulzer and the Allgemeine Elektricitäts Gesellschaft for the Luisenstrasse station at Berlin. 2500 w. 3 plates. Zeitschr d Ver Deutscher Ing—Nov. 4, 1899.

See also **DYNAMOS; STEAM ENGINES.**

**Louisville.**—The Central Station of the Louisville Electric Light Co. George Wilbur Hubley. A description, with illustrations, of a comprehensive system generating alternating, 500-volt power and series arc current. 4300 w. Am Elect'n—Aug., 1899.

**Lynton and Lynmouth.**—The Electric Lighting of Lynton and Lynmouth. J. H. Fooks Bale. Illustrates and describes one of the most interesting stations in Great Britain. 2000 w. Elec Eng, Lond—April 7, 1899.

**Madison, N. J.**—The Municipal Electric Light and Water Plant of Madison, N. J. Describes and illustrates a small attractive municipal station. 1300 w. Am Elect'n—June, 1899.

**Malta.**—The Electric Light Plant of Malta. R. W. Ashcroft. Illustrated description. 900 w. Elec Wld & Engr—May 26, 1900.

**Management.**—See **ELECTRIC STATION MANAGEMENT.**

**Manchester, Eng.**—Manchester Corporation Electric Works. C. H. Wordingham. Describes the five-wire method, the distributing network, insulating troughs, cables, feeders, generating plant, engines, boilers and extensions. 3800 w. Prac Eng—Jan. 22, 1897.

Manchester, Eng., Electric Lighting and Traction. A brief and general report of the deputation recently appointed to visit the Continent for the purpose of inspecting Continental stations. 2500 w. Elec Rev, Lond—Oct. 29, 1897.

**Manchester Canal.**—Manchester Ship Canal Electricity Works. Brief illustrated description of the lighting of the docks. 1800 w. Elec Rev, Lond—Nov. 13, 1896.

**Melbourne.**—The City Council Electric Light Plant in Melbourne, Australia. Frank W. N. King. Illustrated description of the works of the Melbourne City Council. 1600 w. Elec Wld—Jan. 2, 1897.

**Merrill, Wis.**—The Power Plant of the Merrill Railway and Lighting Co. F. E. Woodford. Illustrated description of a Wisconsin plant with a combined hydraulic and steam power station. 1000 w. Am Elect'n—Dec., 1899.

**Milan.**—The Milan Electric Power and Lighting Works. Illustrated description translated from the "Zeitschrift des Vereines Deutscher Ingeieure." 1800 w. Engr, Lond—Dec. 22, 1899.

**Monterey, California.**—The Monterey and Pacific Grove Lighting Plant. Harry J. Bean. Illustrated description of this station as a type of the station most common throughout California. 1800 w. Jour of Elec—March, 1899.

**Montreal, Reconstruction.**—Reconstruction of the Alternating Current System of the Royal Electric Company, Montreal, Canada. P. G. Gossler. An illustrated account of the reconstruction of an alternating current system supplying current to a large territory. 2700 w. Can Elec News—April, 1897.

**Morley, Eng.**—Morley Corporation Electric Supply Works. Illustrated detailed description of an English plant, with brief history of the undertaking. 3000 w. Elect'n, Lond—July 1, 1898.

Morley Electric Lighting Works. Illustrated description of an English plant. 2500 w. Elec Rev, Lond—July 15, 1898.

**Multiple vs. Single.**—Single vs. Multiple Generating stations. John F. C. Snell. Read at meeting of Municipal Electrical Assn., London. The writer favors multiple stations and discusses their advantages. Also editorial. 2800 w. Elec Rev, Lond—June 10, 1898.

**Munich.**—The Electric Plant of the City of Munich. Die Städtischen Elektricitätswerke Münchens). A very complete account of the steam and hydraulic power plant electric generators, lighting and distribution, with numerous illustrations. 6000 w. Elektrotech Zeitschr—Jan. 7, 1897.

The New Electric Station at Munich (Die Neuen Elektricitätswerke Münchens). F. Uppenborn. A general description of this important plant, with plans of the buildings and a map of the city showing the location of the five substations with regard to the main power plant. 5000 w. Elektrotech Zeitschr—March 3, 1898.

**Municipal.**—An Ideal Municipal Electric Plant. Alton D. Adams. Discusses requirements and gives suggestions. 2800 w. Munic Engng—Dec., 1899.

See also **ELECTRIC LIGHTING; MUNICIPAL OWNERSHIP.**

**Naples and Trieste.**—Electric Light and Power Plants in Naples and Trieste (Impianti Elettrici per Luce e Forza in Napoli e in Trieste). Carlo Gabussi. Brief description of two important installations, one of the direct current accumulator sub-stations type and the other of the single phase alternating current variety. 1500 w. Giorn dei Lav Pubb e delle Str Ferr—Nov. 28, 1898.

**Newark, N. J., Repairs.**—An Interesting Example of Practical Expedients. Illustrated description of the rapid and interesting work in re-establishing the service of the Newark, N. J., electric light and power station after the fire. 1700 w. Am Elect'n—Feb., 1897.

**Newcastle-on-Tyne.**—See **STEAM PLANT—Newcastle Electric Station.**

**Newington, London.**—The Newington Vestry Electric Supply Works. Illustrated detailed description, with historical account of this London plant. 2800 w. Elect'n, Lond—June 9, 1899.

The Newington Vestry Electricity Works. Illustrated detailed description of the works. 2500 w. Elec Rev, Lond—June 23, 1899.

**New Jersey.**—The History and Growth of the People's Light and Power Company of New Jersey. Max Loewenthal. Full illustrated account of the organization and expansion of this company. 6300 w. Elec Eng, N Y—Jan. 5, 1899.

**New Orleans.**—The New Station of the Edison Electric Co., of New Orleans, La. Illustrated detailed description. 2300 w. Elec Eng, N Y—Jan. 20, 1898.

**New Westminster, B. C.**—Municipal Electric Light Plant at New Westminster, B. C. Brief account of the works and the returns. 1200 w. Can Elec News—March, 1898.

**New York.**—A Compact Electric Generating Unit. Illustrated description of a machine just installed in the Twelfth Street Station of the Edison Electric Illuminating Co., New York. 2000 w. Power—Feb., 1898.

The Growth of Electric Lighting in New York City. Data from the annual report of R. R. Bowker, relating to the work of the Edison Electric Illuminating Company to date and its plans for the future. Ill. 2000 w. Elec Wld & Elec Eng—March 18, 1899.

The New 28th Street Station of the United Electric Light and Power Co., New York. Describes and illustrates the building, boilers, engines, dynamos, exciters, feed pumps, electric crane, coal and ash conveyor, piping, switchboard and switch gallery. 3400 w. Elec Eng—May 6, 1896.

The Twenty-eighth Street New York Station of the United Electric Light and Power Company. Illustrated description. 3000 w. Power—May, 1896.

The Twenty-eighth Street Central Station of the United Electric Light and Power Company. H. W. York. Illustrated description, submitted by the author because he believes that in this station are embodied a number of features somewhat unusual in central station design. 4400 w. Trans Am Soc of Civ Engs—Feb., 1896.

**New York, Edison.**—The Generation and Distribution of Current by an Edison Station. J. W. Lieb, Jr. Read before the New York Electrical Society. The progress made in industrial applications of electricity is shown by a comparison of the details of equipment of the station of 15 years ago, with that of to-day. 4700 w. Elec Rev—March 11, 1896.

The Edison Electric Illuminating Co. of New York. Jos. Wetzler. A full historical account of the growth and progress of this company. Ill. 16000 w. Elec Eng—Jan. 8, 1896.

The Generation and Distribution of Current by an Edison Station. J. W. Lieb, Jr. Paper read before the N. Y. Electrical Society. Reprinted from "Electricity," N. Y. Historical account of the development of the company and description of station, etc. 4500 w. Elec Plant—April, 1896.

**Niagara Falls.**—Novel Features of the Niagara Falls Lighting Plant. Orrin E. Dunlap. Illustrated description. 1300 w. W Elec—Aug. 15, 1896.

**Norwich, Eng.**—Norwich Central Electric Lighting Station. Illustrated description. 2200 w. Elec Rev, Lond—Oct. 30, 1896.

**Norwood, Ohio.**—A Modern Village Lighting Plant—Norwood, Ohio. Thomas G. Smith, Jr. Description of one of the latest installations operating incandescent lamps for street lighting, by direct constant potential current. 1000 w. Elec Eng—Aug. 19, 1896.

**Nottingham, Eng.**—Nottingham Electricity Works. Illustrated detailed description. 2200 w. Elec Eng, Lond—Feb. 11, 1898.

**Nuremberg.**—The Distribution of Electrical Energy at Nuremberg (Distribution d'Energie de Nuremberg). H. Martin. With numerous illustrations of the generating plant and a full account of the operation of this very successful installation. 3000 w. 1 plate. Génie Civil—Sept. 30, 1899.

The Electric Plant of the City of Nuremberg (Das Städtische Elektricitätswerk Nürnberg). Philipp Scholtes. A very complete and fully illustrated account of this important station, in which current is generated and distributed for lighting and power. Valuable data as to costs are given. Two articles. 12000 w. Electrotech Zeitschr—Nov. 8, 10, 1898.

**Odessa, Russia.**—American Apparatus in the Municipal Lighting Plant, Odessa, Southern Russia. Descriptive of the plant and the special and peculiar requirements that had to be met. 1400 w. Elec Eng—Jan. 22, 1896.

**Omaha Exposition.**—Electric Service Plant at the Trans-Mississippi and International Exposition. Illustrated description of the plant that furnishes current for the illumination of the grounds and buildings and the opesation of motors. 2000 w. W Elect'n—July 23, 1898.

**Operation.**—Methods of Operation and Distribution of an Electric Light Station. John W. Lieb. A lecture to the senior class of the Stevens Inst. Explains the methods employed at the Duane Street station of New York. 1500 w. Stevens Ind—Oct., 1898.

**Para, Brazil.**—Electric Light and Power Plant at Para, Brazil. An illustrated description of the plant, and some of the difficulties encountered in a tropical country. 3500 w. Elec Eng, N. Y.—March 2, 1899.

**Paris.**—A Parisian Electric-Light Station. Illustrations with description of an elaborate installation differing in many respects from American practice. 1000 w. Elec Wld—Aug. 20, 1898.

Lighting Station of the Champs-Elysées at Levallois (Usine de la Compagnie d'Eclairage Electrique du Secteur, des Champs-Elysées a Levallois). Illustrated description of one of the largest stations in Paris. The alternating generators are built upon the fly-wheels of the large Corliss engines. 3000 w. 1 plate. La Rev Tech—April 25, 1897.

Paris Central Electric Stations. Illustrates and describes some of the most important stations, noting their interesting features. 1600 w. Engr, Lond—Nov. 25, 1898.

The Edison Central Station at Paris, France. L. Bayly. Brief detailed description. 1000 w. Elec Rev, N. Y.—July 6, 1898.

The Place Clichy Central Station in Paris. L. Bayly. Illustrates and describes in detail the equipment. The five-wire system of distribution is used. 1500 w. Elec Rev, N. Y.—Nov. 30, 1898.

See also **Asnières.**

**Paris Exposition.**—Electric Light and Power at the Paris Exposition. Illustrated description of the electricity building, generating plant and general arrangements. 6000 w. Elec Wld & Engr—May 19, 1900.

Engines and Generators at the Paris Exposition. Illustrated description of some of the prominent exhibits. 2800 w. Am Elect'n—Aug., 1900.

The Central Station and Power Plant on the Champ de Mars (Pariser Weltausstellung 1900. Die Kraftcentralen auf dem Marsfeld). A. Weber. An illustrated description of the great generating plants at the Exposition, with tables of the engines and dynamos. Serial. 2 parts. 3000 w. Schweiz Bauzeitung—July 21, Aug. 4, 1900.

The Central Station for Power and Light at the Paris Exposition (Die Pariser Weltausstellung III. Die Kraft-und Lichtcentrale). An illustrated description of some of the features of Machinery Hall on the Champ de Mars. 3000 w. Stahl und Eisen—May 15, 1900.

The Electric Plant on the Champ de Mars (Installation des Groupes Electrogènes au Champ-de-Mars). Emile Cayla. An illustrated general description of the electric generating plant at the Exposition. 2000 w. Génie Civil—April 21, 1900.

The International Central Station at the Paris Exposition (Mittheilungen über die Internationale Electricitäts-station in der Weltausstellung Paris, 1900). Dr. O. Feuerlein. An illustrated description of the great international generating plant on the Champ de Mars, with an output of over 20,000 k. w. 2000 w. Elektrotech Zeitschr—April 12, 1900.

The Power Generating Plant at the Paris Exposition Comprising Typical Examples of European Engineering. Illustrated detailed description. 4000 w. Am Elect'n—June, 1900.

See also **DYNAMO; STEAM ENGINE.**

**Paterson, N. J.**—A New Electric Light and Railway Power Station of the Edison Electric Illuminating Co., of Paterson, N. J. Illustrated detailed description. 4500 w. Elec Eng—Dec. 9, 1896.

New Station of the Edison Electric Illuminating Company of Paterson, N. J. The company furnishes not only arc and incandescent light and miscellaneous power, but also the current for operating the electric railroad. Illustrated description. 1800 w. Power—Feb., 1897.

**Pawtucket, R. I.**—The Bridge Mill Power Plant of The Pawtucket, R. I. Electric Co. Illustrated description. 3000 w. Elec Eng—Dec. 23, 1896.

**Pekin.**—See **ELECTRIC TRAMWAY—Pekin.**

**Petoskey, Mich.**—Petoskey Lighting Plant. Illustrated description. 1500 w. W Elect'n—Jan. 13, 1900.

**Philadelphia.**—A Typical Modern Electric Lighting Central Station. Illustrated description of the new high-tension generating plant of the Philadelphia Electric Company. 2800 w. Elec Rev, N. Y.—Jan. 24, 1900.

Central Distributing Station of the Philadelphia Electric Company. C. Walton Swoope. Illustrated description of the system in use since the consolidation. It differs from those in operation in other cities in that more than one permanent generating station will be maintained. 2000 w. Elec Wld & Engr—Feb. 24, 1900.

The New Station of the Southern Electric Light and Power Co., Philadelphia, Pa. Illustrated description of a complete and extensive plant. 900 w. Elec Eng—Nov. 26, 1896.

**Pittsburg.**—See **Alleghany.**

**Pittsfield, Mass.**—Pittsfield Electric Company. Illustrated description of boiler plant, etc. 800 w. Elec Wld—July 25, 1896.

**Plymouth, Eng.**—Plymouth Electric Supply Works. An illustrated account of recently completed works, the first in England to combine the running of the tramways and the lighting of the town. 3700 w. Engng—July 21, 1899.

**Polyphase.**—Consideration of the Multiphase System for Central Station Service. W. S. Kelley. Discussing the most effective system for distributing and utilizing multiphase currents for central station power plants. 3000 w. Elec Eng., N. Y.—Sept. 22, 1898.

See **Asnières, Paris; Liverpool; Prague; Strasburg.**

**Polyphase-Motor Driven.**—See **Brooklyn.**

**Power Sources.**—Economy in Power Installation. Abstract by Charles Weiss from an article in the "Zeitschrift für Electrochemie." On the most economical source of energy for central stations. Considers water, steam and gas, but gives comparative costs of the last two named. 2500 w. Engng—July 8, 1898.

**Prague.**—The Electric Central Station at Prague (Die Elektrische Central-station in Prag). Emil Kolben. A long illustrated description of this large central station, which furnishes polyphase current for tramways, power and lighting. 6000 w. Elektrotech Zeitschr—June 28, 1900.

The Electric Generating System of Prague. Fred. Bathurst. Illustrated detailed description. Serial. Elec Rev, Lond—Aug. 17, 1900.

**Providence, R. I.**—The Narragansett Electric Lighting Co. The Evolution of a Typical Composite Station. Joseph Wetzler. Illustrated description in detail, with editorial comment. 5500 w. Elec Eng—April 7, 1897.

**Rathmines, Dublin.**—Rathmines Municipal Electricity Works. An illustrated description of a small but very complete plant near Dublin. 2000 w. Engr, Lond—Sept. 7, 1900.

**Rating.**—On Rating Electric-Power Plants upon the Heat-Unit Standard. William S. Aldrich. States the advantages of having such a standard for this purpose founded upon the heat-unit basis, and discusses the various phases of the subject. 4200 w. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

**Reconstruction.**—Extensions and Reconstruction of Central Stations and Distributing Systems. Peter Junkersfeld. Considers some of the latest developments in central station work in the United States, particularly with reference to extension and reconstruction of existing plants. 5400 w. Tech, No. 14—1899-1900.

**Regulation.**—The Regulation of the Mechanical Plant. Brief description of this system for automatically regulating the voltage of current delivered. An interesting application of various principles of alternate-current working. 1200 w. Elec Wld—Oct. 1, 1898.

**Review.**—Progress of Central-Station Work. Homer E. Niess. A review of the last year, commenting on the improvements made. 2500 w. W Elect'n—Jan. 6, 1900.

The Development of the Central Station. Samuel Insull. A lecture delivered before the School of Electrical Engineering of Purdue University. Part first is largely a review of Mr. Edison's work. Serial. Elec Eng., N. Y.—May 26, 1898.

**Richmond, Va.**—The Lighting and Power Stations of the Richmond Railway and Electric Company. Illustrated detailed description of a plant of interest as an example of the evolution of practice during the last fifteen years. 1600 w. Elec Wld —Dec. 4, 1897.

**Riverhead, Long Island.**—An Interesting Plant. S. D. Benoliel. A small plant run by a combination of water and steam power at Riverhead, L. I. Illustrated description. 3000 w. Elec Pow—March, 1896.

**Rockford, O.**—A 220-Volt Two-Wire Alternating Current Central Station. W. U. Zurfluh. Describes a plant installed at Rockford, Ohio. 1100 w. Am Elect'n—March, 1900.

**Rouen, France.**—Central Station of Rouen, France. Jules Laffargue. An illustrated detailed description of one of the most interesting stations in France, both in consequence of special features, and good results. 3000 w. Am Elect'n—June, 1897.

**Safety.**—The Prevention of Injury to Man in Electric Plants (Die Sicherheit des Menschen gegenüber Elektrischen Anlagen). Dr. H. Kath. A discussion of what may be considered normal conditions of safety, and the extent to which such conditions may be violated in electrical plants. 3500 w. Elektrotech Zeitschr—Aug. 24, 1899.

See also **German Regulations; Swiss Legislation.**

**St. Helens, Eng.**—St. Helens Corporation Electricity Works and Tramways. Illustrated detailed account. 5300 w. Elec Rev, Lond—July 21, 1899.

St. Helens Electricity Works. Illustrated detailed description. 3300 w. Elec Eng, Lond—Jan. 15, 1897.

See also **REFUSE DISPOSAL—St. Helens.**

**St. Louis.**—A Modern Electric Central Station. George A. Damon. Illustrated detailed description of the plant of the Imperial Electric Light, Heat and Power Company, of St. Louis, Mo., given as showing the latest solution of the problem of the generation and distribution of electrical energy. 5000 w. Trans of Am Inst of Elec Engs—May, 1898.

The Design and Construction of a Modern Central Lighting Station. H. H. Humphrey. A discussion of the design and construction of the plant of the Imperial Electric Light, Heat and Power Co., of St. Louis. Ill. 8000 w. Jour Assn of Engng Socs—Oct., 1899.

The Missouri-Edison Electric Company of St. Louis and Its Development of the Alternating Current System for Light and Power Distribution. Herbert A. Wagner. An interesting historical account of this company with illustrated detailed description of the three stations. 11000 w. Elec Eng, N Y—June 9, 1898.

The Missouri-Edison Plant in St. Louis. George J. Percival. An illustrated description of the general features of the three stations of this company. 2300 w. Elec Wld—June 11, 1898.

**St. Pancras, London.**—St. Pancras Electric Lighting. Illustrated description of the King's Road refuse destructor and electric lighting station. Serial. Eng, Lond—March 13, 1896.

The Development of a Low Pressure System. Descriptive of the new works of the St. Pancras Vestry. Ill. 4500 w. Elec Rev, Lond—Dec. 20, 1895.

**Salisbury, England.**—Salisbury Electric Light Station. Illustrates and describes this English station recently opened, with brief history of the buildings utilized. 2500 w. Elec Eng, Lond—Dec. 23, 1898.

**Sao Paulo, Brazil.**—See **ELECTRIC TRAMWAY—Sao Paulo, Brazil.**

**Shoreditch.**—See **REFUSE DISPOSAL—Shoreditch.**

**Single vs. Multiple.**—See **Multiple vs. Single.**

**South Shields, Eng.**—South Shields Corporation Electricity Works. Illustrated description of the installation for electric lighting. 2200 w. Elec Rev, Lond—Nov. 3, 1899.

**Spain.**—Electric Installation in Spain (Elektrische Anlagen in Spanien). A. Lütke. A descriptive review of the existing electric plants in Spain, with especial reference to the market for German electrical apparatus. 2500 w. Elektrotech Zeitschr—May 5, 1898.

**Spring Mounting.**—Should Generating Plant be Mounted on Springs? James Swinburne. Remarks and brief discussion at Civil Engineers' Conference. 1600 w. Elec Eng, Lond—May 28, 1897.

**Staten Island, N. Y.**—Power Plant of the New York and Staten Island Electric Company. Illustrated description of the new station which generates all the electric current used for lighting on the whole island, and most of the electric power used for traction purposes. 2800 w. Elec Wld—June 11, 1898.

**Steam Plant.**—See also **STEAM PLANT—Electric Station.**

**Stockholm.**—Stockholm Central Station. An illustrated account of a station belonging to the municipality, with table showing its progress. 1100 w. Elec Eng, Lond—Aug. 11, 1899.

**Strasburg.**—A German Three-Phase Central Station. Illustrated detailed description of the plant at Strasburg, Germany. 5400 w. Am Elect'n—Sept., 1897.

The Central Electric Power Station at Strasburg (La Station Centrale d'Energie Electrique de Strassbourg). A fully illustrated description of this important plant with plan of the system of distribution, and plate showing the arrangement of machinery. 3500 w. 1 plate. Génie Civil—May 1, 1897.

**Swiss Legislation.**—Swiss Legislation Concerning Safety in Electric Plant (Sicherheitsvorschriften über Elektrische Anlagen in der Schweiz). The full text of the Swiss law of July 7, 1899. Three articles. 10000 w. Elektrotech Zeitschr—March 1, 8, 15, 1900.

**Taunton, Mass.**—Taunton Electric Supply Works: Old and New. Illustrates and describes the present plant, and reviews the development since 1886. 1300 w. Elect'n, Lond—June 30, 1899.

**Terre Haute, Indiana.**—A Modern Central Station Plant. Frederick L. Ray. Illustrated detailed description of the plant of the Citizens' Electric Light and Power Company, Terre Haute, Ind. 4000 w. Am Elect'n—Aug., 1897.

**Test.**—See **Economy Test.**

**Toledo, O.**—A Combined Street Railway and Electric Lighting Plant at Toledo, Ohio. W. S. Smith. An account of the company's experiments with different systems of motive power, and an illustrated description of its present fine station. 1800 w. Elec Wld—April 23, 1898.

Toledo Traction Company. Burcham Harding. Illustrates and describes the plant of this company, which furnishes light and power on an extensive scale. 3800 w. St Ry Jour—Feb. 3, 1900.

**Toronto.**—The New Works of the Toronto Electric Light Company. Illustrated description. 1200 w. Can Elec News—March, 1898.

**Torquay, Eng.**—Torquay Municipal Electricity Works. Illustrated description of a high pressure alternating current supply system. 2000 w. Elec Rev, Lond—April 1, 1898.

**Triest.**—The Electric Plant of the City of Triest (Das Electricitätswerk der Stadt Triest). G. Szuk. With plan and elevation of the building, and views in the engine and boiler rooms; also diagram of the switchboard, and map of the city, showing the primary and secondary distribution and the location of transformers. 2000 w. Elektrotech Zeitschr—Feb. 1, 1900.

**Trieste and Naples.**—See **ELECTRIC STATIONS—Naples and Trieste.**

**Tri-Phase, Asnières, Paris.**—See **Asnières, Paris.**

**United Kingdom.**—Twenty-five Years' Developments in Central Stations. Robert Hammond. The review is limited to works in the United Kingdom. 4500 w. Elec Rev, Lond—Nov. 12, 1897.

See also **England.**

**United States, Southern.**—Central Stations in the South. W. S. Key. Illustrates and describes the Montgomery Light & Power Company's Central Station in part 1st. Serial. Elec Wld & Engr—June 9, 1900.

**U. S. Statistics.**—Central Station Statistics. From the American Electrical Directory and Buyers' Manual for 1898. Interesting tables of the central station electric lighting business of the United States. 600 w. Sci Am Sup—Sept. 17, 1898.

**Venezuela.**—Electric Light Plant at Barquisimeto, Venezuela (L'Installation de l'Eclairage Electrique de Barquisimeto, Venezuela). Hydraulic power is used, with steam as an auxiliary in times of low water. Interesting effects were observed in the expansion of overhead wires in hot weather. 2000 w. Rev Tech—June 10, 1897.

**Vienna Railway.**—The Electric Lighting Plant of the Vienna City Railway (Elektrische Beleuchtungsanlagen der Wiener Stadtbahn). W. Koula. With a map of the distribution, and plans and views of buildings, machinery and switchboard. 3000 w. Elektrotech Zeitschr—Dec. 1, 1898.

**Wakefield, Eng.**—Wakefield Corporation Electricity Works. Description of an English plant. 3000 w. Elec Rev, Lond—July 8, 1898.

**Wallingford, Conn.**—Wallingford, Conn., Municipal Electric Lighting Plant. Thomas C. Perkins. Illustrated description of the interesting features of a small plant. 1500 w. Elec Wld & Engr—March 17, 1900.

**Walsall, Eng.**—Walsall Electricity Works. Historical and descriptive. Ill. 5500 w. Elec Eng, Lond—Dec. 20, 1895.

**Warsaw.**—Warsaw, Poland, Central Station Plant. Reviews the report of W. H. Lindley, who was employed to investigate every detail, giving extracts. Part first discusses the advantages and disadvantages of direct and alternating currents. Serial. Elec Wld & Engr—Nov. 4, 1899.

**Washington, D. C.**—The New Plant of the United States Electric Lighting Company at Washington, D. C. George H. Draper. Description of a modern station and its equipment. 3000 w. Elec Rev, N Y—Dec. 22, 1897.

The United States Electric Lighting Company of Washington, D. C., and Its New Electrical Equipment. Nevil Monroe Hopkins. Gives briefly the history of the company, with illustrated description of its fine new central station and its equipment. 4500 w. Elec Eng, N Y—Nov. 3, 1898.

**Waterworks.**—Combination of Central Electric Lighting Stations with Waterworks (Elektrische Beleuchtungszentralen in Verbindung mit Wasserwerken). Discussing the economy of the combination, and showing the workings of the central station at Cologne. 1500 w. Die Elektrizität—Feb. 27, 1897.

**Watford, Eng.**—Watford Municipal Electric Supply Works. Illustrates and describes these works, which possess several novel features. 2000 w. Elect'n, Lond—June 2, 1899.

**West Ham, Eng.**—West Ham Corporation Electric Supply Works. Illustrates and describes the plant. The system of supply is the single-phase, alternating current system, with transformer substations. 2500 w. Elect'n, Lond—Aug. 4, 1899.

**Willesden, Eng.**—The Willesden Electricity Works of the Metropolitan Electric Supply Company, Limited. Illustrated description of an important plant. Serial. Elec Rev, Lond—March 23, 1900.

The Willesden Works of the Metropolitan Electric Supply Company. Illustrated detailed description of the works named and of the coaling arrangements. Serial. Elec Eng, Lond—March 9, 1900.

**Winchester, Eng.**—Winchester Electric Lighting. Illustrates and describes this English plant. 1400 w. Elec Eng, Lond—July 8, 1898.

**Windsor.**—Windsor Electricity Works. Illustrated detailed description of works and equipment. 3300 w. Elec Eng, Lond—July 30, 1897.

**Witwatersrand.**—See **Johannesburg.**

**Woburn, Mass.**—A New Electric Power Station, Woburn, Mass. L. R. Wallis. Illustrated description of a station containing novel features, which serves current for public and private lighting, street railways and manufacturing purposes, to a territory of 30000 population and 100 miles of streets. 2500 w. Eng Rec—Nov. 4, 1899.

Woburn, Mass., New Central Station. L. R. Wallis. Illustrated description of a distinctly modern lighting and power plant. 1600 w. Elec Wld & Engr—Oct. 28, 1899.

**Wolverhampton, Eng.**—Wolverhampton Electric Supply System. Illustrated description. 4000 w. Elect'n—June 12, 1896.

**Working.**—Central Station Working. Cecil P. Poole. The first part treats of combining steam and water power electric plants. Serial. 1st part. Elec Wld—Jan. 4, 1896.

**York, Eng.**—York Electricity Supply Works. An outline history of the electric lighting scheme, with illustrated tecnical description of the plant installed. Serial. Elec Eng, Lond—March 23, 1900.

**Youngstown, O.**—The Operation of a Combined Lighting and Power Plant. J. H. Perkins. Read before the Ohio Elec. Lgt. Assn. An account of practice at Youngstown, O. 3300 w. W Elect'n—Sept. 1, 1900.

**Zürich.**—The Extension of the Zurich Electric Station (Die Erweiterungsbauten des Elektricitätswerkes der Stadt Zürich). H. Wagner. With curves showing the increase in demand, and with views of the engine and boiler house, etc. Three papers. 3500 w. Schweizerische Bauzeitung—Aug. 12, 19, 26, 1899.

**Zürich Test.**—The Guarantee Test of the Zürich Electric Plant (Abnahmeversuche der Dampf-Dynamo Anlage des Elektricitätswerkes der Stadt Zürich). H. Wagner. A detailed account of the test of two direct connected steam dynamo sets of 1000 horse-power each. 4500 w. Elektrotech Zeitschr—Feb. 22, 1900.

## ELECTRIC STATION ACCIDENT.

**Montreal.**—Destruction of an Electric Lighting Sub-Station in Montreal. An account of the destruction of the sub-station at Côte Ste. Paul, Montreal, belonging to the Lachine Rapids Hydraulic and Land Co. Ill. 500 w. Elec Wld—Feb. 19, 1898.

**Paterson, N. J.**—The Accident at the Paterson Station. Illustrated description of a singular accident in the Edison generating station at Paterson, N. J. 400 w. Elec Wld—Aug. 21, 1897.

## ELECTRIC STATION MANAGEMENT.

See also **COST-KEEPING; ELECTRIC METER; ELECTRIC STATION; ELECTRIC WIRING; WORKS MANAGEMENT.**

Central Station Economics. Arthur V. Abbott and Franz J. Dommerque. Part I. is a prefatory introduction consisting of a general statement of the conditions affecting the cost of producing power, with a scheme of the manner the subject is to be treated. Part II. will be an analysis of the elements involved in power production and delivery. Part III. Conclusion. Part IV. Relation of load line to design of plant. Serial. Elec Engng—Nov., 1895.

Central Station Economics. Arthur V. Abbott and Franz J. Dommerque. A collection of information particularly relative to central station practice, arranged in form for ready reference, intended to embrace all information of value as relating to profitable design and operation of central stations. 41500 w. Elec Engng—Feb., 1897.

Central Station Economics. William D. Ennis. Part first discusses the operative economies of an electric railroad power station, especially considering the improvements in mechanical apparatus. Serial. R R Gaz—Sept. 2, 1898.

Central Station Economies. Leland L. Summers. Address delivered before the Northwestern Elec. Assn., Milwaukee. Consideration of the factors which are apt to prove a source of loss. 5000 w. W Elec—Feb. 8, 1896.

Comparison of Economy of Various Central Station Lighting Plants. Report of the Committee on Data of the National Electric Light Association. Tabulated statement of watt hours produced per pound of fuel, equipment, efficiency, etc., with diagrams showing variations of load under different capacities. 800 w. Eng News—May 14, 1896.

Economical Equipment and Operating of Power House. H. S. Newton. Paper read before the New York State Railway Assn. Contains valuable suggestions for stationary engineers. 1800 w. Lord's Mag—April, 1896.

Electrical Station Economy. Dr. Basch, in "L'Industrie Electrique." Showing that the capital invested in electric lighting alone is not properly utilized. Discussing the charges for power and light, and the arrangements made in effort to overcome injustice and difficulties. 1500 w. W Elec—April 11, 1896.

Electric Lighting for Profit. Alexander Dow. Paper read before the Northwestern Electrical Assn., with discussion. Gives the writer's opinions on the profits, rates, business methods and general needs of the electric-lighting business. 4800 w. Elec Wld—Jan. 29, 1898.

How to Overcome Some of the Difficulties Encountered by Central Station Men. A. A. Wright. Read at meeting of Can. Elec. Assn. Deals with street lighting, commercial lights, incandescent service, meters, etc. Discussion. 2500 w. Can Elec News—July, 1898.

Incidental Points About a Central Station Plant. By a Superintendent. Suggestions upon central station management. 1200 w. W Elec—Aug. 15, 1896.

Little Economies in Central Station Practice. Thomas G. Grier. Read before the Chicago Electrical Association. A compilation of points suggested by correspondence with a number of central station men. Serial. Elec Rev—May 6, 1896.

Notes on Power-Station Economies. Maurice Hoopes. Gives results of the writer's experience. Serial. Elec Rev, N. Y.—Oct. 11, 1899.

Operating Economics in Central-Station Practice. W. L. Abbott. Read at Chicago meeting of the Nat. Elec. Lgt. Assn. Considers details of central-station operation and methods of reducing expenses. 4000 w. Elec Rev, N. Y.—May 30, 1900.

Operation of Electric-Lighting Plants from a Business Standpoint. A. E. Judge. Read before the Southwestern Gas, Electric, and Street Railway Assn. Discusses in detail the need of guarding against accident, stoppage, etc., accounts, employees, expenses, prices, etc. 1700 w. Am Gas Lgt Jour—April 23, 1900.

Some Electric Supply Data. Diagrams showing percentage loss of energy in distribution in some electric supply systems, percentage load factors, percentage maximum demand factors, and tables showing the distribution efficiency, load factors and maximum demand factors, and a comparison with generating expenses and costs. 800 w. Elect'n—May 8, 1896.

The Care and Oversight of the Power Plant. T. Carpenter Smith. Hints to superintendents regarding the management of men and machinery. 3700 w. Eng Mag—Aug., 1897.

The Factors which Control the Profitableness of Central Electric Stations (Ueber die Faktoren welche die Rentabilität der Elektricitätswerke Beeinflussen). With diagrams showing the subdivisions of cost and relative efficiency. German and English plants are compared. Two articles. 5000 w. Elektrotech Zeitschr—Dec. 23, 30, 1897.

Why Some Lighting Plants Do Not Pay. F. C. Armstrong. Discusses principally failure by reason of mistakes in management and business methods. 2800 w. Can Elec News—June, 1897.

**Accounts.**—A Model System of Bookkeeping for Electric Lighting Companies. John Lyle Clough. Outlines the system used by the Edison Light Co., of Grand Rapids, Mich. 1300 w. Munic Engng—Oct., 1900.

Central Station Accounting from a Business Standpoint. P. H. Hart. Read before the Canadian Elec. Assn. Gives reasons why a standard system should be adopted, and describes a system which the author thinks can be readily put in operation by any company. 3800 w. Can Elec News—July, 1899.

Corporation Electricity Works Accounts. H. M. Stevens. Read at Plymouth meeting of the Corporate Treasurers' and Accountants' Inst. Reviews the form of accounts adopted by the British Board of Trade, discussing the arrangement, and the forms and books used in connection with the system, and related matters. 3800 w. Elec Eng, Lond—July 14, 1899.

Corporation Electricity Works Accounts. H. M. Stevens. Read at the Corporate Treasurers' and Accountants' Institute, England. A discussion of some points in the form prescribed by the Board of Trade. 3500 w. Elect'n, Lond—Aug. 11, 1899.

**Address.**—Presidential Address; Chicago National Electric Light Association Convention. Samuel Insull. Discusses standard v. special machinery, selling price based on cost, public control and private operation, etc. 5000 w. Elec Eng, N. Y.—June 16, 1898.

**Alternating-Current.**—Profits of Alternating-Current Central Stations. T. M. Meston. Urges the establishment of day circuits for power users in connection with intelligent canvassing. 1000 w. Am Gas Lgt Jour—Dec. 12, 1898.

**Arc Lamp Department.**—The Arc Lamp Department of the Central Station Business. H. W. Hillman. Suggestions as to the organization and conduct of such a department. 5000 w. Elec Rev, N. Y.—May 3, 1899.

**Bradford Corporation.**—Some Features of the Electricity Department of the Bradford Corporation, England. Alfred H. Gibbons. A short résumé of what has been done in Bradford in the adoption of certain beneficial arrangements with customers, such as free supply of lamps, hiring out lamps and motors, inspection and repair. 1600 w. Elec, Lond—Oct. 29, 1897.

**Brighton, Eng.**—Cost of Electricity Supply. Arthur Wright. Read before the Municipal Elec. Assn. A description of the modifications of method, and the results of analysing by them the figures obtained from the central supply station of the Brighton Corporation. Serial. Ind & Ir—June 26, 1896.

**British Practice.**—Central Station Practice in Great Britain. H. Cuthbert Hall. A critical review of British practice with especial reference to the principles governing the reduction of cost. 8500 w. Eng Mag—May, 1899.

**Charging.**—See **Load-Factor Charging; Maximum-Demand Charging; Meter Rates; Motor Charges; Rates.**

**Consolidation.**—Commercial Analysis of Small and Unprofitable Electric Lighting and Power Enterprises. William D. Marks. Analytical study of the factors in enterprises dealing with small amounts. 3000 w. Elec Wld & Engr—Sept. 1, 1900.

**Cost-Keeping.**—Analysis of the Cost of the Generation and Distribution of a Unit of Electricity. Calvin W. Rice. Read before the Nat. Elec. Lgt. Assn., at Chicago. A résumé of the most reliable data, showing what has been done and what is being done. Considers the cost of the plant, cost of operation, etc. With discussion. 9500 w. Elec, N. Y.—June 22, 1898.

What Electrical Eenergy Costs. Albert B. Herrick. Part first states the operation of the present usual method of determining cost, and in subsequent articles will present what he considers a proper system. Serial. Elec Eng—July 8, 1897.

Some Suggestions Relative to Determining the Cost of Electric Supply. M. E. Turner. Abstract of paper read at the convention of the Ohio Elec. Lght. Assn. Gives illustration of the method of charging a consumer for electrical current based on the cost of the consumer to the supply company. 1200 w. Elec Wld—Aug. 27, 1898.

Some Suggestions Relative to Determining the Cost of Electric Supply. M. E. Turner. A paper before the Ohio Electric Light Association discussing a method of distributing the various elements of expenses and in order to determine the cost of electric supply. 2000 w. W Elect'n—Sept. 10, 1898.

See also **COST-KEEPING—Electric Stations; ELECTRIC STATION—Cost.**

**Cost, United Kingdom.**—The Cost of Electric Energy in 1896. A. P. Haslam. Graphical representation, with explanation, showing that progress has been the rule, and the prosperous condition of the electricity supply business. Serial. Elec, Lond—June 18, 1897.

Electricity Supply Works Costs in 1897 and 1898. Tables and useful information. 4000 w. Elect'n, Lond—Jan. 5, 1900.

The Cost of Electric Energy in 1898. A. P. Haslam. An analysis of results in England. Serial. Elec, Lond—Oct. 20, 1899.

"Lightning's" Table of Costs. An analysis of the accounts of electricity supply undertakings established under provisional orders in the United Kingdom. Tables of statistics of public and private corporations. 4000 w. Lightning—Sept. 6, 1900.

**Day Load.**—A Profitable Day Load for a Large Central Station. C. H. Wilmerding. Examines the subject from various points of view, and suggests a method for establishing rates. 2000 w. Elec Wld—June 5, 1897.

Day Loads for Central Stations, and How to Increase Them. J. A. Kammerer. Read before Can. Elec. Assn. States the points that commend themselves from a lighting standpoint. 1800 w. Can Elec News—June, 1897.

Profitable Day Load in Alternate Current-Systems. George T. Hanchett. Suggestions for combining a lighting system with power distribution during the day. Also editorial criticism. 2000 w. Elec Wld—April 24, 1897.

The Daylight Work of Central Stations. Abstract of a paper read before the convention of the National Electric Light Assn., at Niagara Falls, by Thomas Commerford Martin. Traces the development of the industry, and the improvement in the last ten years. 1400 w. Elec Wld—June 12, 1897.

**Earnings.**—How Can Central Stations Earn Larger Revenues? Albert B. Herrick. A discussion of the possible resources for increasing the revenue. Serial. Elec Wld & Engr—Sept. 1, 1900.

**Free Wiring.**—See **ELECTRIC WIRING—Free Payment Systems.**

**Gas.**—Some Possibilities with an Electric Lighting Plant. C. O. Poole. Read before the Pacific Coast Gas Assn. Remarks the necessity of carrying an electric-light plant in connection with gas, and the few that pay; then points out errors in construction and operation, and shows how to make the investment profitable. Discussion. 4400 w. Am Gas Lgt Jour—Aug. 12, 1898.

**Gas Competition.**—See **GAS WORKS MANAGEMENT—Electric Competition.**

**Interruption.**—The Prevention of Interruption to Electricity Supply. Leonard Andrews. Read before the Inst. of Elec. Engs., England. Discussing the causes and needed improvements, to guarantee an absolutely constant supply to every one, explaining the way the problem has been solved at Hastings. Ill. 4800 w. Elect'n, Lond—May 6, 1898.

**Lamp Efficiency.**—See **INCANDESCENT LAMP—Efficiency.**

**Lamp, Supply and Renewal.**—The Weak Spot in Incandescent Electric Lighting from Central Stations. Francis W. Willcox. A discussion of the lamp question, advocating free supply and regular renewal. 2200 w. Am Elect'n—May, 1900.

**Load Factor Charging.**—Load Factor System of Charging for Electrical Energy. W. S. Barstow. Explains a system which claims while affording a uniform tariff, to improve the operating load factor, and gradually reduce the cost of manufacture. 2500 w. Elec Eng, N. Y.—Jan. 13, 1898.

**Maximum-Demand Charging.**—Charging for Electric Current on the Wright Demand System. How to Adjust Rates So that Every Class of Customer Shall Be Profitable to the Company. R. S. Hale. System explained. 2000 w. Elec Eng—Oct. 21, 1896.

The Maximum-Demand System of Charging for Electrical Energy. W. Perren Maycock. An explanation of the system, aiming to make it plain to the uninitiated. 2700 w. Elec Rev, Lond—March 2, 1900.

Wright's, or the Maximum Charge System for Electric Light. An explanation of this system, which is becoming widely adopted in England. 1800 w. Engr, Lond—June 30, 1899.

See also **ELECTRIC METER—Wright Discount.**

**Meter Rates.**—Systems of Meter Rates. Edwin L. Debell. Read before the Northwestern Elec. Assn. Aims to show how the conditions of the electrical industry are affected by the system of rates employed, and considers what system will be just to customers and also improve the earnings. 3500 w. Elec Eng, N. Y.—Jan. 26, 1899.

**Meters.**—See also **ELECTRIC METERS.**

**Meters vs. Flat Rates.**—Meters versus Flat Rates. R. F. Schuchardt. Urging that Central stations abandon the system of flat rates and sell their current by meter. 1200 w. Elec Eng, N. Y.—Oct. 28, 1897.

**Motor Charges.**—The Better Utilisation of Central Stations. Dr. Rasch in "L'Industrie Electrique." Favoring the reduction of the tariff for energy consumed by motors. 2000 w. Elec Rev, Lond—Jan. 17, 1896.

**Power Factor.**—Power Factor as Affecting Operation and Investment, with Special Reference to Induction Motors and Enclosed Arc Lamps. F. H. Leonard, Jr. Read before the Can. Elec. Assn. Deals with subjects of importance to central station managers. Also discussion. 5700 w. Can Engr—Sept., 1900.

**Rates.**—Charging for Electric Lighting Service. Arthur J. Farnsworth. The writer states the fundamental principles of a desirable system, notes the defects in the common methods, and calls attention to a system in which some of these defects have been removed. 2700 w. Elec Eng—June 3, 1896.

Meters and Systems of Charging for Electric Energy. William Arnot. Abstract of a paper read before the Inst. of Engs. and Shipbuilders in Scotland. Discusses the costs and methods of charging. 4800 w. Elec Eng, Lond—Dec. 2, 1898.

Methods of Charging for Electricity. Illustrated description of the Wright rebate indicated and the ways in which it is used. 2800 w. Elec Rev, Lond—Nov. 6, 1896.

Low Tariffs vs. Large Profits. Examines the subject of charges for electrical energy, explaining the two opinions which exist and discussing the subject generally. 2400 w. Elec, Lond—Oct. 29, 1897.

Methods of Charging for Electricity Supply. R. P. Wilson. Read before the Northern Soc. of Elec. Engs., Manchester, Eng. Names the systems in use, states the objects of any system, and considers the merits of the systems named. Ill. 3400 w. Elec—March 24, 1897.

Methods of Charging for Public Supply of Electricity. W. W. Lackie. Abstract of a paper read before the Glasgow Section of the Inst. of Elec. Engs. Discusses the methods at present in use, and the basis on which they were founded, and the means of securing a uniform rate. 2500 w. Elect'n, Lond—April 6, 1900.

Multiple-Rate Metering. Eustace Oxley. Illustrated description of new method, or a new system of applying the double-rate method of charging, which has met with great success. 4400 w. W Elct'n—Jan. 8, 1898.

Notes on Methods of Charging for Electric Service (Bemerkungen zur Tariffrage bei Elektricitätswerken). K. Wilkens. A development of practical formulas by which the prices to be charged to customers may be derived from the cost data of the station. 2500 w. Elektrotech Zeitschr—April 13, 1899.

On the Determination of a Fair Return for Current Supply. C. W. Hutton. Read before the Pacific Coast Elec. Trans. Assn. Suggestions of a method for establishing a rate based on the length of time a customer uses the current. 3300 w. Jour of Elec—July, 1899.

Rate Schedules and Dividends. A consideration of the rate schedules of medium-sized plants and suggestions for more equitable methods. 2200 w. Can Elec News—Jan., 1899.

Rates for Electric Lighting. E. L. Wells, Jr. Read before the Texas Gas and Elec. Lgt. Assn. Discusses the advantages and disadvantages of the various systems. Also discussion by members. 6200 w. Am Gas Lgt Jour—April 25, 1898.

Rates for Incandescent Lighting. E. L. Wells, Jr. Abstracts of paper read at the joint meeting of the Texas and Mexican electrical associations, Laredo, Tex. Brief discussion of the two general methods of charging, and their modifications. 1000 w. Elec Wld—March 19, 1898.

Reduction of the Price Current by the New York Edison Company. A new schedule of prices with comments and editorial. 2200 w. Elec Eng, N Y—Oct. 13, 1898.

Two-Rate Charging from the Consumer's Standpoint. Lyman C. Reed. Thinks the system very unsatisfactory, and that the question is solved by the use of accumulators, thus doing away with the excessive engine peak at certain hours. 1800 w. Am Elect'n—March, 1899.

See also **Load-Factor Charging; Maximum-Demand Charging; Meter Rates; Motor Charges.**

**Rates, Germany.**—The Tariff for Supply of Current from Electric Stations (Die Stromtarife bei Elektricitätswerken). A paper before the German Electrotechnic Society discussing the rate of charges for current for light and power in the various cities of Germany, with curves showing the relations. 7500 w. Elektrotech Zeitschr—April 22, 1897.

**Rates, United States.**—Methods of Charging for Electricity in America. R. S. Hale and J. S. Codman. A brief account of the various methods in use in the United States for metering, discounts, contracts, etc. 1400 w. Elec Rev, Lond—Jan. 6, 1899.

**Reconstruction.**—Some Central Station Economies. P. G. Gossler. Abstract of a paper read before the Canadian Elec. Assn. Results obtained from the partial reconstruction of a plant. 3500 w. Elec Eng—July 8, 1896.

**Small Plants.**—Economies in Small Electric Light Plants. E. P. Roberts. Read before the Ohio Elec. Assn. Discusses how to operate a small plant economically. 5000 w. W Elect'n—Nov. 19, 1898.

Positive and Negative Economies in the Operation of Small Electric Light Plants. E. P. Roberts. An examination of successive stages of the work showing where gains or losses are most likely to occur. Two papers. 1800 w. Elec Engr—Sept. 8, 22, 1898.

Diverse Service from Small Stations. Alton D. Adams. Discusses the equipment that will best serve the needs of such stations. 1500 w. Elec Rev, N Y—July 18, 1900.

Electrical Plants for Small Towns. Alexander Dow. Read before the Engineering Soc. of Univ. of Mich. Calls attention to points to be considered in relation of design, location, etc., and to details often overlooked. 8000 w. Technic—1897.

The Electric Light Plant in the Small Town; Its Resources and Chances for Extension. J. R. Cravath. Suggestions to owners of plants in towns of two to five thousand inhabitants of the possibilities for increasing business. 2000 w. Elec Eng, N Y—March 10, 1898.

Why Some Small Electric Light Plants Do Not Pay. J. R. Cravath. Discusses the engineering and business management, noting the mistakes often made. 2300 w. Elec Eng, N Y—Jan. 12, 1899.

See also **ELECTRIC SUPPLY.**

**Tramway Power Charges.**—The Generation of Electrical Energy for Tramways. J. S. Raworth. The object of the paper is to show that a suitable and paying price for the supply of electric energy for tramway purposes, under reasonably favorable conditions, is one penny per unit and that the said supply will reduce the cost of the lighting current by an amount which, though small, is definite. 2800 w. Elect'n—April 30, 1897.

Tramway Power from Lighting Stations. What is a fair price to charge is considered. The conclusion reached is that in the neighborhood of coal fields, the charge for power should not exceed three half-pence per unit, and should often be less. 2500 w. Ry Wld—Jan., 1898.

**ELECTRIC SUBWAY.**

See **ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION—Underground; SUBWAY; UNDERGROUND RAILWAY.**

**ELECTRIC SUPPLY.**

See also **ELECTRIC DISTRIBUTION; ELECTRIC ENERGY; ELECTRIC INDUSTRY; ELECTRIC POWER; ELECTRIC STATION; ELECTRIC STATION MANAGEMENT.**

**Dangers.**—Dangers Connected with the Supply of Electricity. From the report of the committee appointed by the Home Office. 1700 w. Arch, Lond—Aug. 6, 1897.

See also **ELECTRIC INDUSTRY—British Regulations.**

**England.**—The Supply of Electricity to Large Districts. A review of the report of the Joint Parliamentary Committee as to prospective legislation upon the distribution of electricity. Serial. Eng, Lond—Sept. 9, 1898.

See also **ELECTRIC INDUSTRY—British.**

**Small Towns.**—Electricity Supply for Small Towns. Papers by C. S. Vesey Brown and G. M. Harris, read at the Huddersfield convention of the Munic. Elec. Assn. Discusses the system. 5500 w. Elec Engr, Lond—June 22, 1900.

**ELECTRIC SWITCH.**

See also **ARC; CONTROLLER; ELECTRIC CIRCUIT BREAKER; ELECTRIC CUT-OUT; LIGHTNING ARRESTER.**

Electrical Switches. William Baxter, Jr. Illustrates and describes various types. Serial. Am Mach—Oct. 12, 1899.

**Accumulators.**—Double Switch System for Accumulators (Doppelzellenschalter für Akkumulatoren). H. Müller. A description of the switch and distribution system used in connection with the accumulators at the power house at Barmen, Germany. 1500 w. Elektrotech Zeitschr—Feb. 23, 1899.

Sectional Switch for Charging Accumulators (Sektionsschalter für Akkumulatorenladung). Arthur Löwit. A description of a switch with several contacts which facilitates the charging and discharging of batteries in various groupings; with diagram. 500 w. Elektrotech Zeitschr—Aug. 2, 1900.

See also **ACCUMULATOR—Switch.**

**Accumulator Regulator.** — See **ACCUMULATOR — Regulating Devices.**

**Alternating Current.**—A Few Practical Notes on Alternate Current Switch-Gear. L. Andrews. Read before the Northern Soc. of Elec. Engs. Description and a diagram of a safety device used by the writer, with record of its action. Serial. Ind & Ir—Feb. 12, 1897.

A Few Practical Notes on Alternate Current Switch-Gear. L. Andrews. Read before the Northern Soc. of Elec. Engs. Part first describes a safety device and cut-out, with introductory remarks. Serial. Elec Eng, Lond—Jan. 29, 1897.

Alternate Current Station Switch-Gear. Largely descriptive of an automatic non-return alternating switch designed by Leonard Andrews, of the Hastings Electric Light Co., Limited. 2300 w. Elec Rev, Lond—Oct. 9, 1896.

**Alternators in Parallel.**—Working Alternators in Parallel at Hastings. A description of a successful switch used in working the Mordey alternators in parallel. The process explained. 1800 w. Eng, Lond—Oct. 9, 1896.

**Arc Suppression.**—Methods of Suppressing Arcs in Switches, Fuses, etc. Ernest Kilburn Scott. Read before the Northern Soc. of Elec. Engs., England. Discusses some of the devices to suppress the arc. Ill. Serial. Elec Eng, Lond—Dec. 8, 1899.

See also **ELECTRIC CIRCUIT BREAKER.**

**Automatic.**—A New Automatic Switch (Ueber einen Neuen Nebenschluss Automaten). F. Collischonn. Describing and illustrating the author's improved automatic controller for widely varying loads. 2000 w. Elektrotech Zeitschr—June 24, 1897.

**Crane.**—See **CONTROLLER.**

**Cut-Out.**—Heavy Current Cut-Out Switch for Electric Railways and Power Plants (Starkstromausschalter für Elektrische Bahnen und Kraftübertragungen). An illustrated description of an automatic cut-out made by the "Helios" company. 500 w. Zeitschr f Klein u Strassenbahnen—May 1, 1900.

**High Tension.**—High Tension Cut-Out Switch, of Sprecher (Hochspannungsausschalter von Sprecher). An illustrated description of a switch for high tension currents, constructed on the principle of a Siemens-Halske lighting arrester. 600 w. Elektrizität—April 28, 1900.

Measuring Switch for High Tension Systems (Mess-Schaltung für Hochspannungs-Anlagen). L. Schüler. An illustrated description of a combined switching and measuring system, using a transformer to enable low pressure measuring instruments to be used. 1800 w. Elektrotech Zeitschr—Dec. 14, 1899.

The Evolution of Switch Gears for High-Pressure Alternating Currents. W. E. Warrilow. Part first is introductory to descriptions of apparatus used for dealing with currents at 2,000 volts pressure. Serial. Elec Engr, Lond—Aug. 10, 1900.

**Laboratory.**—Some Switch Devices for Laboratory Use (Einige Schaltapparate für den Laboratoriumsgebrauch). Dr. J, Kollert. Describing a form of revolving commutator, and various applications of it to laboratory work. 2000 w. Elektrotech Zeitschr—March 3, 1898.

**Non-Arcing Metals.**—See **ARC—Metals.**

**Rapid Break.**—A Rapid Break for Large Currents. A. G. Webster. A description of the apparatus and a test are given. Ill. 1200 w. Am Jour of Sci—May, 1897.

**Series Motor.**—See **ELECTRIC MOTOR.—Series.**

**Short-Circuit Key.**—Rymer-Jones Short-Circuit Key. Illustrated description of a new form of short-circuit key. 800 w. Elec Rev, Lond—June 15, 1900.

**Shunt Motor.**—See **ELECTRIC MOTOR—Shunt.**

**Signs.**—See **ELECTRIC SIGN—Switching.**

**Starting.**—An Automatic Switch for Starting Electric Motors. An illustrated description of an automatic switch invented by Walter F. Jones, to prevent an undue rush of current at starting motors. 2000 w. Col Guard—Sept. 14, 1900.

See also **RHEOSTAT.**

**Transformer Losses.**—Switching Device for Preventing Losses in Unloaded Transformers (Schaltvorrichtung zur Vermeidung der Leerlaufsarbeit in Unbelasteten Transformatoren). H. Müller. A device for throwing the primary or secondary circuit of a transformer alternately in or out automatically. 1000 w. Elektrotech Zeitschr—Sept. 28, 1899.

**Wurts.**—The Handling of Electric Circuits, Arcs, etc. A. J. Wurts. Abstract of a lecture delivered before Sibley College. Deals with the handling of alternate and direct currents, describing apparatus, especially the Wurts switches. Ill. 3500 w. Sib Jour of Engng—March, 1897.

**ELECTRIC TERMINOLOGY.**

See **ELECTRIC NOMENCLATURE.**

**ELECTRIC TESTING.**

See also **DYNAMO TEST; ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC MOTOR—Testing; INCANDESCENT LAMP—Tests; INSULATION; MAGNETIC TESTING.**

Engineering Tests on Direct-Current Electrical Machinery with Preliminary Tests on the Properties of Conductors. George F. Sever. Gives description of the methods of dynamo and motor operation and testing, experimental work, etc. Ill. 7000 w. Sch of Mines Qr—Jan., 1900.

**Cables.**—Special Apparatus for Testing Cables Rapidly and Accurately. Henry W. Fisher. Illustrates and describes a set of cable-testing apparatus embodying insulation by direct reflection, electrostatic capacity by throw, and conductor resistance by Wheatstone bridge. 2500 w. Elec Wld & Engr—May 12, 1900.

See also **ELECTRIC CABLE; ELECTRIC MEASUREMENT—Cable; Fault.**

**Differential with Single Coil.**—Differential Testing with Single-Coil Instruments. George T. Hanchett. Illustrates and describes methods of measuring. 800 w. Am Elect'n—April, 1900.

**Factory.**—Factory Testing of Electrical Apparatus. Arthur H. Ford. Describes methods of testing various kinds of apparatus. 4800 w. Wis Engr—June, 1900.

**General Electric Company.**—The Testing Department of the General Electric Company's Works. Theo. Straus. Illustrated description. Serial. Elec Eng—Sept. 9, 1896.

**Incandescent Lamps.**—See **INCANDESCENT LAMP—Test; Vacuum Tests.**

**Insulation.**—See also **ELECTRIC MEASUREMENT.**

**Insulation, Tramway Circuits.**—Testing the Insulation of Conductors of Street Railways (Isolations Prüfung von Leitungen Elektrischer Strassenbahnen). M. Stobrawa. The perfection of the insulation is tested by the relative brightness of two series of incandescent lamps connected between the collecting bar and the earth circuit. 1200 w. Elektrotech Zeitschr—May 12, 1898.

**Magnetic.**—See **MAGNETIC TESTING.**

**Practical.**—Practical Electrical Testing. C. C. Haskins. Brief illustrated description of three methods for making a test or measurement of capacity, insulation, resistance and conductivity. 800 w. Elec Ind—Nov., 1895.

**Rail Bonding.**—A Differential Method of Testing Rail Bonding and Return Circuits for Electric Railways. Lincoln Nissley. Describes a method successfully employed by the writer in a recent test on one of the largest consolidated roads. 2800 w. St Ry Rev—March 15, 1900.

**Reichsanstalt.**—The Report of the Physical Technical Institution from February, 1898, to January, 1899 (Die Thätiggkeit der Physikalisch-Technischen Reichsanstalt in der Zeit vom 1 Februar, 1898 bis 31 Januar, 1899). A condensation of the full report, especially devoted to electrical measurements and comparisons made during the year. Two articles. 4000 w. Elektrotech Zeitschr—Aug. 31, Sept. 7, 1899.

The Work of the Physical-Technical German Imperial Laboratory from February, 1899, to February, 1900 (Thätigkeit der Physikalisch-Technischen Reichsanstalt in der Zeit vom Februar, 1899, bis Februar, 1900). A record of the electrical and magnetic work of the institution, abstracted from the "Zeitschr. f. Instrk." Serial. 2 parts. 3500 w. Elektrotech Zeitschr—July 19, 26, 1900.

**Resistance Field Coil.**—See **ELECTRIC RESISTANCE—Field Coil.**

**Telegraph.**—Electrical Testing for Telegraph Engineers. J. Elton Young. Extracted from a forthcoming work to be published by the Electrician Co. The theory and practice of testing as applied to all electrical lines is reviewed. Serial. Elect'n—April 30, 1897.

**Tramway Lines.**—Methods of Testing the Insulation and Resistance of Street Railway Lines. Frank B. Porter. Describes some of the tests usually employed by street railway electricians for determining the resistance of the insulation and the resistance of the conducting circuits of their lines. Ill. 2200 w. Elec Wld—July 17, 1897.

**Wagon, Munich.**—Testing Wagon of the Electrical Department of the City of Munich (Der Kabelmesswagen der Städtischen Elektricitätswerke in München). An illustrated description of a portable testing apparatus, forming a complete laboratory on wheels. 1500 w. Elektrotech Zeitschr—Jan. 21, 1897.

**Wiring Installations.**—Installation Testing. V. Zingler. The object of these notes is to provide a methodical way of testing for and tracing out faults, earths, or short circuits; also to give probable causes of same, and to suggest precautions to be taken to guard against their occurrence. Serial. First part. Elec Rev, Lond—Dec. 11, 1896.

**ELECTRIC THEORY.**

See **ELECTRIC MEASUREMENT; ELECTRIC UNIT; ELECTRO-PHYSICS.**

**ELECTRIC TIME.**

See **ELECTRIC CLOCK.**

**ELECTRIC TOWER.**

**Pan-American Exposition.**—The Electrical Tower at the Pan-American Exposition. Edward Hale Brush. Illustration, with description of this feature of the exposition. 1500 w. Sci Am Sup—Aug. 4, 1900.

The Pan-American Electric Tower. Illustrated description of the general arrangement of the grounds of the Pan-American Exposition at Buffalo and of its leading feature—an electric tower

375 feet high, explaining a number of the special structural details. 1500 w. Eng Rec—July 21, 1900.

**ELECTRIC TRACTION.**

See CANAL HAULAGE; ELECTRIC CONDUIT TRAMWAY; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY; ELECTRIC TRAMWAY; ELECTRIC VEHICLE; MINE HAULAGE; SURFACE CONTACT TRAMWAY.

**ELECTRIC TRAMWAY.**

See also ACCUMULATOR TRAMWAY; CITY RAILWAY; ELECTRIC CONDUIT TRAMWAY; ELECTRIC RAILWAY; MUNICIPAL OWNERSHIP; STREET RAILWAY; SURFACE-CONTACT TRAMWAY; TRAMWAY.

A Decade of Electric Railway Development. William J. Clark. Extracts from a paper read before the Niagara Falls meeting of the New York State Street Railway Assn. Deals with the benefits that the general public have received through the use of electricity as a motive power, and shows that the accidents have been small as compared with steam roads. 1400 w. Elec Wld —Sept. 18, 1897.

A Decade of Progress. Electric traction in the last ten years. 800 w. Elec Ry Gaz—Jan. 4, 1896.

An editorial stating that though trolley lines are in operation but seven years, there are now over 800 trolley roads. Some recent advances are noticed. 900 w. Am Eng & R R Jour—Nov. 28, 1895.

A Review of Electric Traction. Extended extract of a voluminous paper by M. E. de Marchena, with comments. Serial. Elect'n—Oct. 30, 1896.

Electric Traction: A Review of Its Application and a Comparison with Other Methods. R. St. George Moore. A paper before the Inst. of Civ. Engs. discussing traction, line and power from the civil engineers' point of view and by examination of prominent examples. 2800 w. Elec Eng, Lond—July 3, 1896.

Electric Traction. Charles A. Carus-Wilson. A discussion of some of the principles connected with the application of the direct current motor to electric traction. Ill. Serial. Jour of Soc of Arts—Sept. 16, 1898.

Electric Traction. Review of a book by Philip Dawson, which gives particulars of all the various systems. 2300 w. Builder—July 24, 1897.

Electric Traction as Applied to Tramways. Frank Gaskell. The first of a series of articles describing and estimating the cost of the best systems of electric traction. Serial. Elec, Lond —Sept. 3, 1897.

Electric Tramways. F. J. Warden Stevens. A review of the various forms of traction in use at the present time. Part first briefly considers horse, steam, gas or oil, and the cable systems, and commences the discussion of electric systems. Serial. Arch, Lond—Sept. 17, 1897.

Electric Tramway Design. Alex McCallum. Considers some of the general principles applying them to a simple line and indicating how their scope may be extended. 4000 w. Ry Wld —Feb., 1898.

Mechanical Traction by Electricity. Granville C. Cunningham. Read before the British Inst. of Civ. Engs. Briefly considers how this form of traction compares in cost of construction and working. Discussion. 2800 w. Elec Eng, Lond —June 9, 1899.

Modern Electric Tramway Systems (Neuere Systeme Elektrischer Bahnen). A paper before the electrotechnical society of Cologne, discussing overhead and underground trolley systems, as well as the combination of overhead wire and accumulators. 3500 w. Elektrotechnische Zeitschr —March 25, 1897.

Practical Points in Street Railway Engineering. W. A. Harding. Read before the Chicago Elec. Assn. Some points on the selection of cars, motors, etc., for suburban roads. 1200 w. Elec Rev, N. Y.—Dec. 14, 1898.

Some General Observations on Electric Traction. Horace F. Parshall. Read before the Northern Soc. of Elec. Engs. Discusses the steam generating plant, speed of engines, system of transmitting, and various matters relating to the designing and working. Brief report of discussion. 4000 w. Ind & Ir—Jan. 27, 1899.

Some of the difficulties Existing in the Construction and Operation of Electric Street Railways. G. W. Knox. Read before the American Street Railway Assn. The opportunies for economy in construction and operation are discussed. 4400 w. St Ry Rev—Nov. 15, 1897.

The Age of Electric Travel. George Ethelbert Walsh. Explains how railroads came to develop so rapidly in this country and why electric traction has advanced. Discusses the probability of electricity taking the place of steam and the various sources of power to be developed, etc. Chau—Feb., 1897.

The Construction and Operation of Electric Tramways (Ueber den Bau und Betrieb elektrischer Bahnen). A descriptive address by Herr Prasch upon the general details of electric tramway construction. Two articles. 8000 w. Zeitsch d Oesterr Ing u Arch Ver—Feb. 26, & March 5, 1897.

The Electric Railway. W. R. Garton. Abstract from a paper read before the Chicago Elec. Assn. Reviews the electric railway field from the earliest use to the present, touching on construction, methods, equipments, etc. 3400 w. St Ry Rev—April 15, 1898.

The Modern Application of Electricity to Traction Purposes. Philip Dawson. A paper read at the British Assn. An exhaustive article prepared with care and containing valuable statistics. 4500 w. Ry Wld—Dec., 1895.

The Survival of the Fittest. Philip Dawson. Favoring electricity, and the trolley system, as motive power for street railways. What has been accomplished in the United States is cited in favor of the system with tables of traffic, expenses, etc. Serial. Elec Rev, Lond—May 15, 1896.

Traction by Electrical Power. A. C. Elliott. Read before the Inst. of Marine Engs. Brief review of the various systems. 2500 w. Prac Engr—Feb. 17, 1899.

Twenty-Five Years of Electric Traction. Philip Dawson. History of the development and progress. 3000 w. Elec Rev, Lond—Nov. 12, 1897.

**Aberdeen.**—The Aberdeen Corporation Electric Tramways. Illustrated detailed description. 1400 w. Tram & Ry Wld—Jan. 11, 1900.

**Accessories.**—Indispensable Accessories of Electric Traction. Henry E. P. Cottrell. Part first illustrates and discusses the various types of modern electric car trucks, and the requirements they must fulfill. Serial. Elec Rev, Lond—April 28, 1899.

**Accounting.**—Accounting System of the Omaha & Council Bluffs Railway & Bridge Co. Describes the monthly report and comparative statement blanks designed by W. S. Dimmock. 3000 w. St Ry Rev—May 15, 1899.

A Model Method of Supply Accounts. Gives method devised by Auditor Calderwood, of the Twin City Rapid Transit Company, Minneapolis. 1400 w. St Ry Rev—Sept. 15, 1897.

**Accumulator.**—See ACCUMULATOR TRAMWAY.

**Aix-la-Chapelle.**—Electric Tramway in the Suburbs of Aix la-Chapelle (Elektrische Kleinbahn im Landkreis Aachen). Describes a system of over 30 miles of suburban electric road connecting Aix-la-Chapelle, Stolberg, Eschweiler, and Alsberg. Serial. Ill. Zeitschr f Klein u Strassenbahnen —Jan. 1, 1898.

**Akron, Bedford, Cleveland, O.**—The Akron, Bedford and Cleveland Electric Railway. Illustrated description. 1200 w. Elec Wld—Sept. 5, 1896.

**Alexandria.**—The Tramway System of Alexandria (Le Réseau de Tramways de la Ville D'Alexandrie). T. Pollatcheck. A brief general description of the electric railway generating station and a few words about the line and rolling stock. 1000 w. Electricien—May 26, 1900.

**Algiers.**—Electric Railway in Algiers. Illustrated description of a line operated by a French Company, connecting Algiers with neighboring towns. 1800 w. St Ry Jour—April, 1899.

Electric Traction at Algiers. Description, with interesting photographs, of the first electric tramway in French dominions in Africa, with brief account of previous mode of transport. 1400 w. Ry Wld—May 5, 1898.

**American.**—See United States.

**American Practice.**—Recent American Practice in Electric Railways. Louis Bell. Part first is confined to the general design and construction of power stations. Ill. Serial. Ry Wld—May, 1897.

**Amiens.**—The Electric Tramway of Amiens (Les Tramways Electriques d'Amiens). With illustrations of the power plant, the overhead conductors and the cars, and a general description of the installation. 1500 w. L'Electricien—May 13, 1899.

Some Recent Developments in Electric Traction Appliances. A. K. Baylor. Read before the Inst. of Elec. Engs. Part first discusses the modern plant, considering generators, overhead line, ground returns, and the three-wire system. Ill. Serial. Ry Wld—May, 1897.

**Argentina.**—Electric Railway Practice in Argentina. E. Manville. An illustrated description and historrical account. 5000 w. St Ry Jour—Oct., 1899.

**Ashton, Eng.**—See **ELECTRIC STATION—Ashton, Eng.**

**Athens, Ga.**—The Street Railway at Athens, Ga. Illustrated description of an interesting plant in which water power replaces steam. 900 w. St Ry Rev—Feb. 15, 1897.

See also **HYDRO-ELECTRIC PLANT.**

**Aurora & Geneva, Ill.**—Legal Victory for the Aurora & Geneva Railway. Discusses the decision of the Illinois Supreme Court in regard to the right of an interurban electric railway to leave the highway and condemn a right of way through private property. Gives a detailed statement of the facts and circumstances. 7200 w. St Ry Rev—March 15, 1899.

**Aussig, Bohemia.**—The Aussig (Bohemia) Electric Street Railway (Die Aussiger Elektrische Strassenbahn). An illustrated description of this Tramway, built by the Union Electric Co., of Berlin. 1200 w. Mitt d Ver f d Förderung d Local u Strassenbahn-wesens—April, 1900.

**Austria-Hungary.**—Electrical Railway Practice in Austria-Hungary. E. A. Ziffer. A review of the history, with a description of the principal types and methods of construction. 4500 w. St Ry Jour—Oct., 1899.

**Bahia, Brazil.**—The Electric Street Tramway in Bahia (Die Elektrische Strassenbahn in Bahia). Gustav Braun. An illustrated account of this Brazilian road, with map showing the route along the coast from Bahia to Itapagipe. 2000 w. Elektrotech Zeitschr—Sept. 8, 1898.

**Baltimore, Md.**—Electric Street Railways in Baltimore, Md. C. B. Fairchild. Notes on the interesting features of the two systems controlling most of the street-railway mileage, considering the power stations, repair shop practice, rolling stock, discipline, etc. 3000 w. Elec Eng, N. Y. —May 26, 1898.

The System of the Baltimore and Northern Electric Railway Company. Illustrated detailed description. 2500 w. St Ry Jour—April, 1898.

**Baltimore-Washington.**—The Baltimore and Washington Electric Railroad. Brief description with sketch map of line and summary of progress made. 1200 w. R R Gaz—April 24, 1896.

**Barcelona.**—Barcelona Electric Tramways. An illustrated detailed description of the tramways of the largest city in Spain. 4000 w. Ry Wld—Jan. 5, 1899.

**Basle.**—The Basle Electric Tramway. Illustrated description of the electric tramway connecting the two railway stations in this city of Switzerland, and the difficulties arising from the narrow streets. 1200 w. Ry Wld—Nov., 1897.

The Extension of the Tramway System of Basle (Die Erweiterung des Netzes der Basler Strassenbahnen). With details of this overhead trolley system, including power house, wiring, cars, and motors. Four articles. 7500 w. 1 plate. Schweizerische Bauzeitung—Oct. 30, Nov. 6, 13, 20, 1897.

**Batavia, Java.**—Electric Traction in Java. An illustrated description of a new tramway in Batavia, taken from "Elektrotechnische Zeitschrift." Serial. Elec Eng, Lond—Nov. 17, 1899.

The Electric Tramway in Batavia (Die Elektrische Strassenbahn in Batavia). An excellent account of this overhead trolley line, the first in the Dutch East Indies, with numerous illustrations. 4500 w. Elektrotech Zeitschr—Oct. 26, 1899.

**Belgium.**—See also **LIGHT RAILWAYS—Belgium.**

**Bergen County, N. J.**—Recent Extension of the Bergen County Traction Company. Illustrated description of an extension containing a number of structural difficulties, and requiring trestles, viaducts and bridges. 1600 w. St Ry Jour—Feb. 3, 1900.

The Bergen County Traction Company's System. Illustrated description of the new road from Pleasant Valley to Englewood, N. J. 1800 w. Elec Eng—June 3, 1896.

See also **New Jersey.**

**Bergen, Norway.**—The Electric Tramway of Bergen (Die Elektrische Strassenbahn der Stadt Bergen). An interesting description, with photographs, of the overhead trolley line at Bergen; the second electric road started in Norway. 2500 w. Die Schmalspurbahn—Nov. 1, 1897.

**Berlin.**—Electric Traction on the Berlin Metropolitan Railway. Translated from the "Elektrotechnishe Zeitschrift." Ilustrates and describes the scheme proposed by the Union Elektricitäts Gesellschaft. 6700 w. Tram & Ry Wld—June 7, 1900.

The Electric Tramways of Berlin and Vicinity. Illustrated detailed description. 2000 w. Ry Wld—Sept., 1897.

The Introduction of Electric Power on Berlin Tramways (Einführung des Elektrischen Betriebes auf den Linien der Grossen Berliner Strassenbahn). With views of the cars and trucks, showing the arrangement of motors and suspension. 2500 w. Electrotech Zeitschr—May 5, 1898.

The Introduction of Electric Power on the Great Berlin Street Railway up to the End of 1899 (Die Einführung des Elektrischen Betriebes auf den Grossen Berliner Strassenbahnen und Stand desselben Ende 1899). A general descriptive article on the Berlin street railway overhead trolley system, well illustrated. Serial. 2 parts. 3600 w. Zeitschr f Klein u Strassenbahner—May 1, 16, 1900.

Tramway Projects in Berlin. D. B. Macgowan, in the "Chicago Tribune." An account of the lines under construction and in operation. 1900 w. Tram & Ry Wld—Jan. 11, 1900.

See also **ELECTRIC CONDUIT TRAMWAY; ELECTRIC RAILWAY.**

**Bilbao.**—Electric Tramway at Bilbao (Elektrische Strassenbahn in Bilbao). The line runs on both sides of the river Nervion from Bilbao to the harbor on the Bay of Biscay, a distance of about 9 miles. 1200 w. Elektrotechnische Zeitschrift—Jan. 21, 1897.

**Binghamton, N. Y.**—The Binghamton, N. Y., Electric railroad. Harry N. Gardner. Illustrated detailed description. 2000 w. Elec Eng, N. Y.—Oct. 14, 1897.

**Birmingham, Ala.**—The Street Railway of Birmingham, Ala. Illustrated detailed description. 2200 w. St Ry Jour—June 2, 1900.

**Birmingham, Eng.**—Electric Railway in Birmingham. An account of difficulties in tramway matters, and of an experimental overhead electric trolley system. 1500 w. U. S. Cons Repts, No. 815—Aug. 23, 1900.

The Birmingham Tramway Report. Extract from report submitted by the sub-committee on the systems of various European cities. Ill. 2500 w. St Ry Rev—July 15, 1897.

**Blackburn, Eng.**—Electric Tramways at Blackburn. Illustrated detailed description of an English plant. 2500 w. Elec Eng, Lond—March 17, 1899.

**Blackpool, Eng.**—The Tramways of Blackpool and Neighborhood. Notes taken on a recent visit on the working of the three systems operated in this vicinity. 2000 w. Ry Wld—Dec. 8, 1898.

The Trolley Problem at Blackpool. An account of how the trolley has supplanted a conduit system, with illustrated description of the road. 1800 w. Elect'n, Lond—July 28, 1899.

**Blackpool-Fleetwood, England.**—Description of the Blackpool and Fleetwood Tramroad and Generating Station. Tom G. Lumb. Describes the permanent way, distributing system and rolling-stock. 3300 w. Elec Engr, Lond—Aug. 10, 1900.

The Blackpool and Fleetwood Electric Tramways. Brief illustrated description. 1400 w. Elec Rev, Lond—July 22, 1898.

The Blackpool and Fleetwood Electric Tramroad. Illustrated detailed description of the road and its equipment. 4000 w. Ry Wld—Sept. 8, 1898.

**Blast-Furnace-Gas Power.**—See **BLAST-FURNACE GAS—Electric Power Station.**

**Bois de Boulogne.**—The Bois de Boulogne Combined Trolley and Surface Contact Tramway. Illustrates and describes the line and its operation. 2000 w. Elec Rev, Lond—Aug. 17, 1900.

**Boston.**—Boston's Great Street Railway System. H. G. T. Largest and best equipped service;—the "west end" and what it has done for Boston and her suburbs;—a brief outline of the system and its operation. 8400 w. Elec Rev—Feb. 26, 1896.

Street Railway Conditions and Financial Results in Metropolitan Boston. Illustrated description of the principal investment, traffic and operation characteristics of thirty-nine street railways located in the city of Boston, and in about seventy-five suburban cities and towns in the immediate neighborhood. 13800 w. St Ry Jour—Sept., 1898.

The Boston Elevated Railway Company. Reviews the history of street-railroading in Boston, which is considered to have one of the finest systems in the country. Ill. 11500 w. St Ry Rev—Aug. 15, 1898.

A Hubbub in Boston. Analysis of the lease of the West End street railway of Boston, to the Boston elevated. 2500 w. Elec, N. Y.—Dec. 1, 1897.

See also City Growth; **ELEVATED RAILWAY; UNDERGROUND RAILWAY.**

**Bound Brook-Somerville, N. J.**—Construction of 2½ Miles of Electric Railroad Complete in 22 Hours. Describes the rapid work in building the road between Bound Brook and Somerville, N. J., by the New York and Philadelphia Traction Company. Ill. 2200 w. Elec Eng, N. Y.—Nov. 4, 1897.

**Bradford, Eng.**—Bradford Corporation Electric Tramways. An illustrated account of the plant recently installed at Bradford, England, noteworthy as being owned and operated by the municipality. 2000 w. Elec Engr, Lond—Aug. 26, 1898.

Bradford Municipal Electrical Tramways. Illustrated detailed description of the road and its equipment. 3400 w. Ry Wld—Oct. 13, 1898.

The Bradford Electric Tramways. Illustrated detailed description of an English municipal tramway. 1300 w. Elec Rev, Lond—July 29, 1898.

**Brand System.**—See **ELECTRIC RAILWAY.**

**Brighton-Rottingdean.**—A Railway Through the Sea. Illustrated description of a novel electric railway which Mr. Magnus Volk has carried to a successful issue at Brighton, Eng. 1400 w. Elec Rev, Lond—Nov. 27, 1896.

Novel Seashore Electric Railway. An English seaside resort railway which runs on deeply submerged tracks is described and illustrated. 600 w. St Ry Jour—May, 1896.

The Brighton and Rottingdean Seashore Electric Tramroad. The roadbed is under water a considerable portion of the time, and so the car is mounted on a framework of 23 feet above the rails. The power proposed is electricity. The line will be used for passenger traffic. 800 w. Eng, Lond—Nov. 8, 1895.

The Brighton-Rottingdean Sea Trolley Road. Illustrated description of a curious and interesting road. 350 w. Elec Eng—Aug. 26, 1896.

**Brisbane, Australia.**—Tramway System of Brisbane, Australia. S. Herbert Brown. Gives an account of the change from the horse to the electric system, the extension of lines and the success met with. Ill. 1800 w. St Ry Jour—Sept., 1898.

**Bristol, Eng.**—Bristol Electric Tramway. Illustrated description of a British electric city railway of American design but with important modifications. The trolley wire supports are ornamental iron posts, carrying also the electric street lamps. There is a complete description of power plant, rolling stock, permanent way and management. 4800 w. Ry Wld—Nov., 1895.

The Bristol Electric Tramway. Illustrated description of important changes and developments. 2000 w. Engng—Oct. 30, 1896.

See also **RAILWAY.**

**British.**—English Electric Railroads. The first of a series of articles discussing recent developments. The present paper considers the Glasgow electric tramways. Serial. R R Gaz—Nov. 25, 1898.

The Calculation of Distributing Systems of Electric Traction Under British Conditions. H. M. Sayers. States the conditions of working electric tramway systems and their effects, considering these systems in practical use. 7700 w. Brit Inst of Elec Engs—May 3, 1900.

See also England; Great Britain; United Kingdom.

**British Company.**—The British Electric Traction Company. Abstract of address of Emil Garcke, at the staff dinner of the company. Gives an outline of the work accomplished and in prospect, with many interesting matters relating to tramways. 3500 w. Ry Wld—June 2, 1898.

**British Requirements.**—Electric Railway Engineering. Alex. McCallum. The modifications required for British conditions. It is thought that the Board of Trade regulations will increase the inital cost by from 30 to 40 per cent. on long lines. 1600 w. St Ry Jour—April, 1897.

**Brooklyn.**—Financial Characteristics and Operating Organization of the Brooklyn Rapid Transit System. Gives an idea of the organization and administration involved in the management of this property and some of the results achieved. 2000 w. St Ry Jour—Dec., 1897.

The Street Railway Systems of Brooklyn. Illustrated description. Serial. Elec Ry Gaz—Jan. 4, 1896.

The Traffic Difficulties of the Brooklyn Rapid Transit System. An illustrated discussion, with maps, showing the difficulties and transportation trials, and considering the only remedy to be the increasing the dry land communication between Manhattan and Brooklyn. 2200 w. St Ry Jour—Jan. 6, 1900.

**Brooklyn Bridge.**—Electricity on the Brooklyn Bridge. Illustrated description of a successful test made Feb. 8. 1000 w. Elec Rev—Feb. 12, 1896.

Electric Motors on the Brooklyn Bridge. An account of the first official test of electricity as applied to the switching of the cars on the bridge. Ill. 1000 w. Elec Eng—Feb. 12, 1896.

Motor Cars on the Brooklyn Bridge. Illustrated description of the electrical equipment. 1500 w. Elec Eng—Dec. 9, 1896.

Rapid Transit. Report of the committee of experts favorable to the idea of Brooklyn elevated and trolley cars crossing the bridge. Plans for the surface cars and L trains are given. 800 w. Elec—Feb. 10, 1897.

Rapid Transit. The Report of Through Train Service Across the Brooklyn Bridge. Extracts from the report and drawings, showing the plans proposed. 5800 w. Eng News—Feb. 18, 1897.

Surface and Elevated Cars on the New York and Brooklyn Bridge. Presents the situation, giving facts regarding the decrease in revenue as the results of running the electric surface cars, and the proposed operation of elevated railroad cars. 2000 w. R R Gaz—July 1, 1898.

Switching by Electricity at the Brooklyn Bridge Terminals. The switching locomotives will be abandoned and one car of each train will be supplied with electric motors which will furnish driving power at the terminals, after the cable is dropped. Ill. 2800 w. Eng News—Feb. 13, 1896.

The Accepted Plans for Electric Cars in the Brooklyn Bridge. Shows the course which it is proposed that the cars will take, the arrangement for loading and unloading the passengers, etc. Ill. 900 w. R R Gaz—Sept. 24, 1897.

The Plans for Running Through Cars Over the Brooklyn Bridge. Plans showing final arrangements adopted, with explanation. 1000 w. Eng News—Nov. 18, 1897.

The Reason Why Electric Motors Will be Used on the Brooklyn Bridge. The reasons why electric motors will displace the switching locomotives is fully discussed and views presented showing the bad effects of locomotive gases and the terminal arrangement. 1800 w. St Ry Jour—March, 1896.

The Use of the Brooklyn Bridge by the Transportation Systems of Brooklyn. An explanation of the first and the revised plans, and other complications. 1500 w. St Ry Jour—Jan., 1898.

Trolley-Car Service on the Brooklyn Bridge. Illustrated description of the construction methods employed for the track and overhead equipment. 1000 w. Elec Wld—Feb. 5, 1898.

**Brooklyn Finances.**—Financial Analysis of the Brooklyn Rapid Transit System. Statement of the new financial conditions and the possibilities of future development. 2000 w. St Ry Jour—June, 1899.

**Brussels.**—Brussels Electric Tramways. Ernest Kilburn Scott. Information of special features in the construction and equipment, of routes, extensions, and matters of interest. Ill. 2200 w. Elec Rev, Lond—Sept. 17, 1897.

**Budapest.**—See also **UNDERGROUND RAILWAY—Budapest.**

**Budapest Suburban.**—The Budapest-Budafaker Suburban Electric Railway (Die Budapest-Budafaker Elektrische Localbahn). J. v. Fischer and Dr. A. Brunn. A general description, with details of the construction and equipment of this trolley road to an outlying suburb. 2800 w. Zeitschr f Klein-u Strassenbahnen—May 16, 1900.

**Buenos-Aires.**—Electric Railroading in the Argentine. Illustrated description of the electric lines of Buenos Aires. 1800 w. St Ry Jour—Feb., 1899.

See also **ELECTRIC LIGHTING—Buenos Aires.**

**Buffalo.**—Niagara Power for the Buffalo Railway System. Illustrated description of the system. 2500 w. St Ry Jour—Dec., 1896.

System of the International Traction Co., of Buffalo, N. Y. An illustrated description of the interurban lines, the Niagara Falls power equipment, stations, welded rail joints, etc. 5800 w. St Ry Rev—Dec. 15, 1899.

The Application of Niagara Power to the Work of the International Traction Company. Sketches briefly the development of the generating plant and the transmission line, and gives detailed description of the machinery of the traction system. Ill. 3800 w. St Ry Jour—Feb. 3, 1900.

See also **ELECTRIC DISTRIBUTION—Buffalo Tramways.**

**Buffalo-Niagara Tests.**—Car and Line Tests on the Buffalo and Niagara Falls Electric Railway. H. O. Pond and H. P. Curtiss. Abstract from thesis in Mechanical Engineering. The test was divided into friction test, traction test, acceleration and electrical tests of car, etc. 1000 w. Sib Jour of Engng—May, 1896.

Tests of Heavy Motor Cars on the Buffalo & Niagara Falls Electric Railway. Giving graphic representation of results of friction, traction acceleration and electrical tests. 900 w. St Ry Rev—July 15, 1896.

**Cable Auxiliary.**—An Electric-Cable Railway. M. H. Bronsdon. Describes and illustrates a system suitable for cases where it is thought desirable or necessary to have a safety device, and one which is applicable to any grade regardless of the inclination. 800 w. St Ry Rev—Sept. 15, 1897.

**Cable Compared.**—Cables vs. Electric Traction. Editorial argument for electric traction based on accidents due to the breakage of cable strands. 800 w. Elec Ry Gaz—April 10, 1896.

The Working Expenses of Electric and Cable Railways. Tabulation of figures from various English roads, with analytical comment. 1900 w. Ry Wld—Sept., 1896.

**Cairo.**—Electric St. Railroads in Cairo, Egypt. Brief illustrated description of the rapid-transit system inaugurated August, 1896. 700 w. Elec Wld—Dec. 31, 1898.

The Cairo Electric Tramways. Illustrated description of the line and its equipment, with views on the route. 900 w. Ry Wld—July 6, 1899.

To the Pyramids by Electricity. Account of a projected tramway, and information of the popularity of the tramways of Cairo. Ill. 1000 w. St Ry Rev—May 15, 1897.

Trolley in Egypt. An account of the inauguration of the system in Cairo. 600 w. St Ry Rev—Oct. 15, 1896.

**Canal and Claiborne.**—See **New Orleans.**

**Carlisle, England.**—The Electric Tramway System of Carlisle, England. Illustrates and describes a typical British installation. 1300 w. St Ry Jour—Oct. 13, 1900.

**Car Mileage.**—Car Mileage. H. C. Mackay. Read at convention of Am. St. Ry. Assn. The necessity of securing an equitable and standard unit. Discussion. 12500 w. St Ry Rev—Oct. 19, 1899.

Car Mileage Records. A. O. Kittredge. Gives a brief survey of the practice of several companies. 2000 w. St Ry Jour—July, 1898.

**Car Record.**—An Invention that Keeps Track of Electric Cars While in Operation. A system of chronographic recording by which the position of trolley cars can at any time be known at headquarters or at the power-house. 400 w. Bos Jour of Com—Dec. 14, 1895.

**Cedar Rapids and Marion City, Iowa.**—Cedar Rapids and Marion City Railway. Description of a well managed electric railway. Ill. 1500 w. St Ry Rev—Feb. 15, 1896.

**Chalons-sur-Marne.**—Electric Tramway at Chalons-sur-Marne (La Traction Electrique à Chalons-sur-Marne). A description of the opening of a new trolley road, with illustrations of cars, trolley, power house, etc. 6000 w. La Revue Technique—Jan. 10, 1897.

**Charleston, S. C.**—Electric Railways in Charleston. Illustrated detailed description of the new system. 2700 w. St Ry Jour—Sept., 1897.

**Checking Employes.**—System of Collection of Fares and Checking Employés. A. F. Walter. Describes a system that has given satisfaction on the Allentown & Lehigh Valley Traction Co. 3200 w. St Ry Rev—Nov. 15, 1898.

**Chicago.**—Electric Railway Practice in America as Exemplified in Chicago. Reviews American experience and explains the latest and best practice, giving an illustrated detailed description of the Chicago construction. 14500 w. St Ry Jour—Oct., 1899.

**Cincinnati.**—See **Double-Trolley.**

**Circuits.**—The Overhead Line and Ground Return Circuit of Electric Street Railways. David Pepper, Jr. Reviews the important points in construction, and the progress made. 3600 w. Jour Fr Inst—July, 1898.

See also **Overhead Construction; ELECTRIC DISTRIBUTION.**

**City Growth.**—Urban Growth and the Electric Railway. Louis Bell. Discussion of the effect of local railways on the value of real estate, and time saved by business people. Illustrated by a map of Boston, showing the curves of a fifteen minute and half hour ride from business in 1888. 8800 w. St Ry Jour—Jan., 1896.

Urban Growth and the Electric Railway. Louis Bell. A discussion of the influence of improved street traction on the enlargement of a city. Boston is the typical instance used as an illustration. A map shows the enlarged time-radius. 2700 w. Eng News—June 11, 1896.

**Cleveland.**—Electric Roads Near Cleveland. Brief historical review, with map and notes of current work. 900 w. R R Gaz—Oct. 16, 1896.

See also **Akron.**

**Cleveland-Elyria, O.**—The Cleveland and Elyria Electric Railway. Illustrated description. 600 w. Elec Wld—Aug. 29, 1896.

**Club-House.**—Club House for Motormen and Conductors. The street railway of Derby, Conn., has converted one of its buildings into a club house containing bath, dining-room, reading-room, pool and billiard room, and gymnasium. The scheme proposes to bring the employees into closer relation to the company. 700 w. St Ry Jour—Feb., 1896.

**Columbus, O.**—See **Operation.**

**Como, Italy.**—The Electric Tramway at Como (Die Elektrische Strassenbahn in Como). R. v. Podoski. Giving details of the wiring of the motor cars and the construction of the trucks. Also diagrams showing the operation of the brakes on steep inclines. 3000 w. Elektrotech Zeitschr—Jan. 4, 1900.

The Electric Tramway in Como. Illustrates and describes a line of novel construction, carried out in short time. A temporary concession granted to furnish transit for those visiting the Volta Exhibition. 1200 w. Trans & Ry Wld—July 5, 1900.

**Comparative Systems.**—Discussion of the Existing Systems of Conductors for Electric Tramways (Betrachtungen der Ueblichen Stromzuführungs Systeme). A critical comparison between overhead, underground and accumulator systems. 6000 w. Deutschr Zeitschr f Elektrotechnik—Nov. 15, 1897.

**Conduit.**—See **ELECTRIC CONDUIT TRAMWAY.**

**Conduit vs. Trolley.**—Conduit vs. Trolley. A brief description of the excellent design of center poles and other equipment used on the Bastille-Charenton Line, Paris, with comparison of the first coal in conduit and trolley lines. 1200 w. Elec Rev, Lond—Dec. 9, 1898.

Conduit v. Trolley. J. Clifton Robinson. Opposing the construction of the costly conduit in London. 1400 w. Elec Engr, Lond—Aug. 10, 1900.

Conduit vs. the Trolley System. Report of Mr. John Young to the Glasgow Tramways Committee on the advisability of introducing the conduit system. 3500 w. Ry Wld—Dec. 8, 1898.

**Connecticut.**—A Recent New England Railway. An illustrated description of the new line connecting Torrington and Winsted, Conn. 5000 w. St Ry Jour—March, 1898.

See also ELECTRIC RAILWAY.

**Connecticut Finances.**—Earnings and Operating Expenses of Connecticut Street Railways. Detailed reports from twenty railways. 1300 w. St Ry Rev—April 15, 1896.

Operating Expenses of Connecticut Railways. From the annual report of Railroad Commissioners indicating a not very prosperous condition. 3500 w. St Ry Rev—Feb. 18, 1898.

**Consolidation.**—Street Railway Consolidation. Editorial on the advantages of consolidation in economic conditions. 2000 w. St Ry Jour—Sept. 1, 1900.

**Construction.**—Electric Railway Construction. Albert Vickers. A review of modern standards, chiefly of track. Illustrated. 2000 w. Elec Wld—Oct. 24, 1896.

Some Prominent Features in Electric Railway Construction. Points of special engineering difficulty of interest in construction on roads near New York City. 1200 w. Elec Wld—Oct. 24, 1896.

**Copenhagen, Den.**—Fares and Earnings of the Copenhagen Tramways. V. Faber-Madsen. An account of the conditions prevailing in Copenhagen, where the average fare paid is 2.67 cents, with information concerning wages paid, cost of operation, etc. 5000 w. St Ry Jour—Aug., 1898.

**Corea.**—See Seoul, Corea.

**Cork.**—Cork Electric Tramways. Beverley Griffin. Read at meeting of the Municipal and County Engs., Cork. Illustrated description of plant. 1600 w. Elec Eng, Lond—Aug. 12, 1898.

Cork Electric Tramways and Electric Works. Full description of the electrical works of the Cork Electric Tramway and Lighting Co., Ltd., with illustrations and map. 3500 w. Elec Eng, Lond—Dec. 23, 1898.

Electric Tramway System of Cork, Ireland. Gives map of tramways with brief description. 2200 w. St Ry Jour—Jan., 1899.

**Country Roads.**—Country Roads vs. Small Electric Tramways (Sollen wir Land Strassen oder Elektrische Kleinbahnen Bauen?) Describing a system of very narrow gauge electric railways, with trucks upon which ordinary wagons can be carried. 1200 w. Deutsche Zeitschr f Elektrotechnik—June 15, 1897.

**Coventry.**—Coventry Electric Tramways. Illustrated detailed description of a successful English tramway. 3500 w. Tram & Ry Wld—Sept. 7, 1899.

The Coventry Electric Tramway System. Illustrated description. 2800 w. Elec Rev, Lond—Jan. 17, 1896.

**Cuba.**—The First Cuban Electric Railway. Brief illustrated description of the line from Regla to Guanabacoa. 700 w. Elec Wld & Engr—June 2, 1900.

**Current Consumption.**—The Average Consumption of Current in Electric Tramways (Der Mittlere Stromverbrauch von Elektrischen Strassenbahnen). K. Sieber. Developing a formula for practical use, and examples of its application. 3000 w. Elektrotech Zeitschr—Oct. 4, 1900.

**Current Distribution.**—Notes on Electric Tramways. Major P. Cardew and A. P. Trotter. Read before the Inst. of, Elec. Engs., England. Explains a graphical method for determining the fall of potential in the return with uniform distribution of current, and also notes advocating the automatic regulation of this fall of potential. 1800 w. Elect'n, Lond—April 29, 1898.

See also ELECTRIC DISTRIBUTION—Railway.

**Curves.**—Connecting Curves on Electric Tramways (Uebergangskurven bei Elektrischen Strassenbahnen). K. Sieber. An examination of the resistance offered by curves on tramways, with reference to the consequent consumption of electric power. 1800 w. Elektrotech Zeitschr—Oct. 18, 1900.

See also RAILWAY CURVE.

**Dayton, Ohio.**—The Street Railways of Dayton, Ohio. An illustrated account of the railways which are under the control of three distinct companies. 3800 w. St Ry Jour—March, 1898.

**Dayton, O. Interurban.**—Dayton, O., as an Interurban Railway Center. Brief account of the street railways of the city, with illustrated description of the interurban lines completed and under construction. 3800 w. St Ry Jour—April 7, 1900.

**Deri System.**—The Deri Combined Alternating and Continuous-Current System for Electric Tramways. Description of an ingenious system, with editorial presenting its advantages and disadvantages. 3000 w. Elect'n—July 2, 1897.

**Detroit.**—Detroit's Effort to Own Her Street Railways. Edward W. Bemis. Gives the history of the street railways and the movement for municipal ownership. 7500 w. Munic Affairs—Sept., 1899.

The Detroit Railway; Its Power House and Other Features. Illustrated detailed description. 2000 w. Elec Ind—Jan., 1896.

The System of the Detroit Railway Company. A very fully illustrated description of a large electric railway plant. 3600 w. St Ry Jour—Jan., 1896.

See also ELECTRIC RAILWAY; MUNICIPAL OWNERSHIP—Detroit Street Railway.

**Development, 1899.**—Electric-Railway Development of 1899. James R. Chapman. Review of progress and the tendencies in construction and equipment. 1200 w. W Elect'n—Jan. 6, 1900.

**Distribution of Power.**—See ELECTRIC DISTRIBUTION—Railway.

**Double-Current, Toronto.**—The Metropolitan Railway Company, Toronto, Ontario, and Its Double-Current System. Illustrates and describes the recent improvements and extensions. 1600 w. Am Elect'n—Feb., 1900.

**Double-Trolley.**—Some Interesting Facts Relative to the Double-Trolley System. Bert L. Baldwin, with editorial. The successful working of this system in Cincinnati, with the advantages, and objections are considered. The development of the system, with many illustrations. 2500 w. Elec—Feb. 5, 1896.

**Dover, England.**—Dover Municipal Electric Tramways. Illustrated detailed description. 5500 w. Ry Wld—Oct., 1897.

The Dover Corporation Electric Tramways. Henry E. Stilgoe. Read before the Incorporated Assn. of Municipal and County Engs., at Dover. Illustrated detailed description. 2000 w. Elec Eng, Lond—May 7, 1897.

The Dover Tramways. Illustrated description of recently constructed line now in operation. 1800 w. Elec Eng, Lond—Sept. 10, 1897.

See also Signals.

**Drawbridge.**—Overhead Trolley Construction on New Drawbridge in New York. Designed to give complete metallic contact for the trolley connection the entire length of the bridge when the draw is closed. Ill. 600 w. St Ry Jour—April, 1898.

The Protection of Drawbridges. Suggestions as to methods designed to prevent street cars from running into open draws. 1000 w. St. Ry Rev—Jan. 15, 1896.

Trolley Wires Over Movable Bridges. Illustrated description of the arrangements on the North bridge at Hull, England. 600 w. Elec Eng, Lond—Feb. 9, 1900.

**Dublin.**—Clontarf Electric Tramway. Illustrated description of the extension of the Dublin United Tramway Co.'s electric system. 900 w. Ry Wld—Nov., 1896.

Dublin Electric Tramways. Illustrated description of the tramway between Dublin and Dalkey which is an important work in the history of electric railways of that country. 5400 w. Elec Eng, Lond—May 15, 1896.

Dublin Electric Tramways. Illustrated detailed description. Serial. Elec Rev—April 20, 1900.

Electric Tramways in Dublin. Clontarf Section. Illustrated detailed description. 2000 w. Elec Rev, Lond—Dec. 24, 1897.

New Construction in Dublin, Ireland. Illustrated detailed description of the electric system of the Dublin United Tramways Co. 2700 w. St Ry Jour—April, 1898.

The Dublin Electric Tramway System. The first number is devoted principally to the power system, with map of the route and plan of power station. Serial. Engng—June 5, 1896.

The Ringsend Power Plant of the Dublin United Tramways Company at Dublin. A. C. Shaw. Brief review of the history of the Dublin United Tramways Co., with illustrated detailed description of the plant and outside equipment. 7500 w. St Ry Jour—May 5, 1900.

See also **England; Ireland; United Kingdom.**

**Dublin-Dalkey.**—The Dublin-Dalkey Electric Tramway. One of the most interesting features of this system consists in the adoption of power transmission by means of polyphase currents, between the power house and the two sub-stations which feed the line en route. Illustrated description. 2500 w. Elect'n—Jan. 17, 1896.

**Dudley and Stourbridge, Eng.**—The Dudley and Stourbridge Electric Tramways. An illustrated account of a reconstructed line formerly a steam tramway. 2800 w. Elec Rev, Lond—July 28, 1899.

**Dundee.**—Dundee Tramways. Report of E. Manville to the tramway committee of the corporation of Dundee, on the proposed extensions, and other changes under consideration. 7000 w. Elec Eng, Lond—June 16, 1899.

**Earning Power.**—How to Determine the True Net Earning Power of Street Railway Properties. Edward E. Higgins. Describes the physical and financial features of an assumed property, as an illustration of principles, showing how the true earning power may be determined. 4700 w. St Ry Jour—March 3, 1900.

**Earth Returns.**—Earth Returns for Electric Tramways. H. F. Parshall. Part first reports results of tests showing that a large fraction of the current returns through the earth itself, and presents the necessity of determining the conductivity of the rails, fish plates, and bonds before the track is laid in the earth. Discusses the method of jointing and the composition of the rails, bonds, etc. Serial. Elec Eng, Lond—April 29, 1898.

Earth Returns for Electric Tramways. H. F. Parshall. Read before the Inst. of Elec. Engs. England. Considers various types of bonds, welding, and the subject generally, reporting tests and means of preventing electrolysis. 4000 w. Engng—May 6, 1898.

See also **RAIL BOND; STRAY CURRENTS.**

**Edison.**—Edison Electric Railways of 1880 and 1882. Edwin W. Hammer. An illustrated account of Mr. Edison's railway work at Menlo Park. 4000 w. Elec Wld & Elec Engr—June 10, 1899.

**Ekaterinoslav, Russia.**—Electric Railway Plant at Ekaterinoslav, South Russia (Elektrische Bahnanlage in Jekaterinoslaw). Messrs. Winkler and Orban. An illustrated description of a trolley road, power house, and details. 3200 w. Elektrotech Zeitschr—May 24, 1900.

**Electrolysis.**—See **STRAY CURRENTS.**

**Elmira, N. Y.**—Elmira Street Railways. Brief illustrated description of power house, line construction and equipment. 2300 w. Elec Wld—July 4, 1896.

**Energy Distribution.**—Distribution of the Energy of a Pound of Coal in the Electric Railway Cycle. Albert B. Herrick. Diagram showing in a graphic way the magnitude and location of the various losses in street railway operation. 1500 w. St Ry Jour—Jan. 6, 1900.

**England.**—Electric Street Railroads in England. Outlines the evidences of a great awakening in England in the use of electricity, and the chances for American manufacturers and contractors in connection with the work. 2800 w. U. S. Cons Repts, Vol. LIX., Feb., 1899.

Electric Traction. R. H. Smith. The reasons why electric transmission for railway purposes has been delayed in England, the importance of electrical engineers acquainting themselves with the experience gained in America. Frequent reference is made to information from the Street Railway Journal. 4000 w. Eng, Lond—Oct. 16, 1896.

Electric Traction on Tramways. J. Clifton Robinson. Extracts from paper read before Cleveland Inst. of Civ. Engs. at Stockton-on-Tees, England. Relates to the tramways of Bristol, Dublin, Middlesbrough, Stockton and Thornaby, and the London United tramways. 5000 w. St Ry Jour—July, 1899.

Electric Tramway Development. Editorial discussion of the development in England and the points needing special attention. 1800 w. Engr, Lond—March 3, 1899.

English Electric Railroads. A statement of the general situation in England with notes on a few of the roads recently completed. Ill. Serial. R R Gaz—Sept. 2, 1898.

English Electric Street Railroads. Some of the difficulties met by promoters of street railway schemes, the concessions which have been secured, and some that have failed. 1200 w. R R Gaz—May 6, 1898.

Recent Electric Tramway Construction in England. Harold Lomas. Part first gives a summary of the more important rules applying to the overhead-trolley system, with a brief history of electric traction in England. Ill. Serial. Elec Wld—Jan. 29, 1898.

Tramway Extension in Smaller Towns and City Suburbs. Discusses the obstacles to the extension of tramways in England. 1600 w. Ry Wld—July, 1897.

See also **British; Great Britain; United Kingdom.**

**English Legal Aspects.**—Legal Aspects of Electric Street Traction in England. E. F. Vesey Knox. An exposition of the necessity for more extended use of electric traction in England, together with an account of the political difficulties which obstruct the efforts to meet the demand. 5000 w. Engineering Magazine—Oct., 1898.

**Equipment Repairs.**—Some Statistics on the Life of Brake Shoes, Gears, Pinions and Trolley Wheels. Particulars given are the result of inquiry instituted among a few companies. 1300 w. St Ry Jour—March, 1897.

**Europe.**—Electric Railway Practice in Europe. The principal street railway systems of several European cities are described with special reference to the engineering methods adopted in the construction of their roadbed, their overhead construction, their power stations and their rolling stock, and to the financial results which have so far come from the introduction of electricity. Also editorial. Ill. 12500 w. St Ry Jour—April, 1897.

Electric Traction in the Light of Recent Developments. Philip Dawson. Illustrated account of progress traction in Europe. 1800 w. Elec Rev, Lond—Feb. 7, 1896.

European Electric Railway Statistics. Statistics of mileage, power, equipment and construction types. From "L'Industrie Electrique." 500 w. Ry Rev—May 9, 1896.

No Seat, No Fare, in Europe. C. L. Bonney. Report made to the Mayor and city council of Chicago. Brief account of transportation interests in London, Berlin and Paris, with remarks on joint use of tracks and municipal ownership. 2200 w. Elec—Nov. 13, 1895.

Some Suggestions to European Electric Railway Builders. Some points of importance regarding roadbed, track special work, power stations, equipment, etc. 1200 w. St Ry Jour—Sept., 1898.

Statistics of the Electric Tramways in Europe (Statistik der Elektrischen Bahnen in Europa). Giving comparative figures by countries for 1896 and 1897. The mileage has increased from 560 in 1896 to 905 in 1897 and in other respects in the same proportion. 2000 w. Die Elektrizität—May 22, 1897.

Street Railway Engineering in Europe. G. H. B. Zahn. Part first consists of general remarks with a brief description of the system in Zurich, Switzerland. Serial. Elec Eng, N. Y.—Oct. 7, 1897.

**Evian-les-Bains, France.**—Three-Phase Railway at Evain-les-Bains. From "La Revue Technique" and "L'Industrie Electrique." Describes an interesting short line, established to connect the hot baths with the Grand Hotel des Baines. Ill. 1600 w. Elec Eng, N. Y.—Oct. 20, 1898.

Tri-Phase Current Tramway at Evian-les-Bains (Tramway à Courant Triphase d'Evian-les-Bains). An illustrated account of this first three phase current tramway in France, with a profile of the road, and a scheme of the wiring. 1800 w. La Revue Technique—Sept. 25, 1898.

**Expenses.**—See **Working Expenses.**

**Express Service.**—Brooklyn Heights Railroad to Carry Express. Introduction of express service on a large electric system. 1000 w. St Ry Rev May 15, 1896.

Electric Railway Express. A. L. Stone. Illustrated description of equipment, showing how loaded wagons are carried on flat-top cars. 700 w. St Ry Rev—Jan. 15, 1896.

Interurban Express at Binghamton, N. Y. J. P. E. Clark. Introduction of express and freight service on an electric road is described, with illustrations of the combination car employed. 1200 w. St Ry Rev—April 15, 1896.

Some Recent Developments of the Trolley. Illustrated description of mail and express cars and of an electric trolley snow plow. 1400 w. Sci Am Sup—March 28, 1896.

The Albany-Troy Electric Express Service. A brief account of the plans and operation, with illustrations of forms used and tariff rates. 1300 w. St Ry Rev—May 15, 1896.

Trolley Express Service in Brooklyn. A brief description of the system and development of the business. 600 w. St Ry Rev—Oct. 15, 1896.

See also **Freight Service; Mail Service.**

**Fairmount Park, Philadelphia.**—A Novel Electric Railway in Fairmount Park, Philadelphia. Descriptive account. 1500 w. St Ry Jour—Dec., 1896.

The Electric Transportation System of Fairmount Park, Philadelphia. Illustrated detailed description of the methods by which this line has been constructed without interfering with the beauty or enjoyment of the park. 3000 w. St Ry Jour—Aug., 1897.

The Fairmount Park Transportation Co., of Philadelphia, Its Plans and Work. Illustrated descriptive account. 1500 w. Elec Eng—Oct. 21, 1896.

**Fare Collecting.**—Methods for Collecting and Registering Fares on Interurban Lines. F. H. Fitch. The problem of collection and registration of fares is discussed, with description of form designed by the writer. 1800 w. St Ry Rev—Feb. 15, 1899.

**Fares.**—Advantages of Up-to-date Street Railroad Service. Why the Rate of Fare Should not be Reduced. C. S. Rossiter. Read before the N. Y. State Convention at Niagara Falls. Discusses the need of electric street railways in cities, and the distance possible to travel for a single fare. 1300 w. St Ry Rev—Sept. 15, 1897.

Are Lower Street Car Fares Practicable? The past, the present, and the future of electric street railroads is considered at length, arriving at the conclusion that the difficulties are at present insurmountable. 2600 w. Elec—Feb. 5, 1896.

Freight and Passenger Rates on Interurban Lines. Latest views of street railway managers on this subject. 2800 w. St Ry Rev—March 15, 1898.

**Fares, Massachusetts.**—Three-Cent Fare Fallacy Exposed. A review of the report of the Mass. R. R. Commission, showing that on every road in the State the operating expenses exceed 3 cents per passenger. The writer concludes that this demonstrates the impossibility of a 3 cents fare. 1100 w. St Ry Rev—April 15, 1896.

**Feeders.**—Electric Railway Feeders. George T. Hanchett. On the calculation of steel feeders. 1200 w. Am Elect'n—March, 1898.

Feeder Lines. Gives facts regarding street railways operating under different conditions. 2200 w. St Ry Rev—Aug. 15, 1897.

Underground Feeders for Electric Traction. Charles E. Morris. Refers briefly to various methods adopted and their advantages and disadvantages. Ill. 1000 w. Ry Wld—July 7, 1898.

See also **ELECTRIC DISTRIBUTION.**

**Finance.**—Electric Railway Finance. W. R. Lawson. Part first is a historical review of the progress of electric railways, principally confined to Great Britain. Serial. Bankers' Mag, Lond—April, 1898.

The Commercial Aspect of Electric Railways. C. E. A. Carr. Discusses modes of advertising, improvements, and ways of increasing the revenue. 1700 w. Can Elec News—June, 1897.

The Money Centers and Tramway Opportunities of the World. A survey indicating the lines upon which further work can be done in particular sections. Part first considers the opportunities in Europe. Serial. St Ry Jour—Feb., 1899.

**Finance, United States.**—The Financial Results of Cable and Electric Railway Operation in the United States. Part first gives a broad view of the combined street railway systems of New York, Massachusetts, and Pennsylvania. Later papers will discuss the results of individual street railway systems. Serial. St Ry Jour—April, 1897.

**Fixed Stops.**—Fixed Stopping Stations on Tramways. C. Challenger. Discusses the advantages and disadvantages and gives the plan in vogue on the Bristol electric lines, which appears to give satisfaction. 1700 w. Ry Wld—Dec., 1896.

**Florence, Italy.**—The Electric Tramways of Florence. Illustrates and describes the present system and gives numerous views along the lines. 1700 w. Ry Wld—Aug. 10, 1899.

**France.**—Electric Railway Practice in France. A. N. Connett. An illustrated account of the methods employed, the attention given to tasteful construction in overhead work, and the general progress. 9500 w. St Ry Jour—Oct. 13, 1900.

Some Recent Electric Railways in France. Illustrated description of two roads, one between Roubaix and Tourcoing, the other between Raincy and Montfermeil. 1000 w. St Ry Jour—March, 1896.

**Franchises.**—Relation of Cities and Towns to Street Railway Companies. L. S. Rowe. Comments on the recent report of the special committee appointed by the Governor of Massachusetts to investigate the relations between cities and towns and street-railway companies. 2200 w. An of Am Acad—July, 1898.

See also **MUNICIPAL OWNERSHIP.**

**Freight Service.**—Hauling Freight and Express Matter on Electric Railways. A discussion of this service, with suggestions of the latest and best practice, and a description of the methods on a number of roads. Ill. 5000 w. St Ry Rev—April 15, 1900.

Freight, Mail, Express and Baggage Service. A compilation of the experience of 45 roads touching the profit of such service, with editorial review. 3900 w. St Ry Jour—May, 1896.

The Galt, Preston and Hespeler Street Railway and Its Freight Service. W. H. Lutz. An illustrated description of a Canadian line with combined passenger and freight service. The freight department is quite successful. 1400 w. St Ry Rev—Dec. 15, 1895.

The Right to Do Freight Business on Street Railroads. Gives the substance of Judge Hatch's decision, sustaining the right to carry freight. 600 w. R R Gaz—Oct. 20, 1899.

The Unconscious Ownership of an Important Key. W. T. Bonner. Read at meeting of the Can. Elec. Assn. A plea for the introduction of goods traffic on our suburban railways, with discussion. Ill. 6600 w. Can Elec News—July, 1898.

See also **Express Service; Mail Service; ELECTRIC TRANSPORTATION; WAGON—Bonner Rail.**

**Freight Service, Newburgh.**—Light Railway Goods. Service at Newburg. An illustrated account of the methods employed by the Elec. Ry. Co. of Newburgh, N. Y. 1200 w. Tram & Ry Wld—Feb. 8, 1900.

**Galt—Preston—Hespeler, Canada.**—See **Freight Service.**

**Geneva.**—Electric Street Railway in Geneva. Information concerning a railway projected by a citizen of San Francisco, and constructed by an American electrical engineer. 700 w. U. S. Cons Repts, No. 688—March 27, 1900.

The Street Railway System of Geneva, Switzerland. An illustrated article giving points of interest in the construction and operation of an extensive system. 4000 w. St Ry Jour—Aug. 4, 1900.

The Street Railway System of Geneva, Switzerland. Illustrated description. 800 w. St Ry Jour—Feb., 1897.

See **STREET RAILWAYS—International Association.**

**German Safety Rules.**—Safety Regulations for Electric Railway Plants (Sicherheitsregeln für Elektrische Bahnanlagen). The provisional regulations adopted by the Verband Deutscher Elektrotechniker for electric railways; and also those for theatres and for show windows and other places containing inflammable material. 4000 w. Elektrotech Zeitschr—Aug. 2, 1900.

System of Safety Regulations for Electric Railway Plants (Entwurf zu Sicherheitsregeln für Elektrische Bahnanlagen). A preliminary plan of a committee of the Verband Deutscher Elektrotechniker, containing regulations for overhead trolley and accumulator roads, covering all parts of the plant. 1500 w. Elektrotech Zeitschr—May 10, 1900.

See also **ELECTRIC APPARATUS; ELECTRIC INDUSTRY; ELECTRIC STATION.**

**Germany.**—Electric Railway. Construction in Germany. Louis J. Magee. A general review of German systems of finance, construction, equipment and operations. 5000 w. St Ry Jour—July, 1896.

Electric Railway Practice in Germany. Louis J. Magee. Illustrates and describes the interesting features of electrical operation in the country named. 7000 w. St Ry Jour—Oct., 1899.

Electric Street Railways (Elektrische Strassenbahnen). Dr. Gustav Rasch). A discussion of general principles of installation, including the combined overhead and underground system, together with the use of storage batteries. 5000 w. Zeitschr d Ver Deutscher Ing—Feb. 6, 1897.

Electric Traction in Germany. Calls attention to some points brought out by Edwin Houswald, in a paper read before the Electrotechnical Society of Berlin. Gives a summary of the new features of accumulator working. 1200 w. Engr, Lond—May 13, 1898.

Electric Traction in Germany. J. L. Hermessen. Historical review since the first introduction in 1879. 2000 w. Elec, Lond—Nov. 26, 1897.

Some Electric Tramways in the German Empire (Ueber einige elektrische Bahnen im Deutschen Reiche). An illustrated description of a number of German electric roads, both with overhead and underground conductors. 12000 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1897.

Statistics of the Electric Tramways in Germany (Statistik der Elektrischen Bahnen in Deutschland). An elaborate tabulated view of the electric roads of Germany, giving location, gauge, system, capacity and other details. 10000 w. Elektrotech Zeitschr—Jan. 6, 1898.

Statistics of the Electric Tramways of Germany (Die Statistik der Elektrischen Bahnen in Deutschland). The annual review of electric tramways with a fully tabulated statement of the development during 1897-1898. 12000 w. Elektrotech Zeitschr—Jan. 5, 1899.

The Statistics of the Electric Railways of Germany (Statistik der Elektrischen Bahnen in Deutschland). The annual tabulated statement, giving data for existing and proposed roads, and a general summary down to September 1, 1899. 10000 w. Elektrotech Zeitschr—Jan. 4, 1900.

**Glasgow.**—Electric Traction in Glasgow. Illustrates and describes the first electric tramway constructed in Glasgow, giving interesting particulars. 3800 w. Ry Wld—Oct. 13, 1898.

Electric Traction Recommended for Glasgow. Report of a town council sub-committee, based upon a review of the situation in the principal continental cities. 1400 w. Ry Wld—May, 1896.

Glasgow Central Railway. Illustrated description of the portion of the road from Glasgow Cross to Dowsholm and Maryhill. 2200 w. Eng Lond—Oct. 30, 1896.

Glasgow's Municipal Tramways. Milo Ray Maltbie. Facts and figures gathered in Glasgow and verified, showing great advantages as compared with private operation. 6500 w. Munic Af—March, 1900.

Glasgow Tramway Results. A report of the interesting and gratifying financial results of this very municipal undertaking. 1200 w. Engng—Aug. 4, 1899.

The Electrical Equipment of Glasgow Tramways. An illustrated detailed description of this extensive three-phase system. 6500 w. Tram & Ry Wld—Aug. 9, 1900.

The Glasgow Corporation Electric Tramways. Part first explains why electric traction was adopted, and describes the construction of the line. Ill. Serial. Engr, Lond—Feb. 10, 1899.

See also **STEAM ENGINES—Glasgow Tramways.**

**Graphical Records.**—Graphical Representations of the Gross Output of Electric Railways (Graphische Ermittelung der Bruttoabgaben Elektrischer Bahnen). Wilhelm Mattersdorff. Describing a method of plotting the total work of an electric railway by use of curves; illustrated by examples from Berlin Tramways. 1800 w. Elektrotech Zeitschr—Dec. 8, 1898.

Some Graphical Diagrams Used in the Operating and Accounting Departments. Treats of the application of graphical charts to railway records. 4000 w. St Ry Rev—July 15, 1898.

**Great Britain.**—Commercial Aspects of Electrical Traction in Great Britain. Emile Garcke. A discussion of present conditions, showing how onerous conditions and municipalising tendencies have hampered the progress which might otherwise have been made. 5000 w. Eng Mag—April, 1899.

Electric Railway Practice in Great Britain. Sidney H. Short. An illustrated review of roads and equipment, especially at Glasgow. 6000 w. St Ry Jour—Oct., 1899.

Electric Tramways and British Industry. Hawthorne Hill. On the obstacles met in England by electric railway companies, and their effect on the industrial situation. 1400 w. Ir Age—Nov. 23, 1899.

The Progress of Electricity on Railways During the Past Twenty-five Years. W. Langdon. The progress traced is confined to work in Great Britain. Considers construction, materials, accessories, and applications. 4500 w. Elec Rev, Lond—Nov. 12, 1897.

See also **British; England; United Kingdom.**

**Groenendijk, Holland.**—See **Narrow Gauge.**

**Grounded Cars and Dead Rails.**—Grounded Cars and Dead Rails. E. C. Parham. Discusses these troubles and the way to start the car without danger. 1000 w. Am Elect'n—Aug., 1900.

**Ground Return Losses.**—See **ELECTRIC RESISTANCE—Railway Feeders.**

**Guard Wire.**—See **Overhead Construction.**

**Halifax, Eng.**—Halifax Corporation Electric Tramways. Illustrated detailed description. 3000 w. Ry Wld—July 7, 1898.

**Halifax, N. S.**—Electric Railway System of Halifax, N. S. E. M. Archibald. An illustrated detailed description of the line and its equipment. 2000 w. St Ry Jour—May 5, 1900.

**Hamburg.**—Electric Street Car System of Hamburg. Interesting information of the construction and management of what is claimed to be the most complete system on the continent. 1800 w. U. S. Cons Repts, No. 518—Sept. 1, 1899.

The Introduction of Electric Power on the Hamburg-Altona Central Tramways (Die Einführung des Elektrischen Betriebes bei der Hamburg-Altonaer Zentralbahn). Illustrated description of an important overhead trolley line, with details of motors, switchboard, etc. 3500 w. Zeitschr d Vereines Deutscher Ingenieure—March 6, 1897.

**Hanover.**—Electric Street Railways in Hanover (Ueber die Elektrische Strassenbahn in Hanover). A paper before the Street Railway Association at Vienna by Friedrich Ross giving the results of experience both with trolley and storage battery systems. 7500 w. Mitt d Ver f d Ford d Local u Strassenbahnwesens—July, 1897.

The Hanover Electric Tramway (Die Elektrische Strassenbahn in Hanover). A description of the tests and performance of a combined overhead trolley and accumulator system. The accumulators serve not only to propel the cars through the central portion of the city, but also act to equalize the demands upon the generators. A valuable paper. 7500 w. Elektrotechnische Zeitschr—April 1, 1897.

The Street Railway System of Hanover. C. O. Mailloux. Illustrated description. 1100 w. St Ry Jour—Sept., 1896.

The Street Railway System of Hanover, Germany. Woolsey McA. Johnson. Brief illustrated description. 2200 w. Elec Wld & Engr—Oct. 14, 1899.

**Hartford.**—"Kinks" from Hartford. Illustrates and describes recent additions to the power station and other improvements. 2400 w. St Ry Jour—Sept., 1899.

**Hartlepool, Eng.**—Hartlepool Electric Tramways. Description of the line, power, installation and equipment. 2300 w. Ry Wld—July, 1896.

**Havana.**—The Electric Railways of Havana. Illustrated detailed description of the line now in course of construction and the equipment. 2000 w. St Ry Jour—Aug. 4, 1900.

**Higher Voltage.**—Notes on Higher Voltage Trolley Wires. Ernest Kilburn Scott. Notes on raising the voltage of trolley lines as an expedient when tram lines extend great distances from the power station. 1500 w. Elec Rev, Lond—Feb. 10, 1899.

See also **Voltage.**

**Honolulu.**—Honolulu and Its Street Railways. Frank X. Cicott. An illustrated description of the tramways with brief reference to the general conditions of the place. 1400 w. St Ry Jour—Nov., 1896.

**Huddersfield.**—The Huddersfield Tramways and the Municipalization of Tramways. J. Pogson. Historical account of these tramways, with short discussion. 3300 w. Elec Rev, Lond—April 23, 1897.

**Hull, Eng.**—Hull Corporation Electric Tramways. Historical notes with illustrated description of the line and power station. 3600 w. Elect'n Lond—July 28, 1899.

Hull Corporation Electric Tramways. Illustrates and describes the transformation being effected in the tramway facilities. 8000 w. Ry Wld—Aug. 10, 1899.

The Hull Electrical Tramways. Historical account and illustrated description. 3800 w. Elec Rev, Lond—July 7, 1899.

**Hungary.**—See **LIGHT RAILWAYS—Hungary.**

**Indianapolis.**—The Indianapolis Street Railway Franchise. A review of a 34-year franchise for which the company pays $1,160,000 cash and promises to spend over $1,000,000 in improvements of track and equipment under the direction of the local board of public improvements. 1500 w. Eng Rec—May 13, 1899.

**Indian Head Proving Ground.**—See **ELECTRIC PLANT—Powder Works, Indian Head.**

**International Union.**—See **STREET RAILWAY.**

**Interruptions.**—How Can Interruptions in New Power Installations be Prevented? (Wodurch Können Betriebsunfälle bei Strassenbahnen Möglichst Vermieden werden?) Discussing the interruptions and breakdowns which usually accompany the early working of electric trolley lines, with means for their avoidance. 2000 w. Deutsche Zeitschr f Elektrotechnik—April, 1897.

**Ireland.**—Electric Railways in Dublin and Cork. Illustrated description of the Clontarf section, Dublin, which has recently been electrically equipped; also an account of the electric railways of Cork. 2000 w. St Ry Jour—Jan., 1898.

**Isle of Man.**—A New Electric Railway in the Isle of Man. Describes the line, construction, and equipment of a scenic road. 2000 w. Elec Rev, Lond—July 17, 1896.

Douglas Southern Electric Tramway. An illustrated description of the latest addition to the Manx tramways. 2800 w. Ry Wld—Jan., 1897.

Electric Traction in the Isle of Man. General illustrated description of power installation, route, permanent way and equipment. 5400 w. Ry Wld—Aug., 1896.

Isle of Man Electric Tramways. A descriptive account of the system with statistical figures. 2200 w. Ry Wld—May, 1896.

See also **HYDRO-ELECTRIC PLANT—Isle of Man.**

**Ithaca, N. Y.**—The Street Railway System of Ithaca, N. Y. H. S. Cooper. An account of the road, the route, etc. 2600 w. St Ry Rev—June 15, 1900.

The Ithaca Street Railway. A description of a railway system in an ideal situation for the engineer who delights in difficult problems. It is considered a triumph for the electric system of traction. 1700 w. Elec Wld—July 18, 1896.

**Japan.**—Electric Railroad Building in Japan. Map of proposed lines in Tokio, with information concerning the companies formed, systems adopted, etc. 800 w. R R Gaz—May 20, 1898.

The Nagoya, Japan, Electric Railway Company. T. Kogi. Brief descriptive account of the line. 800 w. Elec Wld & Engr—April 7, 1900.

**Kansas City.**—Electricity on the Metropolitan Street Railway in Kansas City. An account of the many improvements made, with illustrated description of the new central power house and its system of power distribution for the operation of electric and cable roads. 900 w. Elec Eng—Sept. 9, 1897.

Pioneer Electric Railway Work in Kansas City. John C. Henry. Brief history of the early electric railroads. 2300 w. Elec Wld and Engr—Sept. 29, 1900.

The Street Railway Situation in the Two Kansas Cities. Illustrated description of this example of the best American practice. 6500 w. St Ry Jour—Oct. 13, 1900.

**Kidderminster-Stourport.**—Kidderminster and Stourport Electric Tramway. Full illustrated description of an English interurban line and its equipment. 3500 w. Ry Wld—June 2, 1898.

Kidderminster-Stourport Electric Tramway. Illustrated detailed description of a British line. 1400 w. Elect'n, Lond—May 20, 1898.

**Kingston, Jamaica.**—The Street Railway System of Kingston, Jamaica. Henry E. Raymond. Illustrates and describes an example of high grade hydraulic and electric engineering in the West Indies. 2000 w. Am Elect'n—July, 1899.

**Lake Erie to Lake Ontario.**—Trolley Line Between Lakes Erie and Ontario. Orrin E. Dunlap. Brief illustrated description. 600 w. W Elec—Sept. 26, 1896.

See also **Niagara.**

**Laon, France.**—Electric Traction at Laon. Illustrated description of a short electric railway with some steep gradients. 700 w. Tram & Ry Wld—Oct. 5, 1899.

The Electric Railway from the Laon Station to the City (Le Chemin de Fer Electrique de Laon-Gare à Laon Ville). With views and profile of the tramway from the station to the height upon which the city is situated. 1500 w. L'Electricien—Oct. 7, 1899.

**Lausanne, Switzerland.**—The Lausanne Electric Tramways. C. Du Riche Preller. Illustrates and describes a system especially interesting because of its exceptionally steep grades. 5000 w. Engng—Dec. 16, 1898.

**Leeds, Eng.**—Electric Tramway Extension at Leeds. Illustrates and describes interesting permanent way reconstruction, including considerable bonding, and also overhead electric equipments. 1500 w. Tram & Ry Wld—Oct. 5, 1899.

Leeds Electric Tramways. Illustrated detailed description. Serial. 1st part. 2400 w. Elec Rev, Lond—Aug. 27, 1897.

The City of Leeds Electric Tramways. Illustrated detailed description of a successful municipal tramway. 8600 w. Ry Wld—Aug., 1897.

The Cost of Electric Traction: Leeds Electric Tramways. Figures relating to the cost of construction and working of this English line, with editorial comment. 2800 w. Ry Wld—May 5, 1898.

**Lemberg, Galicia.**—The Lemberg Electric Tramways. Brief illustrated description. 600 w. Ry Wld—Dec., 1897.

**Legislation.**—The Trolley Is Free. Full text of the decision of the U. S. Circuit Court of Appeals in the case of the Thompson-Houston Electric Company vs. The Hoosick Railway Company. 4400 w. Elec—July 28, 1897.

**Lexington-Boston.**—The Lexington and Boston Electric Railway. An illustrated account of an electric road following for a large part of its course close to the route made famous by Paul Revere's ride. 3000 w. St Ry Jour—June 2, 1900.

**Limoges.**—The Tramways of Limoges (Les Tramways de Limoges). M. Delage. A detailed account of the Limoges tramway system, giving details of construction, operation, and maintenance. 12000 w. 4 plates. Ann des Ponts et Chaussées—2 Trimestre, 1900.

**Liverpool.**—Liverpool Corporation Electric Tramways. An illustrated description of the portion of the line opened for traffic. 2500 w. Elec Rev, Lond—Nov. 18, 1898.

Liverpool Corporation Electric Tramways. Illustrates and describes the new double bogie cars and their equipment. 1800 w. Ry Wld—Nov. 10, 1898.

Liverpool Corporation Tramways. Illustrated description of the construction and equipment. 1300 w. Tram & Ry Wld—Aug. 9, 1900.

**London.**—London United Tramways. Map and description of the system of tramways being constructed by this company. 2000 w. Ry Wld—June 8, 1899.

New Electric Tramway Schemes for London. Extracts from the report of the Highways Committee concerning the proposed new tramways north and south of the Thames. 2000 w. Elec Rev, Lond—Aug. 3, 1900.

Newspaper Comment on Electric Traction. Indicating the status of the overhead wire question in London. 600 w. Ry Wld—April, 1896.

Overhead Electric Tramways for London. J. Clifton Robinson. History, illustrated description and argument. 10600 w. Tram & Ry Wld—July 5, 1900.

The London County Council and Electric Traction. Full text of the report of A. B. W. Kennedy to the Committee on mechanical traction on tramways. 4500 w. Elect'n, Lond—Aug. 18, 1899.

See also **CITY RAILWAY; TRAMWAY.**

**Los Angeles, Cal.**—The System and Methods of the Los Angeles Railway Company. Brief remarks on the rapid growth of the city, and the development of the street railway system, with illustrated detailed description of the present well equipped electric system. 3800 w. St Ry Jour—June, 1898.

**Lugano.**—First Three-Phase Electric Railway in the World. Comment upon the electric tramway at Lugano, Switzerland. 450 w. St Ry Rev—May 15, 1896.

The Polyphase Electric Tramway at Lugano (Tramway Électrique à Courants Polyphasés de Lugano). An illustrated account of this recently constructed road. The alternating polyphase current is generated by water power over 7 miles from the town. 5000 w. Le Génie Civil—July 10, 1897.

Three-Phase Electric Railway at Lugano, Switzerland. Reviews the advantages of the polyphase system and solutions of objections made, and gives a description of the first street railway built under the system. 2000 w. St Ry Rev—July 15, 1896.

**Lyons.**—Electric Traction at Lyons (La Traction Electrique à Lyon). Description, with maps and illustrations of the 12 lines of the Compagnie des Omnibus et Tramways at Lyons. Both trolley and conduit systems are in use. 3000 w. L'Electricien—Nov. 19, 1898.

Electric Traction at Lyons, France. Brief account of the recent change of all lines to electric traction, describing the system adopted. 1500 w. Elec Wld—Dec. 31, 1898.

**Madras, India.**—The Trolley in India. The Madras Electric Railway. George Hell Guy. Historical account of the enterprise and the difficulties, with illustrated description. 1300 w. Elec Eng—Jan. 6, 1897.

**Madrid.**—Madrid Electric Tramways. An illustrated detailed account of these tramways, with a brief sketch of the city. 3000 w. Ry Wld—Feb. 9, 1899.

**Magnetic Observatory.**—See **MAGNETIC OBSERVATORY—Electric Tramway.**

**Mail Service.**—Mail Service on Street Railways. Statements regarding the growth and improvement of the service, which is said to be not a source of great financial gain. 1200 w. St Ry Rev—March 15, 1897.

The Carrying of U. S. Mail Matter on Interurban and Street Railways. W. S. Dimmock. Read before the A. S. R. A. Showing the gain to the Post Office Department from the use of electric lines. Discussion. 6300 w. St Ry Rev—Sept. 15, 1898.

See also **Express Service; Freight Service; ELECTRIC TRANSPORTATION.**

**Maine.**—A Model American Electric Railway System. Illustrates and describes the Lewiston, Brunswick and Bath Street Railway in the state of Maine. 2500 w. Engng—Aug. 18, 1899.

See also **Polyphase.**

**Manchester.**—The Manchester Tramway System. F. Brocklehurst. Explaining the system now existent, the steps taken toward municipalization, and the proposed expenditure. Ill. 3000 w. Tram & Ry Wld—Dec. 7, 1899.

**Marine.**—See **Brighton-Rottingdean.**

**Massachusetts.**—A Cross Country Electric Railway in Eastern Massachusetts. An illustrated detailed account of the Norfolk Western Street Railway Company, with general introductory information. 3300 w. St Ry Jour—Sept., 1899.

A New England Suburban Railway. An illustracted description of the Exeter, Hampton and Amesbury street railway. 1600 w. St Ry Jour—March 3, 1900.

Report of Massachusetts Street Railways. Information from the Railroad Commissioners' report for 1897. 1200 w. St Ry Rev—May 15, 1898.

The Milford, Attleboro and Woonsocket Street Railway. William D. Ennis. Describes this new road and its equipment and operation. Ill. 2500 w. Elec Wld & Engr—March 17, 1900.

**Meadville, Pa.**—Electric Railway System of the Meadville Traction Company. Brief illustrated description of a road in Pennsylvania, constructed according to the latest methods. 900 w. St Ry Jour—July, 1898.

Street Railways of Meadville, Pa. Information relating to the electric lines of this city and the traffic. Ill. 1000 w. St Ry Rev—Dec. 15, 1898.

**Mechanical Features.**—Mechanical Features of Electric Traction. Philip Dawson. Portion of a paper read before the Institution of Mechanical Engineers, England, considering poles, insulators, trucks, motors, gearing, power, etc. 2800 w. Engr, Lond—Nov. 12, 1897.

Mechanical Features of Electric Traction. Philip Dawson. Read before the Institution of Mechanical Engineers, England. Introductory remarks showing the importance of the subject, with discussion of special features entering into the design and construction of the system. Ill. Serial. Elect'n, Lond—Jan. 28, 1898.

Mechanical Features of Electric Traction. Philip Dawson. Read before the Inst. of Mech. Engs. Part first presents the importance of the subject and considers the outside work and rolling stock. Serial. Elec Eng, Lond—Aug. 6, 1897.

**Melbourne.**—The Great Street Railway System of Melbourne. F. W. N. King. Interesting account, with illustrations. 1500 w. St Ry Rev—Aug. 15, 1897.

**Meter.**—The Influence of Accurate Measurements upon Economic Operation. Caryl D. Haskins. Read before the N. Y. State Convention. Recommending the use of meters. 1200 w. St Ry Rev Sept. 15, 1897.

**Meter System, Nashville.**—Economizing Electrical Power. E. G. Connette. Reports the improvement in consumption of power on the Nashville Street Railway since it has been running on the meter system, giving the rules issued and the suggestions for economical application of the current. 2000 w. St Ry Jour—Sept., 1898.

**Middlesbrough-Stockton.**—Middlesbrough, Stockton, and Thornby Electric Tramways. A finely illustrated description of an English interurban street railway constructed by the Imperial Tramways Company on Tees-side. 5500 w. Ry Wld—Aug. 4, 1898.

**Mileage Statistics.**—Railway Mileage in Foreign and American Cities. From the "Surveyor," of London. Gives figures upon the cost of operating trolley lines, and table giving the miles of track and population per mile. 800 w. St Ry Rev—Dec. 15, 1898.

**Milwaukee.**—Milwaukee Electric Tramways. An illustrated description of the installation. 2500 w. Tram & Ry Wld—Jan. 11, 1900.

The Electric Railway System of Milwaukee and Eastern Wisconsin. An illustrated detailed description of a remarkable system, with an account of the equipment, operation and financial results. 8000 w. St Ry Jour—June, 1899.

**Minnesota.**—See **HYDRO-ELECTRIC STATION—St. Anthony's Falls.**

**Montana.**—Double-Track Electric Railway from Butte to Centerville, Montana. Francis W. Blackford. Particulars concerning the change made from cable to electric traction. Ill. 700 w. Jour Assn of Engng Soc's—Jan., 1899.

**Montreal.**—Montreal Island Belt Line Railway. Illustrated description of the line with the equipment and history of the undertaking. 3500 w. Can Eng—April, 1898.

**Moscow.**—The Electric Line of the First Street Railway Company of Moscow (Die Elektrischen Linien der Ersten Strassenbahn Gesellschaft in Moskau). Erich Krannhals. A general description of the plant, and views of points on the road and in the power house. 2000 w. Elektrotech Zeitschr—Feb. 8, 1900.

**Motor Maintenance.**—See **ELECTRIC MOTOR—Railway Repair.**

**Motorman.**—See **MOTORMAN.**

**Municipal Ownership.**—Municipal Ownership and Operation of Street Railways. P. F. Sullivan. Full paper as read at the Niagara Falls convention of the American Railway Assn. Unfavorable to its adoption in American cities at present. 7500 w. St Ry Rev—Nov. 15, 1897.

Municipal Tramway Management. A comparison of the corporation-worked tramways of Leeds, Eng., with a tramway in the hands of a private company, and a discussion of the service and means of benefiting it. 3800 w. Ry Wld—Jan., 1898.

Shall Tramways be Constructed and Operated by the Municipality? (Sollen Kommunen Strassenbahnen Bauen und Betreiben?) Discussing the question of electric tramway franchises from the present German standpoint, showing the difficulties involved in municipal ownership. 3000 w. Deutsche Zeitschr f Elektrotechnik—July 15, 1897.

The Juridic Side of the Municipalization of Tramways. George Beynon Harris. Part first deals with the means by which a corporation may become possessed of a tramways undertaking, according to English law. Serial. Elec Eng, Lond—Jan. 14, 1898.

See also **MUNICIPAL OWNERSHIP.**

**Narrow Gauge.**—The Narrow Gauge Electric Road of the Groenendijk Sugar Works, Holland (Die Elektrische Schmalspurbahn der Zuckerfabrik Groenendijik, in Holland). J. Werther. Illustrated description of an electric road used for conveying the sugar beets from the fields to the works. One motor car draws a train of special tipping cars. 2500 w. Electrotechnische Zeitschr—April 14, 1898.

See also **LIGHT RAILWAY; NARROW GAUGE RAILWAY.**

**Nashville, Tenn.**—See **Meter System.**

**Newcastle, Eng.**—Newcastle Tramway. Full text of the report of W. George Laws on the question of the introduction of electric tramways into that city, and the most desirable system to adopt. 5200 w. Elect'n, Lond—April 14, 1899.

**New England, Southern.**—The Growth of Electric Railways in Southern New England. A review with tables and map. 1200 w. St Ry Jour—Sept., 1896.

**New Jersey.**—Important Work in Northern New Jersey. Illustrates and describes important extensions to the lines of the New Jersey & Hudson River Railway & Ferry Co., and of their equipment. 1500 w. St Ry Jour—Sept. 1, 1900.

See also **Bergen County, N. J.**

**New Jersey Coast.**—The Electric Railway System of the Northern Coast of New Jersey. General Illustrated description. 2800 w. St Ry Jour—Sept., 1896.

**New Jersey Consolidated.**—The System of the Consolidated Traction Company of New Jersey. A full detailed description of power plant, equipment, permanent way, operation and discipline: with complete data, illustrations, table, map of the lines, etc. Also editorial. 7000 w. St Ry Jour—Aug., 1896.

**New Orleans.**—The Electrical Equipment of the Orleans Railroad, New Orleans, La. Illustrated description. 3000 w. Elec Eng—April 1, 1896.

The System of the Orleans Railroad Company, New Orleans, La. A thorough description of plant and operation. One of the novel features in a road bed construction on swampy ground, the bottom of the excavation being floored with cypress planting. Ill. 3800 w. St Ry Jour—April, 1806.

The System of the Canal & Claiborne Railroad Company. Illustrated detailed description. 10000 w. St Ry Jour—May, 1897.

See also **Overhead Construction.**

**Newtown, Pa.**—Three-Phase Installation of the Newtown (Pa.) Electric Street Railway. Brief illustrated description. 700 w. St Ry Rev—March 15, 1900.

**New York Examination.**—New York State Civil Service Examination for Electric Railroad Experts. Questions used in the examination just held. 500 w. Elec Eng—July 8, 1896.

**New York,—Queen's County.**—The New York and Queens County Electric Railway. J. E. Woodbridge. Describes briefly the line, power plant and equipment with photographs and diagram of car wiring. 900 w. Elec Wld—Aug. 1, 1896.

**New Zealand.**—Possibilities for Electric Traction in New Zealand. Frank X. Cicott. Illustrates and describes the physical features of the islands, giving information of the intelligence of the people, the commercial importance, exports, and other matters of interest. 1400 w. St Ry Rev—Nov. 15, 1898.

**Niagara County.**—The Lewiston and Youngstown Frontier Railway. Brief illustrated description of railway in Niagara Co., N. Y. 900 w. St Ry Rev—May 15, 1897.

**Niagara Gorge.**—Building the Niagara Gorge Railway. George A. Ricker. An account of the business side of the enterprise, with illustrations of the route, and description of the construction. 5500 w. Pro Engs' Club of Phila—July, 1899.

The First Five Years' Experience in Maintaining the Niagara Gorge Railroad. George A. Ricker. An illustrated account of the construction of the road, and features of interest. 3000 w. St Ry Jour—Sept. 1, 1900.

The Gorge Road at Niagara Falls. An illustrated description of the Gorge Railroad, which is designed to prove a great attraction to all lovers of natural beauty. 1200 w. Sci Am—March 28, 1896.

**Niagara River.**—Street Railways of Niagara. Brief illustrated descriptions of the various electric lines on both sides the river, covering 127 miles of track. 4400 w. St Ry Rev—Oct. 15, 1897.

The Electric Railways of the Niagara River Region. A brief review of the conditions which have affected the industrial growth of this region, the street railway development, and other things of interest. Ill. 11500 w. St Ry Jour—Oct., 1897.

See also **Lake Erie to Lake Ontario.**

**Nice.**—Electric Tramways of Nice and of the Littoral. Illustrates and describes a transformed system, including the latest applicances for electric traction. 1500 w. Tram & Ry Wld—May 10, 1900.

**Northern Ireland.**—The Portrush and Giant's Causeway Electric Railway. Brief description, with illustrations of an electric railway eight miles long, the first constructed in the United Kingdom. 900 w. Engr, Lond—Sept. 8, 1899.

**Norway.**—The Holmenkollen Railway (Die Holmenkollen-Bahn). F. Hoffman. A very complete account of this electric road, running from Christiania to Holmenkollen, with map and many views, and plans of the wiring and station accumulators. 6000 w. Elektrotech Zeitschr—Sept. 1, 1898.

**Norwich.**—Norwich Electric Tramways. An account of the opening of twenty miles of electrically equipped tramways in a city that has not possessed a tramway of any description. Illustrates and describes the line. Serial. Elect'n, Lond—May 18, 1900.

**Nottingham.**—Nottingham Tramways. Report of the Corporation's committee, with critical review. The committee recommend the adoption of the overhead trolley system, and the reconstruction of the existing system, and many extensions. 4000 w. Ry Wld—May 5, 1898.

**Ohio.**—An Interesting Cross-Country Electric Road. Illustrated description of the tramway from Dayton to Eaton, Ohio. 1000 w. St Ry Jour—June, 1899.

The Dayton and Western Interurban. Illustrates and describes an interurbon road extending 25 miles west of Dayton, O., as an example of latest practice. 1200 w. St Ry Rev—March 15, 1899.

**Ohio Interurban.**—A Forty-Mile Interurban Electric Railway. W. N. Zurfluh. Illustrated description of the power station and equipment of the Dayton, Springfield & Urbana (Ohio) Railway. 1500 w. Am Elect'n—Sept., 1900.

**Omaha & Council Bluffs.**—The Omaha & Council Bluffs Railway & Bridge Co. Illustrates and describes a railway equipped in 1888. 3500 w. St Ry Rev—May 15, 1899.

**Omnibus, Siemens-Halske.**—See **ELECTRIC VEHICLE—Omnibus.**

**Operating Economy.**—Comparative Economy in Electric Railway Operation. Charles H. Davis. Claiming that true economy lies less in the saving of coal than in the saving of wear and labor. 3300 w. Eng Mag—March, 1897.

**Operating Tests.**—Simple Operating Tests for Electric Railways. Illustrates and describes eleven convenient tests. 3800 w. St Ry Jour—May 5, 1900.

**Operation.**—Operation and Maintenance of Street Railways. H. F. MacGregor. Read at meeting of the Southwestern Assn. Suggestions from the experience of the writer. 1600 w. St Ry Rev—May 15, 1900.

Stopping Another Leak in Electric Railway Operation. J. R. Cravath. Illustrated description of recorder, with tests, and the benefits from its use. 3000 w. St Ry Rev—April 15, 1897.

**Operation, Columbus, O.**—Operating Methods of the Columbus Railway Company. Describes the methods and gives information of interest. 3000 w. St Ry Jour—Sept. 1, 1900.

**Orbe-Chavornay, Switzerland.**—The Orbe and Chavornay Electric Railway. C. S. DuRiche Preller. Describes the line, power, rolling stock, electrical equipment, service, etc., giving net results of this road. 1600 w. Engng—Oct. 1, 1897.

**Oshkosh-Neenah, Wis.**—Oshkosh & Neenah Interurban Electric Ry. Illustrated detailed description of a 16-mile railway, which forms an important link in the proposed electric system from Chicago to Green Bay, Wis., a distance of 198 miles. 1900 w. Eng News—April 5, 1900.

**Overhead Construction.**—Modern Overhead Construction for Electric Railways. Benjamin Willard. Abstract of a paper read at the annual convention of Am. St. Ry. Assn. Discusses methods of construction and gives the writer's preferences and reasons. 3000 w. Eng News—Oct. 29, 1896.

Overhead Conductors for Electric Railways (Die Oberleitung Elektrischer Strassenbahnen). Max Schiemann. A very complete discussion of the best methods of constructing overhead trolley lines, including the trolleys and communication to the cars, as well as the support and arrangement of the conductors. Two papers. 10000 w. Elektrotech Zeitschr—May 11, 18, 1899.

Overhead Construction for Electric Tramways (Oberleitungsmaterial für Elektrische Bahnen). A general description of the connections, insulators, supports, and details of overhead trolley construction as used by the "Allgemeine Elektricitätsgesellschaft" at Berlin. 5000 w. Elektrotech Zeitschr—July 13, 1899.

Overhead Feeder and Trolley Construction of the New Orleans Traction Company. W. Nelson Smith. A line interesting because of its size and the peculiar conditions prevailing. Map. 1700 w. Elec Ry Gaz—Nov. 16, 1895.

Overhead Line Construction. Albert B. Herrick. Relates to the selection and erection of apparatus and methods of construction. Ill. Serial. St Ry Jour—May, 1899.

Recent Electrical Overhead Work in San Francisco. S. L. Foster. The work is notable for substantial construction and generous dimensions. 1800 w. St Ry Jour—May, 1899.

The Construction of Overhead Equipments. A brief illustrated account of the work of construction of an overhead line for tramway work, with a view to pointing out some of the difficulties that may be encountered. Serial. Elec Rev, Lond—Feb. 23, 1900.

The Suspension of Trolley Wires for Electric Tramways (Ueber die Aufhängung der Oberleitung bei Elektrischen Bahnen). A mathematical discussion with special reference to the strains on the wires considered at catenaries. Two articles. 8000 w. Elektrotech Zeitschr—July 8 and 15, 1897.

Sliding v. Rolling Contact for Electric Tramways (Ueber Bügel-und Rollen-Kontakt bei Elektrischen Strassenbahnen). Showing that with a properly constructed sliding contact there is less wear on the conducting wire than with the roller, owing to the action of the sides of the grooves in the trolley roller. 2000 w. Deutsche Zeitschr für Elektrotechnik—March, 1897.

European Practice in Overhead Trolley Construction. The European device is a sliding contact collector, and while it appears cumbersome, it possesses many excellent features. 1100 w. W Elec—Feb. 22, 1896.

Some of the Principal Types of the Overhead Trolley. Spencer Baird Prentiss. Brief illustrated description of types comparatively little known. 1200 w. Elec Rev, N. Y.—June 27, 1900.

Note on the Pressure of the Trolley Wheel Against the Wire. Herman S. Hering. A discussion of the effect on sparking, with argument in favor of high pressure, with notes of tests and the results. 1400 w. Elec Wld—Oct. 24, 1896.

The Installation of Overhead Electric Trolley Wires (L'Establissement des Lignes Aériennes de Tramways Electriques). A very complete mathematical discussion of the stresses in overhead trolley wires, taking into account the action of gravity, wind, and changes of temperature. 6000 w. La Rev Tech—Oct. 10, 1898.

The Relation Between Stress and Sag in Span and Trolley Wires. E. A. Merrill. Special attention is called to points having particularly to do with the initial cost, especially in iron pole construction. 1700 w. Elec Ry Gas—Jan. 4, 1896.

Tension and Bending Strength of Electric Trolley Wire (Zug-und Beigungs Festigkeit der Draht-Materialien für Elektrische Bahnen). Giving a table of tests of various steel and copper wires. 1000 w. Deutsche Zeitscher f Elektrotechnik—June 15, 1897.

An Important Trolley Question (Brennende Bahn-Fragen). A discussion of the great tensional strains upon the trolley wires,due to changes of temperature. 1500 w. Deutsche Zeitschr für Elektrotechnik—March, 1897.

The Influence of Temperature Upon the Wires of Electric Tramways (Ueber den Einfluss der Temperatur auf den Fahrdraht Elektrischer Bahnen). Dr. M. Eisig. A discussion of the stresses produced by expansion and contraction. 2000 w. Elektrotech Zeitschr—Sept. 14, 1899.

See also **ELECTRIC CONDUCTOR; ELECTRIC LINE; POLE; TRACK—Street; TROLLEY.**

**Overhead Construction Curves.**—Correct Location of Trolley Wire on Special Curves. Charles A. Alden. Describing a simple mechanical method with diagram. 400 w. St Ry Jour—July, 1896.

**Overhead Construction Guard Wires.**—Overhead Construction, with Special Reference to Guard Wires. Sydney Woodfield. Discusses the cause of accidents, present practice, and suggests points with regard to their erection. Ill. 2800 w. Elec Rev, Lond—Sept. 21, 1900.

Protection of Telegraph and Telephone Wires in Connection with Overhead Traction. R. C. Quin. Read before the Munic. Elec. Assn. at Leeds, Eng. Brief paper discussing the usual practice. 1500 w. Elect'n, Lond—Aug. 10, 1900.

The Protection of Telegraph and Telephone Wires in Connection with Overhead Traction. R. C. Quin. Read at Cardiff convention of Munic. Elec. Assn. Briefly considers the systems of protection in use. 1300 w. Elec, Eng, Lond—July 20, 1900.

A German Substitute for Guard Wires. Illustrated description of a device which is recommended as securing entire efficiency with reduced cost. 600 w. St Ry Rev—April 15, 1896.

**Para, Brazil.**—See **ELECTRIC POWER STATION—Para, Brazil.**

**Paris.**—A Combined Overhead and Conduit System in Paris. Illustrated detailed description. Great care was given to the overhead work, with most pleasing results. The line has many innovations in its constructional features. 2200 w. Ry Wld—Jan. 5, 1899.

A New Electric Tramway System in Paris (Un Nouveau Réseau de Tramways a Traction Electrique a Paris). A discussion of the introduction of electric traction to provide transportation for the exposition of 1900. 3500 w. La Rev Tech—Dec. 25, 1896.

Dual Electric System in Paris. A detailed description of this installation for dual or mixed traction, constructed by the French Thomson-Houston Co. Ill. 1700 w. Ry Wld—Sept. 8, 1898.

Electrical Tramways in Paris. R. T. Collins. Extract from an article in the supplement to the "Contract Journal." Illustrated description of the systems in use; the overhead trolley is excluded. 3500 w. Elec Eng, Lond—April 22, 1898.

Electric Traction in Paris (La Traction Electrique à Paris). Emile Dieudonné. Giving profiles of suburban lines out of Paris and description of accumulator and trolley motor cars soon to be installed. 3000 w. 1 plate. La Rev Tech—March 10, 1898.

The Application of Mechanical Traction to the Lines from the Louvre to Vincennes (Application de la Traction Mechanique aux Lignes du Louvre à Vincennes). A. Monmerqué. A description of the accumulator electric traction system now being installed on an important section of the Paris tramways. 6000 w. Rev Gen de Chem de Fer—July, 1899.

The New Bastille-Charenton Line of Electric Tramways (La Nouvelle Ligné de Tramways Electrique Bastille-Charenton). J. Prouteau. A well illustrated description of this line, the first overhead trolley railway in Paris, with special reference to the construction of the conduit section. 4000 w. La Rev Tech—Nov. 25, 1898.

The Proposed Paris Electric Tramway System (Die Stadtbahn von Paris mit Elektrischem Betriebe). A detailed account of the official plan for providing Paris with a complete system of electrical transportation. 2 plates. 4000 w. Oesterr Monatschr f d Oeffent Baudienst—June, 1897.

Trolley and Conduit Tramway in Paris (Tramway Electrique à Trolley et à Caniveau de la Place de la Bastille à Charenton). G. Boeto. A well illustrated and a complete description of this new line. The conduit construction is similar to that recently installed in New York. 5000 w. 1 large plate. Génie Civil—Dec. 31, 1898.

See also **ELECTRIC CONDUIT TRAMWAY; TRAMWAY.**

**Party Cars.**—Trolley Parties and Party Cars. A compilation of correspondence from managers of various roads, describing their practice regarding this feature of operation. 2200 w. St Ry Rev—Sept. 15, 1896.

See also **ELECTRIC CAR—Parlor; Special.**

**Passaic-Newark, N. J.**—The Passaic and Newark Electric Railway. A well illustrated description. 1300 w. Eng News—Jan. 9, 1896.

**Pekin.**—The Pekin Electric Tramway and Light and Power Station (Die Elektrische Bahn Pekin-Ma-Chia-pu und das Licht-und Kraftwerk Pekin). A. Fischer. With plan of the road and views of the power house. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 1, 1900.

**Perth, Australia.**—The Electric Tramway System of Perth. Illustrated detailed description of a road with interesting features. 1500 w. St Ry Jour—April 7, 1900.

**Philadelphia.**—Organization and Operating Methods of the Union Traction Company of Philadelphia. An illustrated description of the plan of organization, power stations, distribution circuits, roadbed, rolling stock, etc. 5800 w. St Ry Jour—Nov., 1898.

The Electrical Equipment of the Union Traction Company, Philadelphia. An account of some of the interesting features of the latest electrical practice, in the operation of the largest street railroad property in the world. Ill. 1700 w. Elec Rev, N. Y.—Feb. 7, 1900.

See also **Fairmount Park, Roadway Department; Willow Grove.**

**Pittsburg.**—A Few Notes on Early Electric Railway Work in Pittsburg. Leo Daft. Illustrated reminiscences. 3500 w. St Ry Rev—Oct. 15, 1896.

Important Changes Proposed in Pittsburg. An outline of the important changes in regard to the generation of power, made necessary by the recent consolidation of several companies. Ill. 1000 w. St Ry Jour—Feb., 1898.

New Power Station, Shops and Pleasure Resort of the Consolidated Traction Company, Pittsburg. Description and illustrations. 4500 w. St Ry Rev—Feb. 15, 1899.

Notes from the Field—Electricity on the Pittsburg Street Railways. C. B. Fairchild. Part first is a description of the plant and equipment of the Consolidated Traction Company. 3000 w. Elec Eng, N. Y.—July 21, 1898.

System of the United Traction Company, Pittsburg. Illustrated detailed description of the consolidated roads and their equipment. 3000 w. St Ry Jour—July, 1899.

**Pleasure Resort.**—Pleasure Resort Roads. A list of the principal roads of this character, with brief description and illustrations of their attractions. The topic is treated with reference to its relation to travel and income. 3000 w. St Ry Rev—April 15, 1896.

See also **Willow Grove.**

**Polyphase.**—Overhead Trolley System for Multiphase Motor Roads (Oberirdische Stromzuführung für Drehstrombahnen). An arrangement by which two overhead metallic conductors are used, giving details of double conductor trolley pole, etc. 2000 w. Deutsche Zeitschr f Elektrotechnik—June 15, 1897.

Polyphase Transmission for Suburban Extensions. Discusses the advisability of installing polyphase apparatus and the proper type for long distance extensions. 1600 w. St Ry Jour—April 7, 1900.

Power Distribution and the Use of Multiphase Current Transmission for Ordinary Street Railways. Maurice Hoopes. Read at the Convention of the American Street Railway Assn. The paper considers the comparative merits of systems to meet the demands of changed conditions brought about by extensions of roads and other causes. 7000 w. Elec Wld—Oct. 23, 1897.

See also **Evian-les-Bains; Lugano; Newtown, Pa.; Providence, R. I.**

**Portland, Maine.**—The Street Railways of Portland Me., and Vicinity. C. B. Fairchild. An illustrated general description of the system of the Portland Railroad Co. and the suburban line of the Portland & Yarmouth Electric Railway Co. 9000 w. St Ry Rev—Sept. 15, 1900.

**Porto Rico.**—The Exploitation of Electric Tramways in Porto Rico. Antonio Mattei Lluveras. This well illustrated article describes the needs of Porto Rico for some system of transportation better than mule back. It contains much valuable information concerning the resources of the island. 4200 w. Eng Mag—Feb., 1899.

**Potteries, Eng.**—The Potteries Electric Tramway. Illustrated description of an extensive system of tramways in England, which will now have electric service. 2500 w. Elec Eng, Lond—May 19, 1899.

**Pottsville, Pa.—See Schuylkill.**

**Power and Equipment.**—Power and Equipment of Electric Railways. H. H. Hunt and C. K. Stearns. Reviews the events that mark the progress of the application of electricity to street car propulsion, and outlines the problems in design, and the method of treatment. 5600 w. Jour Assn of Engng Soc's—Jan., 1899.

**Power Computation.**—An Analytical and Graphical Method of Computing the Resistance to Starting and Stopping on Electric Tramways (Eine Analytische und Graphische Methode zur Berechnung von Anfahr-und Bremswiderständen für Electrische Eisenbahnen). F. Erens. An elaborate mathematical analysis, showing that rational methods can be used in practice instead of the empirical ones formerly in vogue. 6000 w. Elektrotech Zeitschr—April 20, 1899.

Power Necessary to Keep Tramway Cars in Motion. Describes the method of computing the horse power. 1200 w. Ry Wld—Aug. 4, 1898.

The Computation of the Power Required for Electric Street Railways (Berechnung des Kraftbedarfes von Elektrischen Strassenbahnen). Ludwig Schroeder. A discussion of the graphical method of plotting the varying demands for power, showing the use of accumulators for equalizing the load upon the motive power. 6000 w. Elektrotech Zeit—Feb. 2, 1899.

**Power Consumption.**—Power Consumption in Electric Railroading. S. T. Dodd. Read before the Civil Engs.' Club of Cleveland, O. Part first is mainly devoted to the consideration of frictional resistance. 900 w. Elec Eng, N. Y.—Aug. 18, 1898.

Power Consumption in Rapid Transit Service. A. H. Armstrong. Describes in detail the plotting of curves showing the relation between speed time and distance time, curves showing maximum speeds reached, the relative amount of energy required for the different rates of acceleration, etc. 3000 w. St Ry Jour—June, 1898.

Power Consumption on Electric Railroads. S. T. Dodd. Read before the Civil Engs.' Club of Cleveland. Analyzes train resistances under the divisions of grade curve, acceleration and frictional resistances, and illustrates the data by problems. Also discussion. 5000 w. Jour Assn of Engng Soc's—Aug., 1898.

**Power Cost.**—Cost of Electric Power for Street Railways at the Switchboard, both Steam and

Water Power. R. W. Conant. Read before the A. S. R. A. Facts and figures bearing on the operation of 44 power stations located at important centres throughout the United States are discussed. Discussion. 7500 w. St Ry Rev—Sept. 15, 1898.

**Power Waste.**—A New Method of Detecting Waste of Power in Electric Railways. Harold P. Brown. Description of the method and exposition of the importance of the results in economic regulation of the power station. 1600 w. Elec Wld—Oct. 24, 1896.

**Providence, R. I.**—Three-Phase Transmission on the Union Railroad, Providence, R. I. Burcham Harding. Describes the means taken by the road named to solve the problem of furnishing power upon economical terms for an extended line. Ill. 2000 w. St Ry Jour—April 7, 1900.

**Providence Suburban.**—Suburban Extension of Union Railroad Company at Providence. Burcham Harding. Describes a new extension following the south shore of Narragansett Bay, and passing through a series of summer resorts. Ill. 700 w. W Elect'n—May 5, 1900.

**Quebec, Canada.**—The Electric Railway Systems of Quebec, Canada. Illustrated detailed description of the route, the difficulties, service, equipment, construction, etc. 4000 w. St Ry Jour—Aug., 1899.

**Radial.**—See **ELECTRIC RAILWAY.**

**Rates.**—See **Fares.**

**Remscheid, Germany.**—See **ACCUMULATOR—Electric Power Station.**

**Repair Accounts.**—Street Railway Repair Accounts. C. F. Uebelacker. Advocates and illustrates a system of records designed to secure economy and increase efficiency in repair department. 2000 w. Elec Wld—June 25, 1896.

**Repair Wagons.**—Electric Repair Wagons (Montage und Revisions Wagen für Elektrische Strassenbahnen). Giving illustrations both of the American and German styles of wagons for making repairs to overhead trolley lines. 1000 w. Deutsche Zeitschr f Elektrotechnik—May. 1897.

**Return Circuits.**—The Best Arrangement of Return Conductors for Electric Railways (Ueber die Günstigste Anordnung der Rückleitungen Elektrischer Bahnen). Fr. Natalis. A highly mathematical discussion of the arrangement of return feeders with formulas for practical application. 6000 w. Elektrotech Zeitschr—March 17, 1898.

**Return Conductors.**—The Use of Old Rails as Underground Conductors. F. O. Rusling. Read before the N. Y. State Street Ry. Assn. Discussion of the advantages and limitations of the system. 1200 w. St Ry Rev—Sept. 15, 1896.

**Return Current.**—Fall of Potential Along Tramway Rails. E. Parry. A study of this problem of current distribution. 2000 w. Elect'n, Lond—Aug. 10, 1900.

See also **ELECTRIC DISTRIBUTION—Railway; ELECTRIC RESISTANCE—Alternating Currents; STRAY CURRENT.**

**Richmond, Va.**—The Richmond Traction Co.'s Railway System. Illustrated detailed description. 1200 w. Elec Eng—Dec. 30, 1896.

The Richmond Traction Co., Richmond, Va. Illustrates and describes the single trolley system used and the equipment of the road, management, etc. 2800 w. St Ry Rev—Aug. 15, 1899.

**Roadway Department, Philadelphia.**—Roadway Department of the Union Traction Company, Philadelphia. Describes the practice of this department, and the appliances used. Ill. 2200 w. St Ry Jour—Feb., 1899.

**Rochester, N. Y.**—The Rochester and Irondequoit Park Railway. Devoted principally to description of power installation of a successful electric road, replacing an unsuccessful steam railway. 900 w. Elec Wld—Aug. 15, 1896.

**Rome.**—The Electric Railway of Rome, Italy. Illustrated description. 1100 w. St Ry Jour—Sept., 1896.

**Rouen, France.**—Rouen Electric Tramway. Descriptive of the power installation, buildings, construction of the line, rolling stock, cost of erection and rates of fare. 2800 w. Ry Wld—April, 1896.

The Electric Tramway Between Rouen and Bonsecours (Le Tramway Electrique de Rouen à Bonsecours). L Huret. With illustrations of this suburban tramway, and map and profile showing the heavy grades. 1800 w. L'Electricien—Sept. 23, 1899.

The Electric Railway System of Rouen. A brief summary of the system and equipment. 500 w. St Ry Jour—Aug., 1896.

The Rouen Electric Tramways. Illustrated description of the largest network so far equipped for electric traction in France. 2600 w. Elec Eng, Lond—March 20, 1896.

The Rouen Electric Tramways. Illustrated article, discussing the leading features and characteristics of the work from a critical or comparative standpoint. 3000 w. Elec Rev, Lond—May 22, 1896.

See also **France.**

**Rouen, Hillside.**—A Hillside Electric Tramway Near Rouen. An illustrated description of an interesting extension to the tramway system of Rouen. 1300 w. Tram & Ry Wld—March 8, 1900.

**St. Helens, Eng.**—See **ELECTRIC STATION—St. Helens, Eng.**

**St. Louis-Belleville.**—The St. Louis & Belleville Electric Ry. An illustrated description of a well-built line. 1800 w. St Ry Rev—Dec. 15, 1899.

**San Francisco.**—The Doom of the Cable in San Francisco. S. L. Foster. Illustrated description of method used to convert over half a mile of cable road into a trolley line of wider gauge, in seven days. 1500 w. St Ry Jour—Feb., 1896.

**San José, Cal.**—A Typical Small Street Railway Plant. Harry J. Bean. Illustrates and describes the First Street Electric Railroad Company's system, of San José, Cal., as an example of most of the electric railway plants in the small cities of the West. 1400 w. Jour of Elec—Sept., 1899.

**San José, Costa Rica.**—An Electric Railway in Central America. Dan Wells Casement. Illustrated detailed description of the equipment of the road at San José, Costa Rica. 1200 w. Am Elect'n—Nov., 1899.

**Sao Paulo, Brazil.**—The New Railway, Light and Power Enterprise in Sao Paulo, Brazil. Brief illustrated description, with information of this city directly under the tropic of Capricorn. 1400 w. St Ry Jour—July, 1899.

The Sao Paulo Tramway, Light and Power Company. Illustrates and describes the plant of an important city of Southern Brazil. 3000 w. St Ry Jour—Sept. 1, 1900.

**Schuylkill.**—The Schuylkill Electric Railway. Illustrated description of railway at Pottsville, Pa. 1000 w. Elec Ry Gaz—Feb. 15, 1896.

**Schuylkill Valley, Pa.**—The System of the Schuylkill Valley Traction Company, Norristown, Pa. Map and illustrations of this line which passes through historic and very picturesque territory. 1500 w. St Ry Jour—July, 1898.

**Scranton, Pa.**—The Scranton Traction Company. Illustrated description of plant, buildings and equipment, including also the connecting Carbondale Traction Co. 1400 w. Elec Ry Gaz—April 10, 1896.

**Seoul, Corea.**—An Electric Railway in Corea. H. Collbran. A letter giving information concerning a street railway being constructed in Seoul, the capital city of Corea. Ill. 600 w. Ry Age—July 22, 1898.

The Electric Railway in Seoul. An interesting illustrated account of the opening of an electric railway in the capital of Corea. 800 w. Ry Age—July 21, 1899.

**Service.**—See **Train Service.**

**Service Diagram.**—Number of Cars Required on a Given Length of Track at Various Speeds and Headways. H. C. King. Diagram, graphically presenting all information pertaining to any required service. 400 w. Tram & Ry Wld—May 10, 1900.

**Shanghai.**—See **TELEPHONES—Shanghai.**

**Sheffield, Eng.**—Sheffield Corporation Tramways. Illustrated detailed description. 2700 w. Elect'n, Lond—Sept. 1, 1899.

The Sheffield Corporation Tramways. Illustrated detailed description. 3500 w. Tram & Ry Wld—Nov. 2, 1899.

**Signals.**—Signalling on the Dover Tramways. Illustrated description of an ingenious system and its method of working. 1100 w. Elec Engr, Lond—Oct. 13, 1899.

Signals on Electric Railways. A discussion of methods for protecting crossings and blocks between turnouts, and for emergency communications with power station. 2400 w. St Ry Jour—May, 1896.

Signal System for Single Track Roads. H. S. Cooper. Read at meeting of the N. Y. State St. Ry. Assn. Considers the characteristics of a reliable signal system. Discussion. 3500 w. St Ry Rev—Sept. 15, 1898.

**Small Towns.**—Can Small Electric Railways Be Operated at a Profit? James Blake Cahoon. Part first discusses conditions in small towns and means of increasing the patronage of the road. Serial. St Ry Jour—Aug. 4, 1900.

**Snow Storms.**—Story of the Great Storm. A record of the fine work on various street railways in New England in opening the lines, giving valuable experiences. Ill. 9800 w. St Ry Rev—March 15, 1898.

**Southampton, Eng.**—Southampton Corporation Electric Tramways. Brief illustrated description. 2600 w. Elec Rev, Lond—July 20, 1900.

Southampton Corporation Electric Tramways. Illustrated detailed description of the system. 2300 w. Tram & Ry Wld—May 10, 1900.

Southampton Corporation Tramways. Illustrates and describes interesting features of the line. 2500 w. Elec Engr, Lond—June 8, 1900.

**South Bend, Ind.**—Some Details of Street Railway Construction. W. H. Rosencrans. Describes the lines in and about South Bend, Ind. Ill. 1700 w. Munic Engng—March, 1899.

**Springfield and Holyoke, Mass.**—The Electric-Railway Systems of Springfield and Holyoke, Mass. Illustrated detailed descriptions of the systems of the two cities named and their equipment. 3300 w. St Ry Jour—Aug., 1898.

**Standard Apparatus.**—On the Adoption of a Universal Standard for Rating Railway Apparatus. William Baxter, Jr. A discussion of the subject and its importance, and the objections in the case of electric equipment. Also the fields in which standards would be of advantage. 2200 w. Elec Wld—Nov. 21, 1896.

Standards for Rating Appartus. W. J. Clark. Abstract of paper presented to N. Y. State Street Ry. Assn. Suggestions upon the more thorough standardization of electrical railway apparatus. 1200 w. St Ry Rev—Sept. 15, 1896.

See also **ELECTRIC APPARATUS.**

**Standard Electrical Rules.**—Standard Electrical Rules Relating to Street Railways. This is a communication from Frank R. Ford, representing the American Street Railway Association, presenting the rules at present adopted and asking for suggestions as to revision. 1000 w. St Ry Rev—April 15, 1896.

**Staten Island.**—Staten Island's Railway System. Illustrated description. 1500 w. Elec Eng—Sept. 23, 1896.

The Midland Railway of Staten Island. Illustrated description. 1300 w. Elec Wld—Aug. 22, 1896.

The System of the Staten Island Electric Railroad Company. A fully illustrated detailed description of the system, power house, roadbed and overhead construction and terminals. 3500 w. St Ry Jour—May, 1896.

**Steep Grades.**—Steep Grades on Electric Railways. S. L. Foster. Extract from a paper read at the first annual meeting of the California Street Railway Assn. Chiefly a discussion of the comparative merits of running motors in series and in multiple, with a strong leaning in favor of the former. 2500 w. Eng News—July 9, 1896.

**Stettin.**—The Electric Street Railway at Stettin (Elektrische Strassenbahn Stettin). A fully illustrated description of the new electric tramway system recently installed in the capital of Pomerania. 4000 w. Ill. Zeitschr für Klein-und Strassenbahnen—June 16, 1898.

**Stoppage Losses.**—Loss in Stoppages of Electric Cars. Herman S. Hering. Reply to a query on this subject, giving the results of tests, and advising the using of brakes as little as possible and drifting as much as possible. 1500 w. Am Elect'n—July, 1897.

**Submarine Cable Disturbances.**—See **SUBMARINE CABLE—Electric Tramways.**

**Suburban and Metropolitan.**—Electric Traction and Its Application to Suburban and Metropolitan Railways. Philip Dawson. A paper aiming to show the adaptability of this motive power to the rapid transportation of large crowds from and to their business in large cities. 8700 w. Jour Soc of Arts—March 24, 1899.

**Sunderland, England.**—Sunderland Corporation Electric Tramways. Illustrated description of the commencement of what will ultimately be an extensive system of municipal electric tramways. The line opened is 12.5 miles in length. 2000 w. W Elect'n, Lond—Aug. 24, 1900.

**Surface-Contact.**—See **SURFACE-CONTACT TRAMWAY.**

**Suspended Beam.**—See **OVERHEAD TRAMRAIL.**

**Swansea, Wales.**—The Swansea, Wales, Tramways. Illustrated detailed account. 2800 w. Elec Eng, Lond—July 6, 1900.

**Switch.**—See **RAILWAY SWITCH—Street.**

**Sydney, Australia.**—George and Harris Street (Sydney) Electric Tramway. Detailed description of the first electric line in Sydney. 2200 w. Engr, Lond—April 27, 1900.

**Syracuse, N. Y.**—Street Railway System of Syracuse, N. Y. Illustrated detailed description. 6500 w. St Ry Jour—March, 1897.

The Syracuse Street Railway. A short illustrated description of the power plant and equipment. 1000 w. Elec Wld—Aug. 8, 1896.

**Test Car.**—New Electrical Features on the Lindell Railway, St. Louis. Describes a car for testing and maintaining bonding and other uses, designed by Samuel Barnes. 1000 w. St Ry Rev—Oct. 15, 1897.

**Testing Stations.**—The Design of Testing Stations for Street Railways. R. W. Conant. The importance and character of such a station is intelligently treated and the installation of the West End St. Ry. of Boston is described. The subject of insulation is given special attention. 4500 w. St Ry Jour—April, 1896.

**Tests.**—Important Electric Railroad Tests. Brief illustrated account of tests made by the General Electric Co. on its own special line of track at Schenectady, N. Y. 1000 w. Ir Trd Rev—April 8, 1897.

**Tettnang, Germany.**—See **ACCUMULATOR—Electric Power Station.**

**Toledo.**—The Plant of the Toledo Traction Company. An illustrated account of the extensive system owned and operated by this company, and of other business controlled by them. 2000 w. St Ry Jour—Jan., 1897.

See also **ELECTRIC RAILWAY—Polyphase; ELECTRIC STATION.**

**Toronto, Can.**—An Important Canadian Tramway System. Illustrates and describes the tramways of Toronto. 1800 w. Tram & Ry Wld—Oct. 5, 1899.

Toronto Harbor and the Proposed Island Railway. Report of A. B. Ross, giving an estimate of cost of bridging the gap, with discussion of other objections. 2200 w. Can Eng—March, 1897.

See also **Double-Current.**

**Traffic Development.**—Methods of Developing New Traffic on Street Railways. H. M. Kennedy. Read at meeting of the N. Y. State St. Ry. Assn. Discusses some of the methods that have proved successful. General discussion. 7500 w. St Ry Rev—Sept. 15, 1898.

**Train Service.**—Train Service and Its Practical Application. Ira A. McCormack. Read at convention of Am. St. Ry. Assn. Gives methods which the writer has found useful in cases under his observation. Discussion. 9000 w. St Ry Rev—Oct. 20, 1899.

**United Kingdom.**—The Development of Electric Tramways in the United Kingdom. Reviews the changes and progress, and gives Mr. Parshall's reasons for opposing the combining of lighting and tramway business. 2400 w. St Ry Rev—April 15, 1899.

The Early Future of Electric Tramways in the United Kingdom. Discusses the outlook and progress expected in the near future. 2000 w. Tram & Ry Wld—Oct. 5, 1899.

Tramway Schemes for 1899. A report of English, Scotch and Irish schemes for the coming year. 2200 w. Transport—Dec. 30, 1898.

See also **British; England; Great Britain.**

**United States.**—A French View of American Electric Traction. Extracts from French journals taken from notes of French engineers sent to study American methods. 1300 w. Elec Rev, Lond—Nov. 25, 1898.

Electric and Cable Traction in America. Notes on this subject from one who has looked on the developments in this field in America from the point of view of their applicability to British requirements. 4000 w. Ry Wld—Dec., 1896.

Electric Railway Practice in the United States. An excellent monograph of present practice, well illustrated and up to date. 10400 w. St Ry Jour—Jan., 1896.

Electric Traction in America. Louis Bell. A general review of the improvement in American tramway practice, the different systems, costs and future prospects. 3500 w. Ry Wld—Feb., 1898.

Impressions of American Tramway Practice. A. E. Le Rossignol. Read at the Cardiff convention of the Munic. Elec. Assn. Impressions from a recent visit, with remarks on New York tramways. 2500 w. Elec Eng, Lond—July 20, 1900.

Some Electric Street Railway Data. Harris J. Ryan. Read before the N. Y. St. Ry. convention. Average of answers to questions sent to plants in the United States concerning the construction and operation. 1500 w. St Ry Rev —Sept. 15, 1899.

**United States, Apparatus.**—The Development of Electrical Traction Apparatus in the United States. H. F. Parshall. The more important details of the machinery especially developed for use in electric traction are discussed and illustrated. 6800 w. Jour of Soc of Arts—March 20, 1896.

**United States, 1896.**—Electric Traction in the United States in 1896. Report of Messrs. Young and Clark to the Tramways Committee of Glasgow on the principal tramway enterprises in North America. A brief notice of some of the larger systems inspected during their visit to America. 2500 w. Elect'n, Lond—Dec. 18, 1896.

**U. S. Finance.**—See **Finance, United States.**

**Urban Growth.**—See **City Growth.**

**Varese, Italy.**—The Electric Railway of Varese, Italy. Brief history of the undertaking with illustrated description. 1500 w. St Ry Jour—Dec., 1896.

**Versailles.**—Electric Tramway at Versailles (Les Tramways Electriques de Versailles). Description, with map, of the local overhead trolley line recently opened at Versailles. 3000 w. La Rev Tech—Feb. 10, 1897.

Electric Tramways at Versailles. Illustrated detailed description. 1000 w. Ry Wld—Feb., 1897.

See also **France.**

**Vienna.**—Electric Traction in Vienna. Brief description of combined trolley and accumulator lines, with engravings of rail and car. 900 w. Ry Wld—Nov. 10, 1898.

Electric Traction in Vienna. Illustrated description of the "Transversal" electrical line of the Vienna Tramways Company. 1000 w. Ry Wld—Feb., 1897.

The Ringstrasse-Prater Electric Tramway in Vienna (Die Elektrisch Betriebene Tramway, Ringstrasse—Prater in Wien). With map of the city, and details of track and cars. The combination of overhead trolley and storage battery is used. 3500 w. Mitt d Ver f d Förd d Local u Strassenbahnwesens—Sept., 1896.

Vienna Tramways. An account of provisions for a comprehensive system of electric traction. 1400 w. Ry Wld—Dec. 8, 1898.

See also **CITY.**

**Voltage.**—What Pressure Is Dangerous on Electric Railways with Overhead Trolley Wires. William Rung. Translated from the Danish "Civilengeneer." Gives results of experimental investigations, showing that all pressures between 100 and 1000 volts must be regarded as equally dangerous, and as the higher pressures lead to greater economy there is no reason for not using them. 1700 w. Nature—Aug. 23, 1900.

See also **Higher Voltage.**

**Washington-Mount Vernon.**—High Speed Line Between Washington and Mount Vernon. A brief account of construction of way, equipment and power house. 700 w. St Ry Jour—May, 1896.

The System of the Washington, Alexandria and Mt. Vernon Railway. Illustrated detailed description. 3800 w. St Ry Jour—Jan., 1897.

The Washington, Alexandria & Mt. Vernon Electric Railway. Describes a device for changing from underground to overhead trolley. 600 w. St Ry Rev—July 15, 1896.

**Westphalia.**—The Markisch Tramway System (Die Märkische Strassenbahn). Max Schiemann. An illustrated description of a suburban overhead trolley line connecting a number of towns in the Arnsberg district of Westphalia; with details of the operation. 3000 w. Elektrotech Zeitschr—July 20, 1899.

**Wichita, Kan.**—The Early Wichita Electric Railway, Built in 1887. T. C. Hughes. Brief illustrated description of interesting details of this enterprise. 900 w. St Ry Jour—Sept. 1, 1900.

**Wilkesbarre Interurban.**—The Wilkesbarre Interurban Railway. Illustrates and describes an interesting line, extending from Luzerne, Pa., to Harvey's Lake, which has proved successful where a steam line failed. 1300 w. St Ry Rev—Feb. 15, 1899.

**Willow Grove, Philadelphia.**—Willow Grove Park and Electric Road. Herman S. Hering. Illustrated description of a road and amusement park which has proved a successful investment. Serial. Elec Wld—Oct. 3, 1896.

**Worcester, Mass.**—Extension of the Plant of the Worcester Consolidated Street Railway. The road is so advantageously placed that it practically controls the largest mileage in New England. Describes the enlargement of the station and unique features to be introduced. 3500 w. St Ry Jour—Sept. 1, 1900.

**Working Expenses.**—Working Expenses of Electric and Cable Railways. Tables giving the working expenses, receipts, etc., of three railways in Great Britain. 1300 w. Ry Wld—April 13, 1899.

**Würtemberg.** — Meckenbeuren-Tettnang Electric Railway, Würtemberg, Germany. Illustrated description of a small plant possessing features of interest. 800 w. Elec Rev, Lond—Aug. 14, 1896.

**Zürich.**—The Conversion of the Zürich Tramway for Electric Driving (Der Umbau der Züricher Pferdebahn für Elektrischen Betrieb). P. Schenker. With details of methods of drainage, track-laying, bonding, etc. Serial. Schweizerische Bauzeitung—May 6, 1899.

The Electric Tramways of Zürich (Tramways Electriques de Zürich). Describing this important and interesting plant, in which gas engines operated by producer gas furnish the motive power for the electric generators. 4000 w. Génie Civil—May 15, 1897.

The Zürich Electric Street Railways (Die Elektrischen Strassenbahnen der Stadt Zürich). J. Sigfrid Edström. A well illustrated account of the different parts of this tramway system. 1500 w. Elektrotech Zeitschr—April 26, 1900.

**ELECTRIC TRAMWAY ACCIDENTS.**

See also **STREET RAILWAY—Accidents.**

A Chapter of Accidents. William J. Clark. Calls attention to the exaggeration of street railway accidents, and presents statistics bearing upon the matter, aiming to state the facts exactly as they are. 2800 w. St Ry Jour—Oct., 1897.

The Best Method of Settling Damage Cases and the Prevention of Accidents by the Use of Fenders or Otherwise. Willard J. Hield. Read before the American Street Railway Assn. Discussion of the subjects, considering points of particular interest. 1400 w. Elec Eng, N. Y.—Oct. 21, 1897.

**Claims.**—Relationship Between Claim and Operating Department of Electric Railways.—The Prevention of Accidents and Disposition of Claims. Richard W. Day. Read before the Pennsylvania Street Railway Assn. Discussion and suggestions relating to the subjects named. 2000 w. St Ry Rev—Sept. 15, 1897.

**Cleveland.**—The Cleveland Disaster. An illustrated account of a car plunging through the open drawbridge of the Central Viaduct, and falling 100 ft. into the river, causing the death of many persons. 700 w. Elec Ry Gas—Nov. 23, 1895.

**Prevention.**—The Prevention of Accidents; The Best Method to Accomplish This End. H. S. Cooper. Read before the N. Y. State Convention at Niagara Falls. The answer found is the employment of good men, well cared for, well paid, well disciplined, etc. 3000 w. St Ry Rev —Sept. 15, 1897.

**ELECTRIC TRAMWAY SHOP.**

See **ELECTRIC RAILWAY SHOP.**

ELECTRIC TRANSFORMER.

See ELECTRIC CURRENT CONVERTER; ELECTRIC CURRENT RECTIFIER; MOTOR GENERATOR; ROTARY CONVERTER; TRANSFORMER.

ELECTRIC TRANSMISSION.

See also ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC ENERGY; ELECTRIC LINE; ELECTRIC POWER; HYDRO-ELECTRIC PLANT; WATER POWER.

Economical Transmission and Distribution of Electricity from a Distance. Horace Field Parshall. Read before the British Inst. of Civ. Engs. Considers the subject under economical generation, transmission and distribution. Short discussion. 2200 w. Elec Eng, Lond—June 9, 1899.

Long Distance Power Transmission. Brief illustrated description of one of the most important examples of power transmission yet undertaken. Power transmitted from Ogden, Utah, to Salt Lake City—six miles of water pipe and 36 miles of electric wire. 1000 w. Ry Age—Sept. 25, 1896.

Long Distance Transmission. Charles P. Steinmetz. Reviews the progress of transmission for lighting, mechanical power and electric railroading. 1600 w. Elec Eng—Jan. 6, 1897.

Long Distance Transmission of Electric Power. George Forbes. A paper advocating long distance transmission, and considering the methods in use, and various industries to which it is applicable. Discussion. 7500 w. Jour Soc of Arts—Nov. 25, 1898.

Long Distance Transmission of Power. Ernst J. Berg. Abstract of paper read before the Ohio Elec. Lgt. Assn. Discusses the advantages of parallel operation, and the conditions, and disapproves of the growing use of polyphase systems, especially of the two-phase. 2000 w. Elec Wld—Aug. 27, 1898.

Long Distance Transmission of Power. C. Rice Dooley. From "The Purdue Exponent." Calling attention to growth of water power generating plants, citing examples. 1400 w. Elec, N. Y.—Nov. 30, 1898.

On Distant Electric Power Transmission. George Forbes. Read before the Inst. of Elec. Engs. Describes selected plants, and their points of interest, and the problems of attaining the highest economy. Discussion. Serial. Elec Eng, Lond—May 4, 1900.

Power Transmission by Direct and Alternating Currents. A criticism of Mr. Swinburne's results as given in the paper presented at the Engineering Conference. The cases considered in the paper are worked out and the results given. 1100 w. Elec Rev, Lond—July 7, 1899.

Present Status of the Transmission and Distribution of Electrical Energy. Louis Duncan. Full paper with discussion. Considers the different methods of transmission and distribution and the limits fixed by the present status of electrical development. 12000 w. Trans Am Inst of Elec Engs—Aug. & Sept., 1896.

Recent Advances in Power Transmission. John McGhie. Showing the important place now occupied by electric power. 900 w. Elec Eng—Jan. 13, 1897.

The Basis of Electric Power Transmission. R. B. Williamson, W. B. Potter, M. G. Starrett, R. L. Russell, and W. B. Reed. Interesting addresses, with illustrations. 15000 w. N Y R R Club—Feb. 15, 1900.

The Economies of Power Transmission. Louis Bell. Discusses the items of cost and the probable sources of revenue. 3000 w. Am Elect'n—June, 1897.

The Electrical Transmission of Energy (Transmissions Electriques d'Energie). A. Blondel. A very important report upon the entire subject, made by the Department of Public Works to the French Chamber of Deputies, to assist in preparing legislation upon the subject. 30000 w. Ann des Ponts et Chaussées—1 Trimestre, 1898.

The Electric Transmission of Water Power. William Baxter, Jr. Presents examples of electrical transmission of water powers to distant points where they can be utilised, showing that it has passed far beyond the experimental stage. Also considers the results that may follow. Ill. 3800 w. Ap Pop Sci M—April, 1898.

The New Tool of Transmission. Oberlin Smith. A general and interesting discussion of electricity as a means of transmitting energy, written in popular style. 3200 w. Ir Tr Rev—Jan. 2, 1896.

The Future Possibilities of Electricity. F. A. C. Perrine. An attempt to show how it will be possible for this new means of power transmission and utilization to change certain industries, and to prove that these changes will materially influence localities. 3800 w. Elec Engng—July 1, 1897.

The Past, Present and Future of Electric Power Transmission (Vergangenheit, Gegenwart, und Zukunft der Electrischen Kraftubertragung). Josef Kareis. An interesting address delivered before the Technical Association of Lower Austria, giving a general review of the situation. Two articles. 3500 w. Electro-Techniker—Feb. 28, March 1, 1899.

Transmission of Heavy Currents. G. H. B. Zahn. A study of the various systems used, of conductors, and insulating materials, etc. 4000 w. W Elec—April 17, 1897.

Transmission of Power by Electricity. Alexander Siemens. Read before the British Assn. A study in detail of the developments. 3800 w. Elec Rev, Lond—Sept. 16, 1898.

Twenty-five Years of Transmission of Power by Electricity. Rankin Kennedy. The progress is traced and the applications discussed. 2300 w. Elec Rev, Lond—Nov. 12, 1897.

What Has Been Accomplished in the Long Distance Transmission of Power by Electricity. A summary of what has been accomplished in this line, with illustrations of the different plants, giving an idea of their character and magnitude. 2000 w. Am Mach—Jan. 7, 1897.

The Calculation of Alternating Current Transmission Circuits. P. M. Heldt. The article explains in a clear and simple manner the method of calculating the size of conductors for alternating circuits. 2500 w. Elec Wld—Feb. 8, 1896.

The Transmission of Power to Long Distances by Alternating Currents of Electricity. W. B. Esson. Discusses the subject under the headings of generators, conductors and motors. Discussion follows. 12000 w. Jour of Soc of Arts—March 26, 1897.

Alternate Current Power Transmissions. C. Du Riche Preller. Considers the distribution of energy and the practical working results as shown in three installations transmitting energy over large areas. Ill. 2000 w. Engng—Jan. 12, 1900.

On the Transmission of Power by Alternate Currents. J. T. Morris. Read before the Engng. Soc., Univ. College, London. A few of the leading principles involved in the design of such power transmissions, and a few of the results arrived at in recent practice. Serial. Engng—July 17, 1896.

Address.—Present Status of the Distribution and Transmission of Electrical Energy. Dr. Louis Duncan. The writer takes up the different methods of transmission and distribution and considers the limits that are actually fixed by the present status of electrical development. Presidential inaugural address read before the Am. Inst. of Elec. Engs. Abstract. Serial. Elec Eng—Oct. 7, 1896.

Aigle, Switzerland.—Electric Light and Power Transmission at Aigle, Switzerland. Illustrates and describes an interesting installation showing how the varied wants of consumers are met notwithstanding the long distances and large area of distribution. 1000 w. Engr, Lond—Sept. 8, 1899.

Aluminum Line.—Tests and Calculations for a Forty-Mile Aluminum Wire Transmission Line. F. A. C. Perrine. Read before the Pacific Coast Elec. Trans. Assn. Reports tests of the line of the Standard Electric Co., of California. 1200 w. Jour of Elec—Aug., 1899.

See also ELECTRIC CONDUCTOR—Aluminum.

Apple River, Ill.—The Transmission Plant of the Apple River Power Company. A long distance plant is illustrated and described. 1800 w. Elec Wld—Feb. 5, 1898.

Bakersfield, California.—Long Distance Transmission at Bakersfield, Cal. Illustrated description of plant for utilizing the power of Kern River. 800 w. St Ry Rev—May 15, 1897.

The Bakersfield Transmission. Illustrated description with details. 6500 w. Jour of Elec—Aug., 1897.

**Baltic-Taftville, Conn.**—The Baltic-Taftville Transmission Plant. H. E. Raymond. Illustrated description. 3000 w. Elec Wld—July 4, 1896.

**Barton, Vt.**—A Fourteen-Mile Transmission at Barton, Vt., with Monocyclic Apparatus. Illustrated detailed description. 1100 w. Elec Eng, N. Y.—July 21, 1898.

**Bellegarde, Rhone.**—The Bellegarde Electric Power Transmission. C. S. Du Riche Preller. Illustrated description of the utilization of the water power of the Rhone at Bellegarde, 20 miles below Geneva. Serial. Engng—May 14, 1897.

**Biberist Paper Mill.**—The Electric Transmission of Power in the Paper Mill at Biberist (Die Elektrische Kraftübertragung der Papier-Fabrik Biberist). This is one of the longest in Europe, 365 horse-power being transmitted nearly 18 miles. 4000 w. Elektrotech Rundschau—Jan. 15, 1897.

**Blue Lake, California.**—A Sierran Transmission. George P. Low. Full illustrated description of the plant of the Blue Lakes Water Company in California, with information of the financial condition and persons interested. 9500 w. Jour of Elec—Oct., 1897.

**Big Cottonwood, Utah.**—The Big Cottonwood Power Transmission, Utah. Illustrated description. 1600 w. Elec Eng—Sept. 2, 1896.

The Water Power and Electric Transmission Plant of the Big Cottonwood Power Co. W. P. Hardesty. Illustrated detailed description. 4800 w. Eng News—Oct. 1, 1896.

**Big Creek.**—The Big Creek Power Transmission. Illustrated description. 1200 w. Jour of Elec—July, 1896.

**Brazil.**—Electric Transmission Plant at Juiz de Fora, Brazil. Percy H. Thomas. Describes a large plant supplied by an American manufacturing company. Ill. 2200 w. Elec Wld—Feb. 19, 1898.

**California.**—Electric Power Transmissions of Southern California. Map and facts of interest concerning the sections covered, routes, methods of securing reliability in the service, etc. 2300 w. Jour of Elec—March, 1900.

**Chambly, Canada.**—The Chambly Manufacturing Company's Electrical Power Transmission Plant. Illustrated description of this fine installation, near Montreal, Canada. 1500 w. Elec Wld—Oct. 9, 1897.

The Chambly Transmission Plant. E. M. Archibald. An illustrated description of the electrical equipment of the plant. 3000 w. Can Elec News—Jan., 1900.

**Chart.**—See **ELECTRIC DISTRIBUTION.**

**Concord, N. H.**—Three-Phase System at Concord, N. H. Illustrated description. 1600 w. Elec Wld—Jan. 18, 1896.

**Conductors.**—See also **Aluminum Line; ELECTRIC CONDUCTOR.**

**Conductor Cost.**—Notes on the Cost of Conductors for the Transmission of Electrical Power with High Voltage Currents. M. P. Boucherof in "La Lumière Electrique." A discussion of the problem of determining the cost of transmission. 800 w. Prac Eng—Dec. 31, 1897.

**Copper Economy.**—Economy of Copper in Transmission Lines. Budd Frankenfield. Assistance in determining the choice of a particular system of distribution, copper economy being the criterion of judgment. 1600 w. Wisconsin Engr—Jan., 1899.

**Cost.**—The Cost of the Long Distance Electric Transmission of Large Powers (Die Kosten der Elektrischen Uebertragung Grosser Kräfte auf Weite Entfernungen). A discussion based on the data obtained from the power plant at Rheinfelden and applied to the proposed plant at Heimbach. 2500 w. Zeitschr d Ver Deutscher Ing—Oct. 29, 1898.

**Culm.**—See also **CULM.**

**Direct and Alternating Combined.**—Copper Saving in the Joint Transmission of Direct and Alternating Currents. Frederick Bedell. Abstract of a paper read at N. Y. meeting of the Am. Assn. for the Adv. of Science, with editorial. A mathematical discussion of the problem, with editorial on the practical application. 3000 w. Elec Wld & Engr—June 30, 1900.

Copper Saving in the Joint Transmission of Direct and Alternating Currents. Frederick Bedell. Full paper read at the N. Y. meeting of the Am. Assn. for the Adv. of Science. Calculation of the saving that may be made in the weight of copper and in copper ores. 2100 w. Sib Jour of Engng—Oct., 1900.

**Direct vs. Alternating.**—Direct vs. Alternating Currents for Long Distance Transmission. Wm. Baxter, Jr. The purpose of the article is to show that the direct current is more desirable than the alternating for the transmission of energy over long distances. Serial. Elec Eng—Dec. 4, 1895.

**Direct vs. Three-Phase.**—Power Transmission by Three-Phase and Continuous Currents. G. L. Addenbrooke. A presentation of the changed conditions and the points to be considered in any argument of a continuous vs. a three-phase power transmission. 2000 w. Elec Rev, Lond—April 30, 1897.

**Duluth.**—Power Transmission Schemes at Duluth, Minnesota. Frank W. Springer. Considers the schemes for utilizing as water power the St. Louis and the Black Rivers. Ill. 1800 w. Elec Wld & Engr—April 14, 1900.

**Economics.**—The Economics of Long Distance Electric Power Transmission. Alton D. Adams. Discusses the prospectus of a company in Western Illinois, showing the falsity of the claims made, and of similar claims concerning the transmission of power over long distances. 2200 w. Eng News—Feb. 1, 1900.

**Eichdorf-Grünberg, Germany.**—A 10000-Volt Transmission Plant. Walter King. Abstract of an article in the "Elektrotechnische Zeitschrift." Illustrated description of the transmission from Eichdorf to Grünberg. 1800 w. Elect'n—Feb. 5, 1897.

**European Direct Current.**—Two European Direct Current, High Tension Transmissions. Frank C. Perkins. Brief illustrated description of the Isoverda-Genoa transmission, and that installed at Chaux-de-Fonds and Locle. 700 w. Jour of Elec—Sept., 1900.

**Folsom, Sacramento, Cal.**—Long Distance Transmission of Electric Power. T. A. W. Shock. Read before the Street Railway Assn. of California. Brief description of the Folsom works. 1100 w. St Ry Rev—May 15, 1896.

The Folsom-Sacramento Electric Power Transmission Plant. Illustrated account of the electric plant in detail. 1100 w. Eng News—May 7, 1896.

The Folsom-Sacramento Electric Power Transmission Plant. Brief description, with illustration of the 24-pole three-phase machines. 900 w. Eng, Lond—Sept. 4, 1896.

The Long Distance Electrical Transmission Between Folsom and Sacramento, Cal. Illustrated detailed description. 4500 w. Eng, Lond—June 11, 1897.

**French View.**—A French View of Electrical Power Transmission. Abstract of an interesting article in the "Revue Générale des Sciences," by M. Paul Janet. Discusses the efficiency of transmission, and the systems employed. 2000 w. Elec Rev, Lond—Sept. 30, 1898.

**Fresno, California.**—Long Distance Electrical Transmission in California. Illustrated detailed description of the electrical transmission water power plant of Fresno. 4000 w. Eng, Lond—March 5, 1897.

Some details of the Fresno Plant. C. E. Dutcher. Illustrated description of technical details of the electrical operation of the plant. 4500 w. Jour of Elec—April, 1897.

The Thirty-Five-Mile Electrical Power Transmission of Fresno, Cal. Illustrated description of a recently completed work. The distance is the longest yet attempted for the electrical transmission of power generated by an artificial fall of water. 1400 w. Lord's Mag—July, 1896.

**Hartford, Conn.**—The Long Distance Transmission of Power at Hartford. Illustrated description of the engineering problems, of which the recent extensive changes made in the system are considered a satisfactory solution. Serial. Elec Wld—Feb. 13, 1897.

Rotary Transformers and Storage Batteries as Related to Long Distance Transmission. William Lispenard Robb. Read before the Nat. Elec. Lgt. Assn., New York. A description of the Hartford, Conn., plant and of its operation. Discussion. 3800 w. Elec, N. Y.—May 31, 1899.

See also **HYDRO-ELECTRIC STATION—Tariffville, Conn.**

**Hidalgo, Mexico.**—A Mexican Transmission Plant.

George J. Henry, Jr. Illustrated description of a plant being erected in the state of Hidalgo in Mexico, to supply power to the mines of the Rio del Monte Co. One of the most remarkable installations so far made in any part of the world. 800 w. Jour of Elec—May, 1896.

**High Potential.**—High-Voltage Power Transmission. Charles F. Scott. Describes important work in this field, giving the methods by which measurements have been made and the results which have been reached, and a number of points of interest regarding long distance transmission plants. 12500 w. Trans Am Inst of Elec Engs—Oct., 1898.

High Voltage Transmission. Editorial review of experiments made in America, and the paper of Charles F. Scott, read before the Am. Inst. of Elec. Engs. 2400 w. Engng—Feb. 24, 1899.

Random Notes on Extremely High Potentials. Leon W. Bly. Observations on extreme high potential workings, discussing the difficulties with transformers and the line. 3500 w. Jour of Elec—July, 1898.

**India.**—Electricity in India. C. C. Townsend. On the advantages that would follow the development of electricity from natural sources. 1700 w. Nineteenth Cent—Oct., 1899.

**Inst. Civ. Engrs., Discussion.**—Some Notes on Electric Power Transmission. A report of statements at the Institution of Civil Engineers, by W. B. Esson, W. E. Ayrton, G. Forbes, Alexander Siemens, and others. 1200 w. Eng Rec—Nov. 18, 1899.

**Kalamazoo, Mich.**—Kalamasoo Valley, Michigan, Transmission Plant. Edward James Hart. Illustrates and describes the plant and line. 1800 w. Elec Wld & Engr—Sept. 30, 1899.

**Kootenay-Rossland, B. C.**—Long Distance Transmission Plant of the West Kootenay Power and Light Company. An illustrated account of the development of the falls of the Kootenay River, in British Columbia. 2000 w. Can Elec News—Sept., 1898.

The Kootenay-Rossland Power Transmission. George P. Low. Illustrated description of the region, the power development, and pole line, are given in part first. Serial. Jour of Elec—May, 1899.

The Kootenay-Rossland Power Transmission. An illustrated description of the sub-station at Rossland, and of the application of the power for mining purposes. 3500 w. Can Elec News—Oct., 1899.

**Lachine-Montreal.**—The Lachine Rapids, Montreal Electric-Power Transmission-System. Illustrated description of a large enterprise of great importance in the industrial developments of Canada. 1800 w. Elec Wld—Oct. 2, 1897.

See also **HYDRO-ELECTRIC PLANT.**

**Lausanne.**—The Electric Plant of the City of Lausanne (Les Installations Eléctriques de la villa de Lausanne). An account of the plant now being constructed for this Swiss city. Power is derived from the Rhone and the current led 35 miles to the city. 1200 w. Schweiz Bauzeitung—March 24, 1900.

**Les Clées-Yverdon.**—The Clées-Yverdon Electric Power Transmission (Elektrische Kraftübertragung des Clées-Yverdon). Illustrated description of this excellent plant near Neuchatel, Switzerland; 1200 h. p. are transmitted about 25 miles. 3500 w. Elektrotech Zeitschr—July 14, 1898.

See also **HYDRO-ELECTRIC PLANT—Neuchatel.**

**Lightning.**—The Natural Period of a Transmission Line and the Frequency of Lightning Discharges Therefrom. Charles Proteus Steinmetz. Discusses the frequency of the discharges set up in electrical-transmission lines by lightning and other disturbances. 1500 w. Elec Wld—Aug. 27, 1898.

**Limits.**—Limits of Electric Transmission. Alton D. Adams. Discusses long distance transmission from the coal mines to great cities, showing that it is not economical and not to be considered even if the fuel is free. 2000 w. Sci Am—Aug. 25, 1900.

The Limitations of Long-Distance Power Transmission. W. E. Goldsborough. Considers the success attained in this field and various matters relating to the development, predicting that power can be delivered at distances of 500 miles from the generating station. 1500 w. Elec Rev, N. Y.—April 18, 1900.

**Line Construction.**—See **ELECTRIC LINE.**

**Line Effects.**—The Line Effects in Alternating-Current Transmission. H. E. Raymond. A recital of some "line" incidents resulting from some of the most prominent of the so-called "effects." 1800 w. Am Elect'n—June, 1897.

**Line Losses.**—The Line Losses of Polyphase Transmission. George T. Hanchett. An attempt to reconcile the varying results advanced by conceded authorities and to show how each is obtained. 1800 w. Am Elect'n—Nov., 1899.

**Los Angeles, Cal.**—A Transmission Line to Los Angeles. Illustrates and describes the installation and the service rendered. 2700 w. St Ry Rev—Feb. 15, 1899.

The San Gabriel-Los Angeles Transmission Plant. George P. Low. Illustrated detailed description of this interesting installation and its many novel features. 17500 w. Jour of Elec—Nov., 1898.

**Marbach-Stuttgart.**—See **WATER POWER—Marbach, Neckar River.**

**Mechanicsville-Schenectady, N. Y.**—The Mechanicsville-Schenectady (N. Y.) Power Transmission. Charles P. Steinmetz. Illustrates and describes some of the electrical features, giving reasons why they were adopted. 1800 w. Elec Wld—Nov. 13, 1897.

**Mexico.**—The Regla-Pachuca Power Transmission. George J. Henry. It is the purpose of the article to give a complete description of a high head water power and electric transmission plant in Mexico, and to point out what improvement may be effected in the development of mining and other industries in localities difficult of access. Ill. Serial. Elec Wld—March 13, 1897.

**Mine.**—See **ELECTRIC EQUIPMENT; MINE HAULAGE; MINING MACHINERY; POWER TRANSMISSION.**

**Mining.**—Progress in the Adaptation of Electricity. M. J. H. A review of recent progress due to the development of the transmission of power over long distances, especially in mining work. 2000 w. Ir Tr Rev—Jan. 21, 1897.

**Mohawk Valley.**—Electric Power Transmission Project in the Mohawk Valley. Orrin E. Dunlap. Brief account of the project for developing the power of West Canada Creek at Trenton Falls. Ill. 500 w. W Elect'n—May 1, 1897.

**Monocyclic.**—See **Barton, Vt.**

**Montpelier, Vt.**—Long Distance Transmission Power Plant, Montpelier, Vt., with Battery Auxiliary. Illustrates and describes the new plant of the Barre-Montpelier Traction and Power Co., which presents some very interesting features. 500 w. St Ry Jour—Sept., 1898.

**Mt. Whitney, Cal.**—Mt. Whitney, Cal., Transmission Plant. Donald H. Fry. Illustrates and describes the interesting features of this hydraulic electric plant. 1800 w. Elec Wld & Engr—Oct. 28, 1899.

The Mount Whitney Power Company. Illustrated description of a long-distance high-tension power transmission system in California. 2200 w. Elec Rev, N. Y.—Dec. 20, 1899.

The Mount Whitney Power Transmission. Robert McF. Doble. Interesting illustrated description of this modern and finely equipped installation, with account of its construction. 6500 w. Jour of Elec—Jan., 1900.

**Mülhausen, Alsace.**—Transmission of Power by Two-phase Currents (Transmission de Force par Courants Biphasés). An account of the electric-power installation at the linen mills of Gluck & Co., Mülhouse, Alsace, in which very great uniformity of speed under variable load was demanded. A variation within one-fourth of one per cent. was maintained. 2000 w. Génie Civil—Oct. 30, 1897.

**Nevada County, Cal.**—Electrical Transmission of Power in California. W. F. C. Hassen. Illustrated description of plant in Nevada County, with brief account of causes that led to its installation. 1000 w. Am Elect'n—July, 1896.

The Nevada County Power Transmission. An illustrated description of an installation under many difficulties. 1600 w. Jour of Elec—Nov., 1895.

**Newcastle-Sacramento, California.**—The Newcastle-Sacramento Transmission Plant. Illustrated detailed description. 2300 w. Elec Wld—Dec. 18, 1897.

The Newcastle-Sacramento Transmission. Illustrated description of one of the most interesting installations in the western part of the

United States. 3300 w. Jour of Elec—Feb., 1898.

**Niagara.**—Lord Kelvin and the Niagara Power Transmission. Orrin E. Dunlap. An account of an interview on the occasion of Lord Kelvin's recent visit. Ill. 1600 w. Elec Eng—Aug. 26, 1897.

The Niagara Power Transmission Line. J. G. White. History and description. 3500 w. Elec Eng—June 16, 1897.

See also **HYDRO-ELECTRIC PLANT.**

**Niagara-Buffalo.**—Niagara Falls Power in Buffalo. Stephen L. Coles. An illustrated account of the successful test made at midnight Nov. 15. Brief description of the transmission line and its construction. 3000 w. Elec Rev—Nov. 18, 1896.

Niagara Power in Buffalo. Horatio A. Foster. Read before the Real Estate Exchange, Buffalo, N. Y. States briefly what has been done up to date to place the power in condition for use, discussing also how the power will be distributed, cost, etc. 2000 w. W Elect'n—Jan. 8, 1898.

Niagara Power for the Buffalo Railway. Important details of the project, contracts, and proposed line-construction. 1100 w. St Ry Rev—Aug. 15, 1896.

Niagara Power Transmission Up to Date. Frank C. Perkins. Part first is an illustrated description of the electrical equipment for the Buffalo Street Railway. Serial. Elec Wld—Nov. 21, 1896.

The Buffalo-Niagara Power Celebration. Account of the banquet given Jan. 12, 1897, in celebration of the successful power transmission. 5600 w. Elec Eng—Jan. 20, 1897.

The Transformation of Niagara Power Into Three-Wire Direct Current by the Buffalo General Electric Company. Illustrations with complete description of circuits and explanations of unusual alternating-current phenomena involved. 5500 w. Am Elect'n—Feb., 1900.

The Transmission of Electric Power from Niagara Falls to Buffalo. A transmission line of unusual importance to be ready for use in November. 1100 w. Elec Rev—Aug. 5, 1896.

The Use of Niagara Power by the Buffalo General Electric Company. Orrin E. Dunlap. Illustrated description of the new plant, its novel features of construction and apparatus. This is the most important application of electric power after a long transmission extant. 3000 w. Elec Eng, N. Y.—Jan. 5, 1899.

Transmission of Niagara Power to Buffalo. Orrin E. Dunlap. Illustrated description of the construction of this line, now nearly completed. 2000 w. Elec Eng—Oct. 28, 1896.

See also **ELECTRIC RAILWAY—Buffalo.**

**Niagara, Ontario.**—The Cataract Power Company's Transmission Plant. Illustrates and describes a plant for furnishing electric light and power on a large scale at any point on the line from St. Catherines to Hamilton, Ont. 800 w. Elec Wld—July 2, 1898.

**Niagara-Tonawanda.**—The Work of the Tonawanda Power Company. Illustrates and describes the transforming of Niagara power for motors, converting it for railway use, and regenerating it for arc and incandescent lighting. 4200 w. Am Elect'n—April, 1900.

**North Carolina.**—The Transmission Plant of the Fries Manufacturing and Power Company. An illustrated description of a North Carolina plant. 2200 w. Am Elect'n—Oct., 1898.

**Ogden, Utah.**—A 1000 Horse Power High Voltage Transmission Experiment at Ogden, Utah. Describes an interesting experiment made to ascertain the limits within which high voltage currents might be used commercially. 600 w. Elec Eng, N. Y.—April 28, 1898.

The Pioneer Electric Power Transmission. Illustrated description of the transmission plant for utilizing the water power of Ogden Canyon, Utah. 4200 w. Jour of Elec—March, 1898.

The Power Transmission Plant at Ogden. Illustrated description of an extensive plant laid out with the intention of supplying energy for light, power and railway purposes, both in Ogden and Salt Lake City, Utah, and also for mining, and water for irrigation. 1600 w. Elec Wld—Oct. 16, 1897.

**Paderno-Milan.**—The Power Transmission from Paderno to Milan (Die Kraftübertragung von Paderno nach Mailand). Ugo Ancona. With numerous illustrations of the hydraulic and electric generating station, and of the transforming and distributing system. 2500 w. Zeitschr d Ver Deutscher Ing—Sept. 16, 1899.

The Power Transmission and Central Station Plants of the "Societa Generale Italiana Edison di Elettricita" at Milan. Illustrated description of one of the finest and largest installations in Europe. 1800 w. Elec Rev, N. Y.—May 10, 1899.

See also **HYDRO-ELECTRIC PLANT.**

**Polyphase.**—Effect of the Three-Phase System on Electric Power Transmission. Irving Hale. The enormous extension of the field of electric transmission by the introduction of the multiphase alternating system is shown, and its practical success demonstrated. 1200 w. Min Ind & Rev—Nov. 14, 1895.

Electric Power Transmission. Walter Dixon. Read before the Federated Inst. of Min. Engs. A brief paper calling attention to the advantages of multiphase electrical machinery, followed by discussion. 1600 w. Col Guard—Sept. 17, 1897.

On the Transmission of Power by Two and Three-Phase Currents. Andrew Stewart. Considers the merits of the two systems. 1200 w. Elec, Lond—Oct. 14, 1898.

Polyphase Transmission of Power. F. Wallis. Discusses the various questions relating to long distance transmission, and how the polyphase system compares with the direct current and with the single phase alternating. 4400 w. Elect'n, Lond—Dec. 9, 1898.

Power Transmission by Polyphase E. M. F.'s. George White Fraser. Showing how polyphase currents have revolutionised the art of electrical generation, transmission and utilization of power. Traces the progress of electrical working from direct current, through simple alternating, up to polyphase alternating, considers the complications that arise, the practical questions, and shows that varying conditions require the study of each case. 4500 w. Can Elec News—July, 1896.

Saving of Copper in Three-Phase Transmission Lines. Defines a three-phased system and gives method of calculating the comparative amounts of copper required for three-phase and for single alternating current systems. 1200 w. Am Elect'n—Feb., 1897.

The Disposition of Three-Phase Transmission Lines. Aug. J. Bowie, Jr. Discusses the arrangement of the wires and gives a mathematical solution showing the effect of unequal inductance in given examples. 2500 w. Jour of Elec—Nov., 1899.

**Polyphase Conductors.**—See **ELECTRIC CONDUCTOR—Polyphase Transmission.**

**Portland, Me.**—Power Transmission Plant in the Maine Woods. Illustrates and describes the electric power transmission plant of the Cumberland Illuminating Co., of Portland, Me. 2000 w. Elec Wld & Elec Engr—April 29, 1899.

**Portland, Ore.**—Features of the Portland Transmission Hitherto Unpublished. George P. Low. Scheme of distribution for lighting and power circuits, and other interesting features. 1900 w. Jour of Elec—Dec., 1895.

**Practice.**—Some Transmission Practices. Considers synchronizing two phases, changing insulators on live lines, a prony brake experiment, a novel lighting arrester, etc. Ill. 5200 w. Jour of Elec—Jan., 1898.

**Railway Lines.**—The Efficient Transmission of Power to Street Railway Lines. R. W. Conant. The subject is limited to the medium voltage, direct current transmission. The solution of a few special cases is given, to illustrate a method used by the writer. 2500 w. St Ry Rev—July 15, 1897.

**Railway Plants.**—Possibilities of Long Distance Transmission from Electric Railway Steam Plants. The opinion is expressed that the present methods must change very radically, if a central power station is to possess any advantage over auxiliary stations. 1400 w. St Ry Rev—Dec. 15, 1895.

**Regulation.**—I. Regulation in Long Distance Transmissions. Frederic A. C. Perrine. II. Transmission System Regulation. C. L. Cory. Papers and discussion before the Pacific Coast Trans. Assn. Ill. 9700 w. Jour of Elec—July, 1900.

Regulation in Long Distance Power Transmission by Electricity. Frederic A. C. Perrine. Abstracted from a paper read before the Pacific Coast Elec. Trans. Assn. Calls attention to points demanding careful consideration. 2200 w. Eng News—Sept. 6, 1900.

**Rhine-Zürich.**—The Utilization of the Water Power of the Rhine. C. Du Riche Preller. Considers the main features of an undertaking at Zürich for using the power of this river for lighting, industrial purposes, etc. 2000 w. Engng—March 11, 1898.

**Rheinfelden.**—See also **HYDRO-ELECTRIC PLANT; WATER POWER.**

**Riverside, Cal.**—The Riverside Transmission Plant. W. A. Laymon. Illustrated description of an electric transmission and general distributing system for power and lighting. 1800 w. Min & Sci Pr—July 3, 1897.

**San Gabriel, Cal.**—San Gabriel Electric Company. An illustrated description of an interesting plant transmitting electric current to Los Angeles, Cal. Serial. Engng—Dec. 22, 1899.

**St. Hyacinthe, Quebec.**—Three-Phase Power Transmission at St. Hyacinthe, Quebec, Canada. E. M. Archibald. Illustrated description of the oldest plant in Canada employing this system. 2200 w. Elec Wld & Elec Engr—June 24, 1899.

Three-Phase Power Transmission at St. Hyacinthe, Quebec. E. M. Archibald. Illustrates and describes the oldest plant in Canada employing this system. 2300 w. Can Elec News—Sept., 1899.

**Snoqualmie Falls.**—See **HYDRO-ELECTRIC PLANT.**

**Spain.**—Electrical Transmission in Spain. Description with illustrations of an interesting system recently put down by Messrs. Siemens Bros. to supply light and power to Alcoy and Gandia, two towns in Valencia. The power is from the Serpio, a river running between a range of mountains, but having no natural fall. 900 w. Elec Rev, Lond—June 26, 1896.

**Springfield, Mass.**—The Indian Orchard Water Power Transmission Plant of the United Electric Light Co., Springfield, Mass. An illustrated account of the water power station which has brought about the shutting down of the company's steam plant and practically transferred its generating plant beyond the city limits. 2500 w. Elec Eng—June 9, 1897.

**Steam Compared.**—See also **Economics; Limits.**

**Steam Power.**—The Relations of Electricity to Steam and Water Power. Charles E. Emery. A consideration of cost as dependent upon special local conditions which are stated, illustrated by examples of actual installations. 8000 w. Jour Fr Inst—Sept., 1896.

**Switzerland.**—Legislation Concerning the Installation of High and Low Tension Electric Transmissions (Bundesgesetz Betreffend die Elektrischen Schwach-und Starkstromanlagen). With the full text of the recent Swiss law, based upon the report of an expert commission. 4000 w. Schweizerische Bauzeitung—June 30, 1899.

Swiss Transmission of Power Plans. Wilfrid L. Spence. Notes, principally on polyphase transmission plants, with a comparison between rival systems. 5000 w. Elec Eng, Lond—Nov. 12, 1897.

**Tesla.**—Tesla's System of Electric Power Transmission Through Natural Media. Illustrates and describes a novel method for the transmission of electrical energy without metallic line conductors. 2000 w. Elec Rev, N. Y.—Oct. 26, 1898.

**Tesla Patents.**—The Tesla Patents. Decision of Judge Townsend of the United States Circuit Court of Connecticut in favor of the Tesla patents for the polyphase transmission of power in the suit of the Westinghouse Elec. & Mfg. Co., against the New England Granite Co. 6000 w. Elec Rev, N. Y.—Sept. 19, 1900.

**Three Rivers, Quebec.**—The Electrical Power Transmission Plant at Three Rivers, Quebec. H. R. Leyden. Illustrated description of the first long distance plant to be installed in Canada. 2200 w. Elec Wld—Oct. 9, 1897.

**Toledo & Maumee, Ohio.**—See **HYDRO-ELECTRIC PLANT.**

**United States.**—The Electrical Transmission and Application of Power. Illustrates and describes three plants in the United States, each typical of a certain class of work, and of the industrial application by the same medium. 5500 w. Power—April, 1899.

**Waterport-Albion, N. Y.**—Waterport-Albion Power Transmission. Orrin E. Dunlap. Illustrated description of a new plant in New York State. 1300 w. W Elect'n—Dec. 2, 1899.

**Wave Form.**—Effect of Wave Form on Capacity Current of Transmission Lines. F. G. Baum. Analytic study. 1000 w. Elec Wld & Engr—Oct. 20, 1900.

**Yuba-Marysville, Cal.**—The Yuba-Marysville Transmission. Illustrated detailed description. 8000 w. Jour of Elec—May, 1898.

## ELECTRIC TRANSPORTATION.

**Express and Mail Matter.**—Electric Transportation of Express and Mail Matter. Illustrations of the proposed plan of construction, with explanation of system. 1400 w. Elec Age—Nov. 30, 1895.

## ELECTRIC TRAVERSER.

**Railway Cars.**—An Electric Traverser for Railway Carriages. M. Sabouret. From "Revue Général des Chemins de Fer." Illustrates and describes interesting apparatus for carrying railway carriages from one line of metals across to adjoining rails, at the Orleans Railway Station at Paris. 500 w. Elec Eng, Lond—Feb. 9, 1900.

## ELECTRIC UNIT.

See also **ELECTRIC MEASUREMENT—Standard; WEIGHTS AND MEASURES.**

A Proposed System of Units. Reginald A. Fessenden. Shows the desirability of having electrical units, rationalized, and suggests an intermediate solution of the difficulty. Also editorial. 3500 w. Elec Wld & Engr—Feb. 24, 1900.

On a Possible and Rational Simplification of Electric Units. A. Blondel. On the desirability of promoting the practical use of the C. G. S. system, with suggestions. 2000 w. Elec Wld & Elec Engr—July 29, 1899.

1. On the Rational Suppression of Irrational Systems of Units. E. Hospitalier, "L'Industrie Electrique." 2. On Electrical Units. E. Blondel. Two communications and editorials discussing the C. G. S. units. 3500 w. Elec Wld & Engr—Sept. 23, 1899.

Our Electric Units; What Shall We Do With Them? J. A. Fleming. Discussion of the advisability of a revision of the systems, and suggesting a rational system that the writer considers practical and sound. Serial. Elect'n, Lond—Dec. 29, 1899.

Unit Systems and Dimensions. T. Proctor Hall. A paper read before the Iowa Acad. of Science. Showing that the C. G. S. system is an arbitrary one, and may therefore naturally give rise to disparities between classes. 450 w. Elec Wld—Feb. 8, 1896.

**German Nomenclature.**—See **ELECTRIC NOMENCLATURE.**

**Magnetic.**—Magnetic Units. Complete report, presented by Prof. Hospitalier before the Geneva Electrical Congress. 1600 w. Elec Wld—Sept. 12, 1896.

## ELECTRIC VEHICLE.

See also **ACCUMULATOR TRAMWAY; AUTOMOBILE; AUTOMOBILE COMPETITION.**

Electric Automobiles. William Baxter, Jr. Considers the limits in the present state of electrical development, and gives illustrated descriptions of various vehicles. 3000 w. Pop Sci M—Sept., 1900.

Electric Automobiles (Les Automobiles Electriques). M. Schmitt. A general review of the applicability of electric driving' for automobile vehicles, and a comparison of costs with animal power. Three articles. 3000 w. L'Electricien—May 6, 27, June 3, 1899.

Electric Automobiles. Elmer A. Sperry. Considers in detail the special features of these vehicles, and their maintenance and operation. Ill. 4400 w. Trans Am Inst of Elec Engs—Nov., 1899.

Electrical Carriages. J. T. Niblett. Gives some recent improvements in accumulators and their application to traction on common roads. 2500 w. Elec Rev, N. Y.—Aug. 17, 1898.

Electric Road Vehicles (Ueber Elektrische Fahrzeuge). Franz Wilking. With numerous illustrations of automobile omnibuses, coaches, cabs, etc. 4000 w. Elektrotech Zeitschr—May 25, 1899.

Electricity and the Horseless-Carriage Problem. Wm. Baxter, Jr. Comparing steam, oil, gas, and electricity as motive powers for automobiles, and maintaining the superiority of the electric storage battery for this purpose. 2800 w. Eng Mag—May, 1896.

Recent Electric Motor Vehicles for City Streets. Illustrates and describes four types of horseless vehicles which are in daily use, and found to be successful and economical. 1500 w. Eng News—May 19, 1898.

The Electric Automobile. Félicien Michotte. Part first discusses the motors and accumulators. Ill. Serial. Auto Mag—Nov., 1899.

The Electric Motor-Vehicle. C. E. Woods. Read before the Chicago Elec. Assn. Discusses the development, the cost, utility, possibilities as an industrial feature, etc. Serial. Elec, N. Y.—Nov. 30, 1898.

Waverly Electric Runabout and Columbia Electric Emergency Wagon. Illustrated descriptions of two electric vehicles, exhibited at the recent exhibition in Madison Square Garden, N. Y. 900 w. Sci Am—June 10, 1899.

Electrically Driven Vehicles. A topical discussion opened by Mr. Andrew L. Riker. 1200 w. Trans Am Inst of Elec Engs—Jan., 1897.

**Accumulator.**—Some Recent Improvements in Accumulators and Their Application to Traction on Common Roads. J. T. Niblett. Abstract of a paper read before the Self-Propelled Traffic Assn., Liverpool Centre. Deals especially with propulsion by means of batteries, the recent improvements, how best employed, etc. Serial. Elec Rev, Lond—April 8, 1898.

The Selection of a Storage Battery for an Automobile. George T. Hanchett. Gives a method for determining the speed and radius of the vehicle, illustrating by working out the problem for a given vehicle. 500 w. Am Elect'n—June, 1900.

See also **ACCUMULATOR—Automobile.**

**Accumulator Charging.**—The Charging and Care of Automobile Batteries. Theodore D. Bunce, in the "Horseless Age." An explanation of the general features of the battery, and the care needed. 1800 w. Sci Am Sup—Oct. 14, 1899.

**Accumulator Handling.**—The Box and the Accumulator (Le Coffret et l'Accumulateur). H. Jarry. A discussion of the advantages of standardising the batteries of electric automobiles and the cases containing them so that they would be interchangeable. 1800 w. Rev des Transports Parisiens—Dec. 1, 1898.

The Electric Vehicle Company's Battery Handling Machinery. Hugh Dolnar. Describes and illustrates devices invented by G. Herbert Condit, for handling and charging storage batteries on a large scale. 8000 w. Am Mach—Nov. 10, 1898.

See also **Station.**

**Accumulator Ventilation.**—The Removal of Odors from Electric Battery Vehicles (Geruchbeseitigung in Akkumulatorwagen). R. Ulbricht. Describing methods of ventilating the batteries of electrical vehicles so as to prevent unpleasant odors. 800 w. Elektrotech Zeitschr—Sept. 28, 1899.

**Agriculture.**—See **ELECTRICITY.**

**"American."**—The "American" Electric-Motor Vehicles. Illustrates and describes some of these vehicles. 1300 w. Elec Eng, N. Y.—Aug. 18, 1898.

**Battery.**—See **Accumulator.**

**Berlin Exposition.**—The Electric Carriages at the International Motor-Vehicle Exposition (Elektrische Fahrzeuge auf der Internationalen Motorwagen Ausstellung). Frans Wilking. With numerous illustrations of early and recent vehicles, and an extensive table giving details and dimensions of the various exhibits. 6000 w. Elektrotech Zeitschr—Nov. 23, 1899.

See also **AUTOMOBILE EXHIBITION.**

**Boston.**—Electric Automobiles in Boston. An illustrated account of the work and experience of the New England Electric Vehicle Transportation Company. 2800 w. Elec Wld & Engr—June 16, 1900.

**Bremerhaven.**—See **ACCUMULATOR TRAMWAY.**

**Cab.**—Working Drawings of an Electric Cab. Gives drawings illustrating the design of the side elevation and mechanical features. 2200 w. Sci Am Sup—March 10, 1900.

**Cab, Chicago.**—Electric Cabs in Chicago. Illustrates and describes the vehicles of the Illinois Electric Vehicle Transportation Co., giving related information. 2500 w. W Elect'n—Oct. 7, 1899.

**Cab, Doré.**—The Doré Electrical Motor-Cab. Brief illustrated description. 600 w. Ind & Ir—Aug. 19, 1898.

**Cab, London.**—Electrical Cabs. Describes the cabs put into service by the London Electrical Cab Company. 1700 w. Engng—Aug. 20, 1897.

Electric Cabs. Description of the cabs in use in London, dealing chiefly with the internal arrangements. 2000 w. Arch, Lond—Sept. 3, 1897.

**Cab, New York.**—Electric Cabs in New York. Joseph Sachs. Information concerning the plant of the Electric Vehicle Company, with illustrations and descriptions of the cabs, and of their management. 1800 w. Harper's Wk—Dec. 10, 1898.

Electric Motor-Cab Service in New York City. Illustrated description of the mechanically propelled vehicles, the station, motors, and steering and brake gear are given in part first. Serial. Elec Wld—Aug. 14, 1897.

New York's Electric Cab Service. A very complete paper showing the construction of the 100 motor cabs now in public service in New York, with an account of the practical operation of the work of the Electric Vehicle Company. 4500 w. Am Elect'n—Sept., 1898.

The New York Electric Hansom Cabs. Hugh Dolnar. Illustrated description of the hansom cab and its manner of operation, with success of the venture. 1800 w. Am Mach—July 8, 1897. See also **Station, New York.**

**Cab, Paris.**—A New Type of French Automobile Hansom. Illustrates and describes a vehicle exhibited at the recent Exposition in Paris, which is arranged to carry four people and is mounted from the front. 700 w. Elec Wld & Engr—Sept. 16, 1899.

Electric Cabs in Paris. Remarks on the automobile cab competition held some time ago in France, with a description of the cabs of the Compagnie Générale. Ill. Serial. Engng—Feb. 24, 1899.

French Tests of Electric Cabs for City Service. Reports an interesting and valuable test of electric cabs, carried out in Paris. Eleven carriages were entered. Ill. 1000 w. Elec Eng, N. Y.—Aug. 4, 1898.

Electric Cab System of Paris. Illustrated description of the cab adopted, and the electric plant for charging the batteries. 1500 w. Sci Am—June 2, 1900.

**Cab, Vedovelli-Priestley.**—The Vedovelli and Priestley Cab. From "L'Industrie Electrique." Illustrates and describes a vehicle interesting both in the method of steering and form of the body. 700 w. Sci Am Sup—April 14, 1900.

**Columbia.**—A Fast American Run. Hiram Percy Maxim. An account of a run from Atlantic City to Philadelphia on a Columbia electric automobile, which is supposed to be the fastest long-distance run made by an electric automobile. Ill. 1600 w. Auto Mag—Jan., 1900.

A Record Making Automobile. J. B. Entz and H. P. Maxim. Illustrations and details of the electric automobile which lately brought the world's record for these vehicles to this country. 2000 w. Elec Wld & Engr—Dec. 23, 1899.

The Columbia Electric Motor Carriage. Illustrated detailed description. 3300 w. Elec Wld—May 15, 1897.

See also **Electric Vehicle Company; Manufacture.**

**Combination.**—See **AUTOMOBILE.**

**Commercial Standing.**—The Electric Automobile from a Commercial Point of View. Robert A. Fliess. The first part of a report aiming to determine as accurately as possible the commercial standing of the electric automobile at the present time. Serial. 1st part. 6000 w. Elec Wld & Engr—Oct. 6, 1900.

**Controller.**—See **CONTROLLER—Electric Vehicle.**

**Cost and Limitation.**—Cost and Limitation of Electric Vehicle Traction. Alton D. Adams. Considers the cost of energy as furnished by the horse and by the steam engine, showing the cost of horse power to be about eleven times that of electric power, with much greater limitation. 2000 w. Sci Am—July 28, 1900.

**Coupé Design.**—Working Drawing of Electrical Coupé. From "The Hub." Shows how to construct the body, battery box and the gear in proportions to insure safety. 2000 w. Sci Am Sup—Oct. 20, 1900.

**Delivery Wagon.**—Operating Costs of Horse and Electric Delivery Wagons in New York City. G. F. Sever and R. A. Fliess. Results of an investigation of comparative expenses as at present instituted by the large department stores in New York. 7500 w. Trans Am Inst of Elec Engs—Nov., 1899.

Operating Cost of Horse and Electric Delivery Wagons in New York City. Abstract of a paper read at the meeting of the Am. Inst. of Elec. Engs. Comparison of cost of operating in favor of the electric vehicles, with statement of advantages. 4500 w. Elec Wld & Elec Engr—July 8, 1899.

Power Consumption and Operative Costs of Automobile Delivery Wagons. George F. Sever. A study of the comparative costs of operation and maintenance of horse and electric delivery wagons for city service. 1800 w. Elec Rev, N. Y.—March 28, 1900.

**Delivery Wagons, French Trials.**—French Trials of Electric Delivery Wagons. Illustrates the two electric wagons that successfully withstood the test made at Versailles. 650 w. Elec Wld & Engr—Sept. 23, 1899.

**Design.**—A Design for an Electric Automobile Vehicle. Charles T. Child. Working drawings and description of a type of motor vehicle that can be constructed by an amateur of ordinary mechanical skill, and at comparatively small cost. 5000 w. Sci Am Sup—Nov. 26, 1898.

**Draulette.**—The Draulette Electromobile. Illustrated description of a cab differing in general appearance and driving mechanism from other electrical vehicles. 1000 w. Auto Mag—March, 1900.

**Electric Vehicle Company.**—The Electric Vehicle Company. Outlines the problem of mechanical vehicles for street use, and the work undertaken by the company named. Ill. 2500 w. Am Mach—Sept. 29, 1898.

See also **Columbia; Manufacture; Riker.**

**English.**—English Electrical Vehicles. Brief illustrated description of the Electric Motive Power Company's dog cart. 700 w. Ind & Ir—Jan. 26, 1900.

**European Types.**—European Types of Electric Automobiles. Illustrated descriptions of vehicles made by several of the more important manufacturers abroad. 1300 w. Elec Wld & Engr—Feb. 10, 1900.

**Fire Wagon, Paris.**—An Electric Fire Wagon. Illustrates and describes a vehicle with electrical equipment, designed for the Paris Fire Brigade, and reports highly encouraging experimental trials. 1200 w. Engr, Lond—July 7, 1899.

The Electric Fire Automobiles of the Paris Fire Department. Brief illustrated description, including hook and ladder, fire pump and hose cart. 1200 w. Sci Am—Oct. 27, 1900.

**Heavy.**—See **Paris Competition.**

**Hose Wagon.**—An Electric Hose Wagon. From "Le Magasin Pittoresque." Illustrated description of a vehicle belonging to the Paris Fire Department. 1000 w. Sci Am—Dec. 23, 1899.

**Joel.**—Joel Electric Motor Carriage. Illustrates and describes a new form of motor carriage said to run very smoothly with little vibration. 1700 w. Elec Rev, Lond—April 7, 1899.

**Lorries.**—Electrical Coke Lorries. An illustrated description, with figures, showing the economy over horse haulage. 500 w. Ir & Coal Trds Rev—Sept. 7, 1900.

**Manufacture.**—The Manufacture of Electric Automobiles. Illustrated description of methods employed by the Columbia & Electric Vehicle Co., of Hartford, Conn. 3200 w. Elec Wld & Engr—Jan. 13, 1900.

**Milde.**—The Milde Electric Voiturette. A brief illustrated description of a novel automobile. 800 w. Elec Eng, N. Y.—Jan. 26, 1899.

**Monnard.**—The Monnard Electromobile. Translation of an article by M. Delaselle in "La Locomotion Automobile." Description, with several illustrations. 1200 w. Automotor—Aug., 1899.

**Morris and Salom.**—Automobile Vehicles. Pedro G. Salom, with discussion. After a brief historical retrospect, the bulk of the paper is devoted to a description of the Morris and Salom Electrobat. 6800 w. Jour Fr Inst—April, 1896.

**Mors.**—The Mors Carriage. Review of the motor, mechanism and general details of the motor vehicles manufactured by the Société de l'Electricité et Automobiles Mors, Grenelle, France. Ill. 1800 w. Sci Am Sup—Jan. 20, 1900.

**Motors.**—Motors for Electric Automobiles. P. M. Heldt. Describes various innovations in this line, and discusses the problems. Ill. 2000 w. Elec Wld & Engr—March 10, 1900.

See also **ELECTRIC MOTOR.**

**Omnibus.**—The Siemens & Halske Electric Street Omnibus (Der Elektrische Strassenbahn-Omnibus der Siemens & Halske A. G.). H. Siebert. Illustrating and describing a vehicle for general street service, using both overhead wire and accumulators, with details of motors and controller. 3000 w. Elektrotech Zeitschr—Sept. 21, 1899.

**Paris Competition.**—Electric Automobiles at the Paris Concourse. Compiled and translated from the French technical journals. The first of a series of articles describing the vehicles and their performance. Ill. Serial. Elec Wld—Nov. 5, 1898.

Electrically Driven Automobiles (Ueber Elektrisch Betriebene Selbstfahrer). C. B. Feldmann. A review of the electrically driven vehicles shown at the recent Paris competitions. 2500 w. Elektrotech Zeitschr—Oct. 5, 1899.

See also **AUTOMOBILE COMPETITION.**

**Paris Exhibition, 1899.**—The Electromobile Exhibition of the Automobile Club de France. Constantin de Kubicki. A detailed description of the prominent types lately exhibited in Paris. Ill. 1800 w. Elec Rev, N. Y.—Aug. 23, 1899.

**Paris Exposition, 1900.**—Electric Automobiles at the Paris Exposition. Illustrates and describes some of the vehicles on exhibition. 2800 w. Elec Wld & Engr—July 14, 1900.

**Patin.**—The Patin Electrical Motor Carriage. Illustrated description of a carriage designed by M. O. Patin, possessing several novel features. 800 w. Ind & Ir—June 24, 1898.

**Phaeton.**—Working Drawing of an Electric Phaeton. From "The Hub." Full explanation of drawing. 2800 w. Sci Am Sup—July 14, 1900.

**Postal, Germany.**—Automobile Experiments of the German Postal Department. Abstract of an article in "Der Motorwagen," giving the results of a nine months' test of an electric vehicle for parcel delivery. 500 w. Horseless Age—Sept. 19, 1900.

**Radius of Action.**—Radius of Action of Electric Motor Carriages. Hiram Percy Maxim, in "The Horseless Age." An account of a satisfactory trip in a Columbia carriage of the Pope Manufacturing Company. 2400 w. Sci Am Sup—Dec. 11, 1897.

**Riker.**—Riker's Electric Wagons. Hugh Dolnar. Working drawings showing the principal mechanical inventions in motor wagons made by this establishment, with explanation of methods. 2200 w. Am Mach—July 13, 1899.

See also **Electric Vehicle Company.**

**Riker Trap.**—The Riker Electric Trap. Illustrated description. 2000 w. Elec Wld—Sept. 4, 1897.

**Solignac's Fore-Carriage.**—Solignac's Electric Fore-Carriage. From "La Nature." Illustrates and describes an apparatus recently presented to the Société des Voitures Electriques, of Paris. 600 w. Sci Am Sup—Feb. 24, 1900.

**Station.**—Electric Vehicles and Their Relations to Central Stations. Hiram Percy Maxim. Abstract of paper read before the Northwestern Elec. Assn. Considers the applications of these vehicles to practical purposes and the advisibility of stations providing their plants with the apparatus necessary to charge them. 3300 w. Elec Eng, N. Y.—Jan. 26, 1899.

**Station, Newport.**—The Newport (R. I.) Electrical Automobile Station. Spencer C. Crane. An illustrated description of the station and vehicles of the New England Electric Vehicle Transportation Co., with an account of the success of the enterprise. 2500 w. Elec Wld & Engr—Dec. 16, 1899.

**Station, New York.**—The Cabs and Central Station of the Electric Vehicle Company of New York. Illustrated detailed description. 3500 w. Elec Eng, N. Y.—Sept. 1, 1898.

The New Station of the Electric Vehicle Company. Illustrated description of the finely equipped station in New York City, with brief mention of the essential points and improvements in the vehicles. 3500 w. Elec Wld—Sept. 3, 1898.

**Station, Paris.**—The Central Station of the Electric Cab System of Paris (Station Centrale de Flacres Electriques de la Compagnie Générale des Voitures à Paris). E. Campagne. Giving views of buildings, cabs, generating plant, accumulator room, etc., and a general account of the work of the company. 3500 w. 1 plate. Génie Civil—April 15, 1899.

The Electric Plant of the Paris Electric Cab Company (Usine Electrique de la Compagnie Générale des Voitures, à Paris). Showing the generating plant and the system adopted for charging the batteries. 2000 w. Rev Tech—June 25, 1899.

**United States.**—American Types of Electric Motor Vehicles. Thomas B. Booth. Part first gives illustrated descriptions of the Columbia automobiles, with comments on the development and progress of this industry. Serial. Elec Wld & Elec Eng—May 6, 1899.

**ELECTRIC VESSEL.**

See **ELECTRIC BOAT.**

**ELECTRIC WAVE.**

See **ELECTRO-PHYSICS.**

**ELECTRIC WELDING.**

See also **RAIL JOINT.**

Electrical Welding. Sydney F. Walker. Read before the Bristol Channel Center of the Inst. of Marine Engineers, in the engineering laboratory of University College, Cardiff. The processes described are the Thomson system. Dr. Zerener's system and the Bernardos process. 3200 w. Elec Eng, Lond—Jan. 8, 1897.

Electric Welding and Metal Working (Elektrische Schweissung und Metallbearbeitung). Hermann Lemp. Mainly devoted to a description of the apparatus and methods of Prof. Elihu Thomson. 3500 w. Elektrochemische Zeitschr—Nov., 1899.

The Art of Electric Welding. Illustrated account of a visit to the works of the Electric Welding Co. The process due to Prof. Elihu Thomson is explained, and testimony as to its value is given. 2800 w. Elec Rev, Lond—Feb. 7, 1896.

**Arc.**—Electric Arc Welding. William H. Handy. A general review of the practical progress of welding and metal working by electricity, with particular attention to welding by means of the electric arc. Abstracts of the most important articles in the electrical journals are given, together with references to other articles. 5000 w. Elec Pow—Jan., 1896.

See also **Zerener.**

**Deptford.**—Electric Welding. Illustrated description of a series of experiments carried out by the London Electric Supply Company at its works at Deptford. The examples of work done are very interesting. The welder was of 40 kilowatts, weighing 2800 lbs., with a primary current of 300 volts. The ratio of winding, of primary to secondary, was 300 to 1. 700 w. Eng, Lond—Dec. 20, 1895.

**England.**—Electric Welding in England. John Marsden. Letter reprinted from the "Mechanical World" (England) presenting an interesting account of electric welding as practiced in a shop doing a wide variety of machine forging and repairing. 1000 w. Am Mach—March 26, 1896.

**History.**—The History of Electric Welding. A. J. Moxham. An account of the process and its progress, the laws governing the work and their adaptation to commercial practice. 3000 w. Ir Age—Dec. 30, 1897.

**Rail.**—Electric Welding of Street Railway Rails. Gives an account of the experience with welded joints in 1893, reports experiments, tests since made, and describes the work being done on the Nassau Ry. of Brooklyn. Ill. 1600 w. Eng News—Aug. 4, 1898.

The Electrically Welded Rail. Hunter Morrison. Brief historical review of this work, with table showing energy absorbed in electric welding. Ill. 1200 w. Yale Sci M—Jan., 1898.

The Electrically Welded Continuous Rail. Richard Eyre. The merits of the electrically welded track are shown, and the difficulties that have been conquered in bringing it to its present degree of perfection are discussed. 3300 w. St Ry Jour—Dec., 1896.

The Present Status of Electric Welding of Rails. H. F. A. Kleinschmidt. Describes the excellent results obtained by the Lorain Steel Co., by making a weld from a boss on a bar, instead of from a flat bar. 1000 w. St Ry Jour—June, 1899.

See also **RAIL JOINT.**

**Rails, Buffalo.**—Electric Rail-Welding at Buffalo. Illustrates and describes a plant of the Lorain Steel Co. in operation in this city where 50 miles of track is being welded. 900 w. Elec Wld & Elec Engr—Aug. 12, 1899.

Electric Welding. R. F. Danforth. Read before the N. Y. St. Ry. convention. Describes the process used by the Johnson Co. in welding the rails of the Buffalo Ry. Co. 2000 w. St Ry Rev—Sept. 15, 1899.

**Voltex Process.**—The Voltex Process of Electric Welding. Illustrated description of a new process, also applicable to brazing, soldering, or lead burning, recently brought out by G. W. de Tunzelmann. 700 w. Ir & Coal Trds Rev—Nov. 26, 1897.

**Wheel.**—Electric Wheel Welding Machine. Illustrated description of a machine for welding up wheels with metal hubs and spokes. 1000 w. Ind & Ir—July 31, 1896.

**Zerener.**—The Deflected Arc System of Electric Welding. Complete detailed description of samples of work performed by the Zerener system. Ill. 600 w. Engng—Nov. 29, 1895.

Zerener's Method of Electrical Casting, Welding and Soldering. From the "Electrotechnische Zeitschrift." A report on this method and the latest type of apparatus employed. Ill. 1100 w. Elec Eng, Lond—Feb. 7, 1896.

**ELECTRIC WIRE.**

See also **ELECTRIC CONDUCTOR; ELECTRIC LINE; ELECTRIC TRAMWAY—Overhead Construction.**

**Weatherproof.**—See **INSULATION.**

**ELECTRIC WIRING.**

See also **ELECTRIC CONDUCTOR; ELECTRIC CONDUIT; ELECTRIC DISTRIBUTION; ELECTRIC LINE.**

An Electric Wiring "Reverie." Fred. Bathurst. A discussion of systems in use. 2200 w. Elec, Lond—Oct. 27, 1899.

Calculation of Circuit. Frederic A. C. Perrine. The proper use of the different kinds of insulation under varying conditions; the selecting of a conductor for carrying a definite amount of energy; size of wire and all related topics are discussed. Illustrations and diagrams. 8000 w. Elec Engng—March, 1897.

Changes in Electric Wiring. Harry N. Gardner. Discusses methods which have been in favor but are now considered unsafe; also the methods now in favor. 2500 w. Am Elect'n—July, 1898.

Electric Lighting Undertakers and House Wiring. W. Fennell. Discusses the position of electric lighting authorities, with respect to wiring and wiring contractors, and with regard to free wiring and allied systems. Also editorial. 3000 w. Elec Engr, Lond—Sept. 1, 1899.

Electric Wire in Buildings. Alton D. Adams. A discussion of various systems and methods. Serial. Arch & Build—Nov., 1899.

Electric Wiring. F. J. Warden-Stevens. Reviews the progress made in methods of wiring, considering various systems in detail, and comparing them with the conditions of a perfect system. 2500 w. Arch, Lond—Aug. 13, 1897.

Electric Wiring. Remarks on the systems used their expense and the reasons for using them, with some references to the papers of Mr. Fred. Bathurst, and Mr. Sam Mavor. 1600 w. Engng—March 27, 1896.

Interior Electric Wiring. H. N. Gardner. A few rules applying to the wiring of a frame house of moderate cost. 2000 w. W Elect'n—Feb. 18, 1899.

Interior Electric Wiring. H. N. Gardner. An article for the benefit of beginners but containing suggestions for even competent wiremen. 2700 w. W Elect'n—Oct. 8, 1898.

Interior Wiring. G. C. Allingham. Discusses the systems used and the safety. 2400 w. Elec Rev, Lond—Sept. 28, 1900.

Interior Wiring. Editorial discussion of the wiring rules of the Institution of Electrical Engineers. 3000 w. Elec Rev, Lond—Aug. 20, 1897.

Interior Wiring. General consideration of the attributes of a good wiring installation. 1600 w. Am Elect'n—May, 1896.

Interior Wiring. George T. Hanchett. Calls attention to the important details wherein altercurrent wiring differs from direct current wiring. 1800 w. Am Elect'n—Feb., 1897.

Interior Wiring. Charles E. Knox. Part first is introductory presenting and discussing the methods and practices in vogue at the present day. The serial will include detailed plans for wiring all classes of buildings. Serial. Am Elect'n—Feb., 1898.

Interior Wiring. Switch control in buildings is the topic discussed. Faults in position are pointed out and proper methods described. Diagrams illustrate the text. 1600 w. Am Elect'n—Aug., 1896.

Modern Systems of Interior Wiring. L. B. Chubbuck. Read before the Engng. Soc. of the School of Prac. Science, Toronto. Reviews the methods of wiring used since the introduction of electric lighting, and describes the systems in use at present. Ill. 4500 w. Can Elec News—March, 1899.

Some Things About Wiring and Wiremen. S. H. Sharpsteen. Part first calls attention to the fact that every job has some new condition to meet, and briefly discusses where to enter with the service wires. Serial. Elec Eng—June 30, 1897.

Systems of Wiring. Joseph T. Monell. Lecture delivered before the Henry Elec. Club. Considers the various systems and their advantages and disadvantages. 2300 w. Elec Pow—April, 1896.

Technical Litigation and the Question of Good Work in House Wiring. V. Zingler. Part first considers technical litigation demonstrating that the law is not a fit or proper instrument for deciding these cases on their merits, nor the Law Courts the place for referring the cases. Serial. Elec Rev, Lond—Jan. 28, 1898.

The Electric Wiring of Buildings. W. A. Chamen. Abstract of a paper read before the Inst. of Engs. and Shipbuilders, at Glasgow. Considers the different systems in use and their variations, and discusses what is best in the interests of safety. 4600 w. Elect'n, Lond—Feb. 2, 1900.

The Electric Wiring of Buildings. W. A. Chamen. Considers wiring systems and general arrangements. Also discussion. Ill. 3 parts. 19500 w. Trans Inst of Engs & Shipbuilders in Scotland. Feb., March and April, 1900.

The Electric Wiring Question. Fred. Bathurst. A paper read before the Inst. of Elec. Eng., England. Treats of the development and growth of wiring, technical requirements, present method, the advantage of tube or conduit methods, the superiority of an insulating tube, etc. Serial. Elec Eng, Lond—Nov. 29, 1895.

The Wiring of Houses for the Electric Light. Ed. C. de Segundo. Discusses proper methods of wiring, and the things not revealed by an insulation test. 1900 w. Elec Rev, Lond—Feb. 23, 1900.

**Alternating.**—Interior Alternating Current Wiring. R. W. Lohmann. A résumé of the principles governing the drop in a conductor traversed by an alternating current, with editorial. 4000 w. Elec Wld & Engr—Oct. 21, 1899.

**Architects.**—Architects and Electric Lighting. An attempt to indicate some ways by which good electrical work may, by the help of the architect, be made obligatory and at the same time cheaper. 2800 w. Arch, Lond—Jan. 1, 1897.

Electric Wiring. Thomas W. Flood. Read before the Boston Society of Architects. The necessity for architects to make provision in their plans for the electrical installation. Different classes of electrical work and their requisites. 3000 w. Am Arch—Dec. 12, 1896.

**Boston Municipal.**—Municipal Wiring a Failure in Boston. Alton D. Adams. Comment on information given in the report of the chief electrician of the wire department. 800 w. Elec Wld & Engr—March 10, 1900.

**Capitol, Albany.**—Wiring the New York State Capitol. Describes what is claimed to be the largest and most difficult contract for concealed work in a finished building ever executed in the United States. Ill. 1400 w. Elec Eng. N. Y.—Oct. 13, 1898.

**Chart.**—A Convenient Wiring Chart. R. Laurie Ellis. Illustrates an easy method for performing the calculations graphically, for feeders and service wires. 400 w. Elec Wld—June 25, 1898.

A Universal Electric Wiring Chart. Sanford H. Fry. Chart and formula for solving problems pertaining to electric wiring for the transmission of energy. 700 w. Am Mach—June 22, 1899.

See also **Table.**

**Computer.**—A Mechanical Computer of Fall of Potential. William Hand Browne, Jr. Describes a simple mechanical device for the solution of wiring problems, particularly convenient in calculations of conductor systems supplying current to movable receivers, or where the current demanded by fixed receivers may vary. 1700 w. Elec Wld—May 21, 1898.

**Computor, Alternating Currents.**—A Mechanical Computator for Alternating Current Circuits. William Hand Browne, Jr. Explains the principle and construction of an instrument for solving mechanically any wiring problem for direct currents and its application to alternating currents. 1000 w. Tech, No. 14—1899-1900.

**Concentric.**—Concentric Wiring. Sam Mavor. A paper read before the Inst. of Elec. Engs., England. General remarks on various systems of wiring, specially presenting the advantages of concentric wiring. 9000 w. Elect'n—Nov. 29, 1895.

Concentric Wiring. Editorial examination of arguments for and against concentric wiring. 1600 w. Elect'n, Lond—Dec. 16, 1898.

Concentric Wiring. Mervyn O'Gorman. Illustrates this system of wiring and sets forth its advantages. 3000 w. Elec Wld & Elec Engr—Aug. 12, 1899.

**Conduit.**—Notes on Conduit Wiring. H. H. Norris. Describes present practice and methods. 1200 w. Sib Jour of Engng—June, 1900.

Put a Premium on Safe Wiring. Edward H. Johnson. Paper read at the meeting of the Underwriters' Nat. Elec. Assn. Favoring iron armored conduits. 1200 w. Elec Eng—Dec. 18, 1895.

See also **ELECTRIC CONDUIT.**

**Fire Prevention.**—The Best Means of Effectually Preventing the Leakage of Current to "Earth" in Electrical Installations from Generating Heat and Setting Buildings on Fire. Sydney F. Walker. Considers (1) what do we mean by earth? (2) how does leakage of current to earth occur in electrical installations? (3) how does this leakage current generate heat? (4) what are the best means for its prevention? Serial. Elec Eng, Lond—June 11, 1897.

The Prevention of Fires Due to Leakage of Electricity. Frederick Bathurst. The Fothergill prize essay. Gives a review of the present methods of wiring and reasons for advocating insulating tubing. Discussion follows. 7500 w. Jour Soc of Arts—March 12, 1897.

**Fire Protection.**—The Protection of Secondary Circuits from Fire Risks. Cary T. Hutchinson. A paper presented at the Boston meeting of the Am. Inst. of Elec. Engs. A statement of the various possible consequences of a failure of insulation and the means of prevention. 3800 w. Elec, N. Y.—July 5, 1899.

The Protection of Secondary Circuits from Fire Risks. Cary T. Hutchinson. A statement of the dangers, and the means of protection that have been employed, recommending the grounding of secondaries. Also discussion. 9500 w. Trans Am Inst of Elec Engs—Aug.-Sept., 1899.

**Free.**—Free Wiring. Discussion from the private householder's point of view, and with relation to the effect on the supply, undertaking and the cost per unit. 1800 w. Elec, Lond—Jan. 1, 1897.

Free Wiring. E. E. Hoadley. A copy of the scheme worked out for the free wiring of the city of Worcester, Eng. 3500 w. Elect'n, Lond—June 22, 1900.

Free Wiring Systems. John H. Rider. Report to the Electricity Committee of Plymouth Corporation. Presents the methods of the Free Wiring Syndicate, Limited, and the advantages of the scheme. 1500 w. Elec Eng, Lond—March 18, 1898.

See also **Payment System; ELECTRIC STATION MANAGEMENT.**

**Incandescent Lighting.**—The Computations of a Wiring System for Incandescent Lamps (Calcul d'une Canalisation Electrique pour Lampes à Incandescence). A. Vallée. A mathematical computation, taking into account leakage, heating, economy of copper, and the various elements which enter in practical work. Three papers. 2500 w. L'Electricien—May 6, 13, 20, 1899.

**Inconsistencies.**—Inconsistencies in Electric Wiring. Harry N. Gardner. Calls attention to little inconsistencies which detract from the advantages which would result from carefully installed electric systems and urges the giving of electrical work to only reliable contractors. 2000 w. Elec Eng—Feb. 24, 1897.

**Kirchhoff's Laws.**—Kirchhoff's Laws, and Network Calculations. Ellis H. Crapper. Considers, in an elementary manner, Kirchhoff's laws and the methods of applying them. Serial. Ind & Ir—Oct. 1, 1897.

See also **ELECTRIC DISTRIBUTION.**

**Large Conductors.**—Devices for Supporting Large Conductors. S. H. Sharpsteen. Suggestions for wiring. Serial. Elec Eng, N. Y.—Nov. 11, 1897.

**Municipal Aids.**—Municipal Aids to Wiring. Alfred H. Gibbings. Read before the Municipal Electrical Assn., at Manchester. A short paper, with discussion, presenting the advantage of encouraging the use of electricity. 3000 w. Elect'n—July 9, 1897.

See also **Boston; MUNICIPAL OWNERSHIP.**

**N. E. L. A. Report.**—Report of the National Electric Light Assn. Committee on Safe Wiring. Presented at the Niagara Falls meeting. Reports the obstacles overcome and work done by the committee. 2400 w. Elec Eng—June 16, 1897.

**Office Buildings.**—Electric Lighting of Modern Office Buildings. William S. Monroe. The general principles of wiring are illustrated and explained and the advisability of making allowance for this branch of the building construction is presented. 3000 w. Arch Rec—Oct.-Dec., 1896.

**Payment Systems.**—"Free" and "Easy" Payment Systems of House Wiring. V. Zingler. Sets forth the scheme of John H. Rider to secure easy payment and compares it with the alternative scheme of the National Electric Free Wiring Co. Serial. Elec Rev, Lond—April 22, 1898.

See also **Free; ELECTRIC STATION MANAGEMENT.**

**Protection.**—The Protection of Insulated Wires for Electric Light and Power Inside Buildings. Sydney F. Walker. Considers the requirements and how they may best be fulfilled. Serial. Elec Rev, Lond—May 4, 1900.

**Protection from High Potentials.**—The Protection of Low Tension Wiring Against Dangerous High Potential Currents. W. J. Plews. Read before the Canadian Elec. Assn. Calls attention to the dangers due to a change in the system of secondary distribution, and considers apparatus to protect equipments. 900 w. Can Elec News—July, 1899.

Protection of Interior Wiring from High Potential Currents. Warren B. Reed and Lyman C. Reed. Discusses the efforts made to solve this problem and shows what is needed. 2400 w. Elec Wld & Engr—Oct. 28, 1899.

**Return Loop System.**—Some Formulae for the Calculation of Wires. Edward R. Keller. A paper on the return loop system. Its object is to determine which of the methods ordinarily employed will give the most satisfactory results, and to present formulae by which the wiring in such cases may readily be calculated. 900 w. Jour Fr Inst—Dec., 1895.

**Rules, British.**—Electrical House-Wiring Regulations. Comment on three papers read before the Inst. of Elec. Engs (London), urging the putting of the installation business on a sound basis. 3500 w. Elec Rev, Lond—Jan. 27, 1899.

Electric Wiring Rules. Editorial on the papers of R. E. B. Crompton, C. H. Wordingham, and J. Pigg, presented and discussed at a recent meeting of the Brit. Inst. of Elec. Engs. 2500 w. Engng—Feb. 17, 1899.

Wiring Rules. General rules for wiring, issued by the Institution of Electrical Engineers, confined to a statement of requirements. 4800 w. Elec Eng, Lond—Aug. 13, 1897.

**Rules, Germany.**—German Wiring Rules. Abstract from the "Elektrotechnische Zeitschrift." Abstract of the more important rules, which apply to electrical installations with potentials up to 250 volts between any two conductors or one conductor and earth, with the exception of underground networks and electro-chemical plants. 1200 w. Elect'n—Jan. 24, 1896.

**Rules, United States.**—Changes in Underwriters' Rules. Result of the work of the Electrical Committee of the Underwriters' National Electrical Association, providing for a number of changes and additions to the present code of inspection rules of that body. 1700 w. Elec Wld—Dec. 21, 1895.

National Electrical Code. Sketch prepared by the code committee of the National Conference on standard rules and the committee on press of the Underwriters' National Electric Association jointly. 3800 w. W Elect'n—July 17, 1897.

The National Electrical Code. Part first begins an outline of the evolution of electrical rules from the beginnings to the present time. Serial. Elec Rev—Aug. 18, 1897.

See also **N. E. L. A. Report.**

**Ships.**—Merchant-Marine Wiring. E. W. Counties. Pointing out the precautions that must be taken to avoid fire risks. Ill. 1500 w. Am Elect'n—Feb., 1898.

See also **ELECTRIC EQUIPMENT; ELECTRIC LIGHTING.**

**Solder.**—To Solder or Not to Solder. A. E. Dobbs and Charles H. Nohth. Gives an account of test work in joints which resulted in the writers deciding not to solder joints, except where copper and iron are joined. Ill. 2000 w. Elec Eng, N. Y.—Nov. 18, 1897.

**Specialties.**—Defects in Electrical Specialty Designing. H. N. Gardner. Calls attention to defects in appliances used in electric-light wiring, and the weak points in many specialties now being made. 1800 w. Elec Eng, N. Y.—Nov. 25, 1897.

See also **ELECTRIC APPARATUS.**

**Table.**—The Theory of the Wiring Table. Thomas G. Grier. An explanation, with illustrations of the application. 1700 w. Min & Sci Pr—April 28, 1900.

The Theory of the Wiring Table. Thomas G. Grier. Explains method of getting at once the result in the commercial size of wire from use of table. 1600 w. W Elect'n—Jan. 2, 1897.

See also **Chart; Computer.**

**Tests.**—Quick Methods of Testing for Faults in Electric Wiring. A. E. Hutchins. Directions for testing. 1700 w. W Elect'n—March 21, 1896.

The Testing of Interior Wiring. Deals with the questions raised by the new rules for testing. 2400 w. Elec Rev, Lond—Sept. 10, 1897.

See also **ELECTRIC MEASUREMENT; ELECTRIC TESTING.**

**Tool.**—See **TOOL—Electric Wiring.**

## ELECTRIC WORKS.

See also **DYNAMO FACTORY; ELECTRIC CABLE WORKS; ELECTRO-CHEMICAL WORKS; MACHINE SHOP; MACHINE WORKS.**

**Brown, Boveri & Co.**—The Works of Messrs. Brown, Boveri and Co. An illustrated description of this important Swiss electrical machinery works with especial reference to its prominence in connection with polyphase work on the continent. 3000 w. Elec Rev, Lond—Sept. 9, 1898.

**Bullock, Cincinnati.**—The Works of the Bullock Electric Manufacturing Company. Illustrated description of new shops with electrically driven tools and an unusual system of electric transmission, allowing six changes of speed of tools without changing gears or using resistance. 1800 w. Eng Rec—Nov. 25, 1899.

**Crocker-Wheeler, Ampere, N. J.**—A Day with the Founders of Ampere. T. C. Martin. Illustrated description of the Crocker-Wheeler Electric Co. with historical account of the enterprise. 6400 w. Elec Eng—June 17, 1896.

**Crompton, Chelmsford, Eng.**—The New Arc Works at Chelmsford. Illustrates and describes the new works of Messrs, Crompton & Co. for the manufacture of high-class electrical plant. 3700 w. Elec Eng, Lond—Aug. 5, 1898.

**England.**—Electrical Factories and their Machinery. The first part describes the workshops of Messrs. T. Parker, Limited, of Wolverhampton, with illustrations. Serial. Elec Rev—July 31, 1896.

**Ferranti, Hollinwood, Eng.**—Messrs. Ferranti's Hollinwood Works. Illustrates and describes some of the principal products of these works. Serial. Elec Eng, Lond—May 18, 1900.

**Langdon-Davies, Eng.**—The Langdon-Davies Motor Works. An illustrated description of this motor, and the works where it is constructed. 1200 w. Elect'n, Lond—Dec. 2, 1898.

**Mavor & Coulson, Glasgow.**—Messrs. Mavor and Coulson's Electrical Engineering Works. Illustrated description of these works, in Glasgow, for the production of electrical machinery. 1800 w. Elect'n, Lond—March 25, 1898.

**Oerlikon.**—See **Brown, Boveri & Co.; MACHINE WORKS—Oerlikon.**

**Preston, Eng.**—New Works of the English Electric Manufacturing Company, Limited. An illustrated detailed description of a large plant and its equipment. 5000 w. Tram & Ry Wld—July 5, 1900.

The Electric Railway and Tramway Carriage Works, Limited, Preston, Eng. Benjamin Sykes. Illustrated detailed description. 2800 w. Elec Eng, Lond—Nov. 10, 1899.

The New Works of the English Electric Manufacturing Co. at Preston. An illustrated detailed description of the shops and their equipment, with account of the organization of the company. 4200 w. Elect'n, Lond—June 22, 1900.

**Primitive.**—See **DYNAMO FACTORY.**

**Schuckert.**—The Elektricitäts - Actiengesellschaft. Late Schuckert and Co., Nürnberg, Germany. Illustrated description of these works and their equipment, with history of the founder, Siegmund Schuckert. Serial. Engng—Oct. 14, 1898.

**Siemens-Halske, Charlottenburg.**—The Siemens & Halske Works, at Charlottenburg, Germany. Robert Grimshaw. Illustrated description of some of the machines used in these works. 1800 w. Mach, N. Y.—Feb., 1898.

**Siemens-Halske, U. S.**—The Siemens & Halske Electric Company of America. Illustrated description. Serial. Elec Wld—Nov. 14, 1896.

**United States.**—Through English Eyes. Notes on electrical manufacture in the United States, giving an account of visits to various works. 1500 w. Elec Rev, N. Y.—April 20, 1898.

**Westinghouse.**—Special Operations in Large Electrical Works. Illustrates and describes some methods followed at the works of the Westinghouse Electric & Manufacturing Co. 1400 w. Am Mach—Jan. 19, 1899.

The Westinghouse Electric Works at Pittsburg. An illustrated detailed description. Serial. Engng—March 24, 1899.

The Westinghouse Electrical Works. Illustrated description. Serial. Engng—April 3, 1896.

**Wolverhampton, Eng.**—The Electric Construction Company's Works at Wolverhampton. Gives a short history of the development and an illustrated description. 2800 w. Elect'n, Lond—March 10, 1899.

## ELECTRO-CHEMICAL WORKS.

See also **ELECTRO-CHEMISTRY.**

**Castner.**—A Romance of Modern Industry. An extremely interesting story of the development of the aluminum industry, the ruin of an English enterprise based on the Castner process, by the introduction in America of the electrolytic method of producing metallic alluminum, and the recovery of the fortunes of the company by turning to account the knowledge gained in its abandoned aluminum industry in the manufacture, by a new process, of caustic soda and bleaching powder. 1500 w. Ir & Coal Trds Rev—Nov. 15, 1895.

**Castner-Kellner.**—The Castner-Kellner Alkali Works at Weston Point. John B. C. Kershaw. An illustrated detailed description of the process, and introductory remarks concerning the slow progress of electrolytic processes in England. 3300 w. Elec Rev, Lond—March 31, 1899.

See also **ELECTRO-CHEMISTRY—England.**

**Chedde, Savoy.**—The Electrolytic Chlorate Works at Hallein (Die Sulphit und Elektrischen Anlagen showing the progress of the new method of manufacture, and giving an account of the works situated at Chedde, Haute Savoie, close to Chamounix. 2800 w. Eng & Min Jour—June 10, 1899.

**Clavaux, France.**—The Electrolytic Alkali Works at Clavaux, France. John B. C. Kershaw. Describes the Hulin process and the works at Gavet Clavaux. Ill. 1700 w. Eng & Min Jour—April 29, 1899.

**Dye and Print.**—Electro-Chemistry in a Dye and Print Works. A. E. Sunderland. Read at Bradford, Eng., Technical College. Reviews the applications of electricity in works of this character, the action of the electric current on dyewares, giving some of the results, etc. 2000 w. Elect'n, Lond—Aug. 31, 1900.

**Hallein, Salzburg.**—The Sulphite and Electric Works at Hallein (Die Sulphit und Elektrischen Anlagen in Hallein). An account of the new paper pulp works at Hallein, near Salzburg, in which the bleaching is performed by Dr. Kellner's process of sulphite and electric current. 1500 w. Elektrochemische Zeitschr—Feb., 1897.

**Niagara.**—Making Sodium Peroxide at Niagara. Orrin E. Dunlap. Describes the electrical equipment of the Niagara Electro-Chemical Co. Ill. 500 w. Elec Eng—June 23, 1897.

The Manufacture of Chemicals by Niagara Power. Orrin E. Dunlap. Description of plant and processes of the Chemical Construction Company. 1500 w. Elec Eng—Sept. 9, 1896.

See also **ELECTRIC PLANT; ELECTRIC MACHINERY—Alkali Works, Niagara; HYDRO-ELECTRIC PLANT.**

**St. Helens, Eng.**—The Electro-Chemical Company's Works at St. Helens. Illustrated general description of works apparatus and process for resolving, by the electric current, common salt into soda, and chlorine gas. 2000 w. Eng, Lond—April 10, 1896.

The Manufacture of Electro-Chemical Products. An account of the methods adopted in the works of the Electro-Chemical Co., of St. Helens, where caustic soda, bleaching powder and chlorate of potash are manufactured. Ill. 2000 w. Elec Rev, Lond—March 11, 1898.

See also **HYDRO-ELECTRIC PLANT.**

**St. Michel, France.**—The St. Michel Electrolytic Chlorate Works. John B. C. Kershaw. Brief illustrated description of these interesting works in France. 1300 w. Elec Rev, Lond—Nov. 25, 1898.

**Sault Ste. Marie.**—See **ELECTRIC INDUSTRY.**

## ELECTRO-CHEMISTRY.

See also **ACCUMULATOR; ELECTRIC CELL; ELECTRO-CHEMICAL WORKS; ELECTROLYSIS; ELECTROLYTE; ELECTRO-METALLURGY.**

Applied Electro-Chemistry. James Swinburne. Points touched upon in the first of four Cantor Lectures on this subject. 4400 w. Jour of Soc of Arts—Sept. 11, 1896.

Electro-Chemistry. Wilder D. Bancroft. On the importance of the study, considering points of interest and importance and its applications. 2800 w. Sib Jour of Engng—Dec., 1899.

Electro-Chemistry. Wilder D. Bancroft. The importance of the study, showing the sources of error that may occur in carrying out any electrolytic process and the effect of slight variations. 3000 w. Sib Jour of Engng—June, 1900.

The Future of Electrochemical Technology (Ueber den Gegenwärtigen Stand der Elektrochemiscen Technik). Prof. H. Borchers. A paper before the German Electrochemical Society giving very full statistics of present and proposed electrochemical works in various parts of the world, with discussion. 6000 w. Zeitschr f Elektrochemie—July 20, 1899.

The Future of Electrochemical Technology (Ueber den Gegenwärtigen Stand der Elektrochemischen Technik). Dr. W. Borchers. A tabulation of the present applications of electrochemistry, arranged by countries, and processes, together with an exhaustive commentary on the great future possibilities in metallurgy and industrial technology. 2500 w. Stahl und Eisen—Aug. 1, 1899.

The First Principles of Electro-Chemistry. W W. Haldane Gee. The first of a series of articles relating to the fundamental principles. Serial. Elec, Lond—Aug. 20, 1897.

Chemical Effects of the Electric Current. Reginald Gordon. Lecture delivered before the Henry Electric Club. Brief mention of the various ways the chemical effects of electric currents are being utilized. 2400 w. Elec Pow—July, 1896.

Osmotic Pressure, Dissociation, and Electrolysis. W. Bettel. A contribution to the discussion on Prof. von Oettingen's paper. 4500 w. Jour of Chem & Met Soc of S Africa—March, 1899.

The Relation of Chemistry to Electrical Engineering. C. Fred Burgess. The importance of the science of electro-chemistry, and the close relation and important developments to be looked for in the near future. 2700 w. Wis Engr—Jan., 1898.

**Advancement.**—Advancement of Electrical Chemistry. F. Mollwo Perkin. Deals with electrolytic processes for obtaining the non-metallic elements and for the preparation of inorganic and organic compounds. 2600 w. Nature—June 7, 1900.

**Address.**—Electro-Chemistry's Advance. Inaugural address of J. W. Swan before the British Inst. of Elec. Engs., on the progress of electro-chemistry and the industries and applications. Serial. Engng—Jan. 21, 1898.

**Alkali.**—Anodes for Electrolytic Alkali Processes. A. T. Weightman. A statement of the difficulties met and remedies found. 2700 w. Eng & Min Jour—Aug. 4, 1900.

Industrial Notes on Electrolytic Alkali. John B. C. Kershaw. Brief discussion of the position and prospects of the three electrolytic soda processes. 800 w. Elect'n—Nov. 5, 1897.

**Alkaline Chlorides.**—A Contribution to the History of Electrolysis of Alkaline Chlorides. George Lunge. Discussing the question whether the priority of actual success in this field belongs to Germany or to England. 2500 w. Eng & Min Jour—Sept. 5, 1896.

The Electrolysis of the Alkaline Chlorides (Ueber die Elektrolyse der Alkalichloride). H. Wohlwill. A very elaborate account of the researches of the author, showing the influence of variations in voltage and current density, and investigating the conditions accompanying the production of hypochlorites and chlorates. 10000 w. Zeitschr f Elektrochemie—Aug. 4, 1898.

The Electrolysis of Chlorides. E. Andreoli. Referring only to those electricians who have successfully worked their processes on a commercial scale, and who have erected electro-chemical works capable of turning out daily one or two tons of soda and chlorine, or several tons of chloride of lime. Serial. Eng & Min Jour—June 13, 1896.

**Alkali Salts.**—An Electrolytic Method of Obtaining the Halogen Salts of the Alkalies (Ueber ein Elektrolytisches Verfahren zur Gewrunning der Chlor-Brom-und Iodsauren Salze der Alkalien). Dr. E. Müller. Giving data as to solutions, electrodes, currents and operative details, as successfully employed by the author at the laboratory of the Dresden Polytechnic. 2500 w. Zeit f Elektrochem—April 13, 1899.

Notes on the Electrolysis of the Alkaline Bromides and Fluorides (Beiträge zur Elektrolyse der Alkali-Bromide und Fluoride). Showing the arrangement of apparatus and giving the details of the reactions. 4000 w. Zeitschr f Elektrochemie—May 5, 1897.

The Electrolysis of the Alkali Salts of Fatty Acids (Die Elektrolyse Fettsaurer Alkalisalze). Investigating the phenomena of the electrolytic action and the resulting products. 2500 w. Zeitschr für Elektrochemie—Aug. 20, 1897.

See also **Bromides.**

**Alternating Current Lead Electrodes.**—See **ACCUMULATOR—Electrolysis.**

**Ammonium Thiosulphate.**—On the Electrolysis of Thiosulphate of Ammonium. M. P. Pierron. Describes experiments carried out on aqueous solutions of thiosulphate of ammonium containing 17.5 per cent. of the anhydrous salt. 1200 w. Am Gas Lgt Jour—Sept. 4, 1899.

**Arrhenius' Theory.**—The Meaning of Arrhenius' Theory of Ion Groups in Analytical Chemistry (Die Bedeutung der Arrhenius' schen Theorie der Ionenspaltung für die Analytische Chemie). F. W. Kuster. Showing the application of Arrhenius' theory to analysis by passing an electric current through the solution and observing the conductivity and polarity. 2500 w. Zeitschrift für Elektrochemie—Dec. 5, 1896.

The Electrolytic Conductivity of Pure Substances (Ueber das Elektrolytische Leitvermögen Reiner Substanzen). R. Abegg. An investigation of electrolytic conductivity, based upon the modern theory of Arrhenius. 1500 w. Zeitschr f Electrochemie—Feb. 2, 1899.

**Bleaching.**—On the Manufacture of Alkali and Bleach by Chemical and Electrolytical Methods. Bertram Blount. Read before the Northern Soc. of Elec. Engs. A comparison and a summing up of the weak and strong points of the two methods. 5500 w. Elect'n—Dec. 11, 1896.

Electrolytic Bleach (La Sbianca Elettrica). A short general summary of electrolytic methods for making bleaching agents with data of power absorbed and costs. 900 w. L'Elettricitá—Oct. 30, 1898.

The Use of Electrically Produced Chloride of Lime in Cotton and Linen Bleaching (Praktische Ergebnisse bei Anwendung von auf Elektrolytischem Wege Hergestellten Chlorkalk in der Baumwoll und Leinenbleicherei). This article article shows that chloride of lime produced by the electrical decomposition of common salt possesses especial advantages for bleaching purposes, both for superior results and greater economy, and pronounces its introduction as a great step forward. 1500 w. Elektrochemische Zeitschrift—Nov., 1896.

See also **Hypochlorite; BLEACHING—Electrolytic; CAUSTIC SODA.**

**Bromides.**—The Electrolysis of the Bromides of the Alkaline Earths (Ueber die Elektrolyse der Bromide der Erdalkalien). J. Sarghel. A very full account of experimental analyses, showing the close relation between the theory and the practical results. Two articles. 8000 w. Zeitschr f Elektrochemie—Sept. 7, 14, 1899.

See also **Alkali Salts.**

**Calcium Chloride.**—See also **CALCIUM CHLORIDE.**

**Carbon.**—The Electrolytic Dissolution and Deposition of Carbon. Editorial on the articles written by Prof. Vogel and Dr. Coehn, with the substance of Dr. Coehn's last article. 1600 w. Elect'n—June 12, 1896.

**Carbon Equivalent.**—The Electrochemical Equivalent of carbon (Das Elektrochemische Aequivalent des Kohlenstoffs). A number of experimental determinations give values closely approximating that due to theory. 1000 w. Zeitschr f Elektrochemie—April 5, 1897.

**Caustic Soda.**—See also **CAUSTIC SODA.**

**Chlorates.**—The Electrolytic Preparation of Chlorates (Ueber Elektrolytische Chloratdarstellung). John Laudin. Abstract of a paper read before the Swedish Engineers' Society, Stockholm. 1500 w. Zeitschr f Elektrochemie—March 22, 1900.

**Chromium.**—See **CHROMIUM.**

**Colloids.**—The Electrical Transfer of Colloids (Ueber Elektrische Wanderung von Colloiden). A discussion of the influence of electrical currents upon phenomena of diffusion by Dr. Coehn. 2000 w. Zeitschr f Elektrochemie—July 20, 1897.

**Conductivity.**—See **Arrhenius's Theory; ELECTRIC CONDUCTIVITY; ELECTROLYTE.**

**Conservation of Energy.**—The Principle of the Conservation of Energy in Electrochemistry (Das Prinzip der Erhaltung der Energie in der Elektrochemie). A scholarly investigation of an important phase of the great problem of the conservation of the physical forces. 4000 w. Deutsche Zeitschr f Elektrotechnik—April, 1897.

**Copper.**—See **COPPER REFINING; ELECTRO-METALLURGY.**

**"Cupron-Element."**—The Cupric Oxide Element (Das Kupferoxydelement). P. Geibel. An account of the so-called "Cupron-Element" battery and of the use of cupric oxide in accumulator cells. 2000 w. Elektrotechnische Rundschau—Dec. 1, 1896.

**Decomposition, E. M. F.**—Dr. Tommasi "On the Law of the Proportionality of the Electromotive Force of Decomposition." Abstract of paper published in the "Bulletin Technique." Gives experiments which the writer considers sufficient to disprove Berthelot's law of maximum work, and Sprague's law of minimum work, and formulates a new principle, termed the "principle of least work." 2200 w. Elec Rev, Lond—June 2, 1899.

Studies upon the Voltages of Decomposition (Studien über Zersetzungsspannungen). E. Bose. A long and elaborate account of experimental investigations into the voltages at which the electrical decomposition of various compounds occur. Many tables and diagrams are given. 10000 w. Zeitschr f Elektrochemie—Oct. 6, 1898.

The Decomposition of Solid and Fused Electrolytes (Ueber die Zersetzungsspannung

Fester und Geschmolzener Elektrolyte). C. C. Garrard. A preliminary report upon a number of investigations made at the Göttingen laboratory under the direction of Prof. Nernst. 1500 w. Zeitschr f Elektrochemie—Sept. 28, 1899.

See also **ELECTRIC CELL—Carbon.**

**Dissociation.**—The Application of the Dissociation Theory to the Electrolysis of Aqueous Solutions (Ueber die Verwendtbarkeit der Dissociations-Theorie bei Elektrolyse Wässriger Lösungen). J. G. MacGregor. Discussing the particular case in which two electrolytes and a common ion are used, giving tables of results with a number of solutions. 2500 w. Elektrochem Zeitschr—Jan. 1, 1900.

The Reliability of the Dissociation-Values Determined by Electrical Conductivity Measurements. Arthur A. Noyes. A criticism of an article by von Laar, in "Ztchr. Phys. Chem.," claiming that the dissociation values calculated from electrical conductivity are incorrect, and showing that his "proofs" are not reliable. 2500 w. Tech Quar—June, 1898.

The Theory of Dissociation as Applied to Galvanic Currents. A. von Oettingen. Deals with the phenomena attending electric currents in their entrance into, passage through, and exit from fluid electrolytes. 5800 w. Jour of Chem & Met Soc of S Africa—Feb., 1899.

**Efficiency.**—Efficiency of the Electrolytic Cell. C. F. Burgess. Discusses methods of studying the efficiency of an electrolytic process, and the utilization of the energy of the electrolytic cell. 3000 w. Elec Wld—Dec. 24, 1898.

**1895.**—Industrial Electrolysis in 1895. Bertram Blount. A survey of this industry aiming to indicate the direction in which progress is being made and those in which further progress is possible. 2300 w. Elec Plant—Feb., 1896.

**1896.**—Electro-Chemistry in 1896 (Elektrochemie im Jahre 1896). A general review of the progress of this branch of science for the past year, with numerous references to journals and patents. 7500 w. Elektrochemische Zeitschr—Jan., 1897.

Chemistry. Editorial review of the past year, containing a report of progress in electro-chemistry and metallurgy. 2500 w. Eng, Lond—Jan. 1, 1897.

**1897.**—Electrochemistry in 1897 (Die Elektrochemie im Jahre 1897). Dr. H. Weyer. A very full review of the progress of electro-chemistry during the past year, with numerous references to periodical literature. 6000 w. Elektrochemische Zeitschr—Jan., 1898.

**1898.**—Electro-Chemistry in the Year 1898 (Die Elektrochemie im Jahre 1898). A general index of the important papers which have appeared in the technical journals of many countries upon electrochemistry and allied branches. 4000 w. Elektrochemische Zeitschr—Jan., 1899.

The Electro-Chemical and Electro-Metallurgical Industries in 1898. John B. C. Kershaw. Reports steady advance along the industries already in operation, but no new developments of importance. Deals with the more important industries seriatim. Serial. Elec Rev, Lond—Jan. 13, 1899.

The Progress of Electro-Chemistry in 1898. H. Borus. Begins a reviewing of the work accomplished by various investigators. 3000 w. Eng & Min Jour—Aug. 12, 1899. Serial. 1st part.

**1899.**—Electrochemistry in the Year 1899 (Die Elektrochemie im Jahre, 1899). Dr. M. Krüger. A general review of progress in various branches of the art during the past year. 3500 w. Elektrochemische Zeitschr—Feb., 1900.

Recent Electro-Chemical Progress. C. Khox Harding. Notes on the advances made during 1899. 1200 w. W Elect'n—Jan. 6, 1900.

The Electro-Chemical and Electro-Metallurgical Industries in 1899. John B. C. Kershaw. A review of progress, some of the industries showing steady advancement, while the calcium carbide industry has been phenomenal in its growth. Serial. Elec Rev, Lond—Jan. 5, 1900.

**Electrodes.**—See **Alkali; ELECTRODES.**

**Electrolytic Baths.**—New Process for the Production of Electrolytic Baths. On advantages of an admixture of glycerine. 1100 w. Sci Am Sup—Oct. 27, 1900.

**Electrolytic Thermo Chains.**—Thermic Electrolytic Chains (Ueber Elektrolytische Thermoketten). William Duane. A contribution to the transactions of the Royal Prussian Academy of Sciences of Berlin. This is an investigation into the production of electrolytic action by a series of solutions of different temperatures. 1200 w. Zeitschrift für Elektrochemie—Oct. 20, 1896.

**Electromotive Force.**—Chemical Equivalents and Electromotive Force (Chemisches Gleichgewicht und Elektromotorische Kraft). H. Dauneel. A discussion of the theories of van't Hoff and Nernst upon the relation between the chemical equivalents of given substances and the electromotive force produced by their combination. 1500 w. Zeitschr f Elektrochemie—Nov. 23, 1899.

See also **Decomposition E. M. F.**

**Elements' Periodic Functions.**—The Relation of the General Properties of Elements to Their Atomic Weight (Ueber die Beziehungen der Allgemeinen Eigenschaften der Elemente zu deren Atomgewichte). W. Sander. A general review of the theory of Mendelejeff and his followers, and its application to practical electro-chemistry. 2000 w. Elektrochemische Zeitschr—Oct., 1899.

**England.**—The Electro-Chemical Industries of England. John B. C. Kershaw. Part first gives a review of the progress made in the last twenty years, with views and remarks concerning the Castner-Kellner Alkali Works, at Weston Point, Eng. Serial. Elec, N. Y.—May 18, 1898.

See also **ELECTRO-CHEMICAL WORKS.**

**Equations.**—General Equations of Condition (Allgemeine Zustandsgleichung). R. Mewes. A discussion of the fundamental theoretical equations upon which electrochemical and other chemical relations depend. 3000 w. Elektrochemische Zeitschr—Jan. 1, 1900.

**Europe.**—Electro-Chemical and Electro-Metallurgical Industries of Europe. John B. C. Kershaw. The first of a series of articles dealing with the development of these industries. A rapid survey will be given, with detailed account of those processes which have attained greater development abroad than in the United States, etc. Serial. Elec—Aug. 11, 1897.

**Feeding Apparatus.**—Feeding Arrangement for Electrolytic Apparatus (Speisevorrichtung für Elektrolytische Zersetzungs-Apparate). Raul Girouard. Illustrated description of an apparatus in which liquid is transferred from a reservoir to an electrolytic cell automatically, without the two bodies of liquid coming in contact with each other. 900 w. Elektrochem Zeitschr—Aug., 1900.

**Ferric Chloride.**—On the Hydrolysis of Ferric Chloride. H. M. Goodwin. Results of some experiments on the changes which take place in a neutral ferric chloride solution when suddenly diluted. Based on the electric conductivity. 3600 w. Tech Quar—Dec., 1896.

**Gas Apparatus.**—Arrangement for Drawing Off the Gas from Electrolytic Apparatus with Horizontal Electrodes (Gasabzugs-Einrichtung für Elektrolytische Apparate mit Wesentlich Horizontal Angeordneten Elektroden). W. Bein. An illustrated account of apparatus patented in Germany. 600 w. Zeitschr f Electrochemie—March 29, 1900.

**Hargreaves-Bird Process.**—A New Electrolytic Process of Manufacturing Chemicals. A description of the Hargreaves-Bird process as explained in the "Liverpool Post," with comments. 700 w. U. S. Cons Repts, No. 617—Jan. 2, 1900.

The Hargreaves-Bird Electrolytic Alkali Process. John B. C. Kershaw. A consideration of the various reports which have been made upon this process. 1800 w. Elec Rev, Lond—Nov. 24, 1899.

**History.**—Applied Electro-Chemistry: A Retrospect and a Prospect. E. Edser. Notes briefly applications successful and unsuccessful. 2200 w. Elec Eng, Lond—Jan. 6, 1899.

Electro-Chemical Progress. Bertram Blount. Consideration of recent developments noting advances made and the tendency of thought. 2500 w. Elect'n—Nov. 12, 1897.

Progress in the Electro-Chemical Industry (Fortschritte auf dem Gebiete der Elektrochemischen Industrie). Dr. Hugo Ritter v. Perger. An address delivered before the Society of Austrian Engineers and Architects, reviewing the applications of electricity to industrial chemistry during the last few years. Two articles. 12000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 11 and 18, 1896.

Recent Progress in Electro-Chemistry. Herbert R. Kingman. Notes the theories and principles from which the commercial industries of this field have developed and reviews the progress. Serial. W Elect'n—March 10, 1900.

Some Notes on Electro-Chemistry. J. Wright. Historical review of early experiments in this industry, with description of some of the processes to which the art is applied. 3000 w. Ind & East Engr—March, 1898.

The Electric Current in Chemistry. Part first reviews early discoveries, recalling the labors of eminent investigators, and the results won by them. Serial. Elec Rev, Lond—April 28, 1899.

The Industrial Applications of Electro-Chemistry. Thomas Ewan. Briefly reviews the progress in this field since 1792, giving a general description of processes actually employed. 5500 w. Nature—June 2, 1898.

The Progress of Electro-Chemistry and Electro-Metallurgy During the Last Twenty-Five Years. Emile Andreoli. Sketches the progressive movement, and shows the immense amount of work accomplished. 4000 w. Elec Rev, Lond—Nov. 12, 1897.

The Progress of Electrochemistry and Electrometallurgy during the Past 25 Years (Die Fortschritte der Elektrochemie und Elektrometallurgie Während der Letzen 25 Jahre). A general review of the developments of the industrial applications of electricity to chemistry and metallurgy in the last quarter of the century. 3000 w. Elektrochem Zeitschr—Nov., 1898.

**Hulin Process.**—Methods and Apparatus for the Technical Electrolysis of Alkaline Chlorides (Verfahren und Apparate zur Technischen Elektrolyse von Chloralkalien). Leon Hulin. A practical paper based on the results of working experience. 3500 w. Elektrochemische Zeitschr—July, 1897.

The Hulin Electrolytic Alkali Process. John B. C. Kershaw. An account of the experiments and development of this process, with statement of its advantage. 1500 w. Elect'n, Lond—March 4, 1898.

See also **ELECTRO-CHEMICAL WORKS—Clavaux, France.**

**Hydrolysis and Catalysis.**—Concerning Hydrolysis and Catalysis (Ueber Hydrolyse und Katalyse). G. Platner. Discussing the experiments of Warburg, Paschen, and Jahn, concerning the hydrolytic dissociation of various salts. 3000 w. Elektrochemische Zeitschr—Jan., 1898.

**Hydrolysis and Electrolysis.**—Hydrolytic and Electrolytic Dissociation (Ueber Hydrolytische und Electrolytische Dissosiation). Dr. G. Platner. A general review of preceding investigations, together with the author's own results in the electrical dissociation of solutions of salts, considered from a chemical point of view. 2000 w. Elektrochemische Zeitschr—May 1, 1898.

**Hypochlorite.**—The Electrolytic Production of Solutions of Hypochlorite for Bleaching and Disinfecting Purposes. John B. C. Kershaw. Describes electrolyzers for the production of hypochlorite now in use and the comparative costs. Ill. 2800 w. Elect'n, Lond—June 15, 1900.

The Electrolytic Production of Hypochlorites (Zur Kenntnis der Elektrolytischen Herstellung von Hypochloriten). A. Sieverts. A record and discussion of an extensive series of experiments upon the production of hypochlorites by electrolysis of neutral chloride solution, in the laboratory of the Technical High School at Dresden. Two articles. 5000 w. Zeitschr f Elektrochemie—Jan. 4, 11, 1900.

See also **SANITATION—Woolf Electrolytic.**

**Industrial.**—Electrolytic Processes in Industrial Operations. Dr. W. Borchers. An account of the wonderful progress of electrochemical manufacturing, with descriptions and diagrams of the more important forms of apparatus and tables of output, value, and power employed. Points out especially the way in which otherwise wasted water-power has been employed in this industry. 4000 w. Eng Mag—Dec., 1899.

The Present State of Industrial Electro-Chemistry (Etat Actuel de la Fabrication des Produits Chimiques par l'Electrolyse). Leon Guillet. An elaborate review of the electrolytic methods of producing the alkalies, chlorates, etc., on a commercial scale. Serial. Génie Civil—Nov. 25, 1899.

Electricity in Relation to the Chemical and Metallurgical Industries. John B. C. Kershaw. This series of articles proposes to notice the electro-chemical and electro-metallurgical processes now at work on an industrial scale, so far as information concerning them is obtainable, thus providing a general review of these industries at the end of 1896. Serial. Elect'n—Dec. 25, 1896.

See also **ELECTRO-CHEMICAL WORKS.**

**Intermediate Conductor.**—Concerning the Influence of Intermediate Conductors (Ueber das Verhalten von Mittelleitern). Dr. Hugo Kauffmann. A mathematical investigation of the action of isolated conductors placed in a solution undergoing electrolysis. This bears upon the same subject as an article in the number for Nov. 5, in which a porous carbon cell plays such a part. 1500 w. Zeitschrift für Electrochemie—Dec. 5, 1896.

See also **Porous Carbon Cell.**

**Iodoform.**—See **IODOFORM.**

**Ion Formation Heat.**—The Heat of Formation of Ions. A. Hollard. Translated from the "Revue Générale des Sciences. Explains method of calculation. Serial. Elec Eng, Lond—Jan. 12, 1900.

**Ionization.**—The Transfer of Hydrogen Ions as Determined by Measurements with Lead Accumulators (Die Ueberführungzahl von Schwefelsäuregemischen aus Messungen am Blei-Akkumulator). Arthur Kendrick. Account of research work, in which the electro-motive force of the lead accumulator was exactly determined, and also the migration of hydrogen ions. 3000 w. Zeitschr f Elektrochem—Aug 2, 1900.

**Ion Reactions.**—The Ion Reactions, and their Importance in Electro-Chemistry (Ueber Ionenreaktionen und ihre Bedentung für die Elektrochemie). An address by Prof. Küster on the principles governing electrochemical reactions. 5000 w. Zeitschr für Elektrochemie—Aug 20, 1897.

**Laboratory, Munich.**—The Electrochemical Laboratory at the Royal Technical High School at Munich (Elektrochemisches Laboratorium der Kgl. Bayr. Technischen Hochschule München). A full description of this fine laboratory with numerous illustrations. 3000 w. 3 plates. Zeitschr f Elektrochemie—July 20, 1897.

**Laboratory, Stolberg-Westphalia.**—The Arrangement of the Central Laboratory of the Stolberg and Westphalia Company (Elektrolytische Einrichtung des Central-Laboratoriums der Atkien-Gesellschaft zur Stolberg und in Westfalen). H. Nissenson. With plans of well-arranged electrolytic laboratory, and illustrations of apparatus. 2000 w. Zeitschr Elektrochemie—Oct. 5, 1899.

**Laboratory, Zürich.**—The Heavy Current Plant of the Electro-Chemical Laboratory of the Zürich Polytechnic (Die Starkstromanlage im Elektrochemischen Laboratorium des Eidgen. Polytechnikums in Zurich). R. Lorenz. Giving view and plan of the special building, together with illustrations and description of this special laboratory department. 3000 w. Zeitschr f Elektrochemie—Jan. 4, 1900.

See also **ELECTRIC PLANT.**

**Le Sueur Process.**—The Le Sueur Process for the Electrolytic Production of Alkali and Chlorine. An account of the latest developments of this process which is now working with fair success. Also editorial. 2200 w. Elect'n, Lond—Feb. 10, 1899.

**Magnetism.**—Notes on the Chemical Action of Magnetism (Beitrag zur Chemischen Wirkung des Magnetismus). E. Jahr. An account of numerous experiments upon the influence of magnetism upon chemical action, with plates of photographic reproductions of phenomena. 2000 w. 2 plates. Elektrochem Zeitschr—Dec., 1898.

**Mercury Cells.**—Two New Forms of Mercury Cell for the Electrolytic Production of Alkalies and Chlorine. John B. C. Kershaw. Illustrates and describes two new forms in which mechanical movements are dispensed with, and the forces of gravitation effect the removal of the amalgam from the cells. 1500 w. Elec Rev, Lond—April 13, 1900.

**Metallic Oxides.**—Electrolytic Production of Oxygen Compounds of the Metals. Experiments showing that considerable economy in working can be effected in many industrial processes by care in the choice of electrodes and in the composition and density of the electrolyte. 1100. Elect'n, Lond—April 29, 1898.

**Nitro-Benzole.**—The Electrolytic Reduction of Nitro-Benzole (Elektrolytische Reduktionen des Nitro Benzols). Giving details of solutions used and proper currents to effect the desired reduction. 2500 w. Zeitschr f Elektrochemie—May 5, 1897.

**Nitro Group.**—Studies in the Electrolytic Reduction of the Nitro Group (Studien über die Elektrolytische Reduktion der Nitrogruppe). Walther Löb. Giving the methods and results of a valuable series of experiments in the electrolytic reduction of the nitro organic compounds. 6000 w. Zeitschr f Elektrochemie—March 20, 1898.

**Nomenclature.**—Electrochemical Nomenclature (Elektrochemische Bezeichnungen). M. A. Hollard. Giving the electrochemical terms adopted by the recent Congress in Paris. 1000 w. Zeitschr f Elektrochemie—Sept. 20, 1900.

See also **ELECTRIC NOMENCLATURE.**

**Organic.**—The Electric Current in Organic Chemistry. Edgar F. Smith. Address of the Vice President before Section C of the Am. Assn. for the Adv. of Science. A sketch of the progress in the electrolysis of organic bodies. 6000 w. Science—Sept. 30, 1898.

The Relations of Electrochemistry to Organic Chemistry (Ueber die Beziehungen der Elektrochemie zur Organischen Chemie). Showing the numerous applications of electrochemistry to organic analysis and synthesis. 4500 w. Zeitschr f Elektrochemie—Aug. 5, 1897.

The Results of Organic Electro-Chemistry (Die Erfolge der Organischen Elektrochemie). Dr. M. Krüger. The beginning of a general review of the progress which has been made in the application of electrolysis to organic analysis. 2500 w. Elektrochemische Zeitschr—April 1, 1898.

See also **Synthesis.**

**Osmotic Pressure.**—The Osmotic Pressure Theory of Primary Cells. W. R. Cooper. From a book on "Primary Batteries," soon to be published. Explains the nature of osmotic pressure, and of electrolytic solution pressure and manner of calculating the E. M. F. Serial. Elect'n, Lond—Sept. 28, 1900.

Note on the Osmotic Theory of the Voltaic Cell. H. M. Goodwin. A reply to criticism by Mr. Bancroft of results published by the writer. 1200 w. Phys Rev—Nov.-Dec., 1896.

**Oxides.**—See **Metallic Oxides.**

**Oxygen and Hydrogen.**—The Apparatus for the Commercial Generation of Oxygen and Hydrogen by the Electric Current. W. S. Franklin. An illustrated detailed description. 800 w. Am Elect'n—Nov., 1899.

**Paris Exposition.**—Electro-Chemistry and its Allied Interests at the Paris Exposition of 1900 (Die Elektrochemie und ihre Weitere Interessensphäre auf der Pariser Weltausstellung 1900). Prof. W. Borchers. A general review of electrochemical, mineralogical and other exhibits. Serial. Zeitschr f Elektrochem—July 26, 1900.

Electro-Chemistry at the Paris Exposition (Die Weltausstellung in Paris 1900. Elektrochemie). Dr. Chr. Heinzerling. A general review of the electro-chemical exhibit at Paris, including also electric furnaces and accumulators. 3600 w. Zeitschr de Ver Deutscher Ing—Aug. 4, 1900.

**Photographic Action.**—The Chemical Action of the Electric Current on Gelatino-Bromide Dry Plates (Die Chemische Wirkung des Elektrischen Stromes auf Bromsilber-Gelatin-Trockenplatten). Emil Jahr. With reproductions of plates upon which the current has acted. Tests were made with currents of various tensions. 1200 w. 1 plate. Elektrochemische Zeitschr—Jan., 1899.

**Polarization.**—A New Method for Determining Capacity for Polarization (Eine Neue Methode für die Bestimmung der Polarisations-Kapazität). C. M. Gordon. A paper before the Institut für Elektrochemie of Gottingen, describing a method for determining polarising capacity by means of an induction coil and a varying liquid resistance, in connection with a Wheatstone bridge. 1200 w. Zeitschrift für Elektrochemie—Oct. 20, 1896.

A Simple Method for Determination of Polarization (Eine Einfache Methode zur Bestimmung der Polarisation). Dr. Heim. Describing a method which involves the comparison of results obtained by measuring the voltage with two and with three electrode plates; the subject is discussed at length and practical examples given. 3500 w. Zeitschr f Elektrochemie—June 5, 1898.

Polarization and Internal Resistance of Electrolytic Cells. K. E. Guthe. Describes, with a diagram, laboratory methods of studying behavior of electrolytic cells. 1200 w. Phys Rev—Nov., 1896.

Polarization and Internal Resistance of a Galvanic Cell. B. E. Moore and H. V. Carpenter. Experiment, made with the object to measure the electromotive force and its changes upon closed and open circuit between the zinc and main carbons, to get the electromotive force between the zinc and special carbon at intervals, and also to obtain the electromotive force of the carbon series during the progress of the experiment, with tabulated results. 2000 w. Phys Rev—Jan.-Feb., 1897.

The Polarization Capacity of Reversible Electrodes (Polarisationskapazität Umkehrbarer Elektroden). Elsa Neumann. A mathematical investigation based on the method of Warburg. 2000 w. Zeitschr f Elektrochemie—Aug. 18, 1898.

See also **ELECTRIC CURRENT RECTIFIER.**

**Porous Carbon Cell.**—The Application of Porous Carbon Cells in Electrolysis (Die Verwendung Poröser Kohlecylinder bei Elektrolytischen Versuchen). Walther Lob. Porous cells of carbon were used with solutions to be decomposed placed within and without. The carbon was used either as cathode or merely as a separating conductor. In the former case the decomposition takes place both within and without the carbon cell. 2000 w. Zeitscrift für Elektrochemie—Nov. 5, 1896.

See also **Intermediate Conductor.**

**Potassium Percarbonate.**—The Electrolytic Production of Potassium Percarbonate. Excerpt from account in "Zeitschrift für Elektrochemie" to the effect that E. J. Coustam and A. von Hansen have succeeded in preparing a new salt of high theoretical interest. 1500 w. Elect'n—Oct. 16, 1896.

**Rhodin Process.**—Chlorine from Electricity. A description of what is known as the Rhodin process, by which a saturated solution of common salt can be decomposed in such a manner that chlorine shall be given off at one pole and sodium at the other. 1300 w. Aust Min Stand—Dec. 9, 1897.

Rhodin's Electrolytic System. Illustrated description of an apparatus for the extraction of metals, soda, potash and other alkaline salts, and also for the electrolytic production of a large number of other chemicals. 1100 w. Elec Rev, Lond—Oct. 29, 1897.

**Russia.**—Electrolysis and Electro-Metallurgy in Russia (Elektrolyse und Elektrometallurgie in Russland). Mainly a review of the commercial development of electrochemical industries in Russia since the Moscow exposition of 1882. 2500 w. Elektrochemische Zeitschr—Sept., 1897.

**Salt.**—The Decomposition of Common Salt (Zur Kochsalzzerlegung). R. Lorenz and H. Wehrlin. A contribution from the electro-chemical laboratory of the Zürich Polytechnic, giving the results of experiments upon the electrolytic production of hypochlorites and chlorates by the decomposition of common salt. Three articles. 7500 w. Zeitschr f Elektrochemie—Jan. 25, Feb. 1, 8, 1900.

The Decomposition of Salt (Zur Kochsalzzerlegung). An investigation of the difference between the theoretical and observed voltage, for the decomposition of chloride of sodium. 1000 w. Zeitschr f Elektrochemie—Nov. 20, 1897.

**Salt Solutions.**—Electrolytic Apparatus for Decomposition of Salt Solutions (Elektrolytischer Apparat zur Zersetzung von Salzlösungen). A description by Dr. Koch of his improved apparatus, using a quicksilver cathode. 2000 w. Elektrochemische Zeitschr—May, 1897.

The Electrolysis of Solutions of Common Salt. Reports the causes of different values reached in investigations made, as explained by Prof. Lorenz, of the Zürich Polytechnic in article published in the "Zeits. f. Elektrochemie." 600 w. Elect'n, Lond—Dec. 31, 1897.

**Soda.**—See also **CAUSTIC SODA.**

**Soda and Chlorine.**—The Electrolytic Production of Soda and Chlorine. James F. Hobart. The first paper is introductory. Serial. Am Elect'n—March, 1900.

The Electrolytic Production of Soda and Chlorine. James F. Hobart. Describes the process of separating the soda and chlorine. Ill. 1600 w. Am Elect'n—Aug., 1900.

**Solutions.**—On the Specific Gravity and Electrical Conductivity of the Normal Solutions of Sodium and Potassium Hydroxides and Hydrochloric, Sulphuric, Nitric and Oxalic Acids. E. H. Loomis. A measure of the specific gravity and electrical conductivity of various solutions whose preparations are described. 900 w. Phys Rev—Nov.-Dec., 1896.

**Sugar.**—Electrolysis in the Manufacture of Raw Sugar (Die Elektrolyse in Rohzuckerfabriken). Gustav Schollmeyer. Describing the operation of the electrical diffusion apparatus used at the refinery at Unter-Berkowitz in Bohemia. 2500 w. Elektrochemische Zeitschr—July, 1897.

**Sulphur.**—The Chemical Decomposition of Sulphur (Ueber die Chemische Zerlegbarkeit des Schwefels). A paper by Theodor Gross, in which he describes an electro-chemical decomposition of sulphur and the isolation of a new element called Bythium. 5000 w. Elektrochemische Zeitschr—April, 1897.

**Synthesis.**—On Electrosynthesis. W. G. Mixter. Abstract from the "American Journal of Science," July, 1897. A study of chemical union effected by electricity. 1000 w. Elect'n—Aug. 27, 1897.

**Synthesis, Organic Acids.**—The Synthesis of Organic Acids (Ueber Synthese von Organischen Säuren). A paper by Dr. von Miller, discussing the production of organic acids synthetically by use of the electric current. 2000 w. Zeitschr f Elektrochemie—July 20, 1897.

See also **Organic.**

**Theory.**—A Mechanical Theory of Electrolysis Based on Maxwell's Hypothesis (Mechanische Theorie der Elektrolyse auf Grund der Maxwell'schen Hypothese). Prof. Weyde. Continuing an interesting mechanical analogy to the supposed molecular movements in electrolysis. 2000 w. Elektrotechnische Zeitschr—Nov. 4, 1897.

Contributions to the Theory of Electrochemistry (Beiträge zur Elektrochemischen Theorie). R. Mewes. Discussing the relation of the vibratory theory of chemical action to the corresponding phenomena of electrochemistry. Two articles. 6000 w. Elektrochemische Zeitschr—Sept.-Nov., 1897.

Electrolysis and Some Problems in Molecular Physics. C. L. Mees. Abstract of an address before the Physics Section, American Assn. for the Advancement of Science. The first part reviews the progress in the study of electrolysis. Serial. Elec Wld—Sept. 26, 1896.

Electrolytic Theories and Their Relation to Commercial Electro-Chemistry. Edwin Edser. Thinks England does not give the encouragement to investigation that is given by Continental governments, and notes the stimulating influence on the Continent of the theory of electrolytic dissociation in dilute solutions. 1300 w. Elec Eng, Lond—July 22, 1898.

Modern Theories of Electrolysis. Dr. Joseph W. Richards. Reviews concisely the facts and laws of electrolysis and the attempts to explain observed facts and proven laws by postulating relations which have not yet been fully proven. 8000 w. Jour Fr Inst—March, 1896.

See also **Arrhenius' Theory.**

**Titration.**—A Galvanometric Method of Titration (Ueber eine Galvanometrische Titrier Methode). A paper by Dr. Salomon showing the applicability of the method of measuring electric currents to the solution of problems in volumetric analysis. 2000 w. Zeitschr f Elektrochemie—July 20, 1897.

**Voltameter.**—See **ELECTRIC MEASUREMENT.**

**Water Power.**—See **WATER POWER—Electro-Chemistry.**

**Woolf Hypochlorites.**—See **SANITATION—Woolf Electrolytic.**

### ELECTRODE.

Novelties in Electrodes (Neuerungen an Elektroden). Dr. H. Weyer. Two articles containing a general review of improvements in all kinds of electrodes, with references to German and English patents. Two articles. 5000 w. Elektrochemische Zeitschr—Nov. & Dec., 1896.

**Alkali Process.**—See **ELECTRO-CHEMISTRY.**

**Aluminum.**—See also **ELECTRIC CURRENT RECTIFIER.**

**Aluminum Luminescence.**—The Luminescence of Aluminum Electrodes. W. S. Andrews. Illustrated description of a curious experiment with aluminum-carbon cells. 500 w. Elec Wld & Engr—March 24, 1900.

**Carbon.**—Experiments with Carbon Electrodes (Versuche mit Kohlenelektroden). Dr. J. Zellner. A very full discussion of the advantages in the use of carbon electrodes in electrolytic processes, with tables of data for various solutions. 8000 w. Zeitschr f Elektrochemie—April 6, 1899.

New Carbon Terminals for Electrolysis (Neue Kohlen für Elektrolyse). Lessing's new fused carbon sheets are for use in commercial electrolysis, and are claimed to be unaffected chemically or mechanically by the action of the bath. 1000 w. Elektrochemische Zeitschr—Jan., 1897.

### ELECTRODYNAMOMETER.

**Helmholtz.**—The Helmholtz Absolute Electrodynamometer (Das Helmholtz'sche Absolute Elektrodynamometer). Dr. H. Kahle. A very full illustrated description of the Helmholtz dynamometer, which acts by measuring the turning moment between two coils. 7500 w. Elektrotech Zeitschr—Feb. 3, 1898.

**Mirror.**—Mirror Electrodynamometer for Technical Uses (Elektrodynamometer mit Spiegelablesung für Technische Zwecke). J. Kollert. Fully illustrated description of the dynamometer, with mathematical demonstration of its action. 6000 w. Elektrotech Zeitschr—Sept. 20, 1900.

### ELECTRO-ENGRAVING.

**Amstutz Acrograph.**—An Electrical Engraving Process. N. S. Amstutz. Illustrated description of a mechanism called the acrograph, which does for light what the phonograph does for sound. Specimens of work are also given. 4400 w. Elec Wld & Engr—Feb. 17, 1900.

**Rieder Process.**—Electric Engraving (Elektrogravure). A description by Dr. Langbein, of Rieder's new method of producing intaglio and relief modeling, such as medals, dies, etc., by the electric etching of the medal in contact with a reverse plaster model. 1200 w. Zeitschr f Elektrochemie—Sept. 5, 1897.

Electro-Gravures (Elektrogravüre). Josef Rieder. A long illustrated description of the author's new method of etching steel. 7000 w. Elektrochemische Zeitschr—April, 1900.

### ELECTRO-GALVANIZING.

Electro-Zincing. Sherard Cowper-Coles. Abstract of a paper read before the Liverpool Engineering Society. Points out the importance of galvanizing and gives an idea of the process of electro-zincing, with a description of the plant employed. Ill. 3500 w. Elec Eng, Lond—Nov. 26, 1897.

Methods of Cold Galvanizing (Galvanisation à Froid). M. Quivy. A study of the process of electro-chemical zincing of iron, with data as to baths, current and operative details. 5000 w. Bull de la Soc d'Encour—March, 1899.

Some Notes on Electro-Galvanizing. Sherard Cowper-Coles. Illustrates and describes the process, and notes some of its applications. 1600 w. Ind & Ir—Feb. 2, 1900.

Some Notes on Electro-Galvanising. Sherard Cowper-Cowles. Illustrates and describes the process and recent improvements. 1400 w. Prac Engr—Aug. 10, 1900.

The Electric Galvanising of Iron (La Galvanisation Electrique de Fer). Describing the methods of Dr. Wagner, and of Cowper-Coles, both of these being in successful practical operation. 3000 w. Génie Civil—May 15, 1897.

The Electrolytic Galvanising of Iron (La Galvanisation Electrolytique du Fer). A description of Wagner's method of coating iron with zinc by true galvanic action instead of dipping in a metal bath. 2500 w. Moniteur Industriel—Sept. 11, 1897.

### ELECTRO-GERMINATION.

See **ELECTRICITY—Agriculture; Horticulture; Plants.**

### ELECTROLYSIS.

See also **ELECTRO-CHEMISTRY; ELECTRO-METALLURGY; STRAY CURRENTS.**

Which Electrolytic Methods Can Be Used with Advantage in Analytical Practice? Dr. Bernhard Neumann. From "Zeitschrift für Elektrochemie." A condensed article which contains much valuable information. 4000 w. Elect'n—Nov. 29, 1895.

**Apparatus.**—Apparatus for Use in Experimental Fused Electrolysis. Alec. A. Beadle. Hints gained from experience. Ill. Serial. Elec Rev, Lond—Jan. 19, 1900.

Laboratory Apparatus for Electrolysis (Laboratoriums-Apparat für Electrolyse). Describes various forms in which the electrolyte may be at rest or circulating; enabling a variety of electro-chemical reactions to be observed. 2000 w. Zeitschr f Elektrochemie—April 20, 1897.

**Apart from Electrodes.**—Electrolysis at Places

Apart from Electrodes. F. T. Trouton. A short account of experimental investigations showing that decomposition can take place at unsuspected places. 800 w. Elect'n, Lond—June 23, 1899.

**Aqueous Solutions.**—Electrolytic Decomposition of Aqueous Solutions. L. Glaser. From the "Zeitschrift für Electrochemie." Part first considers the formation of water in the gas battery (H O cell), and the decomposition of water. 1200 w. Elec Rev, Lond—Jan. 6, 1899.

Studies in the Electrolytic Decomposition of Aqueous Solutions (Studien über die Elektrolytische Zersetzung Wässriger Lösungen). L. Glaser. The beginning of an elaborate discussion, starting with the theory of the H. O. chain, and proceeding to the decomposition of water and of solutions. Serial. Zeitschr f Elektrochemie—Feb. 5, 1898.

**Bronze**—See ELECTRO-METALLURGY.

**Diaphragms.**—The Action of Membraneous Diaphragms in the Electrolysis of Salts (Ueber das Verhalten von Membranen bei dem Elektrolytischen Transport von Salzen). Dr. W. Bein. A very complete discussion of experiments with various membranes and solutions, forming an important contribution to the subject of electrical dialysis. 4000 w. Elektrochem Zeitschr—April 1, 1899.

**Electric Tramway Currents.**—See STRAY CURRENTS.

**Electrodeless.**—Electrolysis Without Electrodes (Elektrolyse ohne Elektroden). Rud. v. Heuser. An illustrated description of an apparatus in which the electrolyte circulates between magnet poles and so has currents induced in it. 2000 w. Elektrochem Zeitschr—June, 1900.

Experiment in Electrolysis Without Electrodes (Experiment über Elektrolytische Leitung ohne Elektroden). Dr. Behn-Eschenburg. A non-conducting trough containing the electrolyte is fitted around the iron core of a transformer, and a current is induced in the liquid. 1200 w. Zeitschr f Elektrochemie—March 2, 1899.

**Gas and Water Pipes.**—See STRAY CURRENTS.

**Heavy Metals.**—Notes on the Quantitative Electrolysis of the Heavier Metals (Beitrag zur Quantitativen Elektrolyse von Schwermetallen). L. Wolman. Giving a number of methods, with full data as to solutions and currents. A prize essay at the Technical High School at Stuttgart. 4000 w. Zeitschr f Elektrochemie—June 20, 1897.

**Iron, Nickel and Zinc.**—Notes on the Electrolytic Determination of Iron, Nickel and Zinc. H. H. Nicholson and S. Avery. Results of investigations. 1700 w. Jour Am Chem Soc—July, 1896.

**Mixtures.**—The Electrolysis of Mixtures (Zur Elektrolyse von Gemischen). An examination of the chemical theory and practice of the electrolysis of mixtures according to Hittorf's theory. 7500 w. Zeitschr f Elektrochemie—May 20, 1897.

**Nickel-Cobalt.**—A Method for the Separation of Cobalt and Nickel (Eine Methode zur Trennung von Kobalt und Nickel). Dr. Coehn. A description of the electro-capillary method, using capillary glass electrodes. 1200 w. Zeitschr f Elektrochemie—May 20, 1898.

Determination of Nickel and Cobalt in Iron and Steel (Dosage du Nickel et du Cobalt dans les Fontes et les Aciers). Giving an account of the electrolytic method of M. Ducru for the rapid and accurate determination of nickel and cobalt, with tables of results. 1000 w. La Rev Tech—Oct. 10, 1897.

Electrolytic Determination of Nickel and Cobalt in Steel. M. O. Ducru. Translated from "Comptes Rendus." Discusses methods used. 1000 w. Am Mfr & Ir Wld—Nov. 12, 1897.

**Nitric Acid.**—Quantitative Determination of Nitric Acid by Electrolysis (Die Quantitative Bestimmung der Salpetersäure durch Elektrolyse). K. Ulsch. Tests upon known combinations show the method to be both accurate and convenient. 1200 w. Zeitschr f Elektrochemie—June 20, 1897.

**Quantitative.**—The Quantitative Analysis of Metals by Electrolysis. Illustrated description of Richie's electrolytic apparatus and Classen's electrolytic apparatus. with precautions necessary for carrying on the operation successfully. 800 w. Sci Am Sup—Sept. 5, 1896.

**Soluble Anodes.**—A New Method of Separating Metals by Means of Soluble Anodes (Eine Neue Trennung von Metallen Mittels Löslicher Anoden). R. Pauli. An extension to other metals of the principle exhibited by the deposition of copper upon iron from a solution of cupric sulphate, or of iron upon zinc. 1000 w. Elektrochem Zeitschr—Nov., 1896.

The Separation of Metals by Means of Soluble Anodes (Trennung von Metallen Mittels Löslicher Anoden). A method of determining antimony quantitatively by electro deposition from solution upon a copper cylinder. 500 w. Elektrochem Zeitschr—Jan., 1897.

**Zinc.**—Two Electrolytic Methods of Determining Zinc (Zwei Elektrolytische Zinkbestimmungen). Dr. H. Paweck. A review of preceding methods of determining zinc, and an account of the results obtained by modifying the material and character of the anodes. 1800 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 17, 1898.

## ELECTROLYTES.

**Alternating Conductivity.**—Surface Travel on Electrolytes. W. E. Fiske and W. D. Collins. Investigations of the availability of Ohm's law for electrolytes when in circuit with alternating currents of high frequency. 900 w. Am Jour of Sci—Jan., 1898.

**Conductivity.**—Conductivity in Mixed Solutions of Electrolytes (Ueber Stromleitung in Gemischten Lösungen von Elektrolyten). K. Hopfgartner. Showing the influence which various proportions of mixed electrolytes have upon the results of electrolytic analysis. 3000 w. Zeitschr f Elektrochemie—April 5, 1898.

The Effect of Great Current-Strength on the Conductivity of Electrolytes. Theodore William Richards and John Trowbridge. Investigations to determine if the intense current involved in the discharge of a large condenser is capable of causing any change in the condition of an electrolyte. Concludes that it is not essentially affected. 700 w. Am Jour of Sci—May, 1897.

**Constant Conductivity.**—See ELECTRIC CELL—Primary and Secondary.

**Rarefied Gases.**—Are Rarefied Gases Electrolytes? M. E. Bouty. Read before the Société Francaise de Physique. Describes investigations of the writer and gives results. 2000 w. Elect'n, Lond—March 23, 1900.

## ELECTROLYTIC BLEACH.

See BLEACHING—Electrolytic; ELECTRO-CHEMISTRY—Bleaching.

## ELECTROLYTIC CELL.

See ELECTRIC CELL; ELECTRIC MEASUREMENT—Voltameter; ELECTRO-CHEMISTRY.

## ELECTROMAGNET.

See also DYNAMO; DYNAMO DESIGN; ELECTRO-PHYSICS; HYSTERESIS; MAGNET; MAGNETIC.

**Design.**—Economy in the Design of Electromagnets. W. E. Goldsborough. The writer believes that the best results are to be obtained by working just below rather than just above the knee of the magnetism curve, although the latter is the usual practice. 700 w. Elec Wld—Feb. 6, 1897.

The Calculation of Wires for Magnets. George T. Hanchett. A number of formulae for coils and cores of different sections, together with the meanings of their reference letters. 400 w. Elec Wld—April 17, 1897.

**Field.**—The Forms of Field Magnets and Their Influence Upon the Efficiency of Generators and Motors. William Baxter, Jr. A study of this subject and the means of obtaining the best results. Ill. 3000 w. Am Mach—Nov. 11, 1897.

**Formula.**—Formulas for Winding Magnets. I. A. Taylor. Method for finding the size and number of turns of wire on a magnet. 500 w. Elec Wld—Dec. 7, 1895.

**Great Gun.**—The Great Gun Magnet. W. R. King. Some measurements of the magnetic strength. Ill. 1600 w. Elec Rev—Feb. 3, 1897.

**Magnetic Distribution.**—Magnetic Distribution in Short Iron Cores. W. G. Campbell. Results of experiments made for the solution of the questions. What percentage of the total lines of induction produced at the middle of the primary core, passes through the windings of the secondary coil; and what magnetizing force is necessary to produce the required induction in the core? 1800 w. Technograph—No. XI.

**Mechanisms.**—Electromagnetic Mechanisms. Silvanus P. Thompson. A paper read before the International Electrical Congress, at Paris, giving electromagnetic principles and their applications, with the principal classes of electromagnetic mechanisms. 1800 w. Elec Rev, N. Y.—Sept. 19, 1900.

**Oculist.**—Electro-Magnet Extractor for Oculists (Electro-Aimant Extracteur pour Oculistes). M. Alimet. A brief illustrated description of a powerful electro-magnet for extracting bits of iron from eyes. 250 w. Electricien—June 23, 1900.

**Steel Works.**—Great Plates Moved by Electricity. From the "Pittsburg (Pa.) Dispatch." The work of the great magnets at the plate mill of the Illinois Steel Company is described. 1200 w. Bull of Am Ir & St Assn—Nov. 20, 1897.

**Telegraphic Work.**—Electro-Magnetic Mechanism with Special Reference to Telegraphic Work. R. A. Fessenden. Concerning the designing of electromagnetic mechanism; discussion of electrical units, equations of energy, etc. Serial. Jour Fr Inst—June, 1900.

**Tractive.**—The Design of Tractive Electromagnets. W. Elwell Goldsborough. On the best methods in the design of this class of electromagnets. Mathematical. Ill. 7000 w. Elec Wld & Engr—July 28, 1900.

The Design of Tractive Electromagnets. Lamar Lyndon. A mathematical letter, with diagram, showing how the travel of a plunger may be lengthened by shaping the pole faces conically. 800 w. Elec Wld & Engr—Sept. 15, 1900.

**Tractive Force.**—The Calculation of Electromagnetic Attraction (Die Berechnung der Elektro-Magnetischen Zugkraft). A mathematical investigation of a practical method of calculating the pull which an electro-magnet exerts upon its armature under various conditions. 1500 w. Elektrotech Zeitschr—August 19, 1897.

**Winding.**—Computations for Coil Winding. W. Slingo and A. Brooker. A review of the points involved, with account of experiments. Serial. Elec Rev, Lond—June 5, 1896.

Computations for Coil Windings. J. B. Baker. A discussion, giving formula for pre-determining the proper dimensions and size of wire in winding a coil. 700 w. Elec Rev—March 4, 1896.

Hints on the Windings of Magnet Coils. William Baxter, Jr. Shows that the greatest danger comes from attempts to crowd too many turns in a layer, and illustrates various defects. 1600 w. Am Mach—March 3, 1898.

Magnet and Coil Winding. J. Mason Knox. Illustrates and describes the Varley Duplex Magnet Company's new automatic magnet and coil winder. 800 w. Elec Rev—July 7, 1897.

Magnet Winding Curves. J. P. Stone. Gives curves by use of which the calculation of the space required for the winding is greatly facilitated. 500 w. Elec Eng, N. Y.—March 24, 1898.

Windings for Direct Current Electromagnets. Harold B. Smith. A study of the conditions under which a winding may be designed, with tabulated information. 3000 w. Jour Worcester Poly Inst—Nov., 1899.

See also Formula.

## ELECTROMAGNETIC INDUCTION.

**Curve Apparatus.**—See HYSTERESIS; MAGNETIC INDUCTION.

## ELECTROMAGNETISM.

See ELECTROMAGNET; ELECTRO-PHYSICS; HYSTERESIS; MAGNETIC; MAGNETISM.

## ELECTRO-METALLURGY.

See also ALUMINUM MANUFACTURE; COPPER MANUFACTURE; ELECTRIC FURNACE; ELECTRO-CHEMICAL WORKS; ELECTRO-CHEMISTRY; ELECTROLYSIS; GOLD METALLURGY.

A Dissertation on Electro-Metallurgy. J. Wright. Discusses briefly the mechanical separation of iron ores by the aid of magnetic devices, the separation of the precious metals by means of the electric current, and electric welding. Ill. 4500 w. Ind & East Engr—Nov., 1898.

Electricity as Applied to Metallurgy. Prof. Threlfall. Brief history, both theoretical and practical. 6500 w. Aust Min Stand—Sept., 1896.

Electricity as Applied to Metallurgy. Richard Threlfall. Review of the electro-metallurgical processes, with discussion of the various applications. 16500 w. Aust Min Stand—Aug. 12, 1897.

Electro-Metallurgy (L'Electrometallurgy). P. Chalon. A review of the progress which has been made in winning and refining metals, comparing electrolytic and electrothermic methods. 3600 w. Rev Univ des Mines—March, 1899.

Electro-Metallurgy as a Department of Electrical Engineering. R. H. Thurston. A review of the origin, progress, and present status of the art, illustrating its principles and practice by the aluminum industry. Sib Jour of Engng—June, 1899.

On Some Recent Investigations in Connection with the Electro-Deposition of Metals. J. C. Graham. Communicated to the Royal Society. Experiments appearing to give some light regarding the conditions necessary for the rapid deposition of metals from their solutions by means of the electric current. Serial. Elec Rev, Lond—Feb. 25, 1898.

Progress in Electro-Metallurgy and Analysis (Fortschritte auf dem Gebiete der Elektro-Metallurgie und Analyse). Dr. H. Paweck. A very complete record of the work of the past few years, with bibliography. Five articles. 8000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 2, 9, 16, 23, 30, 1899.

Recent Applications of Electro-Chemistry to the Metal Industries. Sherard Cowper-Coles. Describing the modern electro-galvanizing methods, also devices for removing mill scale, for the production of parabolic reflectors, and other recent applications of electro-chemical methods. 3000 w. Eng Mag—July, 1898.

Recent Progress in Electro-Metallurgy (Ueber die Neueren Fortschritte der Elektrometallurgie). E. Andreoli. A general review of work in electro-metallurgy on the continent as well as in the United States and England. 2000 w. Elektrochem Zeitschr—March 1, 1899.

Studies in the Electrolytic Separation of Metals (Studien über die Electrolytische Trennung von Metallen). N. Revay. Giving details of the separation, by electrolysis, of copper from silver, from mercury, and from arsenic. Serial. Zeitschr f Elektrochemie—Jan. 5, 1898.

The Application of Electricity to Metallurgy on the Large Scale (Die Rolle der Elektricität bei der Jetzigen Metallgewinnung im Grossen). Dr. Düre. A general review of the present state of the art of electro-metallurgy, with especial reference to the winning of metals from their ores. 7500 w. Elektrotech Zeitschr—June 2, 1898.

The Electrolytic Separation of Cadmium and Zinc, etc. (Die Elektrolytische Trennung von Cadmium und Zink, etc.). With details of methods for separating cadmium and zinc; zinc and cobalt; and antimony and tin. 4500 w. Zeitschr f Elektrochemie—Nov. 20, 1897.

The Extraction of Metals from Their Ores by Means of Electrolysis. Extracts from a report by C. Schnabel in the "Chemiker Zeitung." This particular report refers to the non-ferrous metals, and deals with zinc, gold, silver, nickel, copper and aluminum. 1400 w. Elec Rev, Lond—April 23, 1897.

**Alloys.**—Improvements in the Electrolytic Separation of Metallic Alloys (Neuerungen in der Herstellung von Metall-Legierungen auf Elektrolytischem Wege). Indicating a number of possible technical operations of electrolytic separation, including also combinations of metals and metalloids. 2500 w. Zeitschr für Elektrochemie—March 5, 1897.

Some Investigations in Connection with the Electro-Deposition of Alloys. Sherard Cowper-Coles. Part first is a historical review of inventions in this field, and experiments made. Serial. Ind & Ir—Jan. 27, 1899.

**Bronze.**—The Analysis of Bronzes by Electrolysis (Analyse des Bronzes par l'Electrolyse). The method of Holland, in which the various constituents are separated by electric deposition with ease and accuracy. 2000 w. La Rev Tech—July 25, 1897.

**Carbon Action.**—The Action of Carbon Upon Refractory Oxides at High Temperatures. Alec. A. Beadle. On some of the reactions that occur when subjecting metals (or non-metals) to reduction with carbon at the high temperatures obtainable in the electric furnace. 3000 w. Elec Rev, Lond—April 13, 1900.

**Carlin Tube.**—The Carlin Tube. A. von Dessauer. Describes a new connection for anodes and cathodes and states the advantages. 1500 w. Jour of Chem & Met Soc of S Africa—May, 1898.

**Cleaning.**—Electrolysis in the Cleaning of Metallic

Surfaces. C. F. Burgess. Discusses methods in use for the removal of foreign substances from metallic surfaces, dealing especially with electrolytic processes, and giving results of investigations. 2800 w. Elec Wld—Oct. 29, 1896.

**Copper.**—Some Practical Points in the Electro-Deposition of Copper. Alfred F. Bawtree. Read before the students of the Finsburg Tech. College. Discusses the fundamental principles of deposition, and phenomena observed. 1800 w. Elec Rev, Lond—May 11, 1900.

See also COPPER REFINING.

**Copper and Silver.**—Electrolytic Copper and Silver Refining. An illustrated description of the electrical generating plant of the Guggenheim Smelting Co., at Perth Amboy, N. J., and of the electrolytic process. 1800 w. Am Elect'n—Sept. 1896.

See also **Moebius Process.**

**Copper Solutions.**—The Influence of Time upon the Cathode Action in Electrolysis of Copper Solutions (Ueber den Einfluss der Zeit-auf den Kathoden Vorgang bei Elektrolyse der Kupfersulfat-lösung). Giving graphical records of a number of experimental investigations. 4000 w. Zeitschr f Elektrochemie—June 5, 1897.

**Direct from Ore.**—The Electrolytic Winning of Metals Direct from the Ore (Ueber Elektrolytische Reingewinnung von Metallen Direkt aus Ihren Erzen). Dr. C. Hoepfner. A description of the author's process of separating copper by the use of chloride of copper as a solvent for the ore, followed by electrolytic reduction. 3000 w. Elektrotech Zeitschr—Nov. 3, 1898.

The Electrolytic Winning of Metals Direct from the Ore (Elektrolytische Gewinnung von Metallen Direkt aus Erzen). Dr. W. Borchers. A discussion of the recent paper of Dr. Höpfner, criticising details, but confirming the practicability of the processes. 1500 w. Zeitschr f Elektrochemie—March 2, 1899.

**Drilling and Slotting.**—Some Notes on the Electrolytic Drilling and Slotting of Metals. Sherard Cowper-Coles. Brief report of experiments, with illustrations. 300 w. Elec Rev, Lond—July 27, 1900.

**1895.**—Electro-Metallurgy in 1895. E. Andreoli. The encouraging progress in the applications of electrolysis to metallurgy. 3400 w. Elec Rev, Lond—Jan. 31, 1896.

See also ELECTRO-CHEMISTRY.

**1896.**—See ELECTRO-CHEMISTRY.

**1897.**—Progress in Electro-Metallurgy in 1897. E. Andreoli. Reviews the processes in use and the new methods applied to various branches of the industry. 3400 w. Eng & Min Jour—June 18, 1898.

See also ELECTRO-CHEMISTRY.

**1898.**—See ELECTRO-CHEMISTRY.

**1899.**—Electro-Metallurgy in 1899 (L'Electrometallurgie en 1899). P. Chalon. A general review of progress during the year. 3200 w. Rev Universelles d Mines—March, 1900.

See also ELECTRO-CHEMISTRY.

**Europe.**—See ELECTRO-CHEMISTRY.

**Frasch Process.**—The Hans A. Frasch Electrolytic Process for Extracting Metals, as Applied to Copper-Nickel Matte. Brief description of the important points in this process, and conclusions from personal investigation. Promises to greatly reduce the cost of producing the useful metals. 2000 w. Eng & Min Jour—Sept. 8, 1900.

**Gold.**—See also **Precious Metals**; CYANIDE PROCESS—Electrolytic; Siemens-Halske; GOLD BULLION; GOLD METALLURGY—Electrolytic.

**Heating.**—The History of Electric Heating Applied to Metallurgy. Frederic P. Dewey. Read before the Washington Section. A description of the several forms of apparatus which have been designed and used up to the present time. Illustrated by 13 cuts. 1700 w. Jour Am Chem Soc—March, 1896.

The History of Electric Heating Applied to Metallurgy. Frederic P. Dewey. Read before the Washington Section of the Amer. Chem. Soc. Serial. Elec Rev—March 26, 1896.

**History.**—See ELECTRO-CHEMISTRY.

**Industries.**—See also ELECTRO-CHEMISTRY.

**Iron Industry.**—Electro-Metallurgical Memoranda of the Iron Industry. Translation and comment by Richard Moldenke. Discusses electrical heating and the electric furnace and their application to the demands of industrial requirements. 2500 w. Ir Trd Rev—April 21, 1898.

Electro-Metallurgy in the Iron Industry (Elektrometallurgisches für die Eisenindustrie). Dr. W. Borchers. A paper read before the Düsseldorf Convention of the Verein Deutscher Eisenhüttenleute, showing the applicability of the electric furnace to the iron industry, with numerous illustrations of special constructions. 4000 w. Stahl und Eisen—April 1, 1898.

**Laboratory, Leoben, Austria.**—The Electrolytic Laboratory at the Imperial Mining Academy at Leoben (Die Elektrolytische Einrichtung an der k. k. Bergakademie in Leoben). Dr. H. Paweck. An account of the very complete apparatus at the Austrian Mining Academy for instruction in the application of electrolysis to the separation of metals. Two articles. 1 plate. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 19, 26, 1898.

**Lead Desilverization.**—See **Tommasi Process.**

**Lead Refining.**—The Electrolytic Refining of Lead. Sherard Cowper-Coles. Describes the processes. 1000 w. Elec Rev, Lond—April 22, 1898.

**Mechanical Engineering.**—Some Recent Applications of Electro-Metallurgy to Mechanical Engineering. Sherard Cowper-Coles. Abstract of paper read at Dover meeting of the British Assn. Calls attention to the importance electro-metallurgy is taking in engineering works, and describes a few applications. Ill. Serial. Elec Rev, Lond—Sept. 22, 1899.

**Meter.**—Experiments to Determine the Electrolytic Separation of Metals by Use of an Electric Meter (Versuche die Elektrolytische Trennung von Metallen durch einen Elektricitätszähler zu Messen). By closely regulating the strength of current various metals can be separated from a combined solution with a close degree of accuracy. 4000 w. Zeitschr f Elektrochemie—Sept. 20, 1897.

**Moebius Process.**—Notes on the Moebius Process for Parting Gold and Silver, as Carried on at the Guggenheim Smelting Works at Perth Amboy, N. J. Percy Butler. The processes of this establishment are described as all are dependent on one another. The plant is described and illustrated. 4500 w. Can Min Rev—March, 1898.

See also **Copper and Silver.**

**Nickel.**—The Electrolytic Separation of Nickel from an Aqueous Solution of its Sulphate or Chloride (Ueber die Elektrolytische Abscheidung des Nickels aus den Wässerigen Lösungen seines Sulfats oder Chlorids). Dr. F. Foerster. Discussing methods of obtaining a bright deposit of nickel of a greater thickness than has heretofore been practicable. 3500 w. Zeitschr f Elektrochemie—Sept. 20, 1897.

**Nickel and Copper Matte.**—The Separation of Nickel and Copper in Matte, and the Recovery of the Contained Precious Metals. Titus Ulke. A review of the various electrolytic methods proposed. 3300 w. Eng & Min Jour—Jan. 30, 1897.

**Precious Metals.**—Notes on the Electro-Chemical Treatment of Ores Containing the Precious Metals. C. E. Webber. Read before the British Institution of Electrical Engineers. Historical review of the various known processes is given in part first. Ill. Serial. Ind & Ir—Jan. 28, 1898.

Notes on the Electro-Chemical Treatment of Ores Containing the Precious Metals. C. E. Webber. Read before the Inst. of Elec. Engs., London. Part first reviews the history of precipitation with the aid of the electric current. Ill. Serial. Elec, N. Y.—Aug. 24, 1898.

**Sault Ste. Marie.**—See ELECTRIC INDUSTRY—Sault Ste. Marie.

**Silicon.**—See SILICON.

**Silver.**—The Electro- Analytic Separation of Silver from a Nitric Acid Solution, and its Separation from Copper (Ueber die Elektro-Analytische Abscheidung des Silbers aus Salpetersaurer Lösung und die Trennung Desselben von Kupfer). F. W. Kuster and H. von Steinwehr. Showing the results with different voltages and temperatures, and describing the methods employed. 2500 w. Zeitschr f Elektrochemie—April 5, 1898.

**Sulphide Ores.**—The Electrolytic Treatment of Complex Sulphide Ores. Sherard Cowper-Coles. Briefly describes a number of electrolytic processes, confining the paper to wet extraction processes. Serial. Elect'n, Lond—Nov. 10, 1899.

The Electrolytic Treatment of Sulphide Ores. Richard Threfall. Deals with the processes of

Mr. E. A. Ashcroft which have been successful in New South Wales. Describes the processes and the arrangements for carrying them out. Ill. 9500 w. Aust Min Stand—Jan. 20, 1897.

**Tin.**—Some Notes on the Electrolytic Refining of Tin and the Recovery of Tin from Its Ores. Sherard Cowper-Coles. Describes methods which have been tried, and the results obtained. 900 w. Elec Engr, Lond—July 15, 1898.

**Tommasi Process.**—Electrolytic Processes for the Extraction, Separation and Refining of Metals. Dr. D. Tommasi. Stating the advantages of the Tommasi electrolyzer, and discussing in part first the process for treating argentiferous lead. Ill. Serial. Elec Wld—Feb. 25, 1899.

Electrolytic Processes for the Extraction, Separation and Refining of Metals—The Tommasi Process. D. Tommasi. Illustrated description of this method, with statement of its advantages. 5000 w. Elec Eng, N. Y.—Aug. 11, 1898.

Method for Electrolytically Desilverizing Lead (Procede de Desargentation Electrolytique des Plombs Argentifères). By D. Tommasi. Value of constructing a factory for the purpose and the principle on which the process is based. Serial. L'Eclairage Electrique—Oct. 17, 1896.

The Electrolytic Desilverizing of Argentiferous Lead (Désargentation Electrolytique des Plombs Argentifères). A description of the Tommasi process. A solution of double acetate of lead and sodium is used, pure crystals of spongy lead being deposited on the cathode, the silver falling to the bottom of the tank. 1800 w. L'Electricien—March 4, 1899.

The Cost of the Electrolytic Desilverization of Argentic Lead (Prix de Revient de la Désargentation Electrolytique des Plombs Argentifères). A detailed examination of the Tommasi process, showing the various items of cost, and deducing the total cost to be about 7 francs per ton of lead treated. 1500 w. Electricien—June 17, 1899.

The Electrolytic Desilverization of Argentiferous Lead by the Tommasi Process. Dr. D. Tommasi. The principle upon which this process is based is stated, apparatus used is described, also advantages and working cost. 1600 w. Min Jour—Oct. 17,

**Zinc.**—Electrolytic Zinc. A review of the processes used and comments on the cost. 1200 w. Engng—Jan. 21, 1898.

Some Notes on the Electro-Deposition of Zinc Under Pressure. Sherard Cowper-Coles. Illustrated description of experiments. 400 w. Elect'n, Lond—Dec. 1, 1899.

The Electrolytic Winning of Zinc (Verfahren zur Electrolytischen Zinkgewinnung). Dr. O. Hoepfner. Giving precautions and suggestions to aid in the application of the electrolytic separation of metallic zinc from the ore on a commercial scale. 1000 w. Der Elektro Techniker—Dec. 15, 1897.

The Electrolytic Production of Zinc with the Employment of Insoluble Anodes, Combined with the Profitable Use of the Material of the Anodes (Elektrolytische Zinkgewinnung unter Anwendung Unlöslicher Anoden, Verbunden mit Gleichzeitiger Verwertung des Anodenmaterials). J. Routschewsky. An illustrated description of a process in which the electrolyte is an acid zinc sulphate solution and the anode is of lead. Serial. 2 parts. 4500 w. Zeitschr f Elektrochemie—July 12, 19, 1900.

See also **ZINC METALLURGY.**

### ELECTROMETER.

See also **ELECTRIC INSTRUMENT; ELECTRIC METER.**

The Electrometer in Theory and Practice. J. Warren. A study of the principles underlying its action. Serial. Elec, Lond—June 1, 1900.

**Addenbrooke.**—The Addenbrooke Electrometer. Illustrated description of G. L. Addenbrooke's system of alternating current measurement. 1800 w. Elec Eng, Lond—Feb. 2, 1900.

**Capillary.**—A Capillary Electrometer for Electrical Measurements. Charles Frederick Burgess. Gives a description of a form of this instrument, enumerating some of its principal characteristics, and calling attention to its applicability for practical electrical measurements. 3500 w. Trans of Am Inst of Elec Engs—May, 1898.

A Capillary Electrometer for Electrical Measurements. Charles Frederick Burgess. Read at Omaha meeting of Am. Inst. of Elec. Engs. Calls attention to the applicability of this instrument to practical electrical measurements, giving uses that have been tested. 1800 w. Elec Eng, N. Y.—Aug. 4, 1898.

The Capillary Electrometer in Theory and Practice. George J. Burch. The first of a series of articles giving the main results of ten years of hard work. Describes how to make a capillary electrometer; discusses the law, gives directions for producing photographic records, and describes his method of analyzing them. Serial. Elect'n—July 17, 1896.

**Quadrant.**—A Highly Sensitive Quadrant Electrometer (Ueber ein Hochempfindliches Quadrantenelektrometer). An illustrated description of the new electrometer of Profs. Nernst and Dolezalek, with instructions as to its calibration and use. 6000 w. Elektrotech Zeitschr—Aug. 19, 1897.

The Kelvin Quadrant Electrometer as a Wattmeter and Voltmeter. Ernest Wilson. Gives the experience which the writer has gained with this instrument. Serial. Elec Rev, Lond—March 4, 1898.

### ELECTROPHONE.

The Electrophone. J. Wright. Describes the instrument and its operation, by use of which one may sit quietly at home and yet enjoy the latest comedy, opera or tragedy. 1300 w. Elec Eng, Lond—Sept. 10, 1897.

### ELECTRO-PHOTOGRAPHY.

See **ELECTRO-PHYSICS—Electrograph; Electro-Photography; RADIOGRAPHY.**

### ELECTRO-PHYSICS.

See also **CATHODE RAYS; ELECTRIC MEASUREMENT; ELECTRIC UNIT; INTERRUPTER; MAGNETISM; RADIOGRAPHY; ROENTGEN RAYS.**

Tendencies of Modern Electrical Research. M. I. Pupin. An address delivered before the N. Y. Acad. of Sciences. Tracing the development of the science of electricity, and showing how the domain of electricity is being extended. 10900 w. Science—Dec. 27, 1895.

The Development of Electrical Science. Thomas Gray. Address of the president, delivered before the annual meeting of the Indiana Academy of Sciences. 2 parts. 10300 w. Science—March 18, 25, 1898.

**Address.**—The Field of Experimental Research. Elihu Thomson. Vice-presidential address delivered at the Columbus meeting of the Am. Assn. for the Adv. of Science. On the limitations which past discoveries place upon experimental inquiry, giving experimental suggestions. 5500 w. Elec Wld & Engr—Sept. 9, 1899.

**Admittance and Impedance.**—Admittance and Impedance Loci. Frederick Bedell. A study of the relations arising from the reciprocal nature of admittance and impedance. 1300 w. Elec Wld—Nov. 7, 1896.

**Alternating Currents.**—The Compounding of Harmonic Vibrations with Fixed Phase Differences. William Hallock. An account of experiments with telephones. 700 w. Elec Rev, N. Y.—Jan. 3, 1900.

The Symbolic Representation of Double-Vector Products and Alternating Waves in General (Symbolische Darstellung Doppelperiodischer Vektorprodukte und Allgemeiner Wechselstromwellen). C. P. Steinmetz. An elaborate mathematical treatment, giving equations and graphical diagrams as applied to a number of practical cases. Two articles. 7500 w. Elektrotech Zeitschr—Dec. 21, 28, 1899.

**Atomic Charge.**—The Relation Between the Atom and the Charge of Electricity Carried by It. J. J. Thompson. Abstract from the "Phil. Mag." The subject is considered by the writer to be of fundamental importance, and closely related to chemical and electrical phenomena. Serial. Elect'n—Jan. 3, 1896.

**Becquerel Rays.**—See **RADIOGRAPHY.**

**Break Potential.**—An Experimental Study of Electro-Motive Forces Induced on Breaking a Circuit. F. J. A. McKittrick. With an introduction by Edward L. Nichols. An attempt to describe the results of an introductory experimental study of the induction phenomena exhibited when the circuit is broken. The article was read at the general meeting of the Am. Inst. of Elec. Engs. Serial. Elec Wld—June 27, 1896.

Voltage Curves in Breaking Inductive Resistances (Spannungskurven bei Ausschaltung Induktiver Widerstände). Fr. Natalis. A record of tests made upon coils with various windings and cores. The Joubert disc was used, and the data are given with the respective curves. 1800 w. Elektrotech Zeitschr—Sept. 1, 1898.

On the Spark Due to the Break of an Electric Circuit. K. R. Johnson. Imagines an ideal circuit and deduces the true expression of the extra current of the break. 1000 w. Elect'n, Lond—June 15, 1900.

**Capillarity.**—Certain Electro-Capillary Phenomena (Ueber die Kapillar Elektrischen Erscheinungen). H. Luggin. Describes a number of interesting and novel experiments showing the modifications in capillarity produced by electric currents. 4000 w. Zeitschr f Elektrochemie—Dec. 20, 1897.

Some Electro-Capillary Researches (Einige Kapillar Elektrische Versuche). A demonstration by Dr. Nernst of a number of interesting electro-capillary phenomena, before the convention of the German Electrochemical Association. 1200 w. Zeitschr f Elektrochemie—July 5, 1897.

**Carbon Conductivity.**—The Transition of Carbon from the Non-Conducting Into the Conducting Condition. George Brion. Investigations to determine at what temperature and in what manner this transition of carbon from the non-conducting to the conducting condition takes place. Abstract from "Wied. Ann." 1800 w. Elect'n—Feb. 5, 1897.

**Carbon in Flames.**—The Electrical Action of Carbon in Flames. Richard P. Fuge. Experiments are described, showing the effect of using carbon in one or other of its various forms instead of a metal in the flame. 1800 w. Elec Rev, Lond—May 7, 1897.

**Cathode Rays.**—See **CATHODE RAYS.**

**Condensers.**—Application of Hyperbolic Analysis to the Discharge of a Condenser. Alexander Macfarlane. Mathematical investigation. 2400 w. Trans Am Inst of Elec Engs—May, 1897.

**Conduction.**—See also **INSULATION.**

**Conductivity.**—The Conducting Analogy Between the Electric Arc and Certain Metallic Oxides. William Becket Burnie and Charles A. Lee. An account of experiments made to exhibit points of resemblance and dissimilarity between the arc and the oxides. 2000 w. Elect'n, Lond—May 12, 1899.

**Consonance.**—See **Resonance; TRANSFORMER—Electrical Consonance.**

**Contact Maker.**—A Simple Form of Instantaneous Contact Maker. Jonathan Haralson, Jr. Brief illustrated description of an instrument which has been in use in the electrical laboratory of the Alabama Polytechnic Inst. and has given satisfactory results. 450 w. Elec Wld & Elec Engr—July 15, 1899.

**Current Energy.**—Work in the Electric Current (Ueber die Stromarbeit). A mathematical discussion of the mechanical laws of energy applied to the flow of electricity. 3500 w. Electrochem Zeitschr—Feb., 1897.

**Current Path.**—The Insulating Medium Surrounding a Conductor the Real Path of Its Current. E. J. Houston and A. E. Kennelly. A brief description of the manner in which electric current is believed to be transmitted. Abstract of a paper read before the Am. Phil. Soc. 2500 w. Elec Wld—March 27, 1897.

**Diamagnetic Substances.**—Researches in Diamagnetic and Feebly-Magnetic Substances. Luigi Lombardi. Investigations at the Federal Polytechnic of Zürich. The research is chiefly confined to solid diamagnetic bodies, and the results show clearly the absence of hysteresis. 2400 w. Elect'n—Aug. 6, 1897.

**Dielectric Energy.**—On the Conversion of Electric Energy in Dielectrics. Richard Threlfall. An account of the writer's experiments, preceded by a brief review of the work of others in the same field. Serial. Phys Rev—May-June, 1897.

**Diffusion Current.**—Concerning the Current Generated by Means of Diffusing Gases (Ueber den durch Diffundierende Gase Hervorgerufenen Reststrom). A discussion by Prof. Dannel of some former experiments of Helmholtz, with analytical and experimental investigation. Two articles. 4000 w. Zeitschr f Elektrochemie—Oct. 20, Nov. 5, 1897.

**Discharges in Metallic Vapors.**—Discharge Phenomena in Rarefied Metallic Vapors. E. Wiedemann and G. C. Schmidt. An account of experiments with metallic vapors showing (1) that in a heated conducting glass bulb, rarefied metallic vapors may be made to glow by oscillating discharges. (2) In metallic vapors the typical discharge phenomena occur, even in monatomic ones. Color and spectrum of the first and third glow-light strata and of the positive light are essentially different. 1200 w. Elect'n—April 24, 1896.

**Discharge Through Gases.**—High Electromotive Force. John Trowbridge. Describes a large plant for the study of discharges of electricity through gases, and some of the results obtained. 1200 w. Sci Am—Jan. 15, 1898.

See also **ELECTRIC DISCHARGE; LIGHTNING.**

**Discontinuous Conductors.**—Behavior of Discontinuous Conductors Subjected to Electrical Actions. G. Vicentini. A report of investigations, giving experiments on large masses of emulsion, experiments with small masses, and experiments under simple conditions. 1500 w. Elect'n—April 23, 1897.

**Dispersion.**—Dispersion. Oliver Heaviside. An inquiry into some obscurities and inconsistencies which the author finds in Helmholtz's theory. 2800 w. Elect'n—Aug. 7, 1896.

The Electromagnetic Theory of Dispersion. H. von Helmholtz. Presentation of a theory, with investigations. 4000 w. Elect'n—July 24, 1896.

**Dissipation Sheets and Wires.**—Dissipation Sheets and Wires. The behavior of a sheet or wire as an energy-dissipating apparatus is considered, but the article deals only with the care of sheets and wires of bare metal placed in a position such that equal radiation in all directions, and free but not forced connection, will carry away the heat energy. 2100 w. Elect'n—Oct. 30, 1896.

**Double Refraction.**—Double Rrefraction of Electric Rays. Peter Lebedew. Experiments with technical details. 3500 w. Elect'n—Nov. 15, 1895.

**Dust Figures.**—Dust Figures of Electrostatic Lines of Force. David Robertson. An illustrated account of apparatus used and figures obtained. 1600 w. Elec Rev, Lond—Sept. 7, 1900.

**E. M. F. Striking Distance.**—See **LIGHTNING ARRESTER.**

**Electrical Consonance.**—See **Resonance; TRANSFORMER.**

**Electric Touch.**—On Electric Touch and the Molecular Changes Produced in Matter by Electric Waves. Jagadis Chunder Bose. Abstract of paper read before the Royal Soc. An account of investigations made in an attempt to reduce the action of contact-sensitiveness of metals to a systematic behavior. Serial. Elect'n, Lond—Feb. 23, 1900.

On the Similarity of Effect of Electrical Stimulus on Inorganic and Living Substances. Prof. J. Chunder Bose. A paper read before the British Association, on molecular change produced by electric stimulus. Also editorial. Serial. Electrician—Sept. 14, 1900.

Molecular Changes Produced in Matter by Electric Waves. Reviews the paper by Dr. Jagadis Chunder Bose, read before the Royal Society, with comments. 1500 w. Elec Rev, Lond—Sept. 21, 1900.

**Electric Wave.**—See **Electric Touch; Oscillation; Theory; Vibration; Wave.**

**Electrified Matter.**—Electrified Matter. Harry L. Tyler. Part first is introductory to a series of chapters aiming to make clear that the electrician has only to deal with a condition. The various methods of electrifying will be considered. Serial. Elec—July 7, 1897.

**Electographs.**—Electographs of the Electro-Static Current Made Without a Camera. Elmer Gates. Illustrated account of interesting experiments showing the path taken by the current. 1600 w. Sci Am—Oct. 7, 1899.

**Electro-Photography.**—Curious Electro-Photographic Experiments. Illustrates and describes experiments made by Francis E. Nipher, as reported in a paper contributed to the "Trans. of the Acad. of Science of St. Louis." 1500 w. Elec Rev, Lond—Aug. 10, 1900.

See also **RADIOGRAPHY.**

**Electrostatic Field.**—Some Practical Features of the Electrostatis Field. Harris J. Ryan. Discusses the chief characteristics of the field, illustrating and describing phenomena and experiments, and showing the lines along which progress is being made toward rational insulation design. 6000 w. Sib Jour of Engng—June, 1900.

**Energy Transfer.**—On the Mode of Transferring

Energy in the Electric Circuit. Edwin J. Houston and A. E. Kennelly. A suggestion of how the transfer may take place, not merely under the general formula of "motion of Faraday tubes of force through space" but concretely by the use of the more fundamental conception of the energy resident in electrostatic flux. 1500 w. Elec Wld —Dec. 5, 1896.

**Ether Conductivity.**—The Electrical Conductivity of the Ether. John Trowbridge. Outlines a method which enables one to form an estimate of the energy incident upon the production of the Röntgen rays. The experiments made lead to the conclusion that under very high electrical stress the ether becomes a good conductor. 1700 w. Am Jour of Sci—May, 1897.

**Ether Theories.**—On the Prospective Development of Eether Theories. Reginald A. Fessenden. Mathematical development of theories, with discussion of defects. 1700 w. Elec Wld—Jan. 2, 1897.

**Fumes.**—On Electrical Properties of Fumes Proceeding from Flames and Burning Charcoal. Lord Kelvin and Dr. Magnus Maclean. Read at meeting of Royal Soc. Describes experiments made and gives results. Ill. 1800 w. Nature—April 22, 1897.

**Galvanometer.**—See **GALVANOMETER.**

**Gravitation.**—An Explanation of Gravitation. Reginald A. Fessenden. Considers it a secondary electric effect. 2000 w. Elec Wld & Engr—Sept. 29, 1900.

**Hall Phenomenon.**—Experiments on the Hall Phenomenon in Bismuth. Dr. A. Lebret. Investigations made at the physical laboratory of Leyden under Prof. Kamerlingh Onnes' guidance. 2400 w. Elect'n—April 10, 1896.

**Harmonic Analyser.**—An Harmonic Analyser. J. N. Le Conte. Describes the instrument and its use. Ill. 1000 w. Phys Rev—July, 1898.

**Hertz Waves.**—See **Waves, Hertz.**

**High Tension.**—Electricity at High Pressures. Elihu Thomson's lecture before the New York Elec. Soc. Abstract. Considers methods of attaining high voltages and describes a novel adaptation of the Planté rheostatic machine for the production of high electrical pressures. 1000 w. Elec Rev, N. Y.—April 5, 1899.

On the Decomposition of a High Potential Current (Sur la Décomposition d'un Courant à Haut Potential). H. Abraham. A communication to the French Academy recording the results of experiments with disruptive discharges produced by currents of high potential. 1500 w. Comptes Rendus—April 17, 1899.

**High-Tension Accumulator.**—See **ACCUMULATOR—High Tension.**

**High Tension Apparatus.**—A New Laboratory Apparatus for the Production of High Tension Continuous Currents (Ueber einen Neuen Laboratoriumsapparat zur Erzeugung Hoher Gleichstromspannungen). L. Strasser. A number of secondary elements are used in connection with a rotary collector and commutator. 1200 w. Elektrotech Zeitschr—July 13, 1899.

**Hydrodynamic Analogies.**—Hydrodynamic Analogies to the Theory of Potential and Electrotechnics (Hydrodynamische Analogien zur Theorie des Potentials und der Elektrotechnik). Dr. Holzmüller. A comparison between the laws and phenomena of hydrodynamics and those of electricity, showing the close analogy. Two articles. 7000 w. Zeitschr d Ver Deutscher Ing—June 3, 10, 1899.

**Impedance.**—See **Admittance and Impedance; INDUCTANCE—Mutual.**

**Induction.**—See also **MAGNETIC INDUCTION.**

**Induction Law.**—Note on the Simplification of the Law of Induction (Bemerkungen zur Fassung des Induktionsgesetzes). Max Breslauer. A discussion of the existing laws of electrical induction showing how they can be simplified and condensed into one comprehensive law. 1800 w. Elektrotech Zeitschr—July 28, 1898.

**Induction, Parabolic Wave.**—The Current Produced in an Inductive Coil by a Parabolic Wave of E. M. F. Alexánder Russell. Mathematical solution. 800 w. Elec Rev, Lond—Nov. 10, 1899.

**Interrupter.**—See **String Alternator; INTERRUPTER.**

**Ions.**—Ions, Atoms and Electrons. Reviews the discussion on "Ions" which took place at the Bradford meeting of the British Assn. 2200 w. Elec Rev, Lond—Oct. 5, 1900.

**Light and Magnetism.**—The Analogy of Action between Luminous Rays and Lines of Magnetic Force (Sur une Analogie d'Action entre les Rayons Lumineux et les Lignes de Force Magnetique). A paper presented to the French Academy by M. Birkeland discussing some remarkable experiments made with a Crookes tube in a strongly magnetic field. The results are tabulated and shown in diagrams. 1800 w. Comptes Rendus—Feb. 21, 1898.

**Light Influence upon Discharges.**—On the Influence of Light upon the Character of the Influence Machine Discharge. J. Elster and H. Geitel. From "Wied. Ann." Report upon results of experiments. 1800 w. Elec—June 10, 1896.

**Liquid Oxygen.**—On the Magnetic Susceptibility of Liquid Oxygen. J. A. Fleming and James Dewar. Read before the Royal Society. Gives results of experiments on the magnetic susceptibility under magnetising forces varying from 500 to 2500 C. G. S. units. Serial. Elect'n, Lond—July 1, 1898.

On the Magnetic Permeability of Liquid Oxygen and Liquid Air. J. A. Fleming and James Dewar. Read before the Royal Soc. Describes investigations. 3500 w. Elect'n—Dec. 11, 1896.

**Liquid Surface Tension.**—On the Surface Tension of Liquids under the Influence of Electrostatic Induction. Samuel J. Barnett. Gives a brief discussion of previous work in this field, and describes a method of investigation which has proved more satisfactory than those hitherto employed—the method of ripples in its latest form. 7800 w. Phys Rev—May-June, 1898.

**Low Temperatures.**—Electric and Magnetic Research at Low Temperatures. J. A. Fleming. A discourse delivered at the Royal Inst. Description of the latest results in the department of low-temperature investigations. 2500 w. Elec Eng —July 8, 1896.

Electric Research at Low Temperature. An abstract of five papers recently communicated to the Royal Society by Profs. Dewar and Fleming, on the dielectric constants of various substances at low temperatures. Ill. 5400 w. Elect'n—Sept. 10, 1897.

**Magneto-Optic Rotation.**—Magneto-Optic Rotation and Its Explanation by a Gyrostatic System. A discourse delivered at the Royal Inst. by Andrew Gray. Illustrates and describes investigations. Serial. Sci Am Sup—Dec. 2, 1899.

**Magneto-Optics.**—On the Theory of Magneto-Optic Phenomena. C. H. Wind. An examination of the theories advanced; the relation existing between the present theory and some of the older ones; and other features of the subject. Serial. Phys Rev—Jan., 1898.

**Mechanics.**—The Mechanics of the Principal Electrical Phenomena (Die Mechanik der Wichtigsten Elektrischen Erscheinungen). Explaining the fundamental conceptions in electrical action by the corresponding mechanical ideas. Two articles. 6000 w. Elektrotech Zeitschr—Aug. 26, Sept. 2, 1897.

See also **Theory.**

**Motion of Charged Body.**—Note on the Motion of a Charged Body at a Speed Equal to or Greater Than That of Light. Oliver Heaviside. An argument to disprove the statement that "it would seem impossible to make a charged body move at a greater speed than light." 700 w. Elect'n, Lond—Jan. 14, 1898.

**Ohm's Law.**—Ohm's Law According to the Vibration Theory (Das Ohm'sche Gesetz nach der Vibrations Theorie). Rudolf Mewes. A mathematical examination of the vibration theory of resistance as compared with the observed facts, showing that Ohm's is in accordance with the equations for mechanical work. 1500 w. Elektrochem Zeitschr—Nov., 1899.

**Oscillations.**—On the Theory of Electric Oscillations in Mutually Inductive Circuits. Edwin J. Houston and A. E. Kennelly. An answer to a question of considerable theoretical importance. 1300 w. Elec Wld—July 10, 1897.

See also **Vibration; Wave.**

**Oscillation Period.**—An Experimental Determination of the Period of Electrical Oscillations. Arthur Gordon Webster. Researches concerning the experimental verification of the formula giving the period of the oscillations of an alternating current arising when a charged condenser is discharged through a circuit containing self-induction. Ill. 5000 w. Phys Rev—May-June, 1898.

**Permeability.**—See also **MAGNETIC TESTING; MAGNETISM.**

**Phillips Phenomenon.**—A Mathematical Investigation of the Phillips Phenomenon. George W. Walker. States briefly the experiment and gives a general explanation, and the mathematical treatment of the question. Serial. Elect'n, Lond—Aug. 18, 1899.

**Potential Difference.**—The Potential Difference in Electric Conductors (Ueber einen Auffälligen Werth der Potentialdifferenz auf einem Stromdurchflossenen Leiter). H. Teege. A review of former experiments by Dr. Breisig, showing that the paradox of contradiction of Kirchhoff's law is only apparent. 1800 w. Elektrotech Zeitschr—Dec. 7, 1899.

**Quantities.**—On the Nature of the Electric and Magnetic Quantities. Reginald A. Fessenden. Letter, in reply to a criticism, on the writer's system of "Quantitative Mathematics," and explanation of natural phenomena. 1000 w. Elec Rev, Lond—Sept. 14, 1900.

**Quartz Fibres.**—See **PHYSICS.**

**Radiant Forces.**—Radiant Electric Forces. Alfred G. Dell. Deals briefly with some of the forces radiated from induction coils, and their discharges in vacuum tubes. 1500 w. Elec Rev, N. Y.—June 28, 1899.

**Radiation.**—Radiation. C. M. Dorman. Presidential address before the Northern Soc. of Elec. Engs. Investigation of vibrations and waves and their application to electricity. Serial. Elec Eng, Lond—Jan. 22, 1897.

**Radiography.**—See **RADIOGRAPHY.**

**Rarefied Gases.**—The Dielectric Cohesion of Rarefied Gases (Sur la Cohesion Diélectrique des Gaz Raréfiés). E. Bonty. A further communication to the French Academy, describing the author's experiments with electric currents in exhausted tubes. 1200 w. Comptes Rendus—July 24, 1899.

The Electrolytic Conductivity of Rarefied Gases (Les Gaz Raréfiés Possedentils la Conductivité Electrolytique?). E. Bonty. A communication to the French Academy, giving the results of experiments with Crookes' and Geissler's tubes. 1500 w. Comptes Rendus—July 17, 1899.

**Resistivity Bismuth.**—On the Electrical Resistivity of Bismuth at the Temperature of Liquid Air. James Dewar and J. A. Fleming. Read before the Royal Soc., June 4, 1896. Describes experiments and gives results. 1000 w. Elec Rev, Lond—Oct. 16, 1896.

**Resonance.**—Electric Resonance and Consonance (Ueber Elektrische Resonanz und Konsonanz). Two papers by Herr C. P. Feldmann, giving an analytical investigation of the theory with graphical applications. 7500 w. Elektrotech Zeitschr—Feb. 18 and 25, 1897.

Resonance in Circuits Possessing Self and Mutual Inductance, Resistance and Capacity. A. S. Dunston. A short sketch of the phenomenon of resonance in simple circuits containing self-inductance, resistance and capacity is given, and the general method of finding the conditions necessary for resonance to occur is shown. The paper is concerned solely with the phenomena of resonance in the primary circuit. 1200 w. Elec Wld—Jan. 18, 1896.

See also **ELECTRIC CABLE; TRANSFORMER—Electrical Consonance.**

**Röntgen Rays.**—See **ROENTGEN RAYS.**

**Salt Vapors.**—The Electrical Conductivity of Flames Containing Salt Vapors. Harold A. Wilson. Abstract of a paper read before the Royal Soc. Describes experiments undertaken following up the anology between the conductivity of salt vapors and Röntgenised gases, and getting some information about the velocity of the ions in the flame itself. 1200 w. Elect'n, Lond—July 21, 1899.

**Sine Curves.**—See **ALTERNATING CURRENT—Curves; SYNCHRONOGRAPH.**

**Sodium Evaporation.**—On Electrical Effects Due to Evaporation of Sodium in Air and Other Gases. W. Craig Henderson. Communicated to the Royal Soc. An account of experiments to determine whether evaporation of an unelectrified liquid produces any electrification. 800 w. Elect'n, Lond—April 6, 1900.

**String Alternator.**—A String Alternator. K. Honda and S. Shimizu. Describes a modified form of Pupin's interrupter, used as an alternator. 600 w. Am Jour of Sci—July, 1900.

**Tesla Coil.**—Interesting Information on Tesla Coil Experiments. Elliott Woods. The results of the writer's experience are given. 900 w. Elec Rev—Aug. 18, 1897.

See also **INDUCTION COIL.**

**Tesla Currents.**—Some Experiments in Tesla's Laboratory with Currents of High Potential and High Frequency. Nikola Tesla. Illustrated description. 4000 w. Elec Rev, N. Y.—March 29, 1899.

See also **ELECTRIC INVENTION.**

**Theories.**—A Fragmentary Discussion of the So-called Electric Current (Ein Diskontinuirliches Bild des Sogen. Elektrischen Leitungsstroms). Dr. Ludwig Silberstein. A mathematical discussion of some of the features of Maxwell's and Hertz's theories. 4500 w. Elektrochem Zeitschr—Dec., 1896.

Agreement of the Thermodynamic or Vibration Theory with the Theory of Maxwell (Uebereinstimmung der Thermodynamischen oder Vibrationstheorie mit der Theorie von Maxwell). Rudolph Mewes. A mathematical discussion of the agreement of the wave theory with that elaborated in Maxwell's "Electricity and Magnetism." 2000 w. Elektrizität—Feb. 4, 1899.

An Electrical Hypothesis for the Solar and Planetary Systems and Some of Their Associated Phenomenon. Gives an interesting hypothesis explaining the solar and planetary systems as the result of electrical energy. 2400 w. Elec Rev, Lond—Jan. 21, 1898.

An Electromagnetic Theory of the Inertia of Matter. Edwin J. Houston and A. E. Kennelly. The ideas presented are novel and the article is interesting. 2000 w. Elec Wld—June 6, 1896.

A Physical Theory of Electricity and Magnetism. T. Proctor Hall. A theory aiming to supply a simple and easily apprehended physical view of electric and magnetic phenomena. 2000 w. Elec Wld—July 3, 1897.

Mechanical Conceptions of Electrical Phenomena. A. E. Dolbear. The first part traces the progress of mechanical knowledge from the time of Newton. Serial. Jour Fr Inst—June, 1896.

Mechanical Theory of Electricity and Chemical Action. Arthur Whitwell. The object is to develop the idea of molecular rotation and to suggest by its aid a mechanical picture of electrostatic, electromagnetic, magnetic and chemical phenomena. Serial. Elec Rev, Lond—Jan. 8, 1897.

Modern Views of Electricity. Franz Dommerque. Abstract of a paper read before the Chicago Electrical Assn. Lines of work of various eminent electricians and theories advanced. 1500 w. Elec—Nov. 4, 1896.

On the Mechanical Conceptions of Electricity and Magnetism. W. S. Franklin. Read before the Buffalo meeting of the Am. Assn. Develops the conceptions of the dependence of electromotive force upon changing magnetic flux, of the dependence of magneto-motive force upon changing electric flux, of the production of electromotive force in a moving wire, of the energy stream, of electro-magnetic waves, and of the Hertz vibrator. 3000 w. Phys Rev—March-April, 1897.

Report on the State of the Mathematical Theory of Electricity and Magnetism. Arthur Gordon Webster. Reviews the principal points of the development of the theory of electricity and traces its progress. 3300 w. Science—Dec. 9, 1898.

Some Notes on Dr. R. C. Shettle's View of the Ultimate Nature of Electricity. Spencer L. Fletcher. States the view taken, and discusses the opinions of men of science. 2000 w. Elec Engr, Lond—Aug. 17, 1900.

Some Remarks Upon the Cause and Nature of the Electric Force. R. C. Shettle. Facts and arguments in support of the hypothesis that matter was formed by cohession, and that the part which did not undergo condensation constitutes the ether, and is the basis of the electric force. 3500 w. Elec Engr, Lond—Aug. 24, 1900.

The Duality Between Electrical and Magnetic Phenomena (Die Dualität zwischen Elektrischen und Magnetischen Erscheinungen). W. Weiler. A geometric discussion showing the accordance of electrical and magnetic phenomena with the deductions of the modern geometry of position. 2000 w. Elektrotech Rundschau—Oct. 1, 1898.

The Nature of Electricity and Magnetism (Das Wesen der Elektrizität und des Magnetismus). A series of articles treating of the molecular theory of Vogt. Three articles. 7500 w. Die Elektrizität—Jan. 2, 16, 30, 1897.

See also **ELECTRIC CELL; MAGNETISM.**

**Uranium.**—Continuation of Experiments on Electric Properties of Uranium. Lord Kelvin. J. Carruthers Beattie and M. S. de Smolan. Read before the Royal Soc. of Edinburgh. Results bearing on the conductance induced in air by uranium. 1000 w. Nature—May 6, 1897.

**Vacuum Phenomena.**—On the Comparison of Low and High Vacuum Electrical and Radiant Matter Phenomena with the Aurora, the Solar Corona, and Comets. Wallace Gould Levison. Abstract of a note read before the New York Academy of Sciences. Auroral phenomena explained; comets regarded as aggregations of radiant matter. The solar corona is also referred to the same category. 1800 w. Sci Am—Sept. 5, 1896.

**Velocity.**—The Velocity of Electricity. Gifford Le Clear. Investigations tending to show the relation between electricity and light. Ill. 1100 w. Pop Sci M—March, 1896.

See also **Wave Velocity.**

**Vibrations.**—Electricity and Electrical Vibrations. Review of a course of lectures recently delivered by Lord Rayleigh. The six lectures included discussion of induction, alternating currents, currents of very high frequency, vibrations, etc. 2800 w. Col Guard—April 23, 1897.

The Absorption and Emission of Electric Vibrations (Ueber die Absorption und Emission der Elektrischen Schwingungen). A theoretical discussion of the relations of electric to other physical vibrations. 2000 w. Die Elektrizität—April 24, 1897.

See also **Oscillation; Wave.**

**Volta Contact Force.**—Contact Electricity. Editorial on the controversy, noting its antiquity and reviewing its history. 1400 w. Engng—Feb. 16, 1900.

The Volta Contact Force. On the deductions of Prof. Oliver Lodge, and the opposing opinions. 2500 w. Engng—June 1, 1900.

See also **ELECTRIC CELL; ELECTRO-CHEMISTRY.**

**Wave.**—Electrical Waves and Oscillation. Ernest Merritt. Read before the Electrical Soc. of Cornell Univ. Explains experiments illustrating electrical oscillations and waves, and gives such information as has thus far been gained in regard to them. 5200 w. Sib Jour of Engng—June, 1897.

See also **Electric Touch; Oscillation; Theory; Vibration.**

**Wave Apparatus.**—On a Complete Apparatus for the Study of the Properties of Electric Waves. Jagadis Chunder Bose. Illustrated description. 3000 w. Elec Eng, Lond—Oct. 2, 1896.

**Wave Currents.**—See **INTERRUPTER.**

**Wave, Hertz.**—The Hertz Electric Waves, and the Consequent Reform in Physics (Ueber die Hertzschen Elektrischen Schwingungen und die damit Zusammenhängende Reform der Physik). Dr. Holzmüller. An elementary investigation of the Hertz waves, showing their relation to general physical problems. 5000 w. Zeitschr d Ver Deutscher Ing—June 4, 1898.

The Transmission of Hertz Waves Through Liquids (Transmission des Ondes Hertziennes à Travers les Liquides). E. Branly. A communication to the French Academy showing the various absorbing powers of different liquids and describing the apparatus and method of investigation. 1500 w. Comptes Rendus—Oct. 30, 1899.

**Wave Interferometer.**—On the Use of the Interferometer in the Study of Electric Waves. G. F. Hull. Considers the use of the interferometer in the study of light; the analogy between light and electric radiation; apparatus; measurements, etc., with conclusions. 5000 w. Phys Rev—Oct., 1897.

**Wave, Long Wires.**—Electrical Waves in Long Parallel Wires. A. D. Cole. Abstract of paper read before A. A. A. S., Buffalo meeting. Facts described were brought out in experimental study undertaken as a preliminary to a research on the refractive index of certain liquids for electrical undulations as deduced from a measurement of the ratio of the wave-length in the material under investigation to that in air. 2200 w. Elec Wld—Sept. 19, 1896.

**Wave, Parabolic.**—See **Induction, Parabolic Wave.**

**Wave, Propagation.**—Propagation of Long Electrical Waves. M. I. Pupin. Describes an experimental method of investigating the propagation of long electrical waves and discusses the mathematical theory bearing upon the same. 9900 w. Trans Am Inst of Elec Engs—March, 1899.

**Wave, Radio-Micrometer.**—Application of the Radio-Micrometer to the Measurement of Short Electric Waves. G. W. Pierce. An illustrated description of an apparatus found to be useful in quantitative experiments on electric waves. 2300 w. Am Jour of Sci—April, 1900.

**Wave Reflection.**—On the Influence of the Thickness of Air-Space on Total Reflection of Electric Radiation. J. Chunder Bose. Read before the Royal Soc. Investigations of this subject, studying the influence of the angle of incidence and of the wave length in modifying the thickness of the effective air-space. 9500 w. Elect'n, Lond—Nov. 25, 1898.

Reflection of Hertzian Waves at the Ends of Parallel Wires. Lee De Forest. Describes experimental investigations. 4000 w. Am Jour of Sci—July, 1899.

**Wave Refraction.**—The Refraction of Electric Waves. Abstracts of two papers communicated to the Royal Society by Jagadis Chunder Rose, "On the Determination of the Indices of Refraction of Various Substances for the Electric Ray" and "On the Influence of the Thickness of Air Space on Total Reflection of Electric Radiation." Published in "Nature." Ill. 1700 w. Sci Am Sup—Dec. 3, 1898.

**Wave, Spark.**—A Wave-Like Motion of an Electric Spark (Ueber eine Wellenförmige Bewegung Elektrischer Funken). E. Ruhmer. With reproductions of photographs of the peculiar forms and a discussion of the conditions and causes of the phenomena. 3000 w. Elektrotech Zeitschr—Feb. 22, 1900.

See also **ELECTRIC DISCHARGE.**

**Wave Theory.**—The Derivation of the Fundamental Laws of Electrodynamics from the Wave Theory (Die Ableitung des Elektrodynamischen Grundgesetzes aus der Wellentheorie). Rudolf Mewes. A brief mathematical discussion, based on the investigations of Crookes, Heitz, Mayer and others. 3000 w. Elektrizität—June 19, 1897.

**Wave, Tinfoil Grating Detector.**—Note on Tinfoil Grating as a Detector for Electric Waves. T. Mizuno. From the "Journal" of the College of Science, Imperial University, Tokio, Japan. An account of experiments and a few tests of the sensibility of a tinfoil grating as a detector of electric waves. 1500 w. Elect'n—Dec. 6, 1895.

**Wave Velocity.**—The Velocity of Electric Waves. Clarence A. Saunders. Investigation based on the phenomena of resonance. Historical review of past attempts, with description of method and apparatus used in this investigation, with results. 6000 w. Phys Rev—Sept.-Oct., 1896.

Velocities of Electro-Magnetic Waves in Air and Along Wires. M. C. Gutton. Translation of a paper presented at meeting of the Société Internationale des Electriciens. Reviews discoveries and experiments. 1200 w. Elec Rev, N. Y.—Oct. 18, 1899.

Velocity of Electric Waves in Air. G. V. Maclean. Briefly notes methods used by various experimenters, and describes an experiment in which a new method was employed, by which the direct determination of the period of the oscillator was found. 5400 w. Am Jour of Sci—July, 1899.

Velocity of Propagation of Electro-Magnetic Waves Through Air and Through Wires (Comparison des Vitesses de Propagation des Ondes Electro-Magnetiques dans l'Air et le Long des Fils). A communication to the French Academy by M. Gutton, describing the apparatus and method by which the tests were made, and showing the velocity to be alike in both cases. 1200 w. Comptes Rendus—June, 1899.

See also **Velocity.**

**Wave, Visible.**—Visible Electric Waves. B. E. Moore. Describes apparatus and method used by author in showing electric waves to a class. The method is serviceable for lecture purposes. 1200 w. Phys Rev—Sept.-Oct., 1896.

**Wave, Water Cells.**—The Measurement of Short Electrical Waves and Their Transmission Through Water Cells. A. D. Cole. Paper read before the Am. Assoc. for the Adv. of Sci. Brief account of experimental work on the index of refraction and absorption of water for waves of 5, 8 and 16 centimetres length. 3000 w. Phys Rev—Nov., 1898.

**Zeeman Effect.**—A New Action of Magnetism Upon Light (Ueber eine Neue Wirkung des Magnetismus auf das Licht). An account of Dr. Zeeman's experiments showing the action of magnetism upon both the emission and absorption spectra. 1500 w. Elektrotech Zeitschr—April 15, 1897.

New Observations Upon the Zeeman Effect (Observations Nouvelles sur le Phénomène de Zeeman). MM. Becquerel and Deslandres. Giving the results obtained by the use of a Rowland grating and a very intense magnetic field. 3000 w. Comptes Rendus—July 4, 1898.

I. Optics and the Theory of Ions. Dr. P. Zeeman. II. Preliminary Note Upon the Broadening of the Sodium Lines by Intense Magnetic Felds. A. St. C. Dunstan, M. E. Rice and C. A. Kraus. The first article explains an important discovery, valuable from its bearing upon the theories of light and other forms of radiant energy. The second article gives experiments verifying Dr. Zeeman's discovery. 1400 w. Elec Wld—May 1, 1897.

Preston's Investigations on the Zeeman Effect. Study of the effect on the bright lines of the spectrum when placed in a strong magnetic field. Serial. Elec Rev, Lond—Oct. 7, 1898.

The Latest Discovery in Physics. Oliver Lodge. Reviews the work of Faraday and others, giving special attention to the discovery of Dr. P. Zeeman. 2500 w. Elect'n—Feb. 26, 1897.

**ELECTROPLATING.**

See also **ELECTRO-GALVANIZING.**

Some Notes on Electrotyping, Plating and Gilding. J. Warren. Hints for the guidance of amateurs and learners. 2300 w. Elec, Lond—July 31, 1896.

**Copper.**—Electro-Deposition of Copper from Alkaline Solutions. Sherard Cowper-Coles. Illustrates and describes a plant recently erected at the works of the Société des Mines et Founderies de Zinc de la Vieille-Montagne in Belgium, for electro-depositing copper upon metallic zinc sheets. 400 w. Elec Rev, Lond—Feb. 16, 1900.

**Dome, Philadelphia.**—The Electroplating of the Dome of the Philadelphia City Hall Tower. Abstracted from a paper read before the Engineers' Club of Philadelphia by Francis Schumann. The electroplating had to cover some 120000 sq. ft. of surface, and included pieces weighing about 10000 lbs. each. It required nearly fifty months of actual time, working both day and night. 1000 w. Elec Wld—April 16, 1898.

**Gold.**—The Electrolytic Deposition of Gold. An abstract of a paper by E. Wohlwill in "Zeitschr. für Elektrochemie," discussing principally the relations of current density and the temperature of bath to the results obtained. 1000 w. Elec Rev, Lond—Aug. 26, 1898.

**Plant.**—Arrangement of an Electro-Plating Plant. T. Ulke. Plan of the plant is given, showing how the dynamo, voltmeter, switchboards and tanks should be connected, also directions for use and care. 1500 w. Eng & Min Jour—Aug. 6, 1898.

Electrical Equipment of Plating Plants. C. F. Burgess. Comments on the fact that this branch of electrical industry has not shared the rapid development of other electrical industries, and reviews the work, offering suggestions and conclusions. 3300 w. W Elect'n—April 2, 1898.

**Reflectors.**—See **REFLECTOR—Electrolytic Process.**

**Ships.**—Copper Plating Vessels. Explains the advantage of copper as a sheathing for vessels, and describes a new system of depositing the copper. Ill. 1400 w. Ir Age—Feb. 23, 1899.

Electroplating the Hulls of Vessels. Extracts from the report of A. A. Kundson concerning the condition of the hull of the tug "Assistance," which was electroplated with copper in 1895. Gives the method used and gives reason for considering the method an improvement in copper sheathing. Ill. 1700 w. Elec Eng, N. Y.—Feb. 2, 1899.

See also **SHEATHING.**

**Wood.**—Electroplating on Wood. C. F. Burgess. Describes a process by means of which a metallic surface on wood and other non-conducting materials has been obtained. 2000 w. Elec Wld—July 30, 1898.

**ELECTROSTATIC CAPACITY.**

See also **ELECTRIC MEASUREMENT.**

**Cable.**—The Capacity Ratios of Cables (Die Kapacitätsverhältnisse in Kabeln). Dr. H. Andriessen. A mathematical discussion of the relations of the various capacities of a cable for different condenser arrangements. The relations of several telephone wires in the same cable are discussed. 3000 w. Elektrotech Zeitschr—Dec. 30, 1897.

The Electrostatic Capacity of a Two-Wire Cable. George W. Patterson. Briefly derives the expression for the capacity of a single wire cable and from that passes to the capacity of a two-wire cable. 700 w. Technic—1897.

The Electrostatic Capacity of a Two-Wire Cable. George W. Patterson, Jr. Read at the Detroit meeting of the A. A. A. S. A mathematical study. 700 w. Phys Rev—Nov.-Dec., 1897.

See also **ELECTRIC MEASUREMENT—Cable Capacity; SUBMARINE CABLE—Capacity.**

**Oils.**—On the Specific Inductive Capacity of Certain Oils. Arthur L. Clark. Describes investigations made by the use of Quincke's bubble method, giving results. 900 w. Phys Rev—Feb., 1898.

**Overhead Conductors.**—The Computation of the Electrostatic Capacity of Overhead Conductors (Ueber die Berechnung der Elektrostatischen Kapacität Oberirdischer Leitungen). F. Breisig. An approximate solution, taking into account the influence of the surface of the earth, the proximity of wires, and the general working conditions. 5000 w. Elektrotech Zeitschr—Nov. 17, 1898.

**Wires.**—Electrostatic Capacity of Wires. W. Moon. Mathematical demonstration. 800 w. Elec Rev, Lond—Sept. 30, 1898.

**ELECTRO-THERAPEUTICS.**

On the Applications of Electricity in Medical and Surgical Practice. H. Lewis Jones. Read before the Inst. of Elec. Engs. Discusses the apparatus and methods, some of the difficulties met and problems to be solved. 8000 w. Elect'n, Lond—March 9, 1900.

Physico-Chemical Principles and the Application of Cataphoris in Medicine (Physikalisch Chemische Grundlage und Anwendung der Kataphorese in der Medizin). A fundamental discussion of the application of the electrical transfer of particles to medicine. 6000 w. Elektrochem Zeitschr—June, 1897.

The Uses of Electricity in Sanitariums and in the Practice of Medicine and Surgery. George H. Guy. Reviews the different applications of electricity in medical practice, with remarks on the degrees of success. 3000 w. Chau—Aug., 1897.

Twenty-Five Years' Progress in Electro-Therapeutics. W. S. Hedley. Reviews the work of this field and related subjects. 4800 w. Elec Rev, Lond—Nov. 12, 1897.

**High Frequency Currents.**—Therapeutical Effects of Currents of High Frequency. A. d'Arsonval. From "L'Industrie Electrique." Preliminary report of some very exact experiments which are being undertaken in Paris, and which promise results of great value. 1200 w. Elec Eng—Aug. 12, 1896.

The Therapeutic Effect of Electrical Currents of High Frequency (Die Therapeutischen Wirkungen Elektrischer Ströme von Hoher Wechselzahl). An account of a repetition by Dr. Krebs of d'Arsonval's experiments. Beneficial results were obtained in cases of diabetes. 3500 w. Elektrotech Rundschau—Dec. 1, 1896.

**High Frequency Oscillators.**—High Frequency Oscillators for Electro-Therapeutic and other purposes. Nikola Tesla. Read at meeting of American Electro-Therapeutic Assn., at Buffalo, N. Y. An account of the writer's experiments in this field, describing apparatus used. Ill. 7000 w. Elec Eng, N. Y.—Nov. 17, 1898.

See also **ELECTRIC INVENTION; ELECTRIC OSCILLATOR.**

**Light Baths.**—See **ELECTRIC LIGHT BATH.**

**P. and S. College, New York.**—Electricity at the College of Physicians and Surgeons. Illustrated detailed description of the extensive applications of electricity in this branch of Columbia University. 1000 w. Am Elect'n—Dec., 1896.

**Transformer.**—Lighting Circuits for Electro-Therapeutic Requirements. E. Meylan, in "Revue Internationale de l'Electricité." A universal transformer for alternating current. Illustated description with prefatory remarks upon requirements for the utilization of electricity in therapeutics. 2100 w. Elec Rev, Lond—Aug. 14, 1896.

**Vocal Register.**—The Development of the Higher Vocal Register by Electricity. William Harvey King. The purpose is to illustrate the action of the electrical current in developing the muscles of the larynx. Serial. Elec—Jan. 20, 1897.

**ELECTROTYPING.**

See **ELECTROPLATING.**

**ELEVATED RAILWAY.**

See also **CITY RAILWAY; SUSPENDED RAILWAY; UNDERGROUND RAILWAY.**

**Accident, Liverpool.**—Report on the Liverpool Overhead Railway Accident. A reprint of the report of H. A. Yorke to the Railway Dept. of the Board of Trade on the accident of April 15, 1897. Gives description, evidence and conclusion. 3500 w. Elect'n—July 9, 1897.

**Barmen-Elberfeld.**—See **SUSPENDED RAILWAY.**

**Berlin.**—Berlin Elevated Railway. Brief illustrated description of the road, a portion of which will be an underground line. 850 w. St Ry Rev—Sept. 15, 1897.

Discussion of the "Union-Elektricitäts Gesellschaft's" Plan for Operating the Berlin Ringbahn Electrically (Besprechung über den von der Union-Elektricitäts-Gesellschaft in Berlin Aufgestellten Entwurf für Einführung des Elektrischen Betriebes auf der Berliner Stadt-und Ringbahn). Long discussion before the Verein Deutscher Maschinen-Ingenieure on the comparative merits of steam and electrical operation. 1200 w. Glaser's Annalen—April 15, 1900.

Electric Driving on the Berlin Municipal Railway (Der Elektrische Betrieb auf der Berliner Stadt-und Ringbahn). A symposium of contributions from official inspectors and engineers in Berlin concerning the working of the road by electricity. 10000 w. Glaser's Annalen—Aug. 15, 1900.

Investigations on the Speed of Trains on the Berlin Local Railway (Versuche ueber die Fahrgeschwindikeit der Berliner Stadtbahnzüge). Giving the construction of the ingenious speed indicator used, with diagrams plotted by its aid. 1 plate. 4000 w. Glaser's Annalen—July 15, 1897.

Plan for the Introduction of Electric Power Upon the Berlin City and Belt Railway (Projekt über die Einführung des Elektrischen Betriebes auf der Berliner Stadt-und Ringbahn). A full account of the proposed change of the Berlin elevated railway from steam to electric power, with estimates of the cost. Also editorial. 10000 w. Elektrotech Zeitschr—Nov. 16, 1899.

Proposed Electrical Equipment of the Berlin Stadtbahn. From the "Elektrotechnische Zeitschrift." Details of a proposal for the electrical equipment of the Berlin elevated railway, indorsing the multiple unit method. Also editorial. Ill. 9500 w. St Ry Jour—Feb. 3, 1900.

The Applicability of Electric Driving to City Railways (Ob auf Stadtbahnen der Elektrische Betrieb Eingeführt Werden Muss). H. Pforr. Discussing especially the case of the Berlin elevated railway, with diagrams showing the relation of speeds, stops, and efficiency. 4000 w. Glaser's Annalen—March 1, 1900.

The Berlin Electric Elevated Road. An illustrated description of the latest practice in Germany in this branch of engineering. 4000 w. St Ry Jour—Oct. 13, 1900.

The Berlin Electric Railway (Die Elektrische Stadtbahn in Berlin). A general illustrated account of the new local electric railway in Berlin, showing both the elevated and underground construction. Two articles. 3500 w. Schweizer Bauzeit—Oct. 22, 29, 1898.

The Electric City Railway in Berlin (Die Elektrische Stadtbahn in Berlin). M. Foerster. A general description of the electric elevated railway in Berlin, with many illustrations of the structure and stations. 3000 w. Mitt des Ver f d Förd des Local- u Strassenbahnwesens—June, 1898.

The Electric Railway in the City of Berlin (Die Elektrische Stadtbahn in Berlin). M. Foerster. With map, views of elevated structure and details of construction. Serial. 1 plate. Stahl und Eisen—May 1, 1898.

The Metropolitan and Belt Railways of Berlin. Abstracted from the "Revue Generale des Chemins de Fer." Illustrated description. 1700 w. Eng News—Oct. 6, 1898.

See also **ELECTRIC RAILWAY.**

**"Bicycle" System.**—See **SINGLE-RAIL.**

**Boston.**—Building the Boston Elevated. Edgar M. Smith. Views showing details of foundation work on the Charlestown Division are given, and the difficulties are explained. 1800 w. R R Gas—July 7, 1899.

Estimated Cost of the Boston Elevated. Estimates of the sums necessary to go ahead with the work, as presented by George A. Kimball, engineer of the company. 700 w. R R Gas—July 30, 1897.

Some Construction Work of the Boston Elevated Railroad. Edgar M. Smith. Illustrates and describes some fine work under unusual conditions. 900 w. R R Gas—April 20, 1900.

The Boston Elevated Railroad. Information concerning the construction, equipment and operation of this proposed road. Ill. 1800 w. R R Gas—April 22, 1898.

The Boston Elevated Railroad. The important features of the new franchise which has recently been passed and approved by the governor, with comments by editor. Map. 2200 w. R R Gas—July 2, 1897.

The Boston Elevated Railway. Illustrated description and general information. 3800 w. Eng News—May 11, 1899.

The Elevated Structure of the Boston Elevated Railway. Illustrated description of the foundations and metal work of a double-track road, showing all the details, and explaining the method of erection. 3800 w. Eng Rec—March 17, 1900.

The Proposed New Electric Elevated Railway in Boston. Gives a brief description of the new elevated railway system as at present planned, with a statement of the difficulties of the problem. Ill. 1200 w. St Ry Jour—Sept., 1898.

The System of the Boston Elevated Railway Co. C. B. Fairchild. Illustrates and describes the line, the subway, the organization, the mechanical and electrical features and methods. 3800 w. St Ry Rev—March 15, 1900.

See also **ELECTRIC RAILWAY**—Multiple Unit; **ELECTRIC TRAMWAY; UNDERGROUND RAILWAY.**

**Brooklyn.**—Annual Report of the Brooklyn Elevated. Review of the report and comment on projects designed to benefit the company's traffic. 1300 w. R R Gas—Jan. 15, 1897.

See also **ELECTRIC TRAMWAY.**

**Brooklyn Electric.**—Electrical Equipment of the Brooklyn Elevated railroad. The system to be used, and illustrated description of the Short motors, showing the method of suspension, and the relations between motor and truck. 1400 w. Elec Eng, N. Y.—March 3, 1898.

**Chicago.**—A Study in the Designing and Construction of Elevated Railroads, with Special Reference to the Northwestern Elevated Railroad and the Union Loop Elevated Railroad of Chicago. J. A. L. Waddell. An interesting paper, with illustrations designed to bring out an exhaustive discussion of the subject. Ill. 12500 w. Pro Am Soc Civ Engs—Jan., 1897.

Chicago Metropolitan West Side Elevated Electric Railroad. Briefly describes the plan of the lines, the power house and its equipment, track construction, etc., giving illustrations. 1500 w. Elect'n, Lond—Nov. 18, 1898.

Electrical Equipment of the Alley "L," Chicago. To be changed from steam to electricity, the road being divided into 18 sections, each about half a mile in length, each section to be supplied with current by a separate feeder. 1000 w. W Elec—March 27, 1897.

Electrical Operation of the Lake Street Elevated Road, in Chicago. Description of construction and equipment under the third-rail system, with photographs of structure and drawing of third rail connections. 1200 w. W Elec—June 27, 1896.

Electricity on Elevated Roads. The change from steam to electric power being made on the Lake street road in Chicago. 800 w. Ry Age—April 11, 1896.

Elevated Railway Progress in Chicago. Reports the use of the Union Loop since Oct. 3 by one road, and the preparations of other roads to soon use it. Gives also information relating to the loop. Ill. 1300 w. W Elect'n—Oct. 9, 1897.

Extensions of the Lake Street Elevated Railroad. An account of some important extensions in Chicago. Ill. 800 w. W Elect'n—Aug. 12, 1899.

New Electrical Equipment of the South Side Elevated Railroad, Chicago. J. R. Cravath. Illustrated description of the interesting features brought out by the change of motive power from steam to electricity. 4300 w. Elec Eng, N. Y.—May 5, 1898.

Raising a Chicago Elevated Railway. William M. Christie. Illustrated account of the raising of the South Side Elevated Railway. 2000 w. Eng Rec—Jan. 22, 1898.

The Elevated Railroads of Chicago. Illustrated detailed description. 8500 w. St Ry Rev—Oct. 15, 1899.

The Northwestern and the Union Elevated Railroads of Chicago. The first number describes the projection of the route, difficulties encountered, standard structure adopted, and gives descriptions and fine illustrations of general construction, and many special details. Serial. R R Gaz—May 1, 1896.

Third Rail and Feeder Equipment of the Lake Street Elevated, Chicago. The method of construction is fully illustrated and described. 600 w. St Ry Rev—March 15, 1896.

Third Rail Supports—Lake Street Elevated Railroad. Description with drawings of truck attachment and photograph of insulator. The insulation is said to be unusually good. 700 w. Ry Rev—May 9, 1896.

See also **ELECTRIC RAILWAY—Multiple Unit.**

**Chicago Loop.**—Electrical Equipment of the Union Loop, Chicago. Illustrated description of structure built by the Loop Construction Co., with the object of providing greatly needed terminal facilities in the downtown business district, to the four elevated railroads. 1500 w. W Elec—Jan. 16, 1897.

A Union Terminal for Chicago's Elevated Railways. History of the project, with maps and description of general method of using the loop line. 1100 w. Eng News—July 16, 1896.

Heavy Traffic on the Chicago Loop. Report concerning the handling of the heavy traffic on Oct. 9—Chicago Day. 900 w. Eng News—Oct. 19, 1899.

The Chicago Elevated Loop. Henry M. Sperry. Brief illustrated description of the loop and stations is given in part first. Serial. R R Gaz—March 17, 1899.

The Chicago Union Elevated Loop. A description, with plan, of the most complicated elevated railroad problem which has yet arisen. 2200 w. Ry Age—July 23, 1897.

The Union Elevated Railway of Chicago. Illustrated description of the "Loop" property in Chicago, and its working. 2000 w. St Ry Jour—Dec., 1898.

**Chicago Traffic.**—Increased Traffic on South Side Elevated, Chicago. Reports a most satisfactory increase in the number of passengers carried since the road began using the new Union Loop. 500 w. R R Gaz—Nov. 5, 1897.

**Electric.**—Electricity as a Motive Power on Elevated Railways. S. H. Short. Describes the performance of elevated trains with steam as a motive power, also the electrical equipment, with data of operation. Ill. 3800 w. W Elec—July 31, 1897.

Electric Traction "Not Entirely Satisfactory" for Elevated Railroads. Editorial on electricity as a motive power on elevated railroads. 800 w. Loc Engng—Aug., 1900.

Electric Traction on Elevated Railways (La Traction Electrique sur les Chemins de Fer Elevés). A discussion of the applicability of an electric elevated railway for Paris, based on the experiences of Chicago, New York and Brooklyn. 3500 w. 1 plate. La Rev Tech—Feb. 25, 1898.

Electric Traction on Elevated Roads. Leland L. Summers. Discusses principally the Sprague system. 1800 w. Elec Eng—Sept. 15, 1897.

Revolution of the Present Railway System by the Advent of the Elevated Electric Railway. A. Davis. Discusses the steam surface railway and its progress and expense, and the elevated electric railway as an improvement, noting the road about to be built between Liverpool and Manchester, Eng. 2800 w. Can Engr—Sept., 1899.

See also **Berlin; Boston; Chicago; Liverpool; New York—ELECTRIC RAILWAY—Multiple Unit.**

**Electric vs. Steam.**—Electric vs. Steam Railways. A rambling mention of various features of American and European enterprise construction, with comparative tables of operating expenses on the Liverpool, Manhattan and Brooklyn Elevated roads in 1892 and 1893. 1600 w. Ir & Coal Trds Rev—April 10, 1896.

**Employes.**—Discipline of Employes. An explanation of the system of the Metropolitan West Side Elevated Railroad Company, of Chicago, which is based on the percentage classification. 1500 w. St Ry Rev—Jan. 15, 1898.

**Equipment.**—An Inquiry into Elevated Railway Equipment and Service. Editorial on the recent papers by S. H. Short and M. H. Gerry, Jr. 2300 w. Ry Rev—Aug. 14, 1897.

**Liverpool.**—Extension of the Liverpool Overhead Railway. Illustrated detailed description. 2200 w. Elec Rev, Lond—Jan. 29, 1897.

Liverpool Overhead Railway. S. B. Cottrell. Abstract of a paper read before the British Assn. Detailed description of the line, which is partly elevated and partly underground, and operated throughout by electricity. 4400 w. Elect'n—Oct. 9, 1896.

Liverpool Overhead Railway. S. B. Cottrell. Read before the British Assn. for the Adv. of Science. Describes construction, signals, extension, equipment, etc. 4400 w. Elec Rev, Lond—Sept. 25, 1896.

**Motor Cars vs. Electric Locomotives.**—Motor Cars vs. Electric Locomotives. William Baxter, Jr. The subject is discussed and the writer's opinion is that motor cars will be found to be most desirable for all purposes in work on the elevated roads. 4500 w. Elec Wld—July 31, 1897.

**Multiple-Unit System.**—See **Boston; Chicago; ELECTRIC RAILWAY; UNDERGROUND RAILWAY—Boston.**

**New York.**—Electricity on the Manhattan Elevated Railways. The probability of electric propulsion on the elevated railways is discussed. 1600 w. Elec Wld—Feb. 27, 1897.

Electricity on the New York Elevated Railroads. A combination of third rail and storage battery to be tried. 1500 w. Elec Eng—Feb. 12, 1896.

Electric Traction on the Third Avenue "L" Road, New York. Illustrated description of the methods of operation to be introduced on the 34th St. branch. 1300 w. Elec Wld—Oct. 10, 1896.

Rapid Transit in New York. Editorial on the privileges asked by the Manhattan Ry. Co. in the way of extending and improving its system. 1300 w. R R Gaz—Feb. 4, 1898.

Some Opinions Regarding Electricity on the New York Elevated Railways. Opinions of William J. Fransioli and Sidney H. Short, on the feasibility of substituting electric for steam power and the advantages to be expected from the change. 1500 w. Elec Wld—March 6, 1897.

The Electrical Equipment of the Manhattan Elevated Railway. Progress and details of this important installation. 1200 w. Elec Rev, N. Y.—Aug. 1, 1900.

The Manhattan System—What Electricity Will Accomplish. Burton Ellinwood Greene. On the advantage to be gained by electrical equipment. 1200 w. Elec Rev, N. Y.—Nov. 29, 1899.

The Immediate Betterment of Manhattan Transit. O. F. Nichols. Proposes a system for the betterment of the facilities of the Manhattan Elevated Railway. Ill. 4000 w. R R Gaz—July 1, 1898.

See also **CITY RAILWAY.**

**Problems.**—Some Elevated Railway Problems and Results. Considers the conditions confronting the "station class" of railways, especially discussing the elevated systems in New York and Chicago. Ill. 4500 w. St Ry Jour—Dec., 1898.

**Runaway Trains.**—Runaway Trains on Elevated Railroads. An editorial showing that such accidents are not due to any fault in design of the equipment. 2200 w. R R Gaz—Jan. 24, 1896.

**Small Cities.**—The Future of Elevated Railroads. Eugene Klapp. Showing how the construction and operation of elevated roads may be sufficiently cheapened to make them practicable in cities of the second and third ranks. 2800 w. Eng Mag—April, 1896.

**Speed.**—See Berlin.

**Sprague Multiple Unit System.**—See Boston; Chicago; ELECTRIC RAILWAY—Multiple Unit; UNDERGROUND RAILWAY—Boston.

**Summer Car.**—See CAR—Elevated Railway, Summer.

**Suspended.**—See SUSPENDED RAILWAY.

**Traffic Analysis.**—Rapid Transit—Analysis of One Day's Traffic of the Manhattan Railway, New York City. Theodore Cooper. The analysis is very full, and is illustrated by tabular and graphic charts. 2500 w. R R Gaz—Sept. 11, 1896.

**Vienna.**—The Operation of the Vienna City Railway (Der Betrieb der Wiener Stadtbahn). Gustav Gerstel. A discussion of the first year's operation of the Vienna elevated railway, with especial reference to speeds, signals, and the distribution of transportation. 7500 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—Feb. 25, 1898.

The Vienna City Railway (Die Wiener Stadtbahn). A general account of the new elevated and depressed local railway in Vienna, with map and illustrations. Serial. Glaser's Annalen—Dec. 1, 1897.

See also CITY TRANSPORTATION.

**ELEVATED RAILWAY SHOP.**

**Chicago.**—See ELECTRIC CAR—Chicago Elevated; ELECTRIC RAILWAY SHOP.

**ELEVATED RAILWAY STATION.**

**Boston.**—Competitive Designs for Stations on the Boston Elevated Railway. Reproductions of nine of the eleven designs recently submitted, giving the conditions of the competition. 400 w. Eng News—March 31, 1898.

**Chicago.**—Stations of the Union Elevated Loop, Chicago. Description with sectional drawings and elevations. 1200 w. Ry Rev—Aug. 1, 1896.

**ELEVATOR.**

See also HOIST.

Elevators. Charles R. Pratt. Considers the requirements of an elevator, and describes the means used to meet them. Ill. 15900 w. Trans Am Soc of Mech Engs—May, 1899.

Modern Elevators. Fred C. Floyd. Read before the International Convention of Building Commissioners and Inspectors, at Detroit. Considers the causes that have made the elevator a necessity, and the efficiency that has made possible the erection of high buildings; also the dangers, and safety devices. 3200 w. Arch & Build—Jan. 29, 1898.

Passenger Elevators (Ueber Personenaufzüge). A discussion of the best arrangement of passenger elevators, as to location in building as well as motive power, with plate of details of hydraulic and electric elevators. 7000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—July 23, 1897.

**Air-Brake.**—See AIR-BRAKE—Elevators.

**Ash, Locomotive.**—Automatic Ash Elevator. Illustrates and describes an arrangement for handling locomotive ashes. 700 w. Am Engr & R R Jour—Sept., 1900.

**Compressed Air.**—Uses and Advantages of a Public Supply of Compressed Air for Elevators. Frank Richards. The use of compressed air for elevators in buildings, with diagrams of pressure in air cylinders of stage compression machines, and a statement of conditions under which it may be substituted for the hydraulic system are the main features. 1100 w. Am Mach—April 23, 1896.

**Door Opener.**—See DOOR OPENER.

**Electric.**—See ELECTRIC ELEVATOR.

**Electric vs. Hydraulic.**—Electric or Hydraulic Elevators in Toronto? Abstract of report of E. H. Keating regarding the relative merits of the two systems in order to determine which shall be installed in the new municipal building. The only point where a difference can be considered is in repairs and maintenance and running expenses, and these cannot be determined from facts known. 3000 w. Eng Rec—Nov. 27, 1897.

Hydraulic or Electric Elevators. Two communications from P. R. Moses and Horatio A. Foster on the relative economy of hydraulic and electric apparatus. 2000 w. Eng Rec—Feb. 5, 1898.

Hydraulic or Electric Elevators. William H. Bryan. Extracts from a report submitted to owners of a St. Louis building, stating the advantages of each. 1600 w. Eng Rec—Jan. 1, 1898.

The Electric vs. the Hydraulic Elevator. Wm. Baxter, Jr. Showing the cause that led to the development of the electric elevator, and the advantages that point to its triumph in the struggle for supremacy. 3800 w. Eng Mag—June, 1896.

**Grain.**—See GRAIN ELEVATOR.

**Gravel.**—The Hydraulic Elevator at the Chestatee Mine, Georgie. W. R. Crandall. The construction and operation of a type of portable hydraulic lift or gravel-elevator, with a description of the practice at the Chestatee mine. 1800 w. Trans Am Inst of Min Eng—April, 1896.

The Hydraulic Gravel Elevator. Description of the operation of a hydraulic giant and elevator, with illustrations of each in operation. Instances are given where the gravel is elevated from 40 to 96 feet. 1600 w. Min & Sci Pr—April 4, 1896.

**High Speed.**—Modern High Speed Elevators. Charles E. Emery. Abstract from lecture delivered before students of Sibley College. Reviews the various appliances for lifting, and explains the principles of the modern high speed elevator. 8000 w. Sib Jour of Engng—Nov., 1897.

**Hydraulic vs. Electric.**—See Electric vs. Hydraulic.

**Ice.**—See ICE ELEVATOR.

**Inclined.**—See MOVING STAIRWAY.

**Inspection.**—Elevators and Their Inspection. H. V. Loss. Read before the International Convention of Building Commissioners and Inspectors at Detroit. A criticism of the methods employed by the elevator casualty insurance companies, and suggestions considered important for the safety of elevators. Serial. Arch & Build—Feb. 19, 1898.

**Office Building, N. Y.**—Novel Elevator Plant in the Standard Oil Building, New York City. Illustrated description of hydraulic elevators of unusual economy and design. 2600 w. Eng Rec—Oct. 22, 1898.

The Elevator Equipment of the Ivins Syndicate Building, Park Row, New York. Describes the solution of the problem of furnishing rapid and safe transit to and from the various floors of the highest office building in the world. Also editorial comparison of electric and hydraulic elevators for high buildings. Ill. 5800 w. Eng News—April 27, 1899.

**Otis.**—See ELECTRIC ELEVATOR.

**Plunger.**—The Plunger Elevator. George J. Alden. Illustrates and describes this elevator and presents its merits as an appliance for modern office buildings. 5500 w. Trans Am Soc of Mech Engs—May, 1899.

**Private Houses.**—Elevators in Private Houses. From the N. Y. "Evening Post." The growing use of the elevator in private residences, with remarks on the design, motive power, cost, etc. 800 w. Arch & Build—April 9, 1898.

See also ELECTRICITY—Domestic Applications.

**Safety Device.**—A New Pneumatic Safety Device for High-Speed Passenger Elevators. Illustrates and describes a device designed to combine the immediate action of the clutch device and the gradual action of the air cushion. 1400 w. Eng News—Oct. 19, 1899.

Safety Devices for Elevators. Howard Lee Davis. Illustrated description of some of the devices in use for retarding the speed and bringing the car to a standstill. 1700 w. Yale Sci M—March, 1896.

**St. Germain-en-Laye.**—The Elevator at Saint-Germain-en-Laye (L'Ascenseur de Saint-Germain-en-Laye). Illustrated description of hydraulic elevator of 33 metres lift, by which the height of the Saint-Germain-en-Laye, near Paris, is reached. 3000 w. Rev Tech—Nov. 25, 1899.

**Speed.**—See also TALL BUILDINGS—Limiting Height.

**Sprague.**—See ELECTRIC ELEVATOR.

**Warehouse, St. Louis, Mo.**—A High-Duty Pump and Elevator System for a Warehouse. Description of the plant, and of the pump, with the results of its economy test, in the building known as Cupples Station, in St. Louis, Mo. A system of 52 elevators, doing heavy work. The system is worked under a pressure of 750 lbs. 1400 w. Eng Rec—Aug. 8, 1896.

**Water Treatment.**—Treatment of Water for Use in Hydraulic Elevators. M. O. Kasson. Recommends the plentiful use of soap to overcome evil effects of hardness of water. 700 w. Sta Eng—March, 1897.

### ELEVATOR ACCIDENT.

High Buildings and Safe Elevators. An editorial discussion of the recent accident in the American Tract Society Building, and its importance to those interested in high buildings and their construction. 2500 w. Eng News—Nov. 26, 1896.

High Buildings and Safe Elevators. Portions of letters to the editor called forth by the recent editorial on this subject. 2200 w. Eng News—Dec. 3, 1896.

**Chicago.**—Fall of an Elevator in Chicago. An account of the accident, and substance of the inspector's report of the investigation. 500 w. Eng News—April 27, 1899.

**New York.**—Elevator Accident in the American Tract Society Building. Explains the system of elevators installed, giving description, with particulars of the accident. 2000 w. Eng Rec—Sept. 18, 1897.

Fall of an Elevator at the Tract Society Building, New York. Describes the type of elevator, and the accident, with illustration. 1500 w. Sci Am—Sept. 25, 1897.

Fall of a Passenger Elevator in New York City. Brief account of the accident at the American Tract Society Building, on Sept. 10, 1897, which caused the death of two persons. 900 w. Eng News—Sept. 16, 1897.

Fatal Elevator Accident in New York. Describes an unusual accident to an electric elevator due to the falling of counterbalance weights. 1200 w. Eng Rec—Dec. 10, 1898.

Lessons of the Elevator Accident in the Tract Building, New York City. Editorial comment on the verdict of the coroner's jury and discussion of the cause. 1500 w. Eng News—Sept. 30, 1897.

The Elevator Accident at the Tract Society Building, New York. Report of the opinion of the coroner's jury, with comments. 1200 w. Sci Am—Oct. 2, 1897.

The Fall of an Elevator in the Building of the American Tract Society. Illustrations showing the construction of the elevator machinery and safety appliances, with explanation, and suggestion of possible causes of the accident. 3500 w. Eng News—Sept. 23, 1897.

**New York, Waldorf.**—Elevator Accident in a New York Hotel. Brief account of the falling of an elevator in Hotel Waldorf which injured two employees, and badly damaged the car. 400 w. Eng Rec—Oct. 16, 1897.

### ELEVATOR ENGINES.

A Comparison Between Vertical and Horizontal Cylinder Hydraulic Elevator Engines. W. S. Huyette. Part first notes the things to be considered in selecting the type of engine best adapted for a specified purpose, with account of test and description of a vertical cylinder engine. Diagram. Serial. Power—July, 1897.

### ELEVATOR SIGNALS.

Elevator Calling Signals at the New York Telephone Building. Illustrated description of the system installed, which possesses several novel features. 1000 w. Elec Wld—Sept. 4, 1897.

### ELLIPSOGRAPH.

See **DRAWING INSTRUMENT.**

### EMBANKMENT.

**Railway.**—See **RAILWAY CONSTRUCTION**—Embankment.

**Reservoir.**—See **RESERVOIR**—Embankment.

### EMBOSSING PRESS.

Embossing Presses (Nouvelles Presses à Emboutir). Illustrated description of the American presses of the E. W. Bliss Co. 2000 w. La Rev Tech—Jan. 25, 1897.

### EMERY WHEEL.

See also **ABRASIVE; CARBORUNDUM.**

**Norton.**—The Manufacture of Emery Wheels. Illustrates and describes the methods used at the Norton Emery Wheel Co.'s Works at Worcester, Mass. 2500 w. Ir Age—Sept. 6, 1900.

The Plant of the Norton Emery Wheel Company. An illustrated account of these works and things seen there. 1600 w. Am Mach—Jan. 25, 1900.

**Sterling.**—The Emery Wheel and Its Manufacture. Illustrated description of the plant of the Sterling Emery-Wheel Mfg. Company of Tiffin, Ohio, with interesting information about this abrasive. 1300 w. Ir Age—Nov. 4, 1897.

### ENAMEL.

Enamels of High Expansibility for Use with Wrought or Cast Iron (Étude d'Émaux à Hautes Dilatations pour Fonte ou Fer). M. Saglio. A discussion of enamels based upon various borates, such as borocalcite and pandermite, showing that enamels can be made of such expansibility as to be successfully used upon iron. 9000 w. Bulletin de la Société d'Encour—Aug., 1898.

### ENAMELING.

Enameling as an Industry. Josef Vollkommer. The subject of enameling metals is considered. 2400 w. Ir Age—March 23, 1899.

Enameling as an Industry. Josef Vollkommer, in "The Metal Worker." Considers the materials used, their composition, the preparation of the metal, cost, etc. 2800 w. Dom Engng—Aug., 1899.

**Cast Iron.**—Enameling Cast Iron. J. Vollkommer. Part first considers the nature of enamels, the preliminary preparations, cleaning and pickling, slush or first coat, and fusing. Serial. Met Work—Jan. 13, 1900.

### ENERGY.

**Equivalents.**—Energy Equivalents. Edward J. Willis. Tables whereby the labor of a great variety of engineering calculations is reduced to simple multiplication and division. The subject matter was first published in the "American Machinist," but is here presented in tabulated form. 1200 w. Stevens In—Oct., 1895.

See also **CALCULATIONS; UNIT.**

**Transformations.**—Notes on the Commercial Transformation of Energy. Daniel W. Mead. A study of the transmission and transformation of energy. Also discussion. 10700 w. Pro of Ill Soc of Engs & Surv—1899.

See also **CARBON.**

### ENGINE.

See also **LOCOMOTIVE; STEAM ENGINE.**

**Traction.**—See **TRACTION ENGINE.**

### ENGINEER.

See also **CIVIL ENGINEER; ELECTRICAL ENGINEER; ENGINEERING; MECHANICAL ENGINEER; MINING ENGINEER; MUNICIPAL ENGINEER.**

Engineers—Consulting, Inspecting, Contracting. George W. Dickie. Not an exhaustive treatment with respect to any of the points discussed, but intended rather to draw out a general expression from members of how these questions have affected them in their practice. 7000 w. Jour Assn Eng Soc—Feb., 1896.

The Engineer of To-Day. St. George Boswell. A paper read before the Applied Science Graduates Society of McGill Univ. The writer includes under the title all branches of engineering, excepting military engineering, and explains the qualifications which are necessary to an engineer, that he may satisfactorily perform the various duties incident to his profession. 4000 w. Can Eng—Feb., 1896.

**Ancient.**—The Engineers of the Past. Perry F. Nursey. A brief comparison and review of the works of the ancient engineer. 1800 w. Ind & Ir—Feb. 11, 1898.

**Architects.**—See **ARCHITECT**—Engineers.

**Bond.**—The Requirement of a Bond from an Engineer. An able letter, written by Prof. S. Homer Woodbridge to the chairman of the committee of public property of Boston, declining to give a bond and stating reasons. 2000 w. Eng Rec—Dec. 7, 1895.

**Functions.**—The Functions of the Engineer. William Henry Preece. Address delivered before the Glasgow Assn. of Students of the Inst. of Civ. Engs. 3000 w. Engr, Lond—Feb. 16, 1900.

**Legal Duties.**—The Legal Duties of Engineers and Architects. Jas. C. Bradford. Condensed from an address delivered before the Engineering Assn. of the South. The importance of the duties and functions of architects and engineers. 2300 w. Eng News—July 30, 1896.

**Modern.**—The Engineer of To-Day. His responsibility and what he is required to know. 2800 w. Bos Jour of Com—Nov. 14, 1896.

**National Expansion.**—The Engineer and the Policy of National Expansion. Charles B. Going. An essay upon the place of the engineer in the advance of nations. It is argued that the engineer is the real pioneer in modern national expansion, that he is the moving spirit in all material advance and that to him, solely, is due the steady and rapid rise in the standard of living, the gain in security and comfort to the individual and the vast increase in production. In all directions of growth the engineer has the closest and largest interest and to him comes the first and greatest reward. 2800 w. Eng Mag—Jan., 1899.

Empire and Engineering. Editorial discussion of the problems of the present time and the factors that have brought them about, especially the influence of the engineer. 2500 w. Engng—Oct. 14, 1898.

**Note Book.**—See **ENGINEER'S NOTE BOOK.**

**Remuneration.**—The Remuneration of Engineers. Editorial comment upon the smallness of engineers' salaries, as compared with that of specialists in other professions, and the resultant effect on both engineers and their work. 600 w. Eng Rec—March 14, 1896.

**Russia.**—The Status of the Engineer and Architect in Russia (Die Standes und Titel-Verhältnisse der Ingenieure und Architekten in Russland). A. von Abramson. A general account of the official requirements for those bearing the title of engineer or of architect in the Russian empire, with data about Russian technical schools. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—July 22, 1898.

**Status.**—The Status of the Engineer. George F. Swain. Considers the engineer's standing as compared with other professions, and his defects and their remedies. 3800 w. Jour Assn of Engng Soc—March, 1897.

The Status of the Engineer. J. S. Walker. Abridged address of the president of the Engineering Assn. of the South, delivered at Nashville, Tenn. 2700 w. Am Mach—Jan. 12, 1899.

**Steam.**—See **STEAM ENGINEER.**

**Stevens Family.**—A Family of Engineers. T. C. Martin. An account of the great work of John Stevens and his sons. Ill. 4500 w. Cos—May, 1898.

**Store and Office Building.**—The Store and Office-Building Engineer. W. L. Patterson in "The Inland Engineer." Necessary qualifications for engineers in stores and office buildings, and a criticism of the growing tendency to employ one man as chief engineer, consulting engineer or electrical engineer for a number of places. 1000 w. Safety V—June, 1896.

**Tropical Service.**—Medical Outfit and Instructions for an Engineer in the Tropics. Albert L. Ashmead in the "Medical Fortnightly." Describes an outfit which the writer prepared for his brother. 900 w. Eng News—Dec. 1, 1898.

An Engineer's Life in the Tropics. Charles P. Yeatman. Showing the dangers and physical discomforts attending the work of foreign engineers in South American countries. Ill. 2800 w. Eng Mag—Jan., 1896.

**ENGINEERING.**

See also **CIVIL ENGINEERING; ELECTRICAL ENGINEERING; ENGINEER; MECHANICAL ENGINEERING; MINING ENGINEERING; MUNICIPAL ENGINEERING.**

**Address.**—The Development in Technical Industry During the Past Fifty Years (Zur Entwicklung der Technischen Wissenschaften und Künste in den Letzten Fünfzig Jahren). Anton Rücker. The memorial address delivered at the fiftieth anniversary of the Austrian Society of Engineers and Architects, reviewing the progress of the half-century. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—May 12, 1899.

**Architecture.**—See **ARCHITECT—Engineer; ARCHITECTURE—Composition; Engineering; BRIDGE—Architecture.**

**Character.**—The Work of the Engineer. Editorial on the influence of the professional work on the engineer's character. 1500 w. Eng Rec—Dec. 3, 1898.

**Commercial Aspects.**—Commercial Aspect of Engineering. Charles E. Larrard. Extracts from a paper read before the South West London Polytechnic Engineering Society. Part first discusses the need of attention in technical instruction to the preparation of estimates and commercial management. Serial. Prac Engr—July 8, 1898.

**English vs. American Methods.**—English and American Methods in the Engineering and Iron Trades. From presidential address of Henry Webb before the Manchester, (Eng.), Assn. of Engs., contrasting the methods, and suggesting various directions where American methods might be introduced with economy. 2200 w. Engr, Lond—Jan. 21, 1898.

**France.**—Recent French Engineering. W. H. Booth. Notes on things observed during a recent visit which show ability of French engineers. 1200 w. Am Mach—Nov. 23, 1899.

**Labor.**—Engineering and Its Relation to the Labor Question. William Kent. Traces the relation between engineering and economic science, considering engineering as only an agent in increasing the wealth of mankind, and economic science only so far as it relates to the labor problem. 2200 w. Sib Jour of Engng—March, 1896.

See also **LABOR.**

**Pioneers.**—The Pioneers of the Engineering Profession. Editorial giving an explanation of the slow progress of engineering in obtaining recognition. 1300 w. Eng Rec—July 1, 1899.

**Practice with Science.**—Practice with Science. Abstract of a presidential address delivered by Mr. Henry McLaren before the Yorkshire College Engineering Society. Chap. I. deals with the practical man; Chap. II. with the scientific man, and Chap. III. with the man who combines practice with science. 6000 w. Engng—Nov. 27, 1896.

**Professional Standing.**—The Standing of Engineering Among the Professions. J. S. Kreerl. Read before the Montana Soc. of Civ. Engs. A discussion of the fitting recognition of the engineering profession. 1200 w. Arch & Build—July 11, 1896.

**Review.**—A Look Back and a Glance Forward. An interesting review of changes during the last century, and remarks on the possibilities of the future. 1800 w. Eng & Min Jour—Jan. 13, 1900.

Engineering Progress. One of the most comprehensive general reviews of progress in different branches of engineering, and in the industrial world, that has yet appeared. 25000 w. Eng, Lond—Jan. 3, 1896.

**Review, 1899.**—Engineering Review of 1899. Editorial review of all branches of engineering, noting the most prominent features, and giving much intersting information. 28500 w. Engr, Lond—Jan. 5, 1900.

**Science.**—Science and Engineering. Thomas Curtis Clarke. Address at the annual convention of the Am. Soc. Civ. Eng., at San Francisco, Cal., June 30, 1896. Showing the necessary relations and that they are becoming closer every day. 3500 w. Sci Am Sup—July 4, 1896.

**Success.**—The Elements of Success in Engineering as a Profession. The editor states that success is due more to the character of a man than to his genius. 1600 w. Eng, Lond—March 13, 1896.

**United States, Early.**—Early Engineering Work in the United States. Desmond Fitzgerald. Address delivered at the annual convention of the Am. Soc. of Civ. Engs., at Cape May, N. J. Historical review of the earliest works and the men who designed and built them. 7500 w. Eng News—June 29, 1899.

**World Politics.**—See **ENGINEER—National Expansion.**

**ENGINEERING BUILDING.**

See also **COLLEGE; HOUSE; LABORATORY; UNIVERSITY.**

The New Engineering Building of the University of Wisconsin. J. B. Johnson. Description with illustration and plans. 6000 w. Jour W Soc of Engs—June, 1900.

**ENGINEERING COMPETITION.**

**America and Germany.**—See **Germany and America; IRON INDUSTRY—German; MECHANICAL ENGINEERING.**

**American.**—American Competition. Editorial on the annual report of the Am. Ir. & St. Assn. 2000 w. Engng—Nov. 11, 1898.

American and British Industries (L'Industrie Américaine et l'Industrie Anglaise). E. Baird. A review of the recent discussion in "Engineering," from a French standpoint, with curves and tables. 12000 w. Bull de la Soc d'Encour—April 30, 1900.

American Competition in Europe. A review of the progress of American trade, and of special branches that have undertaken to supply the demand, with discussion of the effects, and the means of advancing American interests. 3200 w. Cons Repts—Jan. 18, 1898.

American Competition with British Industries. Extracts from the "Glasgow Herald," with comments. 1800 w. U S Cons Repts, No. 324—Jan. 14, 1899.

American Competition. A letter from Arthur Herschmann, praising the American activity and enterprise in business, with editorial comment. 3000 w. Engr, Lond—Aug. 26, 1898.

American Competition. E. A. Stevens. Discusses the material, labor and management of American works as compared with English. Serial. Engng—Sept. 22, 1899.

American Engineering Competition. Notes on a series of articles recently published in the London "Times." Serial. Jour Gas Lght—Aug. 28, 1900.

American Engineering Competition. Lowthian Bell. From the London "Times." A letter in defense of the British iron and steel trades. 2600 w. Ir & Coal Trds Rev—June 15, 1900.

American Progress in English Industries. Showing the dangers from American competition, and discussing some of the conditions of labor and other matters affecting production. 1800 w. Engr, Lond—Aug. 19, 1898.

Competition of the United States with England. Clippings from British publications bearing on this subject, with comment on the excellence of American manufactures, and the weakness of Americans as traders. 1500 w. U S Cons Repts, No. 311—Dec. 29, 1896.

Competition with British Trade. Extracts from newspapers bearing on this subject, with portions of the report recently issued by the British Board of Trade. 11000 w. U S Cons Repts—Dec., 1898.

**Germany.**—See **EDUCATION; GERMANY.**

**Germany and America.**—America and Germany as Export Competitors and Customers. Louis J. Magee. This paper, the first of a series, deals with the importance of industrial exports, and the desirability of national recognition of this importance. 3400 w. Eng Mag—Feb., 1899.

America and Germany as Export Competitors and customers. Louis J. Magee. Giving especially a view of the economic legislation of Germany and the influence which it has exerted upon trade. 3000 w. Eng Mag—March, 1899.

America and Germany as Export Competitors and Customers. Louis S. Magee. Mr. Magee's third paper describes German commercial and industrial methods, and shows the valuable suggestions and conclusions which may be drawn from them. 3000 w. Eng Mag—April, 1899.

The Follies of Some American Explorers. By a Continental Salesman. An arraignment of the fatuous methods of some would-be-sellers in European markets, on a contrasting exposition of the careful efforts of German machinery makers. 3500 w. Eng Mag—June, 1900.

See also **IRON INDUSTRY—German; MECHANICAL ENGINEERING.**

**Germany and England.**—English Industries and German Competition. Superior technical training, not cheaper labor, is held to be the secret of Germany's capability to compete with English Industry. 900 w. U S Cons Repts—June, 1896.

The Commercial War Between Germany and England. B. H. Thwaite. The writer considers the secret of Germany's great industrial progress to be polytechnic education and philosophic training. He cites examples in proof of his opinions and recommends England to rely upon scientifically controlled industrial processes. 2500 w. Nineteenth Cent—Dec., 1896.

See also **EDUCATION; GERMANY.**

### ENGINEERING CONGRESS.

See also **ELECTRICAL CONGRESS.**

**Paris Exposition.**—International Congresses at the Paris Exposition in 1900 (Internationale Congresse gelegentlich der Weltausstellung zu Paris, 1900). A list of the various congresses, with dates and addresses of the respective presidents and secretaries. 2000 w. Glaser's Annalen—April 15, 1900.

### ENGINEERING EDUCATION.

See **EDUCATION.**

### ENGINEERING EQUIPMENT.

**Railway Terminal.**—See **MECHANICAL PLANT; RAILWAY TERMINAL—Boston Southern.**

### ENGINEERING METHODS.

**Contractors.**—Working Methods of Engineering Contractors. James Brand. Facts from personal observations concerning earthwork excavations, tunnelling, rock cuttings, masonry, cranes, concrete, coffer dams and pumping, etc. 7700 w. Engr, Lond—March, 9, 1900.

See also **CONTRACTOR.**

### ENGINEERING PROJECTS.

**Western America.**—Unprofitable Engineering Projects in Western America. A. G. Allan. Showing the folly of investing in any scheme without the fullest investigation. Both good and bad schemes are discussed and illustrated and the wisdom of obtaining reliable information emphasized. 3500 w. Eng Mag—June, 1898.

### ENGINEERING SCHEMES.

**Parliament.**—Engineering Schemes in Parliament. Editorial discussion of the private bills for consideration in the British parliament. The present article considers the railway schemes. 4000 w. Engng—Nov. 25, 1898.

Engineering Schemes in Parliament. Editorial discussion of private bills before the British parliament. The present article treats of plans of the smaller railway companies, with some applications for light railways. 3000 w. Engng—Dec. 2, 1898.

### ENGINEERING SOCIETY.

See also **CIVIL ENGINEER; ELECTRICAL ENGINEER; ENGINEERING; MECHANICAL ENGINEER; MINING ENGINEER; SCIENTIFIC SOCIETY.**

**Austrian.**—The Austrian Society of Engineers and Architects. A brief review of the half-century's work of this great national organization. 1300 w. Eng Rec—May 6, 1899.

**Boston.**—Addresses delivered at the Meeting to Commemorate the Semi-Centennial of the Boston Society of Civil Engineers, November 11, 1898. Gives the opening address by Howard A. Carson, president of the society; and the historical address by Desmond Fitzgerald, past-president. 7500 w. Jour Assn of Engng Soc—Dec., 1898.

**German.**—The Largest Engineering Society. Describes the organization and work of the Society of German Engineers, which had 13,928 members at the close of 1899. 1100 w. Eng Rec—July 21, 1900.

**German Convention.**—Transactions of the Council of the Society of German Engineers at the Cassel Convention (Versammlung des Vorstandrates des Vereines Deutscher Ingenieure in Cassel). With reports of committees and transaction of varied business. Two articles. 12000 w. Zeitschr d Ver Deutscher Ing—July 31, Aug. 7, 1897.

**German House.**—The Dedication of the Society House (Die Feier der Weihe des Vereinshauses). An account of the dedication ceremonies of the new house of the Society of German Engineers in Berlin, with illustrations of the building and details. 3000 w. Zeitschr d Ver Deutscher Ing—June 26, 1897.

**House.**—See also **HOUSE.**

**Junior Meetings.**—Junior Meetings of Engineering Societies. A statement of their importance to young engineers. 900 w. Eng Rec—March 18, 1899.

**Mechanical Section, Brit. Assn.**—Address of Sir Douglas Fox to the Mechanical Science Section of the British Association. General review of progress. 7000 w. Engng—Oct. 9, 1896.

Address to the Mechanical Science Section of the British Association. Sir Douglas Fox. Review of the mechanical progress in the leading industries of the world, and in various branches of engineering. 9800 w. Eng, Lond—Sept. 25, 1896.

**Mining, Meeting.**—See **MINING ENGINEER—American Institute Meeting.**

**Northern Electrical British.**—See **ELECTRO-PHYSICS—Radiation.**

**United States and Canada.**—Directory of Engineering Societies. Gives not only names and addresses but also places and dates of meetings and names of secretaries for all engineering societies in the United States and Canada. 3700 w. Power—April, 1896.

### ENGINEERING WORKS.

See also **INDUSTRY.**

**Canada.**—Notes of a Canadian Journey. Things seen and information collected by the writer, on a journey from Quebec to Duluth, via Halifax, Montreal and Chicago. Serial. Eng News—Aug. 26, 1897.

**Escher-Wyss.**—See **TURBINE WORKS.**

**Japan, 1896.**—Engineering Works in Japan During 1896. C. Kardono. Does not encourage American contractors to come to Japan on account of their ignorance of customs and usages of the country in contract works. Information of recent improvements. 800 w. Eng News—Feb. 25, 1897.

**Money Question.**—The Money Question and Constructive Enterprise. John R. Dunlap. Designed to present the subject from the standpoint of the engineer, architect, and practical men generally, and showing the essential importance of sound finance to progressive industrial development. 4200 w. Eng Mag—March, 1896.

**United States Early.**—See **ENGINEERING.**

**Water Currents.**—See **WATER CURRENTS—Engineering Works.**

### ENGINEER'S NOTE BOOK.

See also **ARCHITECT—Sketch-Book Ethics; ETHICS.**

An Engineer's Private Note Book. John H. Gregory. Describes a method of preserving notes which permits their ready classification, binding, and duplication by blue-printing. 1300 w. Eng Rec—Oct. 13, 1900.

Field Notes of a Civil Engineer—Do They Belong to His Client or to Himself? J. Vander Hoek. A discussion of this subject giving cases as illustrating certain points. 8000 w. Jour Assn of Engng Socs—July, 1899.

### ENGINE ROOM.

See also **STEAM ENGINE; STEAM ENGINEERING; STEAM PLANT.**

Systematic Work in the Engine Room. W. H. Wakeman. Calls attention to details needing care. 2200 w. Sci Mach—Sept. 1, 1898.

**Artistic.**—Artistic Engine-Room Interiors. E. T. Adams. Pointing out the tendency to heed the esthetic sense in the designing of engine-rooms, and describing several plants notable in this respect. Ill. 2300 w. Eng Mag—March, 1896.

### ENGINE RUNNER.

See also **STEAM ENGINEER.**

The Passing of the Engine Runner. The effect of large power plants upon the occupation of engine runners, the number of which is annually decreasing. 1200 w. Power—July, 1896.

### ENGINE WORKS.

See also **MACHINE SHOP; MACHINE WORKS.**

**Chesterfield, Eng.**—Lincoln Engine Works, Chesterfield. Illustrates and describes a well thought out plan of engineering works, giving details of construction of the building and the general design. Serial. Engng—Nov. 11, 1898.

**Harrisburg, Pa.**—The New Works of the Harrisburg Foundry and Machine Works. Illustrated description of a plant designed to allow all branches of an engine-building industry to be carried out in a single building as fas as possible. The arrangements to meet this aim, and the progress of the work from department to department, are explained in detail. 2500 w. Eng Rec—Jan. 27, 1900.

**Sulzer, Switzerland.**—Sulzer Brothers—A Swiss Engine Shop. Gives a brief outline of the principles of Swiss legislation, and the conditions affecting manufacturing, with illustrated description of this fine machinery building establishment. 4000 w. Am Mach—April 7, 1898.

### ENGLAND.

See also **GREAT BRITAIN; UNITED KINGDOM.**

### ENTROPY.

See also **THERMODYNAMICS.**

Entropy. R. C. Carpenter. The term is defined and its use as applied to the theory of heat engines is explained. A table of the entropy of water is appended and the subject is further illustrated by diagrams. 8300 w. Sib Jour Engng—Oct., 1895.

Entropy and Temperature-Entropy Diagrams. W. F. Durand. Showing that entropy should be considered as a relation rather than a property, and explaining very fully the method of construing and using the temperature-entropy diagram for any given case. 12800 w. Jour Am Soc of Naval Engs—May, 1898.

On Entropy and Entropy Diagrams. Prof. Boulvin. The graphic method in the study of thermodynamics is shown in this paper to be of the highest value. An experimental application of the entropy method to a compound condensing engine is described, with results and conclusions. 5000 w. Engng—Jan. 3, 1896.

Temperature—Entropy Diagrams for Steam and Water. Louis M. Nulton. The graphic method applied to the calorimetric study of an engine, and the exchanges of heat taking place between the fluid and the internal walls of the cylinder. 3500 w. Jour Am Soc of Nav Engs—May, 1896. 1896.

The Entropy Diagram and its Applications (Le Diagramme Entropique et ses Applications). Prof. J. Boulvin. A very lucid and thorough treatise on the principles of thermodynamics, with practical applications of the entropy diagram to steam and gas engines as well as refrigerating machinery. Four Articles. 26000 w. Revue de Mécanique—Jan., Feb., Apr., June, 1897.

The Temperature Entropy Diagram. G. A. Goodenough. A brief résumé of the most interesting properties of the Theta Phi diagram in thermodynamics. 2200 w. Tech—May, 1896.

**Gas Engine.**—A New Graphical Method of Constructing the Entropy Temperature Diagram of a Gas or Oil Engine from Its Indicator Card. Henry T. Eddy. Explains the method. 2800 w. Trans Am Soc of Mech Engs, No. 831—Dec., 1899.

### ERECTING SHOP.

See also **ENGINE WORKS; LOCOMOTIVE WORKS; MACHINE SHOP; MACHINE WORKS.**

**H. K. Porter Co.**—The New Erecting Shop of the H. K. Porter Company. Illustration, plan and brief description of a shop having longitudinal tracks served by overhead cranes. 250 w. R R Gaz—June 22, 1900.

### ESTIMATING.

**Bills of Quantities.**—Estimating from Bills of Quantities. G. Alexander Wright. Recommends the adoption of a national system of estimating from bills of quantities. 3300 w. Am Arch—Oct. 17, 1896.

**Mechanical Engineers.**—Mechanical Engineers' Estimating. Changed conditions have rendered new and more elaborate methods necessary. These methods are editorially considered. 1800 w. Engr, Lond—March 13, 1896.

### ETCHING.

**Acid Blast.**—Acid Blast Process for Etching. Louis Edward Levy. Abstract of a paper on a new method of etching. Ill. 2600 w. Jour Fr Inst—May, 1899.

The Levy Acid-Blast Method of Etching Metal Plates. Report of Franklin Inst. committee on the invention of Louis E. Levy. 1200 w. Jour Fr Inst—Aug., 1900.

### ETHERION.

On the Supposed New Gas, Etherion. Sir William Crookes, in "Chemical News." Results of experiments are given in support of the opinion that etherion is nothing more than aqueous vapor. 2500 w. Am Gas Lgt Jour—Jan. 2, 1899.

### ETHICS.

Ethics of Modern Science. S. Alfred Varley. A criticism of a recent lecture by Prof. Ayrton, with remarks on electrical matters. 3000 w. Elec Rev, Lond—April 2, 1897.

Engineers and Speculative Enterprises. The "Code of Ethics" adopted by the Canadian Society of Civil Engineers—supplies the text for a strong editorial discourse deprecating the connection of engineers of good standing with enterprises of questionable character. 1400 w. Eng News—Oct. 22, 1896.

**Canadian Code.**—The Code of Engineering Ethics Adopted by the Canadian Society of Civil Engineers. Reprint of the full text of the code without comment. 1200 w. Eng News—Feb. 13, 1896.

**Sketch Book.**—See **ARCHITECT—Sketch - Book Ethics; ENGINEER'S NOTE BOOK.**

### EVAPORATING PLANT.

See also **DISTILLING PLANT.**

**EVAPORATION.**

See also **BOILER; GASES; HEAT; STEAM; STEAM ENGINE; STEAM ENGINEERING.**

**Freezing Weather.**—An Apparatus for Measuring Evaporations in Freezing Weather. Describes methods used by Mr. Emil Kuichling at the Mt. Hope reservoir of Rochester, N. Y. 700 w. Eng Rec—July 31, 1897.

**EVAPORATOR.**

See also **DISTILLING PLANT.**

**Gunboat "Nashville."**—Test of a No. 4, Type B (Horizontal) Evaporator. G. W. Baird. Illustrated description of tests of an evaporator of the kind named, designed for the "Nashville," U. S. N. 700 w. Jour Am Soc of Nav Engs—Feb., 1896.

**Lillie.**—The Lillie Evaporator. Illustrated description. 900 w. Engng—Sept. 15, 1899.

**EXAMINATIONS.**

**Grading Engineers.**—Grading Engineers by Examinations. Editorial review of the results of examinations conducted by the Institution of Civil Engs. and by civil service boards in the United States. 1800 w. Eng Rec—Dec. 31, 1898.

**EXCAVATION.**

**Canal.**—See also **CANAL—Chicago Drainage.**

**Swamp.**—The Excavation of a Swamp. Describes methods of excavating muck in a reservoir basin. 700 w. Eng Rec—Oct. 20, 1900.

**EXCAVATOR.**

See also **CABLEWAY—Suwanee Canal, Ga.; CONVEYOR; DREDGE; MECHANICAL HANDLING.**

A New Type of Excavating Machine. S. H. Lea. Illustrates a novel machine not yet placed on the market. It is known as the "Big Auger" and has not been successfully operated. 500 w. Eng News—Feb. 8, 1900.

**Bomford and Evershed.**—Bomford and Evershed's Patent Excavator. Illustrated description of machine especially suitable for reservoir work, and applicable also to any situation where the soil has not to be transported a great distance. 1200 w. Engr, Lond—Feb. 11, 1898.

**Calhoun.**—The Calhoun Excavating and Conveying Machine. Illustrated description of a cableway device which has been used extensively in handling gravel, coal, and similar materials, and is now being built for sewer and ditch work. 1400 w. Eng News—April 15, 1897.

**Iron Ore.**—An Excavating and Loading Machine for Transferring Ore to Railway Cars. A short illustrated description of a machine made by the Jeffery Manufacturing Co. for the Fayal Iron Co., of Minnesota. 250 w. Eng News—Sept. 20, 1900.

**Lowrie's.**—Lowrie's Power Excavator. Illustrated description of a new design containing novel features. 1300 w. R R Gaz—Dec. 8, 1899.

**Smulders.**—Bucket Excavator (Excavateur en Fouille). Illustrated description of a powerful bucket excavator made by Smulders for constructing irrigation works in Java. 1000 w. Génie Civil—Oct. 6, 1900.

Smulders Excavators. Illustrated description of some interesting exhibits at the Paris Exposition. 1300 w. Engng—Aug. 3, 1900.

See also **DREDGE.**

**EXHAUST NOZZLE.**

**Locomotive.**—See **LOCOMOTIVE—Exhaust.**

**EXHAUST STEAM.**

See **ELECTRIC POWER STATION—By-Products; STEAM—Exhaust; STEAM ENGINEERING; STEAM HEATING—Exhaust.**

**EXHIBITION.**

See also **EXPOSITION**; and under specific heads such as **AUTOMOBILE EXHIBITION; ELECTRICAL EXHIBITION**, etc.

**Chicago Architectural Club.**—Ninth Annual Exhibition of the Chicago Architectural Club. Peter B. Wight. An account of the exhibition, which is considered the best the club has ever held. 2000 w. In Arch—April, 1896.

**EXPANDED METAL.**

Expanded Metal. J. P. Allen. Read at meeting of the Northern Arch't Assn., England. Describes this material and discusses its uses to the building trades. 5500 w. Archt, Lond—Dec. 16, 1899.

Expanded Metal (Le Métal Déployé). An illustrated account of the manufacture and numerous application of J. F. Golding's metal lattice-work invention. Serial. Revue Technique—July 10, 1900.

Expanded Metal. An illustrated description of machine devised by Mr. Golding. 800 w. Engng—Nov. 13, 1896.

**Concrete Construction.**—See **CONCRETE REINFORCED—Expanded Metal.**

**Fireproof Construction.**—Expanded Metal in Its Relation to Fireproof Construction. J. F. Gold- Paper read at a meting of the Civil and.g in ing. Paper read at a meeting of the Civil and Mech. Engs.' Society, England. Some information of the manufacture of this material and the uses to which it can be applied. Serial. Arch, Lond—Feb. 25, 1898.

See also **FIREPROOF CONSTRUCTION.**

**Floor.**—Tests of Expanded Metal Floor Construction. Describes test and gives report of George Hill. Ill. 900 w. Eng Rec—June 26, 1897.

**Paris Exposition.**—Expanded Metal Construction at the Exposition (Le Métal Déployé à l'Exposition). With illustrations showing the manner in which expanded metal has been used in connection with reinforced concrete construction in several of the buildings of the Exposition of 1900. 1200 w. La Revue Technique—May 25, 1899.

**EXPERIMENTAL ERROR.**

See also **ACCURACY.**

Experimental Error. Editorial review of A. B. W. Kennedy's "James Forrest Lecture" on Physical Experiment in Relation to Engineering. 1600 w. Engng—May 15, 1896.

**EXPERIMENT STATION.**

**Cornell.**—The Engineering Experiment Station of Sibley College, at Cornell University. R. H. Thurston. Description of the organization of this experiment station, the work carried on therein, its outfit and methods, closing with a plea for further means to extend its usefulness. 7500 w. Sib Jour of Engng—April, 1896.

**United States.**—State Engineering Experiment Stations. J. P. Jackson. Explains the provisions of a bill now before Congress, having for its object the promotion by annual grants of money from the national treasury, of scientific investigation, engineering research and experimental testing at the various State colleges which are beneficiaries of the Land Grant Act of 1862. 1100 w. Elec Wld—March 28, 1896.

**EXPERTS.**

Experts and Expert Evidence. J. E. Hindon Hyde. A discussion of the qualities a competent expert should possess. 5500 w. Trans Am Inst of Elec Engs—April, 1900.

**Gas and Water.**—Some Disputed Points Among Gas and Water Experts. John Wilkinson. Read before the Incor. Gas Inst. Discusses the policy of experts when giving evidence. Also general discussion. 5000 w. Gas Wld—June 16, 1900.

**Scientific Books.**—The Use of Scientific Books by Expert Witnesses. A decision of the U. S. Circuit Court upon the subject of excluding scientific books from the witness stand. 600 w. Eng Rec—June 11, 1898.

**EXPLOSION.**

See also **BOILER EXPLOSION; COAL MINE EXPLOSION; FIREDAMP; GAS EXPLOSION;** etc.

**Cleveland Tunnel.**—The Cleveland Tunnel Explosion. An account of a gas explosion in a waterworks tunnel, killing 11 men. 1000 w. Eng Rec—July 23, 1898.

**Common Substances.**—Explosions Caused by Commonly Occurring Substances. Charles E. Munroe. Address before the Am. Chem. Soc. An interesting study of this class of explosions—as from dust, liquids, vapors, gases, etc., giving many examples. 15800 w. Science—March 10, 1899.

**"Maine."**—See **BATTLESHIP—Maine Disaster.**

**Radii of Danger.**—Large Explosions and Their Radii of Danger. J. T. Bucknill. This investigation has for its object the affording of data for legislation directed to the safeguard of property from danger caused by the traffic in and storage of explosives in large quantities. Serial. Eng—Aug. 28, 1896.

**St. Helens, Eng.**—Chlorate of Potash. Editorial on points connected with the explosion at St. Helens. 1400 w. Engng—May 26, 1899.

The Recent Explosion at St. Helens. Gives the gist of the report made by Colonel A. Ford on the circumstances attending the explosion which occurred on May 12, at the Kurtz Chemical Works. Map. 3000 w. Engr, Lond—Nov. 17, 1899.

See also **GASHOLDER—St. Helens Explosion.**

**Toulon.**—The Toulon Explosion. J. T. Bucknill. An account of the great explosion on March 5 of two magazines, the cause still remaining a mystery. 2200 w. Engng—May 26, 1899.

**EXPLOSIVE.**

See also **BLASTING; COAL-MINE EXPLOSION; MINE VENTILATION.**

The Application of Explosives. Charles E. Munroe. Illustrates and describes some of the methods of producing explosives and also their applications. Serial. Ap Pop Sci M—Jan., 1900.

**Ancient and Modern.**—Explosives—Ancient and Modern. W. J. Orsman. Lecture delivered at the Wigan Mining School. Discusses the action of various explosives, the progress, and their use in mining and in purposes of war. 1200 w. Col Guard—Dec. 9, 1898.

**Austria-Hungary.**—The Development of the Manufacture of Explosives in Austria-Hungary (Die Entwicklung der Sprengmittel-Industrie in Oesterreich-Ungarn). F. Hess. With much interesting information about the properties and composition of mining explosives. 3000 w. Zeitchr d Oesterr Ing u Arch Ver—Aug. 11, 1899.

**British Report.**—See also **Tests, British.**

**British Report, 1895.**—Report of Her Majesty's Inspectors of Explosives for 1895. The twentieth annual report. Reviews the modifications of the law since the Act came into operation, the growth of the trade, and the additions to the list of authorised explosives. 1800 w. Col Guard—May 29, 1896.

**British Report, 1896.**—Explosives in 1896. Editorial review of the Annual Report of Her Majesty's Inspector of Explosives, noting the comparative safety in the factories, the character of the accidents, etc. 1600 w. Engng—Sept. 17, 1897.

**British Report, 1899.**—The Explosives Industry in 1899. Interesting particulars from the annual report of H. M. inspectors of explosives. 2400 w. Col Guard—July 20, 1900.

**British Statistics.**—The Progress of Explosives. Perry F. Nursey. A comprehensive review of the last report of Col. Sir Vivian D. Magendie, taking up especially accidents and their causes and importations into the United Kingdom. 2000 w. Ind & Ir—Sept. 9, 1898.

**Coal Mines.**—British and American Explosives. A Comparison. Considers the legislative restrictions and the benefits in the United Kingdom, the names given, the profits, etc. 1200 w. Col Guard—April 27, 1900.

Coal-Dust and Explosives. H. Richardson. Hewitt. Abstract of a lecture before a meeting of undermanagers and deputies of the Gresley and Coalville districts. History of the subject, with opinions of the writer. 2800 w. Col Guard—July 10, 1896.

Coal-Dust: An Addition to the Priority Question. James Ashworth. Coal-dust and explosives and the influence of coal-dust upon the safety lamps are discussed. 1300 w. Col Guard—Aug. 14, 1896.

Explosives and Firedamp (Explosifs et le Grisou). H. Schmerber. A review of the present condition of the subject in the principal mining countries of Europe. 3500 w. Génie Civil—April 30, 1898.

Explosives for Coal Mines.—Their Classification, Composition and Gaseous Products of Combustion. Vivian B. Lewes. From "Trans. of the Fed. Inst. of Min. Engs." A comprehensive study of the safest explosives for use in gaseous and dusty mines. 4500 w. Col Eng—Feb., 1896.

Explosives for Use in Fiery Pits. J. von Lauer in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Part first gives methods by means of which explosives may be employed with safety and economy. Serial. Col Guard—Jan. 14, 1898.

Further Researches on the Action of Explosives upon Fire Damp and Coal Dust (Weitere Versuche Betreffend das Verhalten von Sprengstoffen Gegenüber Schlagwetter und Kohlenstaub). With analyses of various explosives and tabulated results of experiments. Two articles. 8000 w. Glückauf—July 3, 10, 1897.

High Explosives in Mines. The report of the "Flameless Explosives" Committee to the N. of Eng. Inst. of Min. & Mech. Engs. The article gives the conclusions arrived at after exhaustive experiments. 900 w. Prac Eng—Feb. 21, 1896.

Report on the Explosives in Coal Mines Order, 1896. Two tables giving an abstract of the results of trials made. 700 w. Col Guard—Aug. 20, 1897.

Safety Explosives at the Paris Mining Congress (Die auf dem Internationalen Kongress für Bergbau und Hüttenwesen zu Paris Gehaltenen Vorträge über Sicherheitssprengstoffe). H. Heise. A report of the discussions at Paris on safety mining explosives. 3000 w. Glückauf—Aug. 25, 1900.

The Use of Explosives in Gaseous Mines (Sprengmittel mit Rücksicht auf ihre Verwendung in Schlagwetter führenden Gruben). Joh. v. Lauer. A valuable paper discussing the action of blasting explosives in igniting fire-damp, and giving the conditions under which they may be safely used. Two articles. 12000 w. Oesterr Zeitschr f Berg-u Hüttenwesen—Dec. 18, 25, 1897.

The Use of Explosives in Mines. A copy of a recently issued circular to mine-owners, relating to the use of explosives in coal mines, with a list of the permitted explosives that have passed "special test." 2400 w. Col Guard—Oct. 12, 1900.

Use of Safety Explosives in Fiery Mines. M. L. Aguillon. From a report on behalf of the French Firedamp-Commission. Considers the regulations to which safety explosives are subject in France, and the need of having the composition printed on all the cartridges used in fiery mines. 3500 w. Col Guard—May 4, 1900.

See also **Gunpowder; Safety; Tests; BLASTING; COAL DUST; COAL MINE EXPLOSION; FIREDAMP; MINE VENTILATION.**

**Coal Mine, Austria.**—See **Safety; FIREDAMP.**

**Coal Mine, Belgian.**—New Belgian Regulations as to the Use of Explosives in Collieries. From a Belgian Royal decree, dated the 13th Dec., 1895. The rules are intended to lessen accident due to explosives. 1800 w. Col Guard—Jan. 31, 1896.

The Use of Explosives in Belgian Collieries. Victor Watteyne. From a communication to the "Annales des Mines de Belgique." Information concerning the quantities used, and the progress in safety. 2200 w. Col Guard—Jan. 5, 1900.

Explosives and Firedamp in Belgium (Les Explosifs et le Grisou en Belgique). H. Schmerber. A critical review of the investigations made in Belgium as to the effect of various blasting explosives in igniting firedamp. 1500 w. Génie Civil—April 23, 1898.

The Use of Explosives in Belgian Collieries. Victor Watteyne. From an official report. Gives table showing intensity of blasting for driving roads during three years in the non-fiery and the three classes of fiery mines; also the new regulations and the motive that led to their adoption. 1800 w. Col Guard—Jan. 29, 1897.

**Coal Mine, Breslau District.**—See **MINE VENTILATION—Breslau District.**

**Coal Mine, British.**—Explosives in Coal Mining. An examination of the new order issued by the Home Secretary with reference to the explosives to be used in coal mines. Serial. Min Jour—Jan. 16, 1897.

Explosives in Coal Mines. Order made by the Sec. of State for the Home Dept.—cited as the Explosives in Coal Mines Order, 1896. 2800 w. Col Guard—Dec. 24, 1896.

Explosives and Firedamp in England (Les Explosifs et le Grisou en Angleterre). A review of the experiments made by the English committee on flameless explosives, with illustrations of the testing plant at Hebburn, England. 4000 w. Génie Civil—Nov. 13, 1897.

New Order as to the Use of Explosives in Coal Mines. A new order as to the use of explosives in British mines in substitution for the order dated Feb. 4, 1898. 900 w. Ir & Coal Trds Rev—July 22, 1898.

New Order as to the Use of Explosives in Coal Mines. A new order, dated Dec. 20, 1897, repealing all previous orders, and based on list of explosives which have passed the official test at the Royal Arsenal, Woolwich, Eng. 4000 w. Col Guard—Dec. 24, 1897.

On the Various Systems of High Explosives and the Conditions of Their Economical Application to the Different Methods of Coal-Working in British Collieries. John Heath. Special prize essay. An account of experiments is given in part first. Serial. Ir & Coal Trds Rev—June 3, 1898.

On the Various Systems of High Explosives and the Conditions of their Economical Application to the Different Methods of Coal Working in British Collieries. F. J. Rowan. Special prize essay of "Ir & Coal Trds. Rev." Part first discusses the conditions of safety in explosives. Serial. Ir & Coal Trds Rev—April 8, 1898.

The Government and Permitted Explosives in Coal Mines. Concerning the new order which repeals the two orders now in force in the United Kingdom, and embodies their contents with additions and alterations. This order takes effect Oct. 1, 1899. 1400 w. Ir & Coal Trds Rev—Aug. 4, 1899.

The Use of Blasting Explosives. A. H. Stokes. Considers the principle of the Woolwich test, the application of the explosives in coal mines order, and related matter. 4500 w. Col Guard—May 12, 1899.

The Use of Explosives in Coal Mines. An order modifying the restrictions imposed by a previous order, with reference to the use of explosives in coal mines. 3000 w. Col Guard—June 18, 1897.

The Various Systems of High Explosives, and the Conditions of Their Economical Application to the Different Methods of Working Coal in the British Collieries. L. T. O'Shea. The prize essay of this paper. Part first deals with the composition, safety, flames, etc. Serial. Ir & Coal Trds Rev—Feb. 4, 1898.

See also **British Report.**

**Coal Mines, British Midlands.**—Experience with the Explosives Order in the Midlands. A. H. Stokes. From the inspector's annual report. Cautioning against placing too much reliance in the Woolwich test of explosives, with information relating to the use and care of explosives. 2800 w. Ir & Coal Trds Rev—May 26, 1899.

**Coal Mines, German.**—The Use of Safety Explosives in German Mines. Official report to the British Home Office of two of H. M. mine inspectors delegated to be present at the experiments made in Westphalia. The article contains a great deal of additional information on German mines. 3500 w. Col Guard—March 13, 1896.

**Coal Mine, Westphalia.**—The Danger of Ignition of Mine Gases by Explosives (Ueber Gefahrlose Zündung von Sprengstoffen auf Schlagwetter Gruben). Discussing the relative danger of various blasting powders in this respect, with especial consideration of the Westphalian coal mining district. 2500 w. Glückauf—June 19, 1897.

**Cordite.**—Cordite. This explosive was adopted by the British Government for the ordnance. Its properties are described at length. 2000 w. Eng, Lond—March 13, 1896.

**Drainage.**—See **DRAINAGE—Explosives.**

**Dynamite.**—Manufacture, Use and Abuse of Dynamite. H A. Lee. Abstract of a paper by the Commissioner of Mines of Colorado. Different kinds of explosives having nitro-glycerine for a base are treated. 1800 w. Can Eng—Sept., 1896.

Manufacture, Use and Abuse of Dynamite. Harry A. Lee. A paper by the California State Commissioner of Mines, on the precautions necessary in handling and using dynamite. 1600 w. Eng & Min Jour—Feb. 22, 1896.

Manufacture, Use and Abuse of Dynamite. H. A. Lee. The dangers of dynamite manufacture, the storage and age of powder, freezing temperatures, with a caution not to hurry back to a shot. 1800 w. Min & Sci Pr—June 6, 1896.

Some Notes on the Mechanical Tests, Uses, Effects and History of Dynamite. Arthur Edwin Haynes. An interesting discussion of this powerful agent and the uses made of it. 3000 w. Year Bk of Soc of Engs, Univ of Minn—1898.

See also **High; Nitro.**

**Dynamite Handling.**—Notes on Handling Dynamite. W. R. Quinan. Written for the report of the mines inspector for Montana, for 1897. Describes how it should be stored, and how thawed and exploded. Also its effect on ventilation. 1500 w. Mines & Min—June, 1899.

The Handling of Dynamite. Points from the report of mine inspector Byrne of Montana. 1400 w. Min & Sci Pr—Dec. 17, 1898.

See also **Handling.**

**Dynamite in Blast Furnace.**—See **BLAST FURNACE—Dynamite.**

**Dynamite Magazines.**—See also **Magazines Underground.**

**Dynammon.**—See **Tests.**

**Firedamp.**—See **Coal Mine.**

**Grisounites.**—Experiments Connected with the Detonation of Favier Grisounites. A report of numerous experiments made under various conditions. 2500 w. Col Guard—April 28, 1899.

**Gunpowder.**—High-Grade Blasting Gunpowder. A. F. Hargreaves. Read before the Mining Inst. of Scotland. Favorable to the use of gunpowder of a high standard and giving reasons why it should be placed on the list of permitted explosives. 1100 w. Col Guard—Aug. 20, 1897.

A New "Permitted" Gunpowder. Donald M. D. Stuart. Some information concerning high-grade gunpowders, with illustrations of shots in blasting work. 1600 w. Col Guard—Jan. 19, 1900.

See also **Safety; Smokeless Gunpowder.**

**Gunpowder Cartridge.**—The Permitted Safety Gunpowder Cartridge for Coal Mines. Donald M. Stuart. Résumé of a paper on this subject, at meeting of Colliery Managers' Assn., England. It describes the conditions required in a safe explosion, and claims this cartridge meets the requirements, reporting trials, etc. 900 w. Col Guard—June 17, 1898.

**Handling.**—The Safe Handling of High Explosives. Comments on the changes being made in the explosives used in mines, and the miners' unfamiliarity with the properties of these now used, giving the principal points to be observed in order to handle them with safety. Serial. Col Guard—June 9, 1899.

See also **Dynamite Handling.**

**High.**—Experiments with High Explosives in Large Guns. Hiram Stevens Maxim. An account of experimental investigations and their results. 4800 w. N Am Rev—Feb., 1899.

High Explosives. H. F. Metcalf. Description of some explosives in use, giving their composition and chemical reactions when exploded, and an account of two recent explosives, Mellinite and Vixorite. 1700 w. Yale Sci M—June, 1896.

High Explosives in Guns and Shells. From Captain O'Neil's monograph upon the construction of guns and shells for the firing of high explosives, covering about all the experiments recently made in this country and abroad, and discussing especially the Gathmann system. 4500 w. Ir Age—Feb. 23, 1899.

Modern High Explosives. A topical discussion in which their nature and mode of action was considered by Louis Y. Schermerhorn, and their application in warfare by Arthur Falkenau; a general discussion following. Ill. 6000 w. Pro of Engs' Club of Phila—April, 1898.

Modern High Explosives. Louis Y. Schermerhorn. Portion of a topical discussion before the Engs' Club of Philadelphia. Defines the classes of explosives, their energy, effects, etc. 2500 w. Ir Age—July 28, 1898.

See also **Dynamite Mine; Smokeless Powder.**

**High Naval.**—High Explosives and Modern War Vessels. Referring to experiments made on the old battleship Resistance, and the lessons to be learned. Specially studying the destruction wrought by the bursting of shells filled with high explosives. 1800 w. Engr, Lond—Dec. 24, 1897.

The High Explosives Used in Naval Warfare. Remarks on the different forms of these explosives and their power and safety. 1800 w. Eng News—March 24, 1898.

**Kynoch Co., Birmingham.**—Kynoch Limited and the High Explosives Trade. An account of the manufactures and experience of this firm, near Birmingham, Eng., with blasting explosives. Ill. 3000 w. Ir & Coal Trds Rev—Sept. 16, 1898.

Liquid Air.—See **LIQUID AIR—Explosive.**

**Magazines Underground.**—Automatic Door for Underground Stores for Explosives. J. Jicinsky, in "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Illustrates and describes a closing device used in Austria and approved by mining officials. 1000 w. Col Guard—July 20, 1900.

Conditions for Safely Storing Dynamite in Underground Workings. From a report by M. H. Le Chatelier to the Commission des Substances Explosives, published in the "Annales des Mines." An account of experiments for studying and determining the conditions. Ill. 2000 w. Col Guard—Oct. 27, 1899.

Conditions for the Installation of Underground Dynamite Magazines. From a report by the French Explosives Commission published in the "Annales des Mines." Gives the principle of the arrangements originally proposed by the Commission, with experiments made and conclusions. 4500 w. Col Guard—Ang. 27, 1897.

Dynamite Magazines at Slight Depths. From a report by the French Explosive Substances Commission on the Blanzy experiments, published in the "Annales des Mines." Describes the experiments, giving results and conclusions. Ill. 3700 w. Col Guard—Feb. 9, 1900.

Magazines for Explosives in Coal Mines. Brief account of rules regulating the storage of explosives underground, especially in France. 1400 w. Eng & Min Jour—Aug. 28, 1897.

Self-Closing Door for Underground Magazine for Explosives (Selbstthätiger Abschluss für Unterirdische Sprengmittelmagazine). J. Jicinsky. An illustrated description of an automatic door of a small magazine in a coal mine in Austria. 1 plate. 800 w. Oest Zeitschr f Berg u Hüttenwesen—July 7, 1900.

The Question of Underground Magazines for Explosives (Zur Frage der Unterirdischen Sprengstoff Magazine). Frans Prispisil. A paper before the "Berg-und Hüttenmännischen Vereines" in Ostrawa, Moravia, with various tables. Two articles. 4500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 17, 24, 1900.

Underground Magazines for Mine Explosives. From a report of the French Firedamp Commission by M. Ledoux. Regulations in different countries are given, with a summary of conclusions adopted in France, and discussion of the subject in general. 3500 w. Col Guard—Dec. 31, 1897.

**Manufacture.**—The Manufacture of Explosive Compounds. Perry F. Nursey. Part first discusses gunpowder and gun-cotton and describes the methods of manufacture. Serial. Ind & Ir—Nov. 4, 1898.

**Modern.**—Modern Explosives. J. S. S. Brame. A lecture delivered at the London Inst. A discussion of such explosives as are most used in modern warfare. 4000 w. Nature—April 5, 1900.

**Nitro.**—The Manufacture of Nitro-Explosives. August Prister. Discusses the manufacture of nitroglycerine, and different kinds of dynamite. 5600 w. Chem & Met Soc of S Africa—Jan. 15, 1898.

**Nobel.**—Nobel and His Work (L'Ouevre de Nobel). Louis Roux. A biographical notice of Nobel with a review of the development of modern high explosives. 2500 w. Revue Technique—July 10, 1897.

**Oxygen Liquefied.**—Experiments with Liquefied Oxygen as an Explosive (Essai de l'Oxyliquit comme Explosif). An account of experiments recently made in Germany with liquid oxygen as a safety mining explosive. 2000 w. Revue Technique—Oct. 10, 1899.

**Oxy-Hydrogen.**—Experiments with Oxy-Hydrogen for Mine Blasting. From a communication by Bergassessor Heise to "Glückauf." Describes experiments with cartridges containing a compressed mixture of oxygen and hydrogen, which are ignited by an electric spark. 1100 w. Col Guard—Dec. 10, 1897.

Experiments with Explosive Gas Cartridges (Ueber Versuche mit Knallgaspatronen). Describing experiments with a compressed mixture of oxygen and hydrogen, to be used as a mining explosive. The charge is ignited by an electric spark, and safety, power, and freedom from noxious fumes are claimed. 1500 w. Glückauf—Nov. 6, 1897.

**Rackarock.**—Is Rackarock Safe? Claiming that it has been proved a safe and suitable explosive for mining purposes. 1400 w. Aust Min Stand—Sept. 30, 1897.

**Safety.**—A Further Contribution to the Subject of Safety Mining Explosives (Weiteres zur Frage der Sicherheitssprengstoffe). Bergassessor Heise A very complete examination of safety explosives, especially as regards chemical composition, and heat evolved during explosion. Four articles. 10000 w. Glückauf—Aug. 20, 27, Sept. 3, 10, 1898.

Experiments with Safety Explosives. P. Hess. "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Gives the code of regulations insuring uniformity in the methods of testing with a summary of the results obtained. 1200 w. Col Guard—Aug. 5, 1898.

Experiments with Safety Explosives. From "Mining Engineering." The results of some of the latest German experiments and deductions therefrom. 1500 w. Mines & Min—June, 1898.

Improvements in Safety Explosives. E. M. Hann. Read before the South Wales Inst. of Engineers. Deals with experiments carried out during the last three years, describing the apparatus used. 1500 w. Col Guard—March 18, 1898.

Recent Investigations as to Safety Explosives. M. G. Chesneau. From a communication to the French Firedamp Commission. Gives briefly the results that have been obtained in France, and reviews the results obtained in other countries. 4500 w. Col Guard—June 9, 1899.

Safety Explosions and Their Ignition. Particulars concerning explosives and igniters taken from report to the Austrian Government. Ill. 2200 w. Col Guard—Oct. 6, 1899.

Safety Explosives for Gaseous Mines (Ueber Sicherheitssprengstoffe für Schlagwettergruben). A critical comparison of the various safety explosives used in Germany, in connection with the possible ignition of fire damp. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 4, 1899.

Safety Explosives. Oscar Guttmann. From a paper read before the Soc. of Chem. Ind. Deals with the present state of knowledge and gives suggestions with regard to explosives for the purpose of blasting in coal mines where the presence of inflammable gas and coal dust constitute a danger. 4200 w. Col Guard—March 10, 1899.

The Position of Safety Explosives Abroad. Translated and abridged from the "Annales des Mines de Belgique." Defines what is understood by a "safety explosive," and reviews what has been done to determine whether given explosives satisfy the conditions. Serial. Ir & Coal Trds Rev—Dec. 2, 1898.

The Theory of Safety Explosives (Zur Theorie der Sicherheitssprengstoffe). H. Heise. An abstract of an essay by the Austrian General Hess on substances which explode so rapidly that the surrounding atmosphere has not time to take up the shock and so is compressed and raised to a dangerous temperature. 1400 w. 1 plate. Glückauf—March 24, 1900.

The Theory of Safety Explosives. From a communication by Bergassessor Heise to "Glückauf." Discusses the conclusions reached by the Prussian Firedamp Commission, and the French investigators, and gives the opinions of the writer. 3300 w. Col Guard—April 14, 1899.

Use of Safety Explosives. M. Delafond. From a paper prepared for the International Cong. at Paris. On the advances due to the investigations of the French Firedamp Commission. 1800 w. Col Guard—June 29, 1900.

See also Coal Mine; Gunpowder; Tests; BLASTING; FIREDAMP.

**Safety vs. Gunpowder.**—The Cost and Efficiency of Safety Explosives as compared with Gunpowder. H. Hall. A comparison between the last year gunpowder was used and the last year during which explosives have been used. 900 w. Ir & Coal Trds Rev—Feb. 19, 1897.

**Smokeless Powder.**—An American Smokeless Powder. Frederick H. McGahie. Gives an account of the results obtained by the use of the Maxim-Schupphaus powder, with a brief sketch of the manufacturing process. 2800 w. Sci Am Sup—Aug. 27, 1898.

High Explosives and Smokeless Powders. Hudson Maxim. Deals with the effects of high explosives as destructive agents of warfare, with diagrams illustrating these effects, the qualities required in a good smokeless powder of high explosive character, and describes the Maxim powder, with tables of results attained in government experiments with guns of various calibers, at Sandy Hook. Discussion. 5700 w. Jour Soc of Arts—May 8, 1896.

High Explosives and Smokeless Powders and their Applications in Warfare. Hudson Maxim. Reviews the attempts made to produce smokeless powder, the success with small arms, the importance of a smokeless cannon powder, and the production of the Maxim-Schüpphaus powder. Serial. Jour Fr Inst—Nov., 1898.

Smokeless Powder. Editorial, calling attention to the disadvantages the American Navy have to contend with from not being provided with smokeless powder. 1000 w. Sci Am—June 11, 1898.

Some New Features in Smokeless Powders and Their Ballistic Results. Hudson Maxim. Presents the advantages of the Maxim-Schüpphaus smokeless powder, with tables showing the results of firing with it. Ill. 5700 w. Eng, Lond—July 30, 1897.

The Maxim-Schüpphaus Smokeless Powder. Some further information concerning this powder and its method of combustion. Ill. 3500 w. Engng—June 10, 1898.

See also **AERONAUTICS—Maxim.**

**Storage.**—The Storage of Explosives. Robert Hunter. Gives sets of plans and specifications which have met with approval, and discusses the site and ventilation. Ill. 2500 w. Col Guard—Feb. 11, 1898.

See also **Magazines Underground.**

**Tests.**—Comparative Blasting Tests with Dynammon No. 1. and Compressed Blasting Powder Cartridges (Vergleichende Sprengversuche mit Dynammon Nr. 1 und Comprimirten Sprengpulverpatronen). S. Heyda. An account of experiments in a salt mine with dynammon, a safety explosive consisting principally of ammonium nitrate, and blasting powder; with tables. 3200 w. Oest Zeitschr f Berg u Hüttenwesen—May 26, 1900.

See also **Coal Mine; Safety.**

**Tests, British.**—Experiments on the Action of Flameless Explosives upon Fire Damp and Coal Dust. The experiments conducted by the North of England Inst. of Min. & Mech. Engs., show that no commercial explosive is entirely flameless. The article contains an excellent illustration showing the apparatus employed. 1000 w. Sci Am Sup—April 4, 1896.

Government Apparatus for Testing Explosives to be Used in Coal Mines. James Ashworth. Details of an apparatus erected at Woolwich, Eng., for a series of experiments, and a comparison of this apparatus with those which have been used in past experiments. 1800 w. Col Guard—July 23, 1897.

New Home Office Test for High Explosives. Gives an account of a special test proposed in order to assist miners in the selection of a safe explosive for dangerous mines. 1300 w. Ir & Coal Trds Rev—Nov. 17, 1899.

Testing Mining Explosives. Perry F. Nursey. A discussion of the first report of Captain Cooper-Key, upon the work at the government testing station at Woolwich, where explosives are searchingly tested. 2400 w. Ind & Ir—Sept. 30, 1898.

The Testing of Explosives for Mining Purposes. M. B. Lloyd. Report on the working of the British Government Testing Station for Explosives, for the year 1899. 3000 w. Col Guard—July 20, 1900.

The Testing of Explosives for Mining Purposes. A report by Major A. Cooper-Key to the chief inspector of explosives on the working of the Home Office Testing Station for the year 1898. 4500 w. Col Guard—Feb. 24, 1899.

The Testing of Explosives for Use in Coal Mines. Report of the English Departmental Committee appointed to inquire into the best tests to determine the safety. 3400 w. Col Guard—Dec. 24, 1897.

The Testing of Explosives for Use in Coal Mines. A report by A. Cooper-Key, inspector of explosives at the Home Office Testing Station, Woolwich, England. 3500 w. Col. Guard—July 8, 1898.

See also **British Report.**

**Tests, France.**—Explosives and Firedamp in France (Les Explosifs et le Grisou en France). Describing the experiments made by a special commission of experts as to the effect of various mining explosives in igniting mine gases. The explosives were discharged in chambers containing the gases. Two papers. 5000 w. Le Génie Civil—Aug. 7 & 14, 1897.

**Tests, Germany.**—Explosives and Firedamp in Germany (Les Explosifs et le Grisou en Allemagne). A review of the Neunkirchen experiments for testing the effect of explosives in igniting firedamp in mines. Two articles. 5000 w. Le Génie Civil—Sep. 25, Oct. 2, 1897.

**Test, United States.**—Methods for the Examination of Explosives. W. J. Williams. An outline of the methods used for the examination of smokeless powders, as laid down by the regulations of the War Department and practiced at Frankford Arsenal, near Philadelphia. Ill. 4500 w. Jour Fr Inst—March, 1899.

**United Kingdom.**—See **British; Tests, British.**

## EXPORT TRADE.

**American.**—See **COAL INDUSTRY; ENGINEERING COMPETITION; IRON INDUSTRY.**

## EXPOSITION.

See also **EXHIBITION.**

**Atlanta.**—The Atlanta Exposition. Leonard Waldo. Historical account of this exposition. The first part describes the approaches and buildings. Serial. Engng—March 20, 1896.

See also **ELECTRICAL EXHIBITION.**

**Budapest.**—The Historical Buildings in the Hungarian Millennial Exhibition. Illustrated description of the buildings of the great national exhibition to be opened at Budapest on May 2. These buildings are intended to represent the political and intellectual life through which the country has passed during ten centuries of time. 1100 w. Arch, Lond—March 13, 1896.

The Hungarian Millennial Exhibition at Budapest. An outline of what is anticipated will be a very successful exposition, in which the flour-milling industry will be one of the greatest features. 900 w. Mach, Lond—Feb. 15, 1896.

**Chicago.**—The World's Columbian Exposition. Arthur Peabody. A study of the constructive problem and its value as a criterion. The general design, buildings, construction, materials and methods. 8500 w. Technograph—No. XI.

**Düsseldorf, 1902.**—The Industrial and Trade Exposition at Düsseldorf in 1902 (Die Industrie und Gewerbe Ausstellung in Düsseldorf im Jahre 1902). A short announcement concerning this forthcoming exposition, with especial relation to the department of mining and metallurgy, giving a view of the proposed mining building. 1500 w. 1 plate. Glückauf—Jan. 20, 1900.

**Kiel, 1896.**—The Kiel Exhibition of 1896. Gives a programme of this exhibition which will comprise exhibits in three groups—navigation on the sea, navigation on rivers, and fishery. The first of these groups contain eighteen classes of marine engineering exhibits; the second comprises two classes, and the third seven classes. The whole will form an unique exhibition. 1200 w. Engng—Dec. 6, 1896.

**Nijni-Novgorod.**—The Nijni-Novogorod Exhibition. Illustrations and brief descriptions of water-tower and buildings constructed on Mr. Schuchof's patent principle; their characteristic feature is the absence of any kind of roof-truss or girder. 600 w. Eng Lond—March 19, 1897.

The Russian Exposition at Nijni-Novgorod (L'Exposition Nationale Russe de Nijny-Novgorod). A general review of the present state of Russian industries, from a report made to the French Society of Civil Engineers. 7500 w. Mon Ind—Jan. 2, 1897.

**Omaha.**—The Great Exposition at Omaha. Charles Howard Walker. The plan of the grounds, character of the buildings, and matters of general interest. Ill. 2000 w. Century Mag—Feb., 1898.

The Trans-Mississippi Exposition. C. Howard Walker. Illustrated description of the architecture, with general discussion of the requirements of buildings for expositions. 4000 w. Arch Rev—Vol. V. No. II. 1898.

The Trans-Mississippi Exposition. Octave Thanet. A description of the exhibition, giving many illustrations of buildings, and other exhibits. 4000 w. Cos—Oct., 1898.

**Pan-American.**—See **PAN-AMERICAN EXPOSITION.**

**Paris, 1900.** See **PARIS EXPOSITION.**

**Philadelphia, 1899.**—The Export Exposition at Philadelphia in 1899 (Die Export-Ausstellung in Philadelphia, 1899). Richard Knoller. The official Austrian report, containing a general description of the exhibits, with illustrations. Serial. 2 parts. 10000 w. Zeitschr d Oest Ing u Arch Ver—June 8, 15, 1900.

The National Export Exposition at Philadelphia. Illustrations of some of the interesting exhibits and an account of the exhibition. 6000 w. Power—Dec., 1899.

**South Africa.**—South African Exhibition. An account of the industrial and art exhibition in Grahamstown, and the products represented. 1000 w. U. S. Cons Repts. No. 352—Feb. 16, 1899.

**Stockholm.**—The Stockholm Exhibition. Describes the exhibition, giving illustration of grounds, and high praise of the buildings and exhibits. 1800 w. Sci Am Sup—Sept. 4, 1897.

The Stockholm Exposition (L'Exposition de Stockholm). General description, with photographs of buildings and grounds. 1500 w. La Revue Technique—Sept. 25, 1897.

**Tennessee Centennial.**—Report of the Committee on Architecture and Grounds of the Tennessee Centennial Exposition. Extract from the report, containing intelligent criticism of the architectural work. Ill. 3500 w. Br Build—Jan., 1898.

Some Notes on Tennessee's Centennial. F. Hopkinson Smith. Contains an account of the fine buildings, with illustrations by the author, and criticisms. 5000 w. Scribner's Mag—Sept., 1897.

The Tennessee Centennial Exposition. Brief description of the buildings with illustrations of the work thus far accomplished. 700 w. Tradesman—April 1, 1896.

The Tennessee Centennial Exposition. Brief discussion of the plan with criticism. 2400 w. Arch Rev—Vol. V. No. II., 1898.

**Trans-Mississippi.**—See Omaha.

**Vienna, 1898.**—The Jubilee Exhibition at Vienna, 1898 (Jubiläums-Ausstellung 1898 in Wien). A general plan of the grounds, together with elevation and plan of the pavilion of the three principal commissions. 1800 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—July, 1898.

The Jubilee Exposition of 1898 in Vienna (Jubiläums-Ausstellung 1898 in Wien). Description and illustration of the handsome pavilion of the City of Vienna, erected in honor of the imperial Jubilee. 1200 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1898.

The Prize Design for the Vienna Pavilion (Die Preisausschreibung für den Pavillon der Stadt Wien). With illustrations of the first, second, and third prize designs for the city pavilion for the jubilee exposition to be held at Vienna in 1898. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 12, 1897.

**EXTENSIMETER.**

See **TESTING MACHINE—Extensimeter.**

# F

**FABRICS.**—See also **FIBRE; TEXTILE.**

Fabrics. Aldam Heaton. Paper read before the British Arch. Assn. Pointing out the nature of the most useful fibres and the characteristics of the fabrics produced from them. 7200 w. Arch, Lond—May 15, 1896.

**FACTORY.**

**Mexico.**—Three Large Franco-Mexican Industries in Mexico (Trois Grandes Industries Franco-Mexicaines au Mexique). Saint-Biey. An illustrated sketch of a cotton, a cigarette and a woolen factory, under the direction of French engineers. 2000 w. Revue Technique—June 25, 1900.

**Remodeling.**—Cost of Remodeling an Old Factory. W. S. Rogers. An account of a plant before and after reconstruction, with report of cost, and other matters of interest. Ill. 2200 w. Mach, N. Y.—April, 1898.

**FACTORY ACCIDENT.**

**Law.**—The Law Relating to Accidents in Factories. Deals principally with rubber factories, but is also applicable to any factory. A compilation from legal authorities. 1200 w. Ind Rub Wld—Nov. 10, 1896.

**Prevention.**—The Prevention of Accidents in Industrial Concerns. L. Charles Wallach. Considers the importance of giving attention to this subject, the primary causes of accidents, safety guards and appliances, etc. 3500 w. Mech Wld—May 12, 1899.

**FACTORY ORGANIZATION.**

See **WORKS MANAGEMENT.**

**FACTORY WASTE.**

See also **RIVER POLLUTION; SEWAGE; SEWAGE DISPOSAL; WATER POLLUTION; WATER PURIFICATION—Factory.**

Conditions for the Preliminary Treatment of Trade-Waste Water before its Admission into Public Sewers. H. Maclean Wilson. A statement of the conditions that should be required before such liquids are received into the public sewers. Discussion. 3500 w. Jour of the San Inst—April, 1898.

The Preparation of Water for Industrial Purposes, and the Purification of Discharge Water (Die Aufbereitung der Fabrikationswässer vor dem Gebrauch und die Reinigung von Abwässern). B. Schnackenburg. Giving methods of purification by filtration, neutralization, precipitation, etc., both before and after use. 2500 w. Gesundheits Ingenieur—Dec. 31, 1898.

The Purification of Waste Water (Mittheilung über die Reinigung der Fabriks-Abwässer). Describes simple form of sedimentation, purification and filtration plant, by means of which the discharge water from manufacturing establishments may be purified before discharge into streams. 1 plate. 2500 w. Oesterr Monatschr f d Oeffent Baudienst—May, 1897.

The Purification of Trade Wastes. W. O. E. Meade-King. Abstract of a paper before the Inst. of C. E., describing experiments to determine satisfactory methods of purifying waste liquors from various indusrial establishments. 4400 w. Eng Rec—Aug. 25, 1900.

The Purification of Trade Wastes. Abstract of a description by R. A. Tatton, before the Inst. of C. E., of methods of treating soap and dye waters from manufacturing establishments in the Mersey and Irwell district. 1800 w. Eng Rec—Aug. 18, 1900.

The Relation of Manufacturing Wastes to the Sewerage Problem. F. Herbert Snow. Abstract of a paper presented before the Civil Engs.' Club of Columbus, O. Gives a digest of experiments for purifying these wastes, made by the Mass. Bd. of Health, and other comments on the question of nuisance. 2000 w. Eng News—May 25, 1899.

**Hot into Sewers.**—The Discharge of Hot Mill-Drainage into City Sewers (Die Einführung Heisser Fabrikabwässer in Städtische Kanale). Showing the effect of hot discharges in producing decomposition of sewage, and affecting public health. The safe limit of temperature is placed at 40 degree C. 2000 w. Gesundheits-Ingenieur—April 30, 1899.

**Mersey and Irwell Rivers.**—Improvement of the Mersey and Irwell Rivers. A review of the work accomplished in 8 years in keeping sewage and manufacturing wastes out of these streams. 900 w. Eng Rec—June 9, 1900.

River-Pollution in England. The pollution of the Irwell and the Mersey by manufacturers and sewage discharges, and the action taken in the matter. 1300 w. Fire and Water—Jan. 23, 1897.

The Purification of Water After Its Use in Manufactories. Two papers read at a meeting of the British Inst. of Civ. Engs. Reginald A. Tatton considered the condition of the Mersey and Irwell watershed; and W. O. E. Meade-King gave an account of experiments to correct the evil. 1200 w. Col Guard—Jan. 19, 1900.

**Yorkshire West.**—West Riding Rivers. The Problem of Trades-Refuse. Editorial giving successful solutions of the liquid trades-refuse problem. The case adduced refers to the woolen trade. 2200 w. Engng—May 7, 1897.

**FAN.**

See also **BLOWER; HEATING; HEATING AND**

**VENTILATION; MECHANICAL DRAFT; MINE VENTILATION; TUNNEL VENTILATION; VENTILATION.**

Centrifugal Ventilators. J. T. Beard. A review of designing practice, past and present, showing where the study of design should begin, the need of formulas correlating all the elements of the ventilator and the work, etc. Ill. Serial. Mines & Min—Sept., 1899.

What is an Efficient Type of Ventilating Fan? William Clifford. Address opening the discussion at the W. Penna. Cent. Min. Inst. 1100 w. Am Mfr & Ir Wld—Jan. 22, 1897.

**Capacity.**—Determination of Fan Capacity. Explains the method of determining the fan capacity required when the calculations are based merely upon the times of air change; the system generally adopted for factory and similar work. 1400 w. Heat & Ven—Jan. 15, 1897.

**Capell.**—The Capell Fan. Some results obtained at a test conducted by the Berwind-White Coal-Mining Co., at Windber, Somerset Co., Penn. Ill. 3000 w. Mines & Min—Feb., 1898.

See also **Marine Uses.**

**Chicago Library.**—Some Experiments with Centrifugal Fans. William S. Monroe. Results of experiments made to test the ventilating system of the Chicago Public Library. 2500 w. Dom Engng—March, 1899.

**Curves.**—Fan Characteristic Curves. S. Hanappe, in a paper to the Société des Ingénieurs des Mines du Hainaut. An examination of some of these curves as bearing upon a full sized Guibal fan. 4000 w. Col Guard—May 6, 1898.

**Design.**—The Calculation of Centrifugal Fans for Ventilating Purposes. H. Eisert. Read at the Saratoga meeting of the Am. Soc. of Heat. & Ven. Engs. An account of the investigations of the writer. 5000 w. Heat & Ven—July, 1899.

The Design and Testing of Centrifugal Fans. Hammersley Heenan and William Gilbert. Read before the Inst. of Civ. Engs., London. A record of experiments made by the authors on several of the best known varieties of fans in use, for the object of finding the best type of fan and obtaining data whereby the proper diameter of the standard fan and its most economical speed could be determined for any required output of air at a given pressure. 6500 w. Jour Am Soc of Nav Engs—May, 1897.

The Design and Testing of Centrifugal Fans. A summary of the discussion of a paper on this subject, by Hammersley Heenan and William Gilbert. 8500 w. Col Guard—April 30, 1897.

The Design and Testing of Centrifugal Fans. Correspondence arising from the paper on this subject, by Messrs. Heenan and Gilbert, read before the Inst. of Civil Engs. 5400 w. Col Guard—May 9, 1897.

The Design and Testing of Centrifugal Fans. Abstract of a paper read by Messrs. H. Heenan and W. Gilbert, which describes a method and apparatus for determining best form of fan blade and fan case, and most economical speed and diameter of fan to move any desired volume of air under any given pressure. 900 w. Mach, Lond—Jan. 15, 1896.

The Design and Testing of Centrifugal Fans. H. Heenan and W. Gilbert. Abstract of a paper read at the meeting of the Inst. of Civ. Engs. The results of tests made to determine the discharge and efficiency of fans, and their effect on the design of fan-blades and fan case. 900 w. Ind & East Eng—Feb. 8, 1896.

The Design of Fan Blowers. Walter B. Snow. A discussion of fan blowers and the theoretical considerations which govern their design. 3000 w. Mach, N. Y.—Aug., 1898.

**Disk.**—Helicoidal Ventilators (Ventilateurs Helicoides). A. Laponche. A discussion of exhaust fans and ventilating wheels of the turbine form, together with methods of driving by electricity and steam. 2500 w. Génie Civil—June 17, 1899.

Some Formulas for Disk Fans. J. H. Kinealy. Paper presented at the New York meeting of the Am. Soc. of Heat & Ven. Engs. Formulas deduced by the writer for determining the proper number of revolutions, and the number of cubic feet of air a disk fan could be expected to deliver per minute. 1200 w. Eng News—Jan. 26, 1899.

The Computation of Screw Ventilators (Ueber Berechnung der Schraubenventilatoren). A paper by Herr Recknagel upon the computation of the discharge of ventilating fans of the screw disk type, giving formulas and application; also discussion. 2500 w. Gesundheits-Ingenieur—Oct. 15, 1898.

See also **Test.**

**Driving.**—Comparison of the Methods in Common Use for Driving Fans. William G. Snow. Considered with reference to first cost, expense of running and adaptability. 2500 w. Heat & Ven—Jan. 15, 1896.

**Electric.**—Electric Fans. S. D. Mott. Illustrated description of ventilating fan. 600 w. Elec Wld—April 11, 1896.

See also **Regulation; Test.**

**Farcot.**—Farcot Fan at a Belgian Colliery. Victor Watteyne. From a report on the plant and methods of mine working at the Brussels Exhibition, and also an article in "L'Industrie" of Brussels. Illustrated description. 1500 w. Col Guard—March 11, 1898.

**Literature.**—Literature Relating to Blowing Fans. R. C. Carpenter. Prepared for the Am Soc. of Heat and Ven. Engs. A compilation of titles of various papers which have been published. 2000 w. Heat & Ven—Feb., 1899.

**Marine Uses.**—Centrifugal Fans as Applied to Marine Uses. G. M. Capell. Read before the Institute of Marine Engineers, at Stratford. Reviews the improvements in the last fifteen years in the construction of fans and their use in mines as well as marine uses. 2200 w. Engs' Gaz—Dec., 1897.

See also **VENTILATION—Ships.**

**Mine Ventilation.**—Notes on Mine Fans. William T. Clifford. Read at meeting of Western Pennsylvania Central Mining Inst., at Pittsburg. Traces the advances made in mine fans with consideration of some features. 1800 w. Am Mfr & Ir Wld—Jan. 7, 1898.

The Fan. C. H. Innes. Gives an outline of the experiments conducted by the Prussian Mining Commission in 1884, and gives illustrated descriptions of various types. 2000 w. Prac Eng—Nov. 18, 1898.

See also **MINE VENTILATION.**

**Patton.**—The Patton Fan. Ernest Brackett. The methods used in calculating its proportions and some particulars of tests of its efficiency. Ill. 2800 w. Mines & Min—March, 1899.

**Regulation.**—Special Regulation of Motor Driven Fans and Blowers. Alton D. Adams. Considers methods of speed regulation and their effect on the efficiency. 1000 w. Heat & Ven—March, 1899.

**Test.**—Experiments upon Propeller Ventilating-Fans, and Upon the Electric Motor Driving Them. William George Walker. Read before the Inst. of Mech. Engs. Illustrated description of experiments made on propeller ventilating-fans. 2000 w. Elec Eng, Lond—May 14, 1897.

Experiments Upon Propeller Ventilating Fans and Upon the Electric Motor Driving Them. William George Walker. Read before the Inst. of Mech. Engs. Full account of experiments with results. 5400 w. Eng, Lond—June 25, 1897.

Experiments Upon Propeller Ventilating Fans, and Upon the Electric Motor Driving Them. William George Walker. Read before the Institution of Mech. Engs., England. Part first notes former experiments, describes apparatus used, measurement of air discharge and of brake horse-power, etc. Ill. Serial. Prac Eng—Jan. 7, 1898.

Investigations of a Blowing Fan. R. C. Carpenter. Read before the Am. Soc. of Heat and Ven. Engs. Reprinted from the Jan. issue, with additions by the author. A résumé of experiments conducted to determine the general laws applying to centrifugal blowers of the class represented by the experimental fan. 5500 w. Heat & Ven—Feb., 1899.

Methods of Testing Blowing Fans. Review of a paper by R. C. Carpenter, explaining the sources of error in such tests and describing the apparatus and methods he has found most satisfactory. 2000 w. Eng Rec—Feb. 3, 1900.

Some Experiments Upon Ventilating Fans. W. G. Walker. Abstract of a paper recently read before the British Inst. of Mech. Engs., giving an account of late experiments and their results. 1600 w. Eng Rec—Aug. 6, 1898.

Test of a Blowing Fan in Connection with a Heating Coil. R. C. Carpenter. Describes tests made to investigate the capacity and efficiency of one form of heating surface in connection with a blowing fan. Serial. Heat & Ven—May, 1899.

Tests of Blowing Fans Under Different Conditions and of Different Makes. R. C. Carpenter. Read at semi-annual meetings of Am. Soc. of Heating and Ventilating Engs. A talk on investigations made at Cornell Univ., and the results. 4200 w. Heat & Ven—June 15, 1897.

Ventilating Fans. Discussion of a paper by W. G. Walker, read before the English Institution of Mechanical Engineers. 4000 w. Engng—Nov. 5, 1897.

See also **Design.**

**Theory.**—Fans and Blowers. J. H. Kinealy. On the theory of the action of the ordinary centrifugal type of fan or blower. 1000 w. Heat & Ven—Aug. 15, 1898.

The Theory of the Centrifugal Pump and Fan. C. H. Innes. Read before the North East Coast Inst. of Engineers and Shipbuilders. Discussion of this theory and the paper design of such pumps and fans. Serial. Col Guard—Dec. 10, 1897.

**Velocity and Pressure.**—The Relation of Velocity and Pressure in Centrifugal Blowers. Alton D. Adams. Investigations to find which of two statements is correct, and pointing out an error in Mr. Snell's formula. Also editorial discussion. Ill. 3200 w. Eng News—March 9, 1899.

### FARM.

**Electricity Applications.**—See **ELECTRICITY—Agriculture.**

**Experimental.**—A Wise Railroad Move. Account of a movement proposed by the Seaboard Air Line to establish 100 experimental farms along its line. 800 w. Mfrs Rec—Dec. 11, 1896.

### FARM BUILDING.

See also **COUNTRY ESTATE; STABLE.**

**Sanitary.**—Sanitary Farm Buildings. Louis Hanks. The importance of farm sanitation, and suggestions of how to secure the essentials. 1600 w. San Rec—Jan. 14, 1898.

### FAST TRAIN.

See also **LOCOMOTIVE—High Speed; LOCOMOTIVE PERFORMANCE.**

A Table of Fast and Unusual Runs. Interesting table from the work "Modern Locomotives" soon to be published. 2000 w. R R Gaz—June 11, 1897.

Railway Maximum Speeds. Charles Rous-Marten. Reports personal investigation of English locomotive speeds since 1894 and expresses disbelief in the records claimed for American locomotives. 2000 w. Engr, Lond—Dec. 31, 1897.

Railway Speeds. W. M. A. With editorial. The writer presents arguments for and against high speed, and the editorial criticises these arguments. 3800 w. Engr, Lond—Oct. 14, 1898.

The Fastest Railroad Run Ever Made. Harry Perry Robinson. Distance 510 miles—average running time 65.07 miles an hour—highest speed attained 92.3 miles an hour. Ill. 5500 w. McClure's Mag—Feb., 1896.

**Atlantic City-Philadelphia.**—A New American Railway Record. Charles Rous-Marten. English comments on the speed attained by the fast trains between Philadelphia and Atlantic City. 800 w. Engr, Lond—Aug. 5, 1898.

A Very Fast Regular Train. Report of the excellent time made between Philadelphia and Atlantic City, on the Philadelphia and Reading. 500 w. R R Gaz—Arg. 13, 1897.

Fast Running by the Pennsylvania Railroad to Atlantic City. Particulars of three runs made by engine known as Class E-1, put in service this year. 500 w. R R Gaz—Aug. 11, 1899.

On the Fastest Train in the World. A. S. Describes a ride on the train that runs from Camden to Atlantic City, a distance of 55.5 miles in 50 minutes. 1200 w. Loc Engng—Aug., 1898.

See also **LOCOMOTIVE—Atlantic Type.**

**Austria.**—Express Train Speeds in Austria (Schnellzugs-Geschwindigkeiten in Oesterreich). F. Ross. A comparison of the moderate speeds of Austrian express trains with the much higher speeds regularly attained in other parts of Europe and in the United States. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 10, 1899.

**Black Diamond Express.**—See **Lehigh Valley.**

**British.**—After the Great Railway Race. Charles Rous-Marten. A summary of details of some of the fast runs on English roads, with some reference to American records. 4500 w. Eng, Lond—Jan. 31, 1896.

Notable Speed Trials of British Locomotives. Charles Rous-Marten. A fully illustrated account of British high-speed locomotives with records of speed trials, showing the manner in which records in England have been made and broken under the stimulus of competition. 4500 w. Engineering Magazine—April, 1898.

New Express Trains in England. W. M. Acworth. Reviews the recent improvements in British passenger service. 1000 w. R R Gaz—Aug. 14, 1896.

The New Train Services. Charles Rous-Marten. Describing with considerable detail, typical modern English fast-passenger service. 2500 w. Eng, Lond—July 17, 1896.

See also **Great Western; London; Scottish.**

**British and American.**—Record-Breaking Railway Runs. List of 125 of the most notable runs made in Great Britain and America, with remarks. 1800 w. Ry Age—July 29, 1898.

**British East Coast.**—With the East Coast "Flyer." Charles Rous-Marten. Deals with the service, shows the locomotive performances to be excellent. Describes three runs in detail. 2500 w. Eng Lond—Dec. 18, 1896.

**British West Coast.**—With the West Coast "Flyer." Charles Rous-Marten. Detailed descriptive account of a typical run on an English express. 1700 w. Eng, Lond—Aug. 21, 1896.

**Business Policy.**—Fast Trains as Related to Business Policy. H. G. Prout. Discussing the relation of increase in train-speed to increase in passenger traffic. 4300 w. Eng Mag—Oct., 1896.

**Chicago, Burlington & Quincy R. R.**—A New Record for Long-Distance Running. An interesting account of a fast run made from Chicago to Denver over the C. B. & Q. R. R. at an average speed of 54.27 miles per hour, with running time at an average of 57.53 miles. 1700 w. R. R. Gaz—Feb. 26, 1897.

Fast Runs on the Burlington. Summaries of two very fast runs made on this road on April 14 and 22, 1899. 400 w. Ry Age—April 28, 1899.

**Chic., Mil. & St. Paul Ry.**—The Pioneer Limited. Illustrated description of fine cars placed in service on the C. M. & St. P. R. R. 2200 w. Ry & Eng Rev—June 11, 1898.

**Chicago-Nashville.**—The Chicago-Nashville Fast Run. A record of an excellent performance. 600 w. R R Gaz—June 4, 1897.

**Cost.**—The Cost of Running Fast Trains. G. R. Hudson. Treats of results obtained on the test plant of the Chicago & Northwestern Ry., in regard to fuel consumption. 800 w. Am Engr & R R Jour—June, 1900.

**Cromer, England.**—The Run of the Cromer Express. Great Eastern Railway. A. M. B. Describes the fast run of a train hauled by an oil-fired engine. Ill. 1800 w. Engr, Lond—Sept. 17, 1897.

**Edinburgh-Berwick.**—"Lightning Trains" on the North British Railway. Charles Rous-Marten. Detailed account of test journeys two and fro between Edinburgh and Berwick, with a diagram showing the gradiant profile of the section of the line on which the running took place. 3300 w. Eng, Lond—March 12, 1897.

**1899.**—The Fastest Trains in the World in 1899. Four tables of American, French and British fast trains, reprinted from the London "Times" of Aug. 17, 1900, with comment. 1800 w. R R Gaz—Sept. 21, 1900.

**Empire State and Cornish.**—The Two Fastest Long Distance Runs Without Stop. An account of the locomotive performance of the Empire State Express of the N. Y. C. & H. R. R. R. and the Cornish Express of the Great Western Railway, England. Ill. 2500 w. Sci Am—Sept. 3, 1898.

**England.**—See **British.**

**Europe.**—Continental Express Speeds and Accommodation. J. Pearson Pattinson. Part first refers to the Belgian state railroads. The information relating to gradients, locomotives, and the statistics of express speed are all taken from official sources and may therefore be deemed accurate. Serial. R R Gaz—Nov. 5, 1897.

European Railroads: Mileage and Speed. Statisties showing that the average speed of express trains in Europe varies from 43.49 to 52.48 miles per hour. Reference is made to the late record-breaking runs. 700 w. Con Rept—Jan., 1896.

Fast Trains in Continental Europe. J. Pearson Pattinson. Some particulars of the fastest third-class train in France, and some German express trains with very heavy loads behind the engine. 500 w. R R Gaz—Dec. 11, 1896.

The Swiftest Trains of Europe (Die Schnellsten Züge Europas). A brief introduction, followed by a table of the fastest trains of the principal countries of Continental Europe, giving total length of run, time of run, maximum speed, and time consumed by stops. 1500 w. Glaser's Annalen—Oct. 15, 1897.

**France.**—Speed of Express Trains in France. A free translation of an article by Mr. Varennes which appeared about three years ago, covering the period from 1854 to 1895 inclusive. 2700 w. R R Gaz—April 7, 1899.

The Remarkable Train-Speeds in France. Comment on the speeds attained in France as given in a recent article by Mr. Rous-Marten, and a discussion of their engines as compared with English engines. Ill. 1500 w. Transport—Aug. 11, 1899.

**France and England.**—French and English Railway Speeds. Philip Burtt. Principally an account of what is accomplished in France, and the features which differ from conditions in England. 2200 w. Transport—Oct. 13, 1899.

French and English Railway Speeds. Charles Rous-Marten. Letter aiming to show that Mr. Burtt's comparisons were not quite fair. 1700 w. Transport—Nov. 24, 1899.

**French Northern.**—Fast Run on a French Railway (La Marche d'un Rapide au Chemin de Fer du Nord). Description with diagram of speeds and profile of track between Paris and St. Quentin. The average speed was 62.7 miles per hour over a distance of 95 miles, the train weighing 178 tons. 1000 w. La Rev Tech—Nov. 10, 1898.

Fast Runs on The Northern Railway of France. Charles Rous-Marten. Describes, with illustrations of the engines, a number of service runs of high-speed expresses of the Chemin de Fer du Nord, and gives numerous interesting and valuable data of locomotive performance. 6000 w. Engineering Magazine—Feb., 1899.

**French Winter.**—The French Winter Train Service. Charles Rous-Marten. Gives a list of the chief expresses in France, with comments on the progress with respect to speed. 800 w. Engr, Lond—Dec. 22, 1899.

**Fuel Consumption.**—See LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE.

**German.**—Census of German Express Trains. Information from census made by J. P. Pattinson aiming principally at an estimate of the speed. 300 w. R R Gaz—Nov. 10, 1899.

**Great Western, Eng.**—A Remarkable Run on Great Western Railway. Charles Rous-Marten. Reports the particulars of a fast run on a Britsh railway, at the average rate of 58.7 miles an hour. 1600 w. Engr, Lond—Nov. 4, 1898.

The Awakening of the Great Western. Some notes on the fast time made by the express trains on this road; average, 50 miles per hour. The time and distance table is given showing the average time between stations. 1200 w. Engng—Jan. 10, 1896.

See also **Empire State and Cornish.**

**Lake Shore & Michigan Southern.**—Details of the Fast Run on an American Railway. The run on the Michigan Southern Railway, Oct., 1895, is described, giving profile of route and full details. 1100 w. Eng, Lond—March 27, 1896.

High Speeds in the United States. Editorial comment on the Lake Shore train speed record. The writer is doubtful as to the possibility of such fast time and asks how it was done. 1500 w. Engr, Lond—Nov. 15, 1895.

See also TRAIN RESISTANCE.

**Lehigh Valley Ry.**—Punctuality of the Black Diamond Express. Report of this train for the 12 months ending Dec. 31, 1897. 400 w. R R Gaz—June 17, 1898.

Remarkably Fast Time. Report of a notable record made by the Lehigh Valley R. R. Co.'s Black Diamond express. 850 w. Col Eng—July, 1897.

The "Black Diamond Express." Description and photographs of the new Lehigh Valley train between New York and Buffalo. 700 w. Ry Age—May 16, 1896.

The "Black Diamond" Express. A good description of a recent typical American express train, with diagrams and photo-engravings. 450 w. R R Car Jour—June, 1896.

**Light Cars.**—Railroad Racing. An editorial advocating lighter cars as an element toward obtaining higher speeds. 2000 w. Am Eng & R R Jour—Nov. 28, 1895.

**London-Brighton.**—London to Brighton in an Hour. Charles Rous-Marten. An account of the running of a Pullman car express from Victoria Station to Brighton, with description of the train, service, etc. 1600 w. Engr, Lond—Jan. 27, 1899.

**London-Crewe.**—A Run with a Webb Four-Cylinder Compound. Charles Rous-Marten. An account of a special trip of the Engineering Conference of the Inst. of Civ. Engs. from London to Crewe and back. 1800 w. Engr, Lond—June 16, 1899.

Fast Run on the London & North-Western. An account of a run made by a special train from London to Crewe and return. 700 w. R R Gaz—Aug. 11, 1899.

**London-Exeter.**—The Longest Non-Stopping Railway Run in the World. Charles Rous-Marten. Detailed account of the daily run of 194 miles from Paddington to Exeter on the Great Western Railway. 1700 w. Eng, Lond—Oct. 9, 1896.

**London-Manchester.**—Another Record Breaking Train. An account of the runs of what is known as the "War Express," between London and Manchester, Eng. 700 w. Loc Engng—Dec., 1899.

**London-Paris.**—A Record Run from London to Paris. J. Pearson Pattinson. The time is given in detail, the run being made in six hours and a half. 800 w. R R Gaz—July 3, 1896.

**London-Scotland.**—The New Fast Train Service Between London and Scotland. J. Pearson Pattinson. The service is stated to be remarkable for frequency and speed combined. A table accompanies the article. 850 w. R R Gaz—July 17, 1896.

The Fast Trains Between London and Scotland. J. Pearson Pattinson. Gives in descriptive and tabular form, facts regarding typical British express service. 350 w. R R Gaz—Aug. 14, 1896.

**Long Distance.**—Long and Fast Railroad Runs. Tables from the London "Engineer" of British, American and French fast trains, running 100 miles and upwards. 900 w. R R Gaz—Sept. 28, 1900.

Long-Distance Railway Runs. A comparison of long-distance fast trains in England, America and France, with tables. 1000 w. Engr, Lond—Sept. 7, 1900.

See also **Empire State and Cornish; Paris—Spain.**

**Men, Machinery and Track.**—High-Speed Standards of Men, Machinery and Track. H. G. Prout. Showing that the fast running of trains necessitates improvement in methods and material, and has a disciplinary effect on trainmen. 3000 w. Eng Mag—Dec., 1896.

**New Jersey Central.**—Fast Heavy Passenger Service on the Central Railroad of New Jersey. An account of a trip between Asbury Park and Jersey City, with illustration of engine. 900 w. Loc Engng—Sept., 1900.

**New York-San Francisco.**—A New Fast Mail Train Across the United States. An account of the first run of the train which has shortened the time between New York and San Francisco by twelve hours, and the proposed reduction of twenty to twenty-four hours. 1500 w. Engr, Lond—Feb. 10, 1899.

**Paris-Spain.**—The Fastest Long-Distance Train in the World. Charles Rous-Marten. Information from observations of the Sud Express run from Paris to Spain or Portugal. 2400 w. Engr, Lond—Oct. 20, 1899.

**Philadelphia-Atlantic City.**—See **Atlantic City-Philadelphia.**

**Scottish.**—Remarkable Running Achievements by Scottish Railway Companies. Record of work on the North British and Caledonian railways. 1200 w. Trans—March 19, 1897.

**United States.**—Our Express Trains and Locomotives. Editorial on the progress made by our express trains, and the excellence of locomotives in the United States. 1200 w. Loc Engng—June, 1897.

**Wabash Ry., U. S.**—Fast Runs on the Wabash. Notes the changes recently brought about on this railroad, and gives records of runs, and particulars relating to them. 800 w. Ry Age—Nov. 11, 1898.

## FEED PUMP.

See **PUMP—Feed-Water.**

## FEED WATER.

See also **FEED-WATER HEATER; FEED-WATER PURIFICATION.**

Boiler Feed Water. J. M. Williams. Paper read before Hamilton Assn., No. 2. C. A. S. E. Discusses water, from the boiler, and in the boiler. 2000 w. Power—April, 1900.

Feed Water and Boilers. A discussion of the nature of water supply, and a comparison showing that under certain conditions, one type of boiler may prove satisfactory, while other types may not be adapted to the conditions. 1600 w. Locomotive—Sept., 1900.

**Analysis.**—A Scheme for the Rapid Analysis of Boiler Waters for Scale-Forming Ingredients. Thomas B. Stillman. Gives a scheme of analysis used by the author which shows many advantages for correct determinations with rapidity. 600 w. Stevens Ind—Oct., 1898.

Boiler Waters. S. W. Parr. Classifies in a general way the waters producing harmful results, giving method of analysis. 2800 w. Technograph—No. XI.

The Scientific Treatment of Boiler Feed Waters. J. H. Parsons. On the trouble arising from imperfect samples sent for analysis, and the failures due to the steam-users, with report of some of the worst varieties sent for analysis during the past few months. 1400 w. Eng & Min Jour —April 15, 1899.

**Chemical Measurement.**—Measurement of Feed and Circulating Water, etc., by Chemical Means. C. E. Stromeyer. An ingenious application of the known solubilities of substances in water, to boiler feed measurement, and to the determination of the quantity of water entrained in steam. Read at the 37th Session of the Inst. of Naval Archs. 3500 w. Eng, Lond—April 10, 1896.

**Chemistry.**—The Engineering Chemistry of Boiler-Waters. Henry Leffman. A study of the corroding and scale-forming properties of water in determining its suitability for boiler use. Also discussion. 5200 w. Pro of Engs' Club of Phila —April, 1898.

The Engineering Chemistry of Boiler Waters. Henry Leffman. A paper read before the Engineers' Club of Phila., reviewing the chief impurities, their source, action, and removal. 2800 w. Am Gas Lgt Jour—Sept. 19, 1898.

**Corrosive.**—Corrosive and Incrusto-Corrosive Waters in Steam Boilers (Eaux Corrosives et Incrusto-Corrosives dans les Générateurs de Vapeur). H. de la Coux. An exhaustive discussion of the corrosive action of the various waters met in practice, together with the best methods of relief. Three papers. 6000 w. Génie Civil—Dec. 23, 30, 1899, Jan. 6, 1900.

**Filters.**—Feed Water Filters. A. E. Shute. An illustrated description of such examples as seem most important and popular. 3600 w. Col Guard —Dec. 30, 1898.

**Grease Extractor.**—An Oil Filter for Boiler Feed Water at Peoria, Ill. Dabney H. Maury, Jr. Read before the Buffalo convention of the American Water-Works Assn. An account of the various experiments tried and the final success, with statement of conditions under which the filters and boilers were operated. Ill. 2800 w. Eng News—June 23, 1898.

The Removal of Oil from Feed Water. Editorial statement of the value of oil filters for condensing engine plants or systems where exhaust-steam heating is practiced. 900 w. Eng Rec—Oct. 29, 1898.

The Location of Grease Extractors. William R. Billings. A criticism of statements made in editorial of this paper, giving the writer's experience. 900 w. Eng Rec—March 5, 1898.

The Removal of Grease from Condensed Steam (Entfettung des Kondensirten Abdampfes). Describing Dehne's apparatus for filtering the grease from surface condenser water before it is returned to the boiler. 1200 w. Zeitschr d Ver Deutscher Ing—Aug. 2, 1897.

**Heater.**—See **ECONOMIZER; FEED WATER HEATER.**

**Locomotives.**—See **FEED WATER PURIFICATION; LOCOMOTIVE—Feed Water Heater.**

**Northern Illinois.**—The Quality of the Boiler-Water Supply of a Portion of Northern Illinois. James A. Carney. This subject gives much trouble in Illinois, and after careful analyses the writer concludes that water for boiler purposes should be taken as much as possible from streams, lakes or artificial ponds. 2200 w. Trans Am Inst of Min Engs—May, 1897.

**Objectionable Matter.**—Objectionable Matter Which Tends to Enter Steam Boilers, and Its Prevention from So Doing. W. W. Houfe. Read before the Inst. of Marine Engs. Deductions from the writer's experience. Serial. Prac Engr—Oct. 19, 1900.

**Oil Filter.**—See **Grease Extractor.**

**Pump.**—See **PUMP—Feed-Water.**

**Purification.**—See **FEED WATER PURIFICATION.**

**Regulator.**—Improvements in Steam Generators (Dispositif Applicable aux Générateurs de Vapeur). An illustrated description of a steam generating system in which the water is supplied to the boiler in direct proportion to the consumption of steam. 2000 w. Rev Tech—April 25, 1899.

Normand's Feed Regulating Arrangement. Illustrated description of an arrangement patented by Augustin Normand & Co., of Havre, which has already been successfully tried. 600 w. Engng —Aug. 20, 1897.

**Salt Water.**—Salt-Water Feed for Express Boilers. Details of experiments made by Messrs. Yarrow & Co., in which salt water was used as feed, showing that in case of a complete breakdown of the condenser a vessel fitted with these small tube boilers would be safe for a considerable distance of steaming. 1700 w. Engng—March 19, 1897.

Salt Water in Water-Tube Boilers. Editorial comment on the experiments made by Messrs. Yarrow & Co. 1400 w. Eng, Lond—March 19, 1897.

**Settling Tank.**—A Feed-Water Settling Tank. Walter Ferris. Describes the latest arrangement of a large iron works, for the prevention of scale and sediment in boilers. Ill. 1000 w. Am Mach —Sept. 9, 1897.

**Softening Plant.**—Water-Softening Plant at the Lorain Steel Company's Blast Furnaces. N. O. Goldsmith. Illustrates and describes the plant and the conditions necessary for accurate and uniform treatment, and other points of importance. 2400 w. Trans Am Soc of Mech Engs, No. 863—May, 1900.

## FEED-WATER HEATER.

See also **ECONOMIZER; FEED-WATER PURIFICATION.**

Feed-Water Heaters and Economisers. William H. Fowler. Deals with feed-water heaters and fuel economisers. Ill. 2800 w. Ry Wld—Feb., 1898.

Heating Feed Water. Editorial giving history of this discovery, and discussing the problem. 1500 w. Engr, Lond—April 8, 1898.

High Feed-Water Temperatures. A. L. McClurg. Extract from a recent lecture before the Massachussetts Assn., treating of exhause heaters and their value. 1300 w. Bos Jour of Com—May 1, 1897.

**Coal Mine.**—Notes on a Water-Heater at Cadzow Colliery. William S. Thompson. Read before the Mining Inst. of Scotland. Illustrated description with advantages gained. 900 w. Col Guard—June 17, 1898.

**Granddemange.**—Apparatus for Purifying Feed-Water and Heating it to 100 degrees C. (Epurateur Economique Détertrant l'Eau d'Alimentation des Chaudières et la Réchauffant à 100 degrees). A description of the Granddemange heater and purifier; an open pan-heater for use with exhaust steam. 1000 w. Génie Civil—Nov. 4, 1899.

**Live-Steam.**—Live-Steam Feed-Water Heaters. W. F. Durand. Considers the relation of the live-steam heater to the heat losses, concluding that their use is favorable to economy. 2800 w. Am Elect'n—May, 1900.

The Economy from Heating Feed Water by

Live Steam. Calls attention to a theory credited to Prof. Unwin relating to the value of feed heating. 5000 w. Eng Rec—April 30, 1898.

**Locomotive.**—See LOCOMOTIVE—Feed-Water Heater.

**Lundkvist.**—A New Feed-Heater System. Karl Lundkvist. Illustrated description of trials carried out with the writer's feed-heater system, which is constructed on the principle of using both the latent and sensible heat of the steam for a more intense heating up of feed-water. Serial. Engng—Jan. 29, 1897.

**Warwick.**—The "Warwick" Feed-Heater and Detartariser. An illustrated description of a feed-water heater and purifier. 800 w. Engng—Sept. 14, 1900.

**Water-Tube Boilers.**—Novel Arrangement of Feed-Water Heater in Water-Tube Boilers. A. F. Yarrok. Describes exjeriments made which prove the advantage of the new feed system. Discussion. 4300 w. Jour Am Soc of Naval Engs—May, 1898.

### FEED WATER PURIFICATION.

See also **BOILER CLEANING; BOILER CORROSION; BOILER SCALE; FEED-WATER HEATER; WATER PURIFICATION.**

Boiler Feed-Water Treatment. W. H. Edgar. Topical discussion at meeting of the Western Ry. Club. 3500 w. Ry & Engng Rev—April 28, 1900.

Feed Water Purification. Methods for separating the salts from water as received from rivers and wells. Ill. 1800 w. Am Elect'n—March, 1900.

Improved Feed Water Purifier (Neue Wasserreiniger für Kesselspeise). Showing several forms of apparatus for purifying feed water by heating, precipitating, and filtering. 4000 w. Zeitschr d Ver Deutscher Ing—Aug. 14, 1897.

Purification of Water for Use in Steam Boilers. James Otis Handy. Considers the troubles due to corrosion, scale formation and foaming; the analysis of the water, and the methods; changes occurring in water in boilers; various processes, etc. 10500 w. Pro of Engs' Soc of W Penna—Jan., 1899.

The Cure for Corrosion and Scale from Boiler Waters. Albert A. Cary. A consideration of the various methods for the removal or treatment of scale producing substances. Third paper. 6200 w. Eng Mag—May, 1897.

The Prevention of Scale and Corrosion in Boilers. R. D. Summerfield. The need of water analysis, the use of soda, and the treatment of acid waters and other substances are discussed. 2400 w. Elec Eng, Lond—July 20, 1900.

The Purification of Boiler Feed Water. An explanation by Albert A. Cary in reply to a correspondent, regarding the fitting of the tubes on the water side in the boilers. 4000 w. Power—May, 1900.

Water Purification for Steam. John McNaull Wilson. Read before the Northwestern Electrical Assn. Recommending the purification of water outside of the boiler, in tanks, whereby all scale forming solids are precipitated and soft, clean water only supplied to the boiler. 3800 w. Elec Rev—March 18, 1896.

**Archbutt-Deeley.**—Water-Softening and Purification by the Archbutt-Deeley Process. Leonard Archbutt. Read before the British Inst. of Mech. Engs. An explanation of the process and the chemical changes; also referring to other processes and to points bearing upon the formation of boiler scale. 5500 w. Col Guard—Aug. 12, 1898.

**Clark Process.**—Water Purifying Plant. Howard Stillman. The Clark process, adding milk of lime and carbonate of soda successively, is used at Port Los Angeles, Cal., successively for purifying locomotive feed water. Details of apparatus and method are given. Ill. 4000 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Grevenbroich.**—A New Water Purifier for the Prevention of Boiler Scale (Ein Neuer Wasserreiniger zur Vollständigen Vermeidung von Kesselstein). Franz Walter. An illustrated description of the Grevenbroich filtering apparatus for boiler feed-water. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—July, 1899.

**Heat.**—Purification of Boiler Feed Waters by Heat (Epuration des Eaux d'Alimentation des Chaudières par la Chaleur). A general description of methods and apparatus, illustrated with details of the Buron apparatus, with data of heat required for precipitation of calcareous matters. 1800 w. Génie Civil—Dec. 3, 1898.

**Locomotive.**—Feed-Water Purifying. A symposium of replies from important roads to a circular of inquiry as to experience and methods tested. 6800 w. Ry Age—June 13, 1896.

On "Pure Water for Locomotives by Evaporation." C. Herschel Koyl. Discusses articles bearing on this subject and favors the purifying of the water by chemical means as far cheaper. Ill. 1500 w. R R Gaz—Aug. 17, 1900.

Pure Water for Locomotives by Evaporation. Editorial discussing the advantages and the possibility of using distilled water for locomotives. 2400 w. R R Gaz—June 22, 1900.

Purification of Feed Water. J. A. F. Aspinall. Abstract of a report on the purification of feed-water for locomotive boilers, with short editorial. 2500 w. R R Gaz—Aug. 24, 1900.

Purification of Feed-Water. J. A. F. Aspinall. Abstract from a report on the "Purification of Feed-Water of Locomotives and the Use of Disincrustants," prepared for the International Railway Congress. 1800 w. Ir & Coal Trds Rev—Sept. 7, 1900.

Recent Practice in Purifying Feed-Water for Locomotives. A summary of the committee report to the Mas. Mechs. Assn., dealing with purification by chemicals, and the treatment of water at pumping stations. 4000 w. Eng News—June 29, 1899.

Some Peculiarities About Water. Editorial on the practical value of water selection and treatment for railways. 1500 w. Loc Engng—May, 1900.

The Work of Railroad Men on the Problem of Pure Water for Steam Boilers. C. Herschel Koyl. Part first reviews the valuable statistics gathered by the Master Mechs.' Assn. in their investigations of boiler water. 1700 w. R R Gaz—March 23, 1900.

### FELDSPAR.

**Pennsylvania.**—See **KAOLIN.**

### FENCE.

**Railway.**—Recent Designs in Metal Fences for Railways. An illustrated description of some cheap wire fences with iron posts. 1200 w. Eng News—Dec. 26, 1896.

### FENDER.

**Electric Car.**—Brakes and Fenders for Electric Cars. Oberlin Smith. Maintaining that the fender problem has not been attacked from the proper standpoint. Not only protection for the body, but for the arms and legs should be provided. Gives hints. 800 w. Ir Age—Nov. 21, 1895.

Fenders, Are They Practicable? M. D. Stein. A paper read before the California Street Railway Assn. The points emphasized are the unsatisfactory results from types experimented with, the alleged increase in number of accidents when fenders are used and the need of statistics. 2800 w. St Ry Rev—June 15, 1896.

### FENESTRATION.

See **WINDOW.**

### FERMENTATION.

Modern Theories of Fermentation, with Notes on the Morphology and Culture of Yeasts. Dr. Francis Wyatt. A dissertation upon germs and the life history of micro-organisms. Serial. Jour Fr Inst—Oct., 1896.

### FERRY APRON.

**San Francisco Bay.**—Reconstruction of the Car Ferry Transfer Aprons at Port Costa and Benicia. John B. Leonard. An apron connecting the transfer boat with the R. R. tracks. It consists of five longitudinal bowstring trusses 100 ft. long. It is 44½ ft. wide and carries four tracks. Detail drawings are given. 2500 w. Jour of Assn of Eng Soc—Nov., 1895.

### FERRYBOAT.

See also **ICE BREAKER.**

**"Berkeley," San Francisco.**—Propeller Ferryboat "Berkeley" in Service in San Francisco Bay. Illustrated detailed description. 1100 w. Marine Engng—Aug., 1899.

The New Double-Screw Ferry Steamer "Berkeley," of the Southern Pacific Co. Illustrated description of a large ferry steamer just put in service on the San Francisco Bay ferry line, between the foot of Market St., San Francisco, Cal., and Oakland Pier. 500 w. Eng News—Dec. 29, 1898.

**"Chebucto."**—The Ferry Steamer "Chebucto." Illustrated description of a Canadian double-screw ferry steamer. 700 w. Engr, Lond—Oct. 8, 1897.

**Cincinnati Trials.**—See **Pa. R. R., New York.**

**Danish.**—Danish Ferryboats (Die in Dänemark in Verwendung Stehenden Ueberfuhrsboote). An account of the ferry systems in use among the islands of Denmark, both for general traffic and for transportation of railway cars. 1 plate. 2500 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1898.

Railway Ferryboats in Denmark (Eisenbahn-Dampffähren in Dänemark). Giving plans and sections of ferryboats with one and two tracks; also description of landing stage for manipulation of trains. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 6, 1900.

See also **ICE BREAKER.**

**East River.**—New East River Ferryboat. An illustrated description of the "John Englis," recently launched. 1400 w. Naut Gaz—June 21, 1900.

**Glasgow.**—Ferry Steamer with an Elevating Deck. Illustrated description of a vessel for service in Glasgow harbor, with an elevating deck, so that the deck may be brought to the same level as the quay at all stages of the tide. 1000 w. Sci Am—April 7, 1900.

**Great Lakes.**—Car Ferries of the Great Lakes of America. Illustrated description. 2400 w. Eng, Lond—Feb. 5, 1897.

Car Ferrying on the Great Lakes. Waldon Fawcett. Illustrates and describes some of the boats used in this service, giving an account of their efficiency. 1500 w. Loc Engng—Dec., 1899.

The Car Ferryboat "Pere Marquette." Illustrated description of a boat built expressly for this route between Ludington, Mich., and Manitowoc, Wis. 500 w. Ry & Engng Rev—July 30, 1898.

**History.**—Origin and Development of the Ferryboat. A. E. Stevens. Calls attention to the conditions which have made New York pre-eminent in the specialty of ferryboats, and briefly describes some of the early designs. Ill. 1100 w. Marine Engng—April, 1897.

The History of Ferryboats (Le Bac à Travers les Ages). Daniel Bellet. Illustrated popular article. 1200 w. La Nature—Dec. 17, 1898.

**Ice-Breaking.**—See **ICE BREAKER.**

**New York, 1850.**—The Harbor Ferryboats of 1850. Reprint of an article appearing in the "N. Y. Herald" on July 2, 1850, giving a correct list of the boats and the companies operating, and interesting facts of vessels in N. Y. harbor. 2000 w. Naut Gaz—July 26, 1900.

**Pa. R. R., New York.**—Pennsylvania R. R. Ferryboats at New York. Illustrated detailed description of these fine boats. 600 w. Ry & Engng Rev—April 7, 1900.

Speed Trials of a Screw Propelled Ferryboat. F. L. Du Bosque. Trials made with the screw-propelled ferryboat "Cincinnati" are described. 1700 w. Eng News—Nov. 19, 1896.

The New Pennsylvania Railroad Ferryboats. Illustrated description of the new double twin-screw ferryboats built for the new service of this road. 1000 w. Sea—July 29, 1897.

**"Pere Marquette."**—See **Great Lakes.**

**St. Louis, Mo.**—Recent Improvements in Mississippi River Ferryboats at St. Louis. William H. Bryan. A statement is given of the conditions of service required with review of types used in the past, and illustrated description of the latest boats. 3300 w. Marine Engng—Aug., 1898.

**San Francisco.**—See **Berkeley.**

**Screw.**—Coal Economy of Screw Ferryboats. E. A. Stevens. Treats of the type with one screw at each end, and takes four boats as examples, giving the conclusions reached. 1200 w. Stevens Ind—April, 1900.

**U. S., Western River.**—New Type of Western River Ferryboat. William H. Bryan. From the official proceedings of the St. Louis Railway Club. An illustrated description of the "Andrew Christy," with review of types and progress. 4000 w. Naut Gaz—Sept. 27, 1900.

### FERRY BRIDGE.

Transfer Bridges. Illustrated description of a suspended ferry, with a statement of its advantages. These bridges are from designs of Messrs. Arnodin and Palacio. Serial. Engng—Feb. 23, 1900.

**Rouen.**—The New Bridge at Rouen. From "La Nature." Illustrated description of a trans-shipping bridge. 900 w. Sci Am Sup—Dec. 2, 1899.

**Tunis.**—The Transporter at Bizerte, Tunis (Bizerte et son Pont Transbordeur). G. Leugny. An illustrated account of the suspension tramway ferry over the entrance to the harbor of Bizerte in Tunis. 1500 w. Rev Tech—July 25, 1899.

Trolley Bridge at Bizerta, Tunis. Illustrates and describes what is known in France as the "transbordeur" type of bridge of the Arnodin's system. 1500 w. Ry & Engng Rev—Dec. 2, 1899.

### FERRY HOUSE.

**Pennsylvania R. R., New York.**—A Handsome Metal Ferry House. Illustrated description of the building erected by the Pennsylvania Railroad Company at Twenty-third street and Eleventh avenue, New York. It is of iron construction and covered with sheet metal inside and out. 900 w. Met Work—Sept. 11, 1897.

**San Francisco.**—New Ferry House at San Francisco, Cal. Illustrated detailed description of new structure being built at the foot of Market St. to accommodate heavy suburban traffic and the main line traffic of the railways. 1800 w. Eng News—July 29, 1897.

### FERRY SYSTEM.

**Glasgow.**—The Ferry System at Glasgow Harbor. Describes the system, dealing only with the cross-ferry steamers, and with the up-and-down Clutha steamers traversing three or four miles of the harbor at a uniform fare of 1d. per passenger. Ill. 3000 w. Engng—Dec. 24, 1897.

### FIBRE.

See also **FABRIC; TEXTILE.**

**Rhea.**—The Preparation of Rhea Fibre for Textile Purposes. Perry F. Nursey. Read before the Society of Engineers. The experiences of the writer with this product, supplemented by the work of others. Serial. Ind & Ir—Nov. 11, 1898.

**U. S. Industries.**—The Possible Fibre Industries of the United States. Charles Richards Dodge. Shows the importance of these industries as new sources of national prosperity, outlining the difficulties of the problem and the points of vantage. Ill. 5500 w. Ap Pop Sci M—Nov., 1898.

### FILE.

Making Files. From "Modern Machinery." Describes the making of files, and the difficulties met in endeavoring to have the work done mechanically, and the device which has proved successful. 2400 w. Bos Jour of Com—May 14, 1898.

The Manufacture of Files (Die Herstellung der Feile). Illustrated account of the process of file making, including both hand and machine cutting, with illustrations of German file-cutting machines. 3000 w. Stahl und Eisen—Aug. 1, 1898.

**Tools Made From.**—Making Chisels and Other Tools from Files. Walter J. May. Suggestions as to the proper treatment to secure good tools. 1400 w. Prac Engr—Oct. 12, 1900.

### FILING.

See also **CATALOGUE; DRAWING-ROOM; INDEX.**

**Pamphlets.**—Pamphlet Filing. William H. Bryan. Describes and illustrates a very convenient method of preserving special trade literature, such as catalogues, cards, circulars, reports of tests, etc. 1400 w. Jour of Assn of Eng Soc—Nov., 1895.

### FILTRATION.

See also **FACTORY WASTE; RIVER POLLUTION; SEWAGE DISPOSAL; WATER PURIFICATION; WATER SUPPLY; WATER WORKS.**

A Discussion on Filtration. Report of discussions by George W. Fuller and Allen Hazen on sand and mechanical filtration, and the turbidity of streams. 900 w. Eng Rec—Feb. 11, 1899.

Filtration and the Water Supply of Cities and Towns. Deductions drawn from investigations made at various places to determine whether the methods applied to large water plants, afford the desired protection. 1300 w. Sci Am—Nov. 12, 1898.

Filtration of Public Water Supplies. Allen Hazen. The possibilities of purification of water supply by this method are greater than have hitherto been generally supposed. The conditions for effective filtration are stated and defects in practice are pointed out. 4500 w. Pav & Mun Engng—June, 1896.

Mechanical Analysis of Filtering Materials. Allen Hazen. Describes the manner of testing and methods of comparison, the record of results, and all details of the work. 1800 w. Eng Rec—Jan. 23, 1897.

The Benefit of Water Filtration—Illustrative Examples. John W. Hill. Abstract of address before the Arapahoe and Denver Medical Society. Explains the method which nearly fifty years of use in Europe has proved to be practical and efficient. 1500 w. San—June, 1898.

The Filtration of Water. Edmund B. Weston. Read before the National Convention of Mayors and Councilmen, at Columbus, O. Discusses and describes the purification of water by sand filtration, and by mechanical filtration aided by the application of chemicals. 4800 w. Munic Engng—Oct., 1897.

The Present Status of Water Filtration. Paper of George W. Fuller read before the American Water Works Assn., reviewing the conditions found in many places in America, and their influence on purification work. 2000 w. Eng Rec—May 27, 1899.

Water Filtration. Churchill Hungerford. An explanation of why properly constructed filter beds improve with age. Ill. 1000 w. Sci Am—July 31, 1897.

**Albany, N. Y.**—Filtration Plant for the Albany Water Supply. Illustrated description of this plant, designed and erected for the removal of typhoid bacteria. 2200 w. Sci Am—March 24, 1900.

Operation of the Water Settling and Filtration Plant at Albany, N. Y. Gives results of nearly a year's operation of this plant. 1700 w. Eng News—Aug. 9, 1900.

Progress on the Water Purification Plant at Albany, N. Y. An illustrated account of the present state of this interesting piece of engineering work. 1000 w. Eng News—Oct. 20, 1898.

Slow Filtration at Albany. A discussion of the results of the operation of the covered sand filters, by G. I. Bailey, G. C. Whipple, and G. W. Fuller. 3900 w. Eng Rec—April 7, 1900.

The Albany Filtration System. Describes the 15,000,000 gallon covered sand-filter plant to be built at Albany, N. Y. 1500 w. Eng Rec—Jan. 29, 1898.

The Albany Water Filtration Plant. Allen Hazen. Gives an historical account of the supply, a description of the plant, and information relating to its operation and construction. Ill. 13600 w. Pro Am Soc of Civ Engs—Nov., 1899.

The Albany Water Filtration Plant. Allen Hazen. An informal talk at the Syracuse convention. Reviews the history of the supply, describes the plant, its construction and operation. Ill. 11000 w. Jour N E Water Wks Assn—June, 1900.

The Albany Water Filtration Plant. Continued discussion of paper by Allen Hazen. 8000 w. Pro Am Soc of Civ Engs—April, 1900.

The Albany Water Filtration Plant. Discussion of paper by Allen Hazen. 11500 w. Pro Am Soc of Civ Engs—Feb., 1900.

The New Sedimentation Basin and Masonry Covered Sand Filter Beds at Albany, N. Y. An illustrated description with specifications for filtering material, of what will be the largest water-purification plant in the United States. 1600 w. Eng News—Feb. 10, 1898.

The Regulation of the Albany Filters. An explanation of the methods adopted at this plant to combine the advantages of both the British and German methods of operating slow-sand filters. 900 w. Eng Rec—Dec. 9, 1899.

**Allegheny.**—See Crib.

**American.**—On American Filters and Filtration Methods, Particularly on the Rapid Filter (Ueber Amerikanische Filter und Filter-Methoden, insbesondere über die Schnell-Wasserfilter). Wm. Paul Gerhard. A general review of American methods of filtering water for city purposes on a large scale. Serial. Gesundh Ing—July 15, 1900.

**Am. Soc. of Civ. Eng. Discussion.**—Filtration of Water for Public Use. By Rudolph Hering, Philip H. Palmer, and E. Perrett. An informal discussion of the processes in use, their sanitary effect, cost, and reliability. 8300 w. Pro Am Soc of Civ Engs—Aug., 1900.

The Filtration of Water for Public Use. Résumé of a discussion at the London meetings of the Am. Soc. of Civ. Engs. 4000 w. Jour Gas Lgt—July 24, 1900.

Filtration of Water for Public Use. Continued informal discussion. 8000 w. Pro Am Soc of Civ Engs—Oct., 1900.

**Ashland, Wis.**—Covered Sand Filter at Ashland, Wis. William Wheeler. A statement of the conditions, description of filter, cost, cleaning and care, operation. Followed by discussion. Ill. 10000 w. Jour N Eng Water Works Assn—June, 1897.

**Automatic Controller.**—An Automatic Controller or Regulating-Weir. Illustrated description of an apparatus enabling a mechanical filter to be regulated with unusual closeness. 800 w. Eng Rec—Nov. 25, 1899.

**Bacterial Test.**—Bacterial Test of a Mechanical Filter at Louisiana, Mo. Gives results of a filter which is treating water drawn from the Mississippi River. Ill. 1800 w. Eng News—Nov. 16, 1899.

Bacterial Test of Mechanical Filters at Lorain, O. Taken from the "Ohio Sanitary Bulletin." Valuable information regarding the bacterial efficiency of mechanical filtration, with editorial comment. 5800 w. Eng News—Oct. 28, 1897.

**Bed Dimensions.**—Economical Dimensions of Rectangular Filter Beds. John H. Gregory. Formulas and diagrams of value in making arrangements of filters. 500 w. Eng News—Oct. 11, 1900.

**Berwyn, Pa.**—A Sand Filter Plant. J. W. Ledoux. Full paper with discussion. Illustrated description of a plant constructed for the Berwyn Water Co., having a capacity of one and one-half million gallons per day. 4200 w. Pro of Engs' Club of Phila—March, 1899.

The Berwyn Sand-Filter. Illustrated description of a sand-filter plant of 1,500,000 gals. daily capacity, constructed to be operated in connection with a mechanical filter plant, to determine the relative advantages of the two for the given conditions. 1200 w. Eng Rec—March 11, 1899.

The Slow Sand Filtration Plant of the Berwyn, Pa., Water Co. J. W. Ledoux. Abstract of a paper read before the Engs' Club of Phila. Illustrates and describes a plant having a nominal capacity of 1,500,000 gals. per day. 1400 w. Eng News—March 9, 1899.

**Cardiff, Wales.**—Water Filtration at Cardiff, Wales. Describes three open sand filters. 1200 w. Eng Rec—July 2, 1898.

**Cholera Epidemic.**—The Purification of Surface Water by Sand Filtration During Cholera Epidemic (Grundsätze für die Reiningung von Oberflächenwasser durch Sandfiltration zu Zeiten der Choleragefahr). An abstract of the German government report with extracts showing the conditions to be maintained and the precautions necessary. 2500 w. Gesundheits-Ingenieur—April 15, 1899.

**Cincinnati.**—Cincinnati and Its Filtration Report. A statement of the conclusions reached as regards the English and American filtration systems. 450 w. Fire & Water—April 29, 1899.

Report of the Water Purification Experiments at Cincinnati, O. A summary of work which was concluded at Cincinnati in January. Advises the adoption of the American system of clarification and purification. 2500 w. Eng News—March 9, 1899.

The Cincinnati Filtration Experiments. A review of experiments lasting about 8 months to determine the best method of filtering a river water carrying at times large quantities of fine silt. 5200 w. Eng Rec—March 11, 1899.

The Mechanical Filtration of Water. A review of experimental results obtained at Cincinnati by G. W. Fuller. 1800 w. Eng Rec—Oct. 7, 1899.

**Coagulant Patent.**—Another Court Decision Regarding the Use of a Coagulant in Mechanical Filters. Decision rendered in the United States by Judge Coxe regarding the use of alum or other coagulants in mechanical filters being an infringement of the Hyatt patent. 1200 w. Eng News—Sept. 30, 1897.

**Cost.**—The Cost of Filtration. Considers the estimates recently sent in by the filtration commission of Pittsburg, Pa., with a few words on the experience in Cincinnati. 1500 w. Fire & Water—April 29, 1899.

**Crib, Allegheny River.**—Filter Cribs in the Allegheny River, near Pittsburg, Pa. Describes cribs built with the object of removing matter carried in suspension by the river. Ill. 1200 w. Eng News—April 28, 1898.

The Filter Crib of the Allegheny Water Works. Illustrated description, with information concerning the construction and working. 900 w. Eng News—May 17, 1900.

**Davenport, Ia.**—Clear Water from the Mississippi. Illustrated description of the system at Davenport, Ia., by means of which the water is rendered clear and potable. 900 w. Fire & Water—Sept. 9, 1899.

**Domestic.**—Domestic Filtration of Water. A caution against so-called self-cleansing filters, and precautions needed in all water filtering on a small scale for domestic supply. 1300 w. Ind Engng—Nov. 9, 1895.

**East Providence, R. I.**—Test of a Mechanical Filter, East Providence, R. I. Gives the results of a run of several months under every day conditions of a filter of 500,000 gals. capacity. 1200 w. Eng Rec—July 1, 1899.

Test of a Mechanical Filter. Edmund B. Weston. Illustrates and describes the results of a three-months' test of filter recently installed for the East Providence, R. I., Water Company. 3000 w. Pro Am Soc of Civ Engs—Sept., 1899.

Test of Mechanical Filter at East Providence, R. I. Edmund B. Weston. Gives results that were obtained during a test of 110 days of a filter for the East Providence Water Co. 1000 w. Eng News—July 13, 1899.

The East Providence Filter. Illustrated description of a mechanical filter plant, with a summary of the results of tests made during five months' regular operation. 800 w. Eng Rec—Oct. 21, 1899.

See also **Providence.**

**Efficiency.**—Some of the Factors Which Determine the Efficiency of Filters for Water Purification. James H. Fuertes. Description of European methods of solving the problem of efficiency. Theoretical considerations affecting the question systematically presented, in connection with actual mechanisms employed. Serial. Eng Rec—July 25, 1896.

**Elgin, Ill.**—Filtration at Elgin, Illinois. Illustrates and describes a very complete system. 600 w. Fire & Water—July 23, 1898.

**Elmira, N. Y.**—Mechanical Filtration. W. P. Mason. Read at meeting of the Am. Waterworks Assn. Notes on the experiments made at the Elmira filtering plant by order of the U. S. Courts. 1200 w. Munic Engng—July, 1898.

**Far Rockaway, N. Y.**—Iron Removal from Ground Water at Far Rockaway by Slow Sand Filtration. Illustrates and describes the apparently efficient plant of the Queens County Water Company. 1200 w. Eng News—April 12, 1900.

**Feed-Water.**—See FEED-WATER—**Filter; Grease Extractor.**

**Germany.**—An Improved Method of Filtration. Describes a system in operation in several cities of Germany that should be of interest to those struggling with the problem of purifying river water on a large scale for household and manufacturing purposes. 1400 w. Cons Repts—Feb., 1897.

The Filtration of Water in Germany. M. L. Holman. Describes German practice in filtration, giving only those features which pertain directly to construction and operation. Discussion. Ill. 10500 w. Jour Assn of Engng Socs—July, 1898.

The Operation of Water Filters in Germany. Translation of the official regulations for the operation of sand filters during times of cholera which are also advised for regular service. 1600 w. Eng Rec—June 10, 1899.

**Graded.**—Graded Filters for Large Quantities of Water (Filtres Degrossisseurs pour Grandes Masses D'Eau). A. Puech. An illustrated description of filters in which the water passes successively through beds of gravel which at first is rough and grows finer and finer. 3400 w. Mem d l Soc d Ing Civils de France—Nov. 10, 1900.

**Hyatt Patent.**—See **Coagulant Patent.**

**Icy Beds, Cleaning.**—The Cleaning of the Open Filters at Hamburg in Time of Frost (Die Reinigung der Hamburger Offenen Sandfilter in der Frostzeit). An illustrated description of the Mager Scoop, by means of which the Hamburg filter beds are effectively cleaned when covered with ice. 6000 w. Gesundheits Ingenieur—May 31, 1897.

See also ICE ELEVATOR.

**Imperfect.**—Is Filtration a Perfect Safeguard? An editorial negative answer is given to the question propounded. The contingency that at times filters will fail to act, is asserted as ever existing. Examples of imperfect filtration are cited. 2000 w. Ind Eng—July 18, 1896.

**Intermittent Downward.**—The Purification of Water and Sewage by Intermittent Downward Filtration. Arthur N. Talbot. The system compared with other methods of water and sewage purification has proved its value. Discussion. 2200 w. Tenth An Rept of Ill Soc of Eng & Surv—1895.

**Iron Coagulant.**—Iron as a Coagulant for Mechanical Filters. Review of a paper by Dow R. Gwinn before the Am. Waterworks Assn., on the methods used for coagulation at Quincy, where the raw water does not have sufficient carbonate of lime to allow the use of sulphate of alumina. 1000 w. Eng Rec—May 19, 1900.

**Jersey City, N. J.**—Mr. Allen Hazen's Report Upon the Jersey City Water Supply. The conditions of obtaining a good water supply for Jersey City make the problem one of such difficulty that this report, dealing with these conditions, is of more than ordinary interest. The practicability of a filtered water supply is specially discussed and is viewed favorably, and the cost of such a plant is placed at $1,235,000. 1800 w. Eng Rec—March 28, 1896.

The Feasibility and Cost of Purifying Badly Polluted Water. Editorial review of the report made by Mr. Allen Hazen, for Noyes & Hazen, of Boston, on the feasibility of a system of filtration of water for Jersey City water supply and an estimate of its cost. 2400 w. Eng News—April 2, 1896.

**Jewell Mechanical.**—The Jewell Mechanical Water Filter Plant at Wilkesbarre, Pa. Very full illustrated description of this system of filtration, and of the plant. 4400 w. Eng News—May 21, 1896.

**Lambertville, N. J.**—Sand Filter Beds for the Waterworks of Lambertville, N. J. Churchill Hungerford. Illustrated description. 1400 w. Eng News—July 2, 1896.

**Lawrence, Mass.**—A Few Words Upon Water Filtration. H. W. Clark. Some results at Lawrence, Mass., are given. 2000 w. Jour N Eng Water Wks Assn—Sept., 1899.

Recent Experience with the Lawrence Filter. A description of the clogging of part of an open sand filter and the method of repairing the trouble, which was in the under drains. 2000 w. Eng Rec—Nov. 25, 1899.

Alum Feeder for the Filtration Plant at Lexington, Ky. Illustrations and description. 700 w. Eng News—Jan. 14, 1897.

Filtration. S. A. Charles. A description of the filter plant at Lexington, Ky. The mechanical filter in use there is said to be entirely satisfactory. 2400 w. Fire & Water—Nov. 14, 1896.

Filtration at Lexington, Ky. Decaying matter accumulating in the reservoirs made filtration necessary. A mechanical filter is used with success. The aerating feature is conspicuous. Cost given. 900 w. Fire & Water—May 1, 1897.

My Experience in Filtration and Aeration. S. A. Charles. The writer's experience at Lexington, Ky., greatly favors the use of mechanical filters, with aeration. 1800 w. Fire & Water—June 18, 1898.

See also ICE ELEVATOR.

**Little Falls, N. Y.**—The Little Falls Sand Filter. Illustrated description of a one-acre open sand filter costing but $11,750. 1200 w. Eng Rec—June 4, 1898.

The Slow Sand Filtration Plant for Little Falls, N. Y. Describes a plant containing some unique features, now being built for the city named. 1600 w. Eng News—June 22, 1899.

**London.**—The Efficiency of the London Filters. Summary of official data indicating a bacterial purification of over 99 per cent. in every case. 800 w. Eng Rec—May 28, 1898.

**Louisville Experiments.**—Lessons from the Louisville Experiments on Water Purification. Editorial on the value of experimental work, the careful investigations of mechanical filters at Louisville, and similar work at other places. 2800 w. Eng News—Nov. 10, 1898.

The Louisville Experiments with Mechanical Filtration. Gives the leading results of two years' experiments with different methods of purifying a silt-bearing river water. 2400 w. Eng Rec—Dec. 3, 1898.

**Marlborough, Boston.**—Surface Water Filters, Marlborough, Mass. Describes filters for the run-off of a well-populated area of 1.8 sq. miles, draining into a large reservoir. Also editorial on the purification of a storm water. 1500 w. Eng Rec—Oct. 6, 1900.

The Marlborough Brook Filter Beds; Metropolitan Water Supply for Boston and Vicinity. Brief account of these beds, the cost of construction, etc. 1000 w. Eng News—Aug. 30, 1900.

**Mechanical.**—Mechanical Filtration. Results of experiments performed by Mr. Edmund B. Weston, assistant city engineer in charge of Providence (R. I.) water department. The results of comparison between natural and mechanical filtration are decidedly favorable to the latter. A variety of filtration appliances were tested. 2000 w. Fire & Water—April 25, 1896.

Mechanical Filtration. Editorial discussion of mechanical filtration as carried out in the United States. 1500 w. Engng—Sept. 11, 1896.

Mechanical Filtration. Edmund B. Weston. On the purification of water supplies by the use of sulphate of alumina in connection with the subsidence gravity system of mechanical filtration. Outlines the process, describing in detail and giving illustrations. Also discussion. 11000 w. Jour N. E. Water Wks Assn—June, 1900.

The Efficiency of Mechanical Filtration. A review of recent criticisms of the operation of a mechanical filter in East Providence, R. I. 2000 w. Eng Rec—March 10, 1900.

See also **Sand vs. Mechanical.**

**Missouri.**—Water Supply and Purification Works at Parkville and Bethany, Mo. Wynkoop Kiersted. Illustrates and describes the sedimentation and mechanical filtration plant at Parkville, Mo., and the new intake crib, siphon, filter bed and clean water well at Behtany, Mo. 1600 w. Eng News—Dec. 14, 1899.

**Mount Vernon, N. Y.**—Sand Filtration at Mount Vernon, N. Y. John S. Chester. Remarks concerning the construction and operation of this filter. Ill. 1200 w. Fire & Water—Jan. 1, 1898.

**Norfolk, Va.**—The Norfolk Mechanical Filter Plant. Review of a paper by E. B. Weston before the Am. Water Wks. Assn. on an 8,000,000-gal. plant for the removal of color and turbidity from a swampy water. The coagulation and sedimentation take place in a reservoir outside the filter house, instead of in the sedimentation chambers of each filter tank. 1800 w. Eng Rec—May 19, 1900.

**Nyack, N. Y.**—Slow Sand Filtration, Nyack, N. Y. Illustrated description of the details of a pair of open filter beds, with a combined area of ½ acre. 800 w. Eng Rec—April 28, 1900.

**Ottumwa, Iowa.**—The Ottumwa, Iowa, Filters. General description of plant. 600 w. Eng Rec—May 9, 1896.

**Paris.**—Filtration of River Supplies. Illustrated description of water filtration at Paris. 1300 w. Fire & Water—Sept. 5, 1896.

**Philadelphia.**—A Practical Plan for Sand Filtration in Philadelphia. Allen Hazen. Deals with the possibilities of filtration, which are considered in relation to present sources of supply, sites for filters, system of distribution, reservoirs, consumption of water, nature of proposed filtration, population, magnitude of supply, cost estimates, with conclusions favorable to the practicability of the proposed system. 6500 w. Jour Fr Inst—Nov., 1896.

Filtration of the Philadelphia Water Supply. Review of the movement in Philadelphia for better water and of the report of Mr. Allen Hazen upon a system of filtration of the supply. 1100 w. Eng News—Oct. 1, 1896.

The Filtration of City Water Supplies, with Special Reference to the Needs of the City of Philadelphia. An argument for the filtration of water drawn from the Schuylkill River for domestic supply, by Edwin F. Smith; with discussion by A. K. Leeds, L. Y. Schermerhorn, J. C. Trautwine and others. 6000 w. Jour Fr Inst—May, 1896.

The Improvement of the Philadelphia Water Supply. Illustrated description of the filters recommended by the expert commission of 1899. 1000 w. Eng Rec—Oct. 7, 1899.

The Problem of Water Purification for the City of Philadelphia. P. J. A. Maignen. Notes the increasing daily consumption of water, and the urgent need of filtration; describes a system of sand filtration and its efficiency. Discussion. 10800 w. Pro of Engs' Club of Phila—March, 1899.

**Pittsburg.**—Filtration at Pittsburg. Extracts from a report of the committee appointed to investigate methods of filtration. Considers sand and mechanical filtration. 1800 w. Fire & Water—April 22, 1899.

See also **Crib, Allegheny River; WATERWORKS—New England Association.**

**Pittsburg Commission.**—The Report of the Pittsburg Water Filtration Commission. An abstract of a report as yet unpublished, favoring a combined system of sedimentation and slow sand filtration, and of a thorough meter system to lessen the waste. 5500 w. Eng News—Feb. 23, 1899.

**Pittsburg Experiments.**—Water Filtration Experiments, Pittsburg, Pa. A review of the experiments begun in June, 1897, to determine the best method of supplying pure water to Pittsburg. Gives results of experiments with sand and mechanical filters and sedimentation basins and similar data. 5600 w. Eng Rec—Feb. 11, 1899.

**Poughkeepsie.**—The Operation of a Slow Sand Filter. Charles E. Fowler. Experiences and facts in regard to the first sand filter in America, located at Poughkeepsie, N. Y., to render the water of the Hudson fit for domestic use. Discussion. 15000 w. Jour of New Eng Waterworks Assn—June, 1898.

**Providence, R. I.**—The Providence Filtration Experiments. Reprinted from Appendix to the Annual Report of the Rhode Island State Board of Health. The experiments were under the direction of the city engineer, J. Herbert Shedd, and occupied a period of nearly one year. Results and data are given. 2800 w. Eng Rec—April 11, 1896.

See also **East Providence.**

**Quincy, Ill.**—A New Coagulant for Mechanical Filters. Describes the plant at Quincy, Ill., where the iron process is used with satisfactory results. 1000 w. Eng Rec—May 27, 1899.

**Reading, Pa.**—Filtration at Reading. Gives an account of the sources of the supply, and the steps being taken to provide a filtration plant. 1400 w. Fire & Water—May 28, 1898.

**Ripley, N. Y.**—See **WATERWORKS.**

**Russian.**—A Russian Report on Mechanical Filters. Review of the report made to the Moscow city officials by N. P. Simin, advising the adoption of mechanical filters, and advancing suggestions for their improvement. 800 w. Eng Rec—Jan. 20, 1900.

A Russian View of Mechanical Filtration. Nicholas P. Simin. Gives recommendations for improvements which have been hinted many times by engineers, although never before printed. 800 w. Eng Rec—March 19, 1898.

**St. Louis.**—Experiments in Water Filtration at St. Louis. Information in response to request, with copy of report of John F. Wixford, chemist of the water department. 2300 w. Munic Engng—Aug., 1897.

**Sand.**—Sand Filtration. Allen Hazen. Report to the Women's Health Protective Assn. concerning a practical plan for sand filtration as a means of securing a better water supply for the city of Philadelphia. 6000 w. San—Nov., 1896.

Sand Filtration of Public Water Supplies. R. S. Lea. Read before the Canadian Soc. of Civ. Engs. Describes the circumstances under which water supplies become polluted, and the nature of the pollution; also the process of purifying the water in large quantities by sand filtration. 13500 w. Adv Proof—Jan. 19, 1899.

Some Facts about Slow Sand Filtration of Water. Mrs. Percy Frankland. The fluctuations in the quality of filtered water as indicated by systematic bacterial examinations are noted, with conspicuous examples; and while effecient filtration is of the highest sanitary importance, it is shown that this does not render us independent of the nature of a water supply. 1300 w. Eng News—July 30, 1896.

The Biology of Sand Filtration. Ad. Kemna. Abstract of a paper read before the Engineering Conference of the Inst. of Civ. Engs., England, with discussion. Shows the progress and complications in sand filtration. 3800 w. Jour Gas Lgt—June 20, 1899.

The Purification of River Water Supplies. Allen Hazen. Especially devoted to a description and illustration of modern sand filters, showing details of construction and demonstrating the success which has attended their use. 2500 w. Eng Mag—May, 1898.

**Sand vs. Mechanical.**—Relative Applicability of Sand and Mechanical Filters. George W. Fuller. Outlines the work and the evidence now available upon these two methods of purification, and emphasizes the necessity of studying each supply. Also discussion. 9000 w. Jour N Eng Water Wks Assn—Sept., 1899.

**Sewage.**—See **FACTORY WASTE; SEWAGE DISPOSAL.**

**Somersworth, N. H.**—A New Covered Filter Bed for the Water Works of Somersworth, N. H. Drawings and description of a slow sand filtration plant covered with a masonry roof. 1600 w. Eng News—Dec., 8, 1898.

The Somersworth, N. H., Sand Filters. Illustrated description of covered sand-filters of half-an-acre effective area. 1100 w. Eng Rec—Aug. 27, 1898.

**Test.**—Test of a Mechanical Filter. Continued discussion of a paper by Edmund B. Weston. 2700 w. Pro Am Soc of Civ Engs—Jan., 1900.

Test of a Mechanical Filter. Discussion of the paper by Edmund B. Weston. 4000 w. Pro Am Soc of Civ Engs—Dec., 1899.

**Vincennes, Ind.**—Mechanical Filtration, Vincennes, Indiana. Illustrated description of a plant of 2,000,000 gals. daily capacity, containing a number of new features for controlling the operations and washing the sand. 1800 w. Eng Rec—May 5, 1900.

Water Purification at Vincennes, Ind. Illustrated description of this plant, with statement of the conditions to be met. 2500 w. Eng News—May 3, 1900.

**Washington, D. C.**—Filtration of the Washington Water Supply. Reviews the experiments made to ascertain the best method of removing the high bacteria and turbidity characteristics of the Potomac River water, which led to a recommendation to build a mechanical filter plant. 3000 w. Eng Rec—May 12, 1900.

**Well Water.**—Protection to Well-Water Supply. H. Etheridge. Illustrates and describes a device for straining water filtered through sand, and thus overcoming the destructive effects on machinery. 900 w. Fire & Water—May 12, 1900.

**Wilkesbarre, Pa.**—See **Jewell Mechanical.**

**Wilmington, Del.**—Water Purification at Wilmington, Delaware. Illustrated description of filtration plant of a rated capacity of 10,000,000 gallons per day. The upward flow system is used. 3000 w. Eng News—Sept. 8, 1898.

**Zürich.**—Water Filtration, Zürich, Switzerland. James H. Fuertes. Illustrated account of the filter beds and a statement of the work they accomplish. 1100 w. Eng Rev—April 22, 1899.

## FIRE.

See also **FIREPROOF CONSTRUCTION.**

**Burnley, Eng.**—See **FIREPROOF CONSTRUCTION—Steel Buildings.**

**Coal Mine.**—The Fire in the Consolidated Cleophas Mine in Upper Silesia, March 3, 1896 (Der Brand in der Konsolidierten Cleophas Grube in Oberschlesien am 3 März 1896). With an account of the successful use of steam and water for subjugating a stubborn fire in a gaseous mine. 2500 w. Glückauf—Feb. 12, 1898.

See also **COAL MINE FIRE.**

**Electric Power House.**—Cause of Fire at Union Traction Company's Power House, Philadelphia. Report of William McDevitt to the Philadelphia Fire Underwriters' association. 1000 w. W Elect'n—May 1, 1897.

**Flour Mills.**—Fires in Flour Mills During 1895. Despite the favoring conditions resulting from depression in trade, which increases the moral hazard, these statistics show no material increase in mill fires for the year. A table of fires for 1894 and 1895 is presented, with other interesting details. 1600 w. Am Miller—April, 1896.

**Forest, New Jersey.**—Forest Fires in New Jersey. John Gifford. Causes, the removal of which is imperative, and the effects of these fires upon timber, soil, seeds and game. Methods of fighting these fires when once started. 3000 w. Jour Fr Inst—Aug., 1896.

**Hoboken Piers.**—Hoboken's Holocaust. An account with editorial comment, of the terrible fire that destroyed the North German Lloyd's piers and vessels. 5000 w. Fire & Water—July 7, 1900.

Ships and Docks of the North German Lloyd Steamship Co. Destroyed by Fire. An illustrated account of the destructive fire of June 30, 1900. 700 w. Marine Engng—Aug., 1900.

The Burning of the North German Lloyd Steamships and Docks, Hoboken, N. J. An illustrated account of this disaster, with editorial comment. 3000 w. Sci Am—July 14, 1900.

The Lessons of the New York Harbor Fire. Editorial briefly describing the conditions at the fire which destroyed the piers and steamships of the N. German Lloyd Co., at Hoboken, and commenting on steps needed to avert a repetition of the catastrophe. 2200 w. Eng News—July 14, 1900.

**Home Insurance Building.**—See **FIREPROOF CONSTRUCTION.**

**London.**—The Cripplegate Fire and Its Lessons. Editorial on the reported investigations of a committee appointed to inquire into the possibilities of improvement in the burned district, in order to prevent a repetition of the catastrophe. 1800 w. Engng—Jan. 28, 1898.

The Cripplegate Fire. Reports the evidence of the witnesses of the architectural profession regarding the class of buildings, and the use to which they were put, fire protection needed, etc. 5800 w. Engng—Dec. 24, 1897.

The Great City Fire. Editorial on the fire protection of London and the necessity of fire prevention. 1900 w. Engng—Nov. 26, 1897.

**Paris Bazaar.**—The Fire at the Paris Bazaar. Additional information of this catastrophe, with illustrations of site, buildings, plans, etc. 1800 w. Engng—May 14, 1897.

The Paris Bazaar Fire. Edwin O. Sachs. Read at meeting of the London Architectural Assn. A careful discussion of this subject and of fire hazards in general, with the remedy needed to secure safety for large gatherings. Followed by discussion. 11000 w. Builder—Oct. 30, 1897.

The Lesson of the Paris Fire. Points out the great risk of temporary buildings, and the danger of using rooms unsuited in plan for bazaars, or public entertainments. 1600 w. Builder—May 8, 1897.

**Pittsburg.**—See **FIREPROOF CONSTRUCTION.**

**Zürich Telephone Exchange.**—See **TELEPHONE EXCHANGE—Zürich Fire.**

## FIRE ALARM.

See also **ELECTRIC SIGNAL.**

A Great Advance in Fire-Alarm Telegraph Protection. J. W. Aydon. Read before the Assn. of Fire and Police Telegraph Supts. and Municipal Electricians. Describes a recent advance in methods which make the outbreak of a fire and the sounding of the alarm simultaneous. 1500 w. Elec Rev, N. Y.—Aug. 24, 1898.

Some Requisities of a Perfect Fire-Alarm Box. James W. Johnson. Read before the Illinois Firemen's Assn. Points out a few of the essential features that should be embodied in all boxes to render them reliable and efficient under the many and varying conditions. 1200 w. W Elec—March 20, 1897.

Test of Fire-Alarm Boxes. Report of the findings of the commission selected to test the fire-alarm boxes of Chicago, with brief editorial comment. 2500 w. W Elec—Feb. 13, 1897.

The Evolution of the Fire Alarm Telegraph. P. R. Colpitt. Read before the Maritime Electrical Assn. at Halifax. Describes the system as it is to-day, and the various stages of improvement by which it reached the present perfection. 2500 w. Can Elec News—May, 1899.

What Are the Requirements of a Fire Alarm System in Medium-Size and Large Cities (Welche Anforderungen sind an eine Feuermelde-Einrichtung in Mittleren und Grösseren Städten zu Stellen)? C. v. Moltke. A paper read before the Verband Deutscher Elektrotechniker containing a general discussion of the subject. 1100 w. Elektrotech Zeitschr—June 21, 1900.

**Accumulators.**—What Are the Increased Benefits of the Storage Battery for Fire Alarm Systems? Morris W. Mead. Read at the Syracuse, N. Y., meeting of the International Assn. of Fire Engineers. Considers the advantage of the storage battery over the gravity or other primary cell, and the storage battery controlling board and its special adaptation to fire telegraph service. 1200 w. Fire & Water—Aug. 26, 1899.

See also **ACCUMULATOR—Fire Alarm.**

**Baltimore.**—The Fire Alarm Telegraph System of Baltimore, Md. C. B. Fairchild. Illustrated description. 1000 w. Elec Eng, N. Y.—Sept. 29, 1896.

**Battery.**—See **ELECTRIC CELL—Gravity Alarm.**

**History.**—Historical Sketch of the Fire Alarm Telegraph. Adam Bosch. The history of the development of this branch of telegraph work, from 1845 to the present. 7000 w. Trans Am Inst of Elec Engs—June and July, 1897.

The Evolution of the Fire-Alarm Telegraph. Historical Review. Ill. Serial. Fire & Water—Jan. 1, 1898.

The Fire Alarm Telegraph, General History and Latest Improvements. William Brophy. A general review of progress from 1845 to date. 5300 w. Fire & Water—Sept. 26, 1896.

**Los Angeles.**—Fire Alarm and Police Telegraph System, Los Angeles. Illustrated description of a fine automatic system in Los Angeles, Cal., comprising 14 box circuits and 10 gong circuits for the fire alarm system, and 4 signal circuits for the police telegraph system. 1400 w. Elec Wld & Engr—Feb. 17, 1900.

**Multiphase Cable.**—The Montauk Multiphase Fire Cable. Illustrates and describes an ingenious system of fire alarm. 800 w. Sci Am—Jan. 1, 1897.

**Office Building.**—A Modern Fire-Alarm System. Illustrated description of the protective equipment of the Washington Life Insurance Building, New York City. 1000 w. Elec Rev, N. Y.—Dec. 20, 1899.

**Thermostatic.**—Thermostatic Fire Alarm Telegraphs. George Herbert Stockbridge. The reliability of the service rendered by this automatic system since recent improvements. 3000 w. Jour of Elec—July, 1896.

Thermostatic Fire Alarm Telegraphs. George Herbert Stockbridge. Illustrated description of automatic service. 1800 w. Elec, Lond—Oct. 9, 1896.

### FIRE BOAT.

**Chicago.**—New and Powerful Fire Boat for the City of Chicago. Illustrates and describes the chief features of the design and construction of a vessel embodying the most modern ideas for this class. 1800 w. Marine Engng—Dec., 1898.

**Detroit.**—Detroit Fire Boat. Illustrated description of a modern vessel of the fire-fighting kind. The pumps have a capacity of 6000 gallons per minute. 600 w. Marine Rev—May 17, 1900.

**New York.**—Fire Boat "Robert A. Van Wyck" for the City of New York. Illustrated detailed description. 1200 w. Marine Engng—July, 1898.

### FIREBOX.

See **BOILER; GRATE; LOCOMOTIVE FIREBOX.**

### FIRE BRICK.

See also **CUPOLA—Lining; FIRE CLAY; FURNACE LINING.**

Properties of Fire Brick. Charles Ferry. Considers each constituent which appears in an analysis of fire clay and the facts derived from the study. 2500 w. Gas Engs' Mag—March 10, 1900.

**Bauxite.**—Bauxite Firebricks. Calls attention to this variety of firebrick, also describing magnesia and other brick. 800 w. Clay Rec—Sept. 26, 1898.

**Germany.**—On Various Kinds of Fire Brick used in Germany (Ueber Verschiedene im Handel befindliche Chamottesteine). H. Hect, H. Leger and E. Cramer. A comparison of various German and foreign refractory bricks, with table giving chemical composition, specific gravity, resistance to heat and other data. 1500 w. Stahl und Eisen—June 15, 1900.

**Properties.**—Laboratory Note in the Heat Conductivity, Expansion and Fusibility of Fire Brick. J. D. Pennock. The samples examined were Grecian magnesite, American magnesite, silica brick and coke oven tiling made in Belgium and used in retort coke ovens. 700 w. Trans Am Inst of Min Engs—July, 1896.

### FIRE CLAY.

See also **FIRE BRICK.**

A Modification of Bischof's Method for Determining the Fusibility of Clays, as Applied to Non-Refractory Clays, and the Resistance of Fire Clays to Fluxes. H. O. Hofman. Explains the direct and indirect methods, and describes the modification and the experimental tests made to verify the method. 1500 w. Am Inst of Min Engs—Oct., 1898.

Does the Size of Particles Have Any Influence in Determining the Resistance of Fire Clays to Heat and to Fluxes? H. O. Hofman and B. Stoughton. Report of a series of tests made, giving tabulated results. 800 w. Am Inst of Min Engs—Oct., 1898.

Fire Clays. T. C. Hopkins. What they are, where they are found, and how to test them to find their value. The various uses to which they are put and properties necessary for each. Their value in connection with economy in coal mining. Ill. 2800 w. Mines & Min—Sept., 1898.

**Coal Seam Under-Clays.**—The Manufacture of Fire Clay Goods from the Under-Clays of Thin Coal Seams. Philip Kirkup. Read at meeting of Fed. Inst. of Min. Engs., at Newcastle-on-Tyne. Presents the importance of utilising any by-product possible, to assist in the profitable working of a colliery, especially in the working of thin seams, and gives general description of articles made from fire clay. 3500 w. Col Guard—March 5, 1898.

**Gas Works.**—A Chapter on the Manufacture of Fire Clay Material for Gas Works. Frederic Egner. Information concerning this product, which, it is hoped, will be of practical use to gas engineers. 2200 w. Am Gas Lgt Jour—Aug. 20, 1900.

**Manufacturers.**—Fire Clay Manufacturers. W. H. Allen. Read before the Northern Architectural Assn. Describes the process of manufacture of sanitary pipes and specialties, glazed bricks, scullery sinks, white channel bends, closets, etc. 3300 w. Arch, Lond—April 30, 1897.

**New Jersey.**—New Jersey Fire Clays. Charles Ferry. A condemnation of the "bung" method usually employed in testing the refractory properties of clays. 1200 w. Ir Age—March 19, 1896.

**Red Plastic.**—Red Plastic Fire Clay. Charles Ferry. The writer states that a small percentage of iron oxide may be beneficial, as it makes the brick hard and tough. 1600 w. Ir Age—Jan. 16, 1896.

### FIREDAMP.

See also **CARBONIC OXIDE; COAL GEOLOGY; COAL MINE EXPLOSION; MINE VENTILATION.**

Apparent Cause of Error in Firedamp Determination by the Limits of Inflammability. M. Lebreton. From a communication to the "Annales des Mines." Discusses the causes of variation. 1200 w. Col Guard—Nov. 3, 1899.

Contributions to the Firedamp Question (Beiträge zur Schlagwetterfrage). With especial reference to the relation of atmospheric conditions and the production of explosive gases in mines. 10000 w. Glückauf—May 8, 1897.

Explosive Mixtures of Combustible Gases with Air. Frank Clowes. Summary of a lecture delivered at the Gas. Inst. Deals with the explosion of combustible gases and the limits; poisonous constituent in coal gas, gaseous fuel, and in the products of their incomplete combustion; detection and measurement of carbonic oxide, etc. 2800 w. Col Guard—July 24, 1896.

Firedamp Disengagements and Barometric Variations. Herr Bellmann, in "Glückauf." Abstract translation. A report of observations recorded, and particulars of explosions. 1400 w. Col Guard—Oct. 21, 1898.

Firedamp and the Means of Preventing Accidents in Mines (Le Grisou-Moyens de Prevenir les Accidents dans les Mines). Dealing with the rate of production of gas and the proper degree of ventilation necessary for safety. Serial. Part I. 1800 w. Génie Moderne—Oct. 15, 1897.

Some Dangerous Gases of the Coal Mine. Abstract of a lecture by F. Clowes. Consideration of some of the common "damps" or gases which cause danger in the coal mine, such as firedamp, chokedamp and blackdamp. 1800 w. Min Jour—Jan. 2, 1897.

**Afterdamp.**—See COAL MINE EXPLOSION.

**Analysis.**—Apparatus for Estimating Marsh Gas and Carbon Dioxide in Pit Gases. R. Jeller. "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." An illustrated description of apparatus suitable for the requirements of practice, but not intended for use where the proportion of combustible gases gives rise to an explosive mixture. 1500 w. Col Guard—Aug. 5, 1898.

Composition of Mine Atmosphere. From a paper by Prof. Kotsowsky, prepared for the International Cong. at Paris. Concerning investigations made in Russia, and the results, Russian mine regulations, etc. 2300 w. Col Guard—July 20, 1900.

Mine Air Analysis and Firedamp Detection. M. S. Chesneau. From a communication to the International Congress of Applied Chemistry. Shows the importance of analyzing the air of mines, and discusses the methods used in France for the determination of firedamp. 3000 w. Col Guard—May 20, 1898.

Study of Firedamp Composition. From the "Annales des Mines." Investigation to ascertain whether firedamp does not contain a small quantity of other gases, beside methane, equally combustible. Serial. Col Guard—May 7, 1897.

See also **Russia; Tests.**

**Austria.**—Explosives and Firedamp in Austria (Les Explosifs et le Grisou en Autriche). A review of the work of the Austrian government commission upon the action of mining explosives in igniting firedamp. Two articles. 4500 w. Génie Civil—March 5, 12, 1898.

Contributions to the Firedamp Question (Beiträge zur Schlagwetterfrage). An elaborate review of Behren's treatise, giving data relating especially to the coal mines of Austria-Hungary. Three articles. 8000 w. Oesterr Zeitschr für Berg u Hüttenwesen—Jan. 23, 30, Feb. 6, 1897.

Report of the Committee for the Investigation of the Firedamp Question (Mitteilungen der Ständigen Comités zur Untersuchung von Schlagwetterfragen). Giving the results of the work of the Austrian commission, with especial reference to safety primers, explosives, and lamps. 3000 w. Glückauf—Feb. 11, 1899.

**Coal Formation.**—See COAL GEOLOGY—Formation.

**Connellsville, Pa.**—Firedamp. F. C. Keighley. Read before the Ohio Inst. of Min. Engs. Experiences of a mine manager in some of the gaseous mines in the Connellsville, Pa., region, with deductions drawn from the same. 4200 w. Col Eng—July, 1896.

**Dortmund, Germany.**—The Firedamp. Explosions in the Upper Dortmund District (Die Schlagwetterexplosionen im Oberbergamtsbezirk Dortmund). A tabulated report of the mine explosions of 1897, with a chart of barometric curves, showing the relation of explosions to atmospheric pressure. 2000 w. 1 plate. Glückauf—Sept. 17, 1898.

**Electric Ignition.**—Ignition of Firedamp and Coal-dust by Electricity. Heise and Theim in "Zeit. für Angewandte Chemie." Detailed conclusions deduced from experiments made by the writers. 700 w. Col Guard—June 10, 1898.

Ignition of Firedamp and Coal Dust by Means of Electricity. A report of experiments made to ascertain the danger in using electric appliances in mines. 1500 w. Mines & Min—Aug., 1899.

Investigations as to the Ignition of Firedamp and Coal Dust by Electricity (Versuche betreffend die Entzündlichkeit von Schlagwettergemischen und Kohlenstaubaufwirbelungen durch die Wirkungen der Elektrizität). An account of the important experiments made at Gelsenkirchen by Herr Heise and Dr. Thiem. Serial. Glückauf—Jan. 1, 1898.

Researches on the Explosion of Firedamp Mixtures by Electric Currents. H. Couriot and J. Meunier. From "Comptes Rendus." Some facts concerning the external influences of electricity on firedamp mixtures. 800 w. Col Guard—April 1, 1898.

Researches Upon the Explosion of Gaseous Mixtures by Electric Currents (Recherches sur l'Explosion des Mélanges Grisouteux par les Courants Electriques). Paper by MM. Couriot and Meunier relating the results of experiments to determine the igniting effect of incandescent wires and electric sparks upon mixtures of air and firedamp. 1200 w. Comptes Rendus—March 7, 1898.

The Electric Spark in Coal Mines. Examines the question of the passage of electric sparks in mines where inflammable gas may be present, with the view of enabling mine managers to form an impartial opinion. Ill. 3200 w. Col Guard—July 27, 1900.

The Ignition of Firedamp by Electricity (Entzündbarkeit der Schlagwetter durch Elektrizität). A review of the experiments of Drs. Heise and Thiem, with a reply by Dr. Heise. 3000 w. Glückauf—May 7, 1898.

The Ignition of Gaseous Mixtures by the Electric Spark (Sur l'Explosion des Melanges Grisouteux par l'Etincelle Electrique). A paper contributed to the French Academy by MM. Couriot and Meunier discussing the conditions under which the electric spark is capable of igniting mixtures of air and firedamp in mines. 1200 w. Comptes Rendus—March 21, 1898.

The Ignition of Firedamp and Coal Dust by Means of Electricity. Sydney F. Walker. Gives a résumé of the contents of a paper by Bergassessor Heise and Dr. Theim recording experiments on this subject, and considers the results. Serial. Col Guard—Jan. 12, 1900.

The Influence of Self-Induction in the Explosion of Mixtures of Firedamp and Air by the Electric Spark (Sur l'Influence de la Self-Induction dans l'Explosion des Mélanges de Grisou et d'Air par l'Etincelle Electrique). A note to the French Academy by MM. Couriot and Meunier, discussing the conditions under which self-induction may become a source of danger. 1500 w. Comptes Rendus—April 18, 1898.

Danger from Electrical Appliances in Coal Mines. Report of the tests made in the testing gallery of the Consolidation Colliery, near Gelsenkirchen, on the dangers from the use of electrical apparatus in coal mines. Not unfavorable, but necessary to apply the ordinary precautions. 1200 w. Engng—March 25, 1898.

Use of Electricity in Fiery Mines, Westphalia. M. Leproux, in "Annales des Mines." The main provisions of an ordinance in dealing with the distribution and supervision of ventilation, the use of explosives, and the lighting of mines, in connection with the subject named. 3600 w. Col Guard—April 1, 1898.

See also ELECTRIC EQUIPMENT—Coal Mine Precautions.

**Experimental Apparatus.**—Apparatus for Experimenting with Firedamp. H. Schmerber, in "Le Génie Civil." The apparatus is illustrated by detail drawings, and is intended to show the effect of various gases on the lamp flame. 1500 w. Col Guard—Feb. 14, 1896.

**Explosives.**—See EXPLOSIVE—Coal Mine.

**Formenophone.**—Firedamp, the Formenophone and the Indicating Safety Lamp. Ernest Hardy. A communication from the inventor of the formenophone as to the application of sonorous vibrations for analyzing gases of different density, with brief discussion of other methods for indicating the percentage of firedamp. 2000 w. Col Guard—April 17, 1896.

**French Regulations.**—Regulations as to Fiery Mines in the Loire Coal Field. Substance of the government regulations as to ventilation, lighting and the use of explosives for fiery mines in the French department of La Loire, issued last Sept. on behalf of the Prefect. 2800 w. Col Guard—May 8, 1896.

**Gas Barrier.**—Wagner's Portable Gas Barrier for Mine Gangways (Wagner's Transportabler Wetterdamm für Bergwerke). An inflatable air cushion used to close off any portion of a mine containing firedamp or smoke. With numerous illustrations showing the method of application. 3000 w. Glaser's Annalen—Oct. 1, 1897.

**Germany, 1897.**—The Firedamp and Coal Dust Explosions in 1897 (Die im Jahre 1897 Erfolgten Schlagwetter und Kohlenstaub Explosionen). With especial reference to the Westphalia district, giving details of the most important instances. 3500 w. Glückauf—Nov. 12, 1898.

**Gob Workings.**—Draining Gas from Gob Workings. Charles Connor. Considers the relative advantages of force and exhaust fans for this purpose. Also discussion. 7000 w. Mines & Min—Sept., 1900.

Drawing Gas from Gob Workings by Bore Holes. Charles Connor. Read before the Western Penna. Cent. Min. Inst. Explains certain conditions under which this method is most effective and cheapest. 1600 w. Mines & Min—June, 1900.

See also **COAL MINE FIRE—Gob.**

**Grisoumeter.**—Carbonic Oxide, Firedamp, and the Grisoumetre (L'Oxyde de Carbone, Le Grisou, et le Grisoumètre). An address delivered by Dr. Grêhant, describing the application of his device called the grisoumètre for determining the proportion of dangerous gases in mine air. 6000 w. Bull de la Société d'Encour—April, 1898.

**Hypothesis.**—On a Hypothesis to Explain the Partial Non-Explosive Combination of Explosive Gases and Gaseous Mixtures. W. G. Mixers. Reviews investigation made, and states the writer's views, based on a study of the phenomena of explosives. 2800 w. Am Jour of Sci—May, 1899.

**Indicating Lamp.**—See **SAFETY LAMP.**

**Indicator.**—Colliery Warnings: Their Utility Called in Question. W. Fairley, in "Mining Engineering." Considers that no instrument yet constructed can give warning of the approach of firedamp. 1000 w. Can Min Rev—Sept., 1898.

Recording Indicators for Firedamp and the Velocity of Air Currents. P. Fuchs, in "Zeitschrift für Berg-, Hütten-, und Salinenwesen." Illustrated description of the apparatus employed for securing the records by the photographic method. 1500 w. Col Guard—May 4, 1900.

**Indicator, Lyncker and Schropp.**—The Lyncker and Schropp Gas Indicator. From "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrates and describes an apparatus for use in collieries, ships' bunkers, gas works, etc., based on the principle of the diffusion of gases. 900 w. Col Guard—Dec. 30, 1898.

**Krell Apparatus.**—Continuous Examination of Pit Gas for Firedamp by the Krell Apparatus. P. Fuchs, in "Zeitschrift für Berg-, Hütten-, und Salinenwesen." Illustrated description of this method, which is based on the principle of the hydrostatic balance, and of the apparatus used. 1600 w. Col Guard—May 19, 1899.

**Meteorology.**—Firedamp in Its Relation to Meteorology. Ernest Van den Broeck. From a communication to the Société Belge de Geologie de Paléontologie et d'Hydrologie. Remarks on the limited success in solving the problem of firedamp, and a project for making magnetic and endogenous observations to investigate the connection between the disengagement of underground gases and aerial storms. 2200 w. Col Guard—Aug. 12, 1898.

Fire Damp and Underground Meterology. Emile Harzé. A reply to article "Firedamp in its Relation to Meteorology," published in this paper Aug. 12, considering some of the statements open to criticism. 2800 w. Col Guard—Sept. 16, 1898.

The Relation between Firedamp Exposions and Atmospheric Pressure (Die Schlagwetter Explosionen mit Beziehung auf den Barometerstand). The annual report for the Dortmund district for 1896, giving barograph curves and data of explosions, showing the relation between the relief of atmospheric pressure and the release of gas. 3000 w. 1 plate. Glückauf—Aug. 7, 1897.

**Methane.**—The Determination of Methane in Mine Gases (Ueber die Bestimmung des Methans in der Grubenluft). E. Hankus. Showing the variation in the percentage of methane for different barometric pressures, and giving the results of analyses. 800 w. Oesterr Zeitschr f Berg u Hüttenwesen—October 2, 1897.

**Outburst.**—Outbursts of Gas at Lancashire Collieries. John Gerrard. Communication to the Geological Society. Describes the outburst in the Westleigh colliery in December last, and also an outburst in the Arley Mine, Welch Whittle, in 1897. 1800 w. Col Guard—Sept. 15, 1899.

Sudden Outbursts of Firedamp and Measures for Avoiding Accidents. A record of facts which are of a nature to throw light on these phenomena, obtained from records of engineers who have specially studied the subject. 4000 w. Col Guard—July 9, 1897.

Sudden Outbursts of Gas in a Non-Fiery Mine. M. Leproux. From a communication to the "Annales des Mines." Supposed to have been caused by a flow of marsh gas from an adjoining swamp, tapped by a bore-hole. 2800 w. Col Guard—Dec. 27, 1895.

**Periodicity.**—Periodicity of Firedamp. A. Doneux. From "Cosmos." Supplementary to a previous article on the same subject. 550 w. Col Guard—April 10, 1896.

Periodicity of Firedamp. A Doneux. The writer states that firedamp explosions follow sympathetically the hebdomadal fluctuation, and that they obey the law of volcanic action. 1800 w. Col Guard—Jan. 10, 1896.

**Russia.**—Composition of the Air in the Mines of the Doulets Basin. N. Kotsowsky. Translated from "La Revue Universelle des Mines, de la Metallurgie," etc. Analyses from various parts of these Russian mines are given showing that gas exists in dangerous quantities and that ventilation is defective. 3200 w. Col Guard—Nov. 8, 1895.

**Safety Explosive.**—See **EXPLOSIVE.**

**Safety Lamp.**—See **SAFETY LAMP.**

**Testing Station, France.**—Firedamp Testing Station at Marchienne-au-Pont. H. Schmerber. Illustrated description. 900 w. Col Guard—Aug. 14, 1896.

**Testing Station, Höngen.**—The Testing Gallery at the Maria Coal Mine at Höngen (Die Versuchsstrecke auf der Steinkohlengrube Maria bei Höngen). An illustrated account of the plant at Höngen, in the Aachen district, for testing the explosive character of mine gases. 1500 w. 1 plate. Glückauf—July 1, 1899.

**Tests.**—The Air of Coal Mines. Frank Clowes. A lecture delivered at the University College, Nottingham, showing the unreliability of the flame test in the presence of carbonic oxide. 700 w. Col Guard—Jan. 31, 1896.

Continuous and Automatic Sample-Taking of Air in Colliery Workings. Paul Petit. From a communication to the Société de l'Industrie Minérale, by the manager of the Saint-Etienne collieries. The apparatus used is described and illustrated by a diagram. 2000 w. Col Guard—March 27, 1896.

See also **Electric Ignition.**

### FIRE DEPARTMENT.

**American.**—Col. Varigault on American Fire Departments. A French view of our fire department systems derived from a tour of inspection by the chief of the fire department of Paris and his aids. 1900 w. Fire & Water—Nov. 16, 1895.

**Boston, Mass.**—American Fire Protection. Summary of a report by Sir D. Colnaghi describing the organisation and equipment of the Boston, Mass., fire department. 1500 w. Arch, Lond—Sept. 2, 1898.

**Europe vs. America.**—The Fire Department of Europe in Comparison with American. Chief Hosmer. Read at convention of the Mass. Fire Assn., at Brockton, Mass. A very interesting comparison based upon personal observation and study. 4600 w. Fire & Water—Oct. 3, 1896.

**New York.**—The Equipment and Organization of a City Fire Department. Hugh Bonner. A discussion of the organization of the fire department of New York City as typical of the general principles of municipal equipment, by the chief of the New York Fire Department. 4000 w. Eng Mag—Feb., 1898.

### FIRE ENGINE.

**Boiler.**—See **BOILER—Fire Engine.**

**Electric.**—See **ELECTRIC VEHICLE—Fire Wagon.**

### FIRE ENGINE HOUSE.

**Boston, Mass.**—Station for a Boston Fire Company. Illustrated description of new building on Warren street. 1400 w. Eng Rec—March 20, 1897.

Fire Department Headquarters, Boston, Mass. Illustrated description of a new fire department building in Boston, Mass. 2000 w. Eng Rec—Feb. 22, 1896.

The Ashmont Engine House, Boston, Mass. Illustrated description. 1100 w. Eng Rec—July 4, 1896.

**Hartford, Conn.**—New Engine Houses at Hartford, Con. Brief illustrated description. 500 w. Fire & Water—Sept. 12, 1896.

**New York.**—An Extensive Fire Apparatus Station, New York. Illustrated description of the engine house, corner of Elm and White Sts., New York. The aim has been to make it as perfect as possible in all its appointments. 1800 w. Eng Rec—April 11, 1896.

Engine House for Fire Department, New York City. Detailed illustrated description of building. 900 w. Eng Rec—Nov. 30, 1895.

**FIRE-ESCAPE.**

A Novel Fire-Escape. Illustrated description of a fire-escape consisting of a chute and spiral slide. 400 w. Sci Am—Aug. 26, 1899.

**FIRE FIGHTING.**

Chief Swenie on Fire Fighting. Deals with the increased and still increasing fire hazards, much of which increase is due to methods of heating and lighting unknown to previous generations, and also to new industries and modern methods of organizing industrial establishments, and current methods of constructing industrial buildings. Serial. Fire & Water—Jan. 25, 1896.

General Fire Fighting, with Particular Reference to the Advisability of the Establishment of a Fire School or College in Connection Therewith. Simon Brentano. Fundamental laws of fire extinguishing. Suggestion for a school of instruction in fighting fire. 2000 w. Fire & Water—Sept. 26, 1896.

**FIRE HAZARD.**

Fire Hazards. H. de B. Parsons. Discussing the effect of design and construction on the risk of fire, and the materials that best resist a conflagration. 6500 w. Jour Fr Inst—Sept., 1900.

**Electrical Construction.**—Insurance as Affected by Electrical Construction. G. S. McLaren. Abstract of a paper read before the Northwestern Elec. Assn. Discusses the position taken by underwriters in regard to the use of electricity, and calls attention to dangers to be avoided. 1500 w. Elec Eng—Feb. 10, 1897.

**Electrical Engineer.**—The Relation of the Underwriter to the Electrical Engineer. William Brophy. An account of the influence upon the electric lighting industry of the fire underwriters and rules promulgated and enforced by them. The character and efficiency of inspectors is somewhat reviewed, and the opinion is given that the system of electric inspection is of mutual benefit when conducted by men of ability and integrity. 3500 w. Elec Power—May, 1896.

**Electric Plants.**—The Insurance of Electrical Plants. R. H. Pierce. Read before the Northwestern Electrical Assn. The problem of safety is the real question. If this fire hazard is small the rate of insurance should be comparatively low. 1600 w. W Elec—July 25, 1896.

**Electric Stations.**—Fire Risks at Electricity Works. G. Pearson. A discussion of the question, considering some of the suggestions made for solving the problem of municipal insurance with the difficulties. 2800 w. Prac Eng—Feb. 5, 1897.

The Fire Risk of Electrical Power Installations. A. Lester Taylor. Read before the Manchester (Eng.) Insurance Institute. Notes the rapid extension in the use of electric power, with consideration of the additional fire risk, reviewing the experience, and the precautions necessary. 5800 w. Elec Rev, Lond—Dec. 17, 1897.

**Fireproof Buildings.**—The Fire Risk in Fireproof Buildings. A review of an analysis by R. W. Gibson, of the effect of various improvements in the premium to be paid for fire insurance. 1600 w. Eng Rec—Feb. 18, 1899.

**Flour Mill.**—The Fire Hazard in Mills. James Goldie. Principles of fireproof and of slow-burning construction, applied to flour mills and the supply of means for extinguishing fires in this class of structures. 1900 w. Am Miller—Dec., 1895.

**High-Pressure Heating Apparatus.**—See **HEATING—High-Pressure.**

**Tall Buildings.**—Dangers of the Sky-scrapers. Extract from N. Y. "Sun." Chief Bonner's explanation of his opposition to high buildings before the committee appointed by the Board of Trade and Transportation. 1600 w. Arch & Build—Dec. 12, 1896.

**Warehouse and Factory.**—Warehouse and Factory Fire Dangers. George H. Bibby. Discusses the construction of these buildings and the causes of the spread of fires within the buildings. 2000 w. Arch, Lond—Dec. 3, 1897.

**Wooden Lagging.**—See **LAGGING—Carbonizing.**

**FIRE HYDRANTS.**

See also **FIRE PROTECTION; WATER SUPPLY—Fire Service.**

**Experiments.**—Experiments on Various Types of Fire Hydrants. Charles L. Newcomb. A report of tests aiming to make a complete investigation of the fire hydrants now commonly used, giving tabulated results. Ill. 15000 w. Trans Am Soc of Mech Engs—May, 1899.

**Winter Care.**—The Care of Fire Hydrants in Winter. George I. Bailey. Considers methods for their care and maintenance. 2000 w. Jour N. E. W. Wks Assn—Dec., 1899.

**FIRE INSURANCE.**

See also **FIRE HAZARD.**

**Municipal.**—Municipal Fire Insurance. Robert Donald. The broadest paternalism is advocated. The article supports the general thesis that "there can be no finality to such expansion of duties as fall to public authorities;" and then proceeds to discuss alleged advantages, which would result from municipal fire insurance. 6200 w. Contemporary Rev—Dec., 1895.

**Mutual.**—The Prevention of Loss from Fire by Mutual Insurance. Editorial on a review of the development of mutual factory fire insurance in the United States, published by Edward Atkinsin, discussing some of the causes of fires. 1700 w. Eng News—May 31, 1900.

**FIRE PREVENTION.**

See **FIRE HAZARD; FIRE PROTECTION.**

**FIREPROOF CONSTRUCTION.**

See also **ARCH—Terra Cotta; BUILDING MATERIALS—Asbestic and Petrifite; CONCRETE REINFORCED; FLOOR.**

An Unscientific Inquiry Into Fireproof Building. Russell Sturgis. A discussion of what may be done to make buildings more truly fireproof, what restrictions should be maintained, etc. Ill. 10000 w. Arch Rec—Jan., 1900.

Development of the Fireproofing of Buildings. Peter B. Wight. An illustrated review of the development of fireproof construction. 3300 w. Cal Arch't—Feb., 1900.

Fire and Water Resistance. Howard Constable.. Extracts from a paper read before the Boston Society of Architects. On the necessity of further development in the directions of fire prevention. 2800 w. Am Arch—Feb. 19, 1898.

Fireproof Buildings. Comments on the severe tests of recent fires on this style of structure, discussing the Manhattan Bank, New York, the fires at Pittsburg, Pa., and Detroit, Mich. Ill. 1200 w. Fire & Water—Oct. 30, 1897.

Fireproof Buildings. Francis C. Moore. Extracted from the publications of the British Fire Prevention Committee. Discusses the precautions that should be taken in the construction of these buildings and the dangers that threaten. Serial. Can Eng—Aug., 1898.

Fireproof Construction and Prevention of Corrosion. William Sooysmith. Considers the materials employed and the mode of construction of buildings, with a view to making them strong, safe and economical, and proof against destruction by fire and water; recommending a construction using "asbestic" as a covering and presenting its qualities. 3500 w. Jour W Soc of Engs—April, 1898.

Fireproof Construction. A. L. A. Himmelwright. Reprint from "The Polytechnic." Considers particularly the fireproof floor construction, and the protection of the steel skeleton frame of buildings. 3000 w. Arch & Build—May 28, 1898.

Fireproof Construction. Editorial, reviewing a recent work by J. K. Freitag—"The Fireproofing of Steel Buildings." 4000 w. Builder—April 28, 1900.

Fireproofing as a Specialty. Joseph K. Freitag. Facts showing the drain on our national resources from fire losses and the expenses arising from them, and that proper fire protection must soon be recognized as a distinct branch of engineering. 3000 w. Purdue Soc of Civ Engs—1896.

Fireproofing Buildings. Discusses means of making buildings already built of combustible materials, capable of resisting fire. 900 w. Fire & Water—Dec. 19, 1896.

Fireproofing Material. Considers that the proper handling of steel or iron for fireproofing requires that it be surrounded with concrete so as to leave no air space, and discusses the proper kind of concrete to be used. Ill. 1600 w. Fire & Water—Feb. 18, 1899.

Fireproofing Under Fireproofing Laws. Calls attention to the weak points that are allowed by architects, and advocates the use of terra cotta as a protection of iron and steel frames. 2000 w. Br Build—Oct., 1897.

How to Build Fireproof. Francis C. Moore. A summary of important points discussed in a series of articles on this subject. 6200 w. Br Build—April, 1898.

How to Build Fireproof. Francis C. Moore. Considers twelve important propositions bearing on this subject, or rather on slow-burning buildings and their care. 3800 w. Br Build—March, 1898.

Lessons from Fire and Panic. Thomas Blashfill. Paper read at meeting of the Surveyors' Inst. at Manchester, Eng. Discusses points in construction tending to secure safety of the inmates. 7300 w. Builder—April 23, 1898.

Materials and Methods in Fireproof Construction. W. M. Scanlan. The writer names the forms of construction and the materials that seem to him the best. Of materials, porous tiling is considered the best, and the beam floor construction. 4300 w. Eng Mag—March, 1897.

Slow-Burning and Fireproof Construction. Dankmar Adler. Examples of fires in buildings of each class are given, and in part first the "slow-burning" is pronounced by far the inferior system of construction. Serial. In Arch—Jan., 1896.

Some Deductions from the Evolution in Fireproof Construction. Corydon T. Purdy. Historical review of the progress of this form of construction. Serial. Br Build—Aug., 1899.

The Art of Fireproofing. Herman B. Seely. An illustrated discussion of methods and principles, value of materials used, protective coverings, etc. Serial. Eng News—April 9, 1896.

The Present Condition of the Art of Fireproofing. Peter B. Wight. Discussion of this question, with favorable comment on the use of burned clay. 2000 w. Br Build—Nov., 1897.

**America.**—Fireproof Construction in North America (Feuerfeste Bauausführungen in Nordamerika). Karl Riensberg. A well illustrated account of methods of fireproof construction and materials used, principally in the high buildings of New York. Serial. Stahl und Eisen—July 15, 1900.

**Appraisers' Stores, New York.**—Special Fireproof Construction in the U. S. Appraisers' Warehouse, New York City. Gunwald Aus. Illustrated description of this large building, with special mention of the fire-retarding screen which encloses the light well. 1000 w. Eng News—Nov. 3, 1898.

**Bailey Flooring.**—Test of the Bailey System of Fireproof Flooring. Description of construction and very successful test. 350 w. Eng News—Jan. 7, 1897.

**Bank Building.**—The Youngstown, O., Bank Building. Illustrated description of a handsome building of fireproof construction. 2800 w. Eng Rec—Nov. 14, 1896.

**Burned Clay.**—See Terra Cotta.

**California.**—Fireproof Floor Construction in California. G. W. Percy. Illustrates and describes the methods employed in the Wells-Fargo Building in San Francisco, and Stanford University Library. 1000 w. Eng Rec—June 17, 1899.

**Cement.**—See CEMENT—Heat Action.

**Chicago.**—Recent Improvements in Fireproof Construction at Chicago. Peter B. Wight. Illustrates and describes the Ayer Building. 800 w. Br Build—Feb., 1899.

**Church.**—An Example of Fireproof Church Architecture. Peter B. Wight. An illustrated description of the new St. Paul's (R. C.) church in Chicago, with interesting facts relating to its construction. 2800 w. Br Build—Nov., 1898.

Second Church of Christ, Scientist, New York City. Illustrated description of a fireproof structure containing unusual features of arrangement and construction. 2500 w. Eng Rec—July 7, 1900.

**Detroit.**—See Steel Building, Detroit.

**Domestic Buildings.**—Fireproof Construction of Domestic Buildings. Thomas Potter. Discusses means of fire protection for buildings used wholly or mainly for habitation. Also discussion. Ill. 12500 w. Jour Soc of Arts—Jan. 28, 1898.

**Efficiency.**—The Efficiency of Modern Fireproof Building Construction. A discussion of the question of fireproofing and protective construction, reviewing recent papers on the subject, with a view to indicating wherein our best building construction fails, and how it may be improved in respect to its residence to damage and destruction from fire. 3000 w. Eng News—April 16, 1896.

**Expanded Metal.**—See also EXPANDED METAL—Fireproof Construction.

**Expanded Metal-Concrete.**—A New Type of Fireproof Construction (Un Nouveau Type de Construction Incombustibles). Describing the use of expanded metal and cement to form a satisfactory system of fireproof construction. 1200 w. La Rev Tech—June 25, 1898.

**Experiences.**—Some Experiences of Modern Fireproofing Material in Actual Tests. Peter B. Wight. It is the purpose of the article to give descriptions of incipient fires in fireproof buildings of the best class, with reliable data. Serial. Br Build—Nov., 1896.

**Factory.**—Effective Fireproofing. Describes a fire in a building for light manufacturing purposes, which, though lasting two hours, was confined to one floor by the fireproofing. 1500 w. Eng Rec—Jan. 29, 1898.

**Ferry House, N. Y.**—A New Method of Fireproofing. Illustrated description of a new departure in fireproof construction used in the Barclay St. ferry house. 600 w. Eng News—Aug. 13, 1896.

**Fire Stops.**—The Massachusetts Rules for the Provision of Fire Stops in Buildings. A copy of the specifications covering the requirements for preventing the spread of fire in buildings, with comments. 1200 w. Eng News—April 6, 1899.

**Floor.**—A New Fireproof Floor. Illustrated description of a new form of floor designed on the beam principle. The beams are made of "mackolite," the basis of the material being gypsum. 1000 w. Eng News—May 26, 1898.

Fireproof Floors in Modern Buildings. F. L. Douglas. A discussion of fireproof floors. Considers hollow tile arches, concrete iron floors, metropolitan system, Melan system, Roebling system, Columbian system. 4300 w. Engineers' Year Book, Univ of Minn—1896.

Fire-Resisting Floors. Frederick R. Farrow. Extracted from a paper issued by the British Fire Prevention Committee, and published in the "Railway Engineer." Reviews the earliest attempts at the construction of these floors, and describes various forms which have been devised. Ill. 1800 w. Ry & Eng Rev—Nov. 26, 1898.

Fire-Resisting Floors. Illustrates and briefly describes many forms of construction. 1400 w. 2 parts. Fire & Water—Aug. 5 & 12, 1899.

See also Test; FLOOR.

**Floor, Concrete.**—Concrete Floors. Frank Caws. Read before the Northern Archt. Assn., at Newcastle. Describes work from the writer's experience, and urging the fireproof construction for all buildings. Ill. 8200 w. Jour Roy Inst of Brit Archts—March 10, 1900.

**Floor, New York.**—Fireproof Floor Construction in New York City. Presents and discusses facts collected on this subject, and the New York building law. 5000 w. Eng News—Feb. 4, 1897.

See also Test.

**Flour Mills.**—See FIRE HAZARD.

**Foundries.**—See FOUNDRY—Fireproof.

**Guastavino.**—See Test, New York.

**Hallberg Floor.**—A New System of Fireproof Flooring. Describes the Hallberg system, as reported by the "Chicago Record." It proposes the using of supension rods as carrying members, with tiling and concrete as compressing members. 700 w. Arch & Build—Jan. 9, 1897.

**Hamburg Experiments.**—The Hamburg Experiments on the Fireproofing of Cast Iron, Wrought Iron, and Wooden Columns (Die Hamburger Versuche über die Feuersicherheit Gusseiserner, Schmiedeeiserner, und Hölzerner Säulen). Tests were made of bare columns, also with sheathings of concrete, asbestos cement and similar materials; discussion is appended. 1800 w. Zeitschr d Ver Deutscher Ing—Feb. 12, 1898.

**Hinton Serrated Arch.**—A New Form of Hollow Tile Fireproof Floor Arch Construction. Illustration, with description of the invention of Henry L. Hinton, called the serrated arch. 1300 w. Eng News—Nov. 9, 1899.

**Hollow Tiles.**—Details of Fireproof Construction with Burned Clay. Peter B. Wight. Illustrations with description of hollow-tile building blocks used for partitions and the setting of them. Serial. Br Build—Sept., 1897.

Hollow Tile Floors, Past and Present. Fr. von Emperger. The development traced, with accounts of tests made, and suggestions of requirements according to load and span submitted by the author for discussion. 3300 w. Tr Am Soc Civ Eng—Dec., 1895.

Origin and History of Hollow Tile Fireproof Floor Construction. Peter B. Wight. Part first gives the early history in the United States of the use of I beams, brick arches and other forms of floor construction which finally led to the use of hollow tile. Ill. Serial. Br Build—March, 1897.

What Constitutes a Fireproof Building Material? Peter B. Wight. Concludes that a true fireproofing system can only be based on the use of hollow clay blocks for all interior and roof constructions, and the protection of iron and steel. 1800 w. Br Build—Sept., 1896.

See also **Terra Cotta; BUILDING MATERIAL.**

**Hollow Tile v. Concrete.**—A Competitive Test of a Hollow Tile and a Concrete Fireproof Floor. Describes an arranged test growing out of a challenge by Henry Maurer & Sons, of New York, manufacturers of hollow tile fireproofing, and responded to by the firm of John A. Roebling's Sons Co. Ill. 1500 w. Eng News—Dec. 2, 1897.

**Home Life Ins. Building, N. Y.**—A Seventeen-Story Building Tested by Fire. T. Cusack. Observations on the lessons learned by the fire effect on the Home Life Insurance Building, New York. 1100 w. Br Build—Dec., 1898.

Lessons from the Home Life Building Fire. Thomas Cusack. Presents the opinions of architects on the weather and fire-resisting qualities of terra-cotta as compared with marble, granite, limestone or sandstone. 1100 w. Br Build—Jan., 1899.

Report on Home Life Building Fire, New York, Dec. 4, 1898. Charles J. Everett, Jr. Illustrates and describes the building and the damage, drawing conclusions from the facts stated. 2300 w. Br Build—Dec., 1898.

The Exposure Fire in the Home Life Insurance Building, New York City. Describes the fireproof construction and the conditions existing, the progress of the fire, the damage, and the facts ascertained. 1800 w. Eng News—Dec. 8, 1898.

The Home Insurance Building Fire. Illustrated description of the effect of a violent exterior fire, and fires on several stories, on the structure of a 280-ft. office building, the examination being made before the fire was entirely extinguished. 3400 w. Eng Rec—Dec. 10, 1898.

The Tall Building Under the Test of Fire. H. de B. Parsons. A well illustrated paper dealing with the dangers of fire in high buildings, especially as exemplified in the case of the Home Life Insurance Building in New York, and with the questions of so-called fireproof construction and isolated fire-fighting plants. 4800 w. Eng Mag—Feb., 1899.

The Teachings of the New York Fire. Quotes from editorials and articles in the New York papers upon the fire effects on the Home Life Insurance Building, commenting on their justness and intelligence. 800 w. Br Build—Jan., 1899.

**Knoche Floor.**—Tests of the strength of a new fireproof floor. Floor construction invented by G. Knoche. The advantages are cheapness and the very small space taken up by the floors, walls and partitions. 600 w. Eng News—Dec. 12, 1895.

**London.**—London Methods of Fireproof Flooring. F. R. Darrow. Brief illustrated descriptions of the varied forms devised, with discussion of the construction in general. 1800 w. Brick—March 1, 1899.

**London Regulations.**—Fire-Resisting Construction. G. A. T. Middleton. A discussion of the regulations in force in London, both as regards general buildings and places of entertainment. 2500 w. Eng Mag—Aug., 1898.

**Mercantile Buildings.**—The Best Fireproof Construction for Buildings Occupied for Mercantile Purposes. W. L. B. Jenney. Abstract of paper presented to the Fire Underwriters' Assn., giving suggestions that, if followed, would permit but little injury to the building other than smoking the walls and ceilings and blistering the paint. 5700 w. Eng Rec—Oct. 9, 1897.

**Partial.**—The Effect of Fire on a Partially Fireproofed Building. Showing that when the beams are not entirely covered by fireproofing material, the structure is not properly fireproof, as was illustrated by the beams giving way in the case of the Manhattan Bank Building in the late New York fire. 850 w. Eng News—Nov. 14, 1895

The Effect of Fire on a Partially Fireproofed Building. Showing that when the beams are not entirely covered by fireproofing material, the structure is not properly fireproof, as was illustrated by the beams giving way in the case of the Manhattan Bank Building in the late New York fire. 850 w. Eng News—Nov. 14, 1895.

**Piers.**—Fires on Freight Piers. Editorial discussion of the construction of freight piers to diminish fire hazards. 1000 w. Eng Rec—July 14, 1900.

**Pittsburg.**—An Instructive Fire in Pittsburg, Pa. An illustrated account of the large fire in Pittsburg, interesting as giving an opportunity of judging of the value of modern methods of fireproofing. 2200 w. Eng Rec—May 22, 1897.

Experts' Report on the Pittsburg Fire. Reviews a report of Corydon T. Purdy on the conclusion of the Board of Experts appointed by fire underwriters to study the Pittsburg fire of May 3, 1897. 3500 w. Eng Rec—April 23, 1898.

Fireproof Building Construction in the Pittsburg, Pa., Fire. Account of the origin and progress of the fire, the burned buildings, and views showing the effects on fireproof construction, and editorial containing suggestions to engineers and architects. 6000 w. Eng News—May 20, 1897.

Fireproof Building Construction in Pittsburg, Pa., Fire. The story of the fire, with illustrations and extracts from an article published in the Engineering News, and editorial. 5500 w. Arch & Build—June 12, 1897.

Reports of Insurance Companies' Experts on the Pittsburg, Pa., Fire. Parts of reports of interest as indicating the manner in which this fire and its action impressed the insurance experts, and as giving their ideas as to the defects shown to exist in fireproof construction, with editorial. Ill. 6500 w. Eng News—July 15, 1897.

The Horne Fire, Pittsburg. Illustrated description of the results of a fire in a six-story department store, where the contents were almost wholly destroyed without material injury to the steelwork, owing to the protection afforded by fireproofing. 2500 w. Eng Rec—April 14, 1900.

The Recent Fire at Pittsburg. Peter B. Wight. Description, with illustrations, and discussion of its effect on the fire-resisting construction and material. 6400 w. Br Build—June, 1897.

The Second Fire in the Fireproof Horne Store Building, Pittsburg, Pa. Information concerning this fire, with illustrated description of the damage. 1000 w. Eng News—April 26, 1900.

The Second Fire in the Horne Department Store at Pittsburg. Peter B. Wight. Describes the construction of the building after the first fire, and illustrates the damage, calling attention to the lessons of the second test. 2800 w. Br Build—May, 1900.

An Expert's Opinion of Pittsburg Fire. Report of S. Albert Reed. Describes the damage and the cause, and lessons learned from this fire. 2500 w. Eng Rec—June 26, 1897.

Can Buildings Be Made Fireproof? Corydon T. Purdy. Relates in brief the incident of the Pittsburg fire, describes the important characteristics of the construction, and points out the lessons. Ill. 7500 w. Pro Am Soc of Civ Engs—Sept., 1897.

**Poulson Metal House.**—The Poulson Metal House. Illustrated description of a fireproof building which presents some unusual features obtained by the combination of iron and copper for exterior and interior construction and ornamentation. 900 w. Sci Am—Oct. 17, 1896.

**Railway Structures.**—The Protected Railway Depot and Viaducts. Illustrated description of the improvements of the Illinois Central Railroad Company, at Van Buren and Harrison streets, Chicago. Overhead crossing bridges, and suburban passenger station, in which fireproof tiling has been used to veneer the whole surface of the metalwork. 1800 w. Eng Rec—July 31, 1897.

**Retardent Materials.**—Tests of Fire Retardent Materials. Charles L. Norton. Describes experiments and tests carried out with a view to determining the efficiency of several means of protecting wooden surfaces from fire. 4000 w. Tech Quar—June, 1900.

**Roebling.**—Construction Details and Testing of a Fireproof Floor System. A. L. A. Himmelwright. Illustrated description of construction and tests of the Roebling floor system. 2500 w. Eng Rec—Jan. 2, 1897.

**Roebling.**—See also **Test, Roebling.**

**Rushforth.**—A New Fireproofing System. System devised by Mr. George Rushforth, architect, of Stockton, Cal. Illustrated. 250 w. Br Build—Aug., 1896.

**Scagliol and Pertrura.**—Scagliol and Petrura. Information relating to two fire-resisting materials being introduced in London. 700 w. Builder—July 8, 1899.

**Slow Burning.**—The Construction of Slow Burning Buildings. Francis C. Moore. Especially devoted to such details of residence construction as affect the safety from destruction by fire. Formal specifications governing the most important features are given. 3500 w. Engineering Magazine—March, 1898.

**Stable.**—Fireproof Stable Construction. Illustrated description of a large stable in Chicago, which has an iron framework and an unusual form of concrete floor. 1000 w. Eng Rec—March 11, 1899.

**Steel Building.**—Fireproof Buildings. Edward Atkinson. A warning concerning the present construction of many steel- and iron-framed buildings, with report of the destruction by fire of a so-called "fireproof" factory in Burnley, Eng. Ill. 2500 w. Am Arch—Jan. 29, 1898.

See also **METAL PROTECTION; STEEL CONSTRUCTION—Rust and Fire.**

**Steel Building, Detroit.**—Behavior of Non-Fireproof Steel Building Construction in the Detroit, Mich., Fire. Frank M. Dunlap. Showing the excellent resistance made by the steel structure and describing the effect upon various kinds of construction, with photograph. 700 w. Eng News—Oct. 14, 1897.

**Stone and Burnt Clay.**—Effects of Heat upon Natural Stone and Burnt Clay. Charles J. Everett. Gives a report of investigations made after great conflagrations, also giving opinions of others. 2800 w. Br Build—March, 1899.

**Structural Iron Work.**—Progress in the Application of Fireproofing to Structural Iron Work (Die Fortschritte in der Anwendung und Erfahrungen über die Feuersicherheit des Eisens im Hochbau). W. Linse. An examination into the value of various fireproofing materials, showing apparatus for testing the strength of iron columns when covered and subjected to heat. Serial. Stahl und Eisen—Aug. 1, 1898.

**Tall Buildings.**—The Fire-Trap Modern "Sky-Scraper." William Sooysmith. A thorough discussion of the inadequacy of so-called fireproofing, as applied to modern tall buildings, and a proposed plan for rendering them really fireproof. Gives an account of tests of the crushing strength of stone columns of a stated construction, and believes they may be practically and advantageously substituted for steel in tall structures. 3400 w. Stone—Dec., 1895.

The Status of the Fireproof Building. Oscar Lowinson. Discusses questions of fireproof protection in connection with the destructive effects of the recent fire in the Home Life Building of New York. Serial. Arch & Build—Dec. 24, 1898.

See also **Home Life Ins. Building.**

**Terra Cotta.**—Burned Clay as a Fireproofing Material. W. D. Henry. Read at the Pittsburg meeting of the N. B. M. Assn. Considers the adaptability of burned clay to fireproofing, the proper way to make it, the results, etc. 3500 w. Brick—March, 1898.

Details of Fireproof Construction with Burned Clay. Peter B. Wight. A study of column protection. Ill. 2500 w. Br Build—Aug., 1897.

Fireproof Construction, Some Valuable Opinions. Interviews with the aim of obtaining current opinion in regard to the use and possibilities of terra-cotta. Views of prominent architects of N. Y. and Boston. 3200 w. Br Build—Jan., 1897.

Some Notes upon the Struggle for Survival between Burnt-Clay Fireproofing and Its Newly Arisen Rivals. Dankmar Adler. Part first notes the pauses that are sure to come in the development of industrial progress, and comments on the wisest way to meet the pause now reached by the burnt-clay fire protective coverings, suggesting a study of the damages inflicted on the material by fire and the means of prevention. Serial. 2000 w. Br Build—May, 1898.

See also **Hollow Tile; Home Life Ins. Building; TERRA COTTA.**

**Test.**—Description of Fire Test of a Ten-Inch Hollow Flat Arch, Made by Maurer & Son, New Jersey. Gustav Liebau. The test was carried out on a building of brick erected for the purpose. Ill. 800 w. Brick—Jan., 1899.

Fireproof Buildings. Editorial on the investigations of fireproof construction being made in the United States, and the importance of having such tests made in England. 2000 w. Builder—May 29, 1897.

Fireproof Construction and Recent Tests. Ill. A. L. A. Himmelwright. Describing the tests of fireproof qualities lately made by the New York Department of Buildings. 3900 w. Eng Mag—Dec., 1896.

Tests of Fireproof Flooring Material. George Hill. An exhaustive and valuable series of tests fully described and illustrated. 6000 w. Trans Am Soc Civ Eng—Dec., 1895.

**Test, Berlin.**—Fireproof Floors. Results of some experiments made at Berlin, under the auspices of the Royal Police Fire Brigade. 2800 w. Ill. Car & Build—Oct. 9, 1896.

**Test, British.**—Fire Tests of Fireproof Construction by the British Fire Preventive Committee. An outline of the proposed work, describing the testing plant and giving regulations governing the tests. Also editorial. Ill. 5400 w. Eng News—June 8, 1899.

Recent Fire Tests of Fireproofing by the British Fire Prevention Committee. Gives details of a comparative fire test of two different constructions of fireproof doors. 1600 w. Eng News—Nov. 9, 1899.

**Test, Floor.**—Fire Tests with Floors. An illustrated account of an experimental fire test, made in England, with a floor of deal joists, with coke breeze concrete. 1300 w. Fire & Water—June 2, 1900.

Tests of Fireproof Floor Constructions. Report of tests made on various forms of construction, with results. 1600 w. Eng News—April 22, 1897.

Test of Wide Floor Arches. Corydon T. Purdy. Gives an illustrated description of a test of two 7 ft. arches, one segmental and the other flat. 1200 w. Br Build—July, 1899.

**Testing Committee, Am. Soc. Mech. Eng.**—Preliminary Report of the Committee on Tests of Fireproofing. Progress made to date in the work of the committee. Gives results of tests of unprotected columns, with illustrations. 2200 w. Eng News—Aug. 6, 1896.

Report of Progress of the Committee on Fireproofing Tests. Illustrated report of progress made by a joint committee to the several bodies which created these committees. 2000 w. Am Soc of Mech Engs—Dec., 1896.

Report of the Committee on Fireproofing Tests. This report was prepared by a committee of four gentlemen; one appointed by the Tariff Assn. of New York, one by the Architectural League of New York, and two by the Am. Soc. of Mech. Engs. An account of the tests and the results is given, with diagrams and engravings. 1500 w. Arch & Build—Aug. 22, 1896.

Work of the Committee on Fireproofing Tests. S. Albert Reed. The co-operative committee of three, representing the Fire Insurance Underwriters, the Architectural League and the American Society of Mechanical Engineers. Interesting information with tests thus far made. 4000 w. Jour Fr Inst—Nov., 1896

**Test, New York.**—Comparative Standard Fireproof Floor Test of the New York Building Department. Part first deals with the introductory history, conditions and purposes, previous tests, kilns, and requirements of building, loading, firing, and quenching, and the Rapp system. Ill. Serial. Eng Rec—Sept. 18, 1897.

Fireproofing Tests. Describes an interesting test at the proving ground at 68th St. and Avenue A, New York, conducted after the requirements of the New York Dept. of Buildings. The arched or flat-domed floor, built after Mr. Guastavino's method of cohesive construction, was submitted to a test of unusual severity. 1600 w. Am Arch—May 8, 1897.

Official Test of Fireproof Floor Construction Systems. Report of the test of the "Metropolitan" system. Ill. 1800 w. Eng Rec—May 29, 1897.

See also **Test, Roebling.**

**Test, Perth Amboy.**—The Effect of Fire on Fireproofing materials. James C. Rossi. Results of a fire and water test made by Howard Constable upon a building at Perth Amboy, N. J. The test is particularly interesting as the floor tested was of a larger size than usual, and represented an entirely completed floor and ceiling ready for use with a distributed load of 170 lbs. per sq. ft. 800 w. Eng News—May 14, 1896.

**Test, Roebling.**—Tests of Fireproof Material. Describes tests of the Roebling fireproof construction system for floors and partitions of buildings, made in New York on Sept. 3, under the supervision of the Department of Buildings. 1000 w. Eng News—Sept. 17, 1896.

Tests of the Roebling Fireproof Floor. A protest was sent to the N. Y. Building Dept. claiming that the two hours' test was not sufficient, so a second test for a period of five hours was made and is here described. 800 w. Eng News—Nov. 5, 1896.

**Theatre, Prague.**—The Iron Reconstruction of the Variety Theatre at Prague (Die Eisenconstruction des Variété-Theatres in Prag). A valuable description of fireproof theatre construction, with details of iron work. 1800 w. Wiener Bauindustrie-Zeitung—Jan. 6, 1898.

**United States.**—Fireproof Construction of Buildings in the United States. R. W. Gibson. A discussion of the fire-resisting building methods in use in the United States, and the materials which have proved most satisfactory, with related matter of interest. Discussion. Ill. 11700 w. Jour Roy Inst of Brit Archt's—Dec. 10, 1898.

**Warehouse.**—Fireproofing of Warehouses. Frank B. Abbott. Discusses the means of protecting steel framed buildings from corrosion and fire. Urges the surrounding every structural member with concrete, leaving no air spaces externally or internally. Discussion. 1400 w. Jour W Soc of Engs—April, 1898.

**Warehouses, Hamburg.**—Hamburg Warehouses. Edwin O. Sachs. One of a series of papers on "Fire Protection" published in "Engineering." Describes and criticises these buildings from the fireproof point of view. Ill. 2400 w. Am Arch—Oct. 22, 1898.

**FIREPROOFING.**

See also **TIMBER PRESERVATION—Fireproofing.**

**Electrolytic.**—See **TIMBER PRESERVATION.**

**Timber and Timber Substitutes.**—Some Notes on the Preserving and Fireproofing of Timber and Timber Substitutes. Sherard Cowper Coles. On the various processes and the degree of success; the effect of the chemicals on the durability and strength of the wood, etc. 1500 w. Engng—Feb. 24, 1899.

**Wood.**—A Process of Fireproofing Wood to Be Used for the Woodwork of War Vessels. C. J. Hexamer. Describes process of impregating the wood with soluble glass. 2000 w. Jour Fr Inst—Jan., 1899.

A Useful Wood for Shipbuilding and Docks. An account of tests made on wood treated by a new method to protect it from all danger of combustion. 1000 w. Trans—May 14, 1897.

A Wood Fireproofing Plant. Illustrated description of a plant for injecting a fireproofing liquid into wood, with a statement of the results of the process. 1700 w. Eng Rec—Dec. 2, 1899.

Fireproofing Wood. Illustrated description of the latest method, invented by Joseph L. Ferrell. 2500 w. Sci Am—July 28, 1900.

Fireproof Wood for Ships. Illustrates and describes one of the plants and the process of manufacture. 2000 w. Marine Rev—Nov. 30, 1899.

Non-Flammable Wood. Charles E. Ellis. Read at the International Congress of Naval Architects and Marine Engineers. The process is described and tests reported, with some discussion of the use of such wood in naval architecture. 2000 w. Engng—July 9, 1897.

The Fireproofing of Wood for the New United States Battleships. A description of the method of preparation, with information concerning the actual fireprooofness, durability and strength. Ill. 2200 w. Eng News—Nov. 17, 1898.

Wood Fireproofing. Illustrates and describes the process of the American Wood Fireproofing Company of New York. 1000 w. Fire & Water—Feb. 24, 1900.

**FIRE PROTECTION.**

See also **FIRE DEPARTMENT; FIRE HAZARD.**

A Plea for Better Protection of Life and Property. Christopher Clarke. Suggestions of plans of protection and prevention resulting from years of study of the subject of reducing loss by fires in buildings. 800 w. Fire & Water—Dec. 7, 1895.

Fire Protection. Francis B. Stevens. An account of fires dating back to 1845, illustrating the progress made in means of extinguishing fires, discussing also systems for pumping salt water. 2500 w. Stevens Ind—Jan., 1900.

Security Against Fire. A paper entitled "Lessons from Fire and Panic," read by Thomas Blashill before the Surveyors' Inst., and published by the British Fire Prevention Committee. Calls attention to details often neglected, which are essential for protection, and the construction of fire-resisting buildings. 3000 w. Arch, Lond—Aug. 12, 1898.

**Architect.**—The Architect in Relation to Fire Prevention. Thomas Blashill. Abstract of paper read at meeting of the Roy. Inst. of Brit. Archts., with discussion. Considers progress and methods. 3500 w. Builder—Dec. 23, 1899.

**Charlottenburg Exhibition.**—The Fire Protection Apparatus at the Charlottenburg Exhibition (Die Feuerwehrtechnischen Maschinen auf der Ausstellung in Charlottenburg). Wilh. Geutsch. Devoted especially to aerial ladders and similar apparatus for the use of municipal fire departments. Serial. Zeitschr d Ver Deutscher Ing—Oct. 29, 1898.

**1899.**—Fire Prevention in 1899. Editorial on the paper of Thomas Blashill, and the lessons learned from tests and experience. 4200 w. Engng—Dec. 22, 1899.

**Europe.**—Fire Protection in Europe. Edwin O. Sachs. The first of a series of contributions intending to record the facts and issues, and furnish an outline of fire protection as it exists to-day. Serial. Engng—June 18, 1897.

**High-Pressure Water Service.**—See **WATER SUPPLY—Fire Service, Providence, R. I.**

**Hydrant.**—See **FIRE HYDRANT.**

**Legislation.**—The Duty of Firemen's Associations to Obtain Legislation That Will Secure Better Protection of Life and Property from Destruction by Fire. Christopher Clark. Changes in construction demanded. 900 w. Fire & Water—Sept. 26, 1896.

**London.**—London Fires and the Bridge. A few notes on London methods of fire prevention and extinguishing. 1100 w. Eng, Lond—Jan. 31, 1896.

**Machine Shop.**—See **MACHINE SHOP—Fire Department.**

**Metallurgical Works.**—Precautions Against Fire in Metallurgical Works. Discusses faults in mill construction, and calls attention to points requiring care. 1000 w. Eng & Min Jour—July 17, 1897.

**Museums.**—Protection Against Fire in Museums. Report on English museums as discussed by the Select Committee on Museums, of the Science and Art Department. 5700 w. Arch, Lond—Nov. 26, 1897.

**New York.**—Fire Protection for the District Below Chambers Street, New York City. Francis B. Stevens. Presents a plan modified to meet the changed conditions in this business portion of the city. 4500 w. Stevens Ind—July, 1899.

The City's Fire Hydrants, Water Pressure and

Meters. Information brought out in the testimony at the Maset investigation. 2500 w. Fire & Water—June 10, 1899.

**Salt Water, Boston.**—Salt Water Fire System of Boston. Frank A. McInnes. Describes the system which aims to extend the action of the fire boats, so that the power may be available at a distance from the water front. Ill. 2700 w. Jour N E Water Wks Assn—June, 1899.

**Standpipe.**—See **STANDPIPE—Fire Protection.**

**Tall Buildings.**—Fire Protection for High Buildings. Abstract of the opinions of engineers and other experts on the general need of fire protection, as given at the hearing before the Aldermen's committee and the building department of New York. 1200 w. Fire & Water—Feb. 4, 1899.

How to Make High Buildings Safe.—Christopher Clarke. Gives the changes that are generally agreed by experts necessary to make them safe. 1200 w. Fire & Water—Feb. 6, 1897.

Radical Changes Necessary in Fire Extinction in New York City. Jean Wetmore. A discussion of the inadequateness of the present fire system to protect the high buildings, with suggestions for improvements. 2500 w. Elec Eng, N. Y.—Dec. 22, 1898.

The Protection of High Buildings. Views of Prominent architects, firemen, and others on the best means of protecting from fire. 2000 w. Fire & Water—Dec. 17, 1898.

The Need of Improved Methods for Extinguishing Fire in High Buildings. Editorial discussion of this subject in connection with the partial burning of the 16 story Home Life Insurance Building in New York. 2500 w. Eng News—Dec. 22, 1898.

**Temporary Structures.**—The Paris Fire and the Building of Temporary Structures. H. Heathcote Statham. Showing how official control and inspection should guard against fire. Ill. 3600 w. Eng Mag—July, 1897.

**Testing Station.**—Testing Station of the British Fire Prevention Committee. Describes a recently opened testing station for fire-resisting materials, methods of construction and appliances, with a general view of the testing chambers and generator, and a view of the instrument room. 1800 w. Engng—Feb. 3, 1899.

**Theatres.**—The Safety of Theatre Audiences. Wm. Paul Gerhard. Reprinted from the publications of the British Fire Prevention Committee. Discusses the features of the building upon which the safety of the people depends. Serial. Am Arch—Oct. 21, 1899.

**Watchmen.**—A Proposed Improvement in Arrangement of Service of Night Watchmen. C. F. Simonson. From an address delivered at a meeting of officers and special agents of the Hartford Fire Insurance Company. The author is Gen. Inspector of the company. He suggests the employment of two watchmen in order to prevent the carelessness of one man alone. 1500 w. Eng News—Feb. 13, 1896.

**Water Curtains.**—Water Curtains for the Fire Protection of the Chicago Public Library. Illustrates and describes the system. 1100 w. Eng News—June 8, 1899.

**FIRE RISK.**

See **FIRE HAZARD.**

**FIRE STREAM.**

**Photographs.**—A Photographic Study of Fire Streams. A. Marston. Abstract of paper presented at the recent meeting of the Iowa Engng. Soc. Illustrated description of the results of an investigation of fire streams, conducted with a number of ring and smooth nozzles, in which the streams were photographed, as well as measured in the usual manner. 2000 w. Eng Rec—Feb. 18, 1899.

**FIRING.**

See also **BOILER; COMBUSTION; FUEL; FURNACE; GRATE; MECHANICAL STOKING; SMOKE PREVENTION.**

Firing. H. H. Kelley. Suggestions for changing the methods of firing to suit the conditions. Ill. 2500 w. Engr, U. S. A.—March 15, 1900.

Notes on Firing (Etwas über Füllfeuerungen). Ed. Brauss. Gives various practical hints on fuel, furnaces, chimneys, etc. 1500 w. Gesundh Ing —July 15, 1900.

Plain Talk to the Boys. C. B. Conger. A talk on the subject of firing coal properly, confined principally to the practical and mechanical side. 2400 w. Loc Engng—Feb., 1899.

Fuel and Furnaces. C. E. Lake. Discusses means of reducing waste, especially by the labor employed. 1200 w. Elec Engng—Dec., 1898.

**Inclined Grate.**—Smokeless Firing with Inclined Grate (Rauchfreie Verstellbare Schrägfeuerung). H. Karft. An illustrated description of an improved stoker by use of which smokeless combustion may be attained. 2000 w. Zeitschr d Ver Deutscher Ing—May 6, 1899.

**Labor Cost.**—The Cost of Boiler-Room Labor. Information concerning the cost of labor in steam-boiler plants, taken from Circular No. 6 of the Steam Users' Assn. 700 w. Eng News—Jan. 28, 1897.

See also **LABOR—Boiler Room.**

**Locomotive.**—See **LOCOMOTIVE OPERATION.**

**Water-Tube Boiler.**—Tests of Two Systems of Firing on a Water-Tube Boiler. Records of two tests conducted by George H. Barrus at the Edison Electric Illuminating Co.'s Atlantic Ave. power station, Boston, Mass., which had for an object a comparison of two systems of firing,—the common method of spread firing and a coking system in connection with a brick roof over the front of the furnace. Data shows superiority of spread firing. 600 w. Eng Rec—July 18, 1896.

**FISH-COMMISSION CAR.**

The Transportation by Rail of Fish and Fish Eggs. Illustrated description of the United States Fish Commission car, which is adapted for the distribution of live fishes. 1000 w. Sci Am—Jan. 8, 1898.

**FISHERMEN.**

**France.**—See **FISHING VESSEL.**

**FISHING VESSEL.**

**Bergen Exposition.**—The Maritime Fisheries Exposition at Bergen (L'Exposition des Pêches Maritimes à Bergen). M. J. Pérard. With many illustrations of fishing boats and appliances. 20000 w. Bull de la Soc d'Encour—Sept., 1899.

**France.**—The Ocean Fisheries and the Professional Instruction of Mariners Les Pèches Maritimes et l'Enseignement Professionnel des Marins). M. Perard. A discussion of the commercial value of the North Sea fisheries and an account of the construction of the fishing vessels, and the schools for instruction of fishers in France. 10000 w. Bulletin de la Société d'Encour—Nov., 1897.

**FISH PRODUCTS.**

**Oil and Guano.**—Oil and Guano from Fish (L'Huile et le Guano de Poisson). Discussing the technological applications of fish oil, and the use of the residues as a fertiliser. 2000 w. Le Génie Civil —Jan. 1, 1898.

**FISHWAY.**

See also **DAM.**

**Sterling, Ill.**—Fishway for Dam at Sterling, Ill. Illustrated description. 100 w. Eng News—Aug. 20, 1896.

**FIT.**

**Forcing.**—Allowance for Forcing Fits. Reviews the prevailing practice as gathered from different makers, with tabulated statements. 1900 w. Mach, N. Y.—May, 1897.

**Shrink and Force.**—Shrink and Force Fits. Jno. J. Wilmore. Reports experiments made by students in mechanical engineering, giving results and conclusions. Ill. 1400 w. Am Mach—Feb. 16, 1899.

Shrink and Press Fits. Henry Hess. Discussion from both theoretical and practical standpoints. 2200 w. Mach, N. Y.—Jan., 1900.

**Standard.**—Standard Fits in the Machine Shop. Arthur A. Fuller. Explains the peculiar adaptation of the limit system in this field, and reports cases of its application. Ill. 2700 w. Mach, N. Y.—Nov., 1897.

**FITTING.**

**Crown Brasses.**—Fitting Crown Brasses into Driving Boxes. Illustrated description of gages and method of using. 400 w. Am Mach—Oct. 20, 1898.

**Curved Surfaces.**—The Fitting of Curved Surfaces. Some suggestions for this work showing the principles involved. 1000 w. Prac Eng—June 3, 1898.

**FLAME.**

See also **GAS; PHOTOMETRY.**

**Explosion.**—Explosion Flames. Harold B. Dixon.

Abstract of a lecture at the Royal Institution. Reviews the work of others and gives an account of his own experiments. 3000 w. Jour Gas Lgt —May 25, 1897.

**Temperatures.**—Acetylene and Other Flame Temperatures. Edward L. Nichols. Read at meeting of the Am. Physical Soc. Description of apparatus used and observations. 5500 w. Pro Age—June 1, 1900.

The Temperature of Certain Flames. W. Noll Hartley. Description of attempts to ascertain temperature of flames. 1600 w. Am Gas Lgt Jour—July 27, 1896.

See also **GAS.**

### FLANGE.

**Joints.**—Experiments on Flange Joints (Versuche mit Flanschenverbindungen). C. Bach. A very fully illustrated account of tests made upon the strength of bolted flange-joints on pipes, valves, etc. Accurate measurements of the deformation under various pressures were made, and much valuable information deduced. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—March 25, April 1, 1899.

**Pipe.**—Pipe Flanges and Their Bolts. A. F. Nagle. Analyzes the forces at work upon a flange joint and recommends changes that aim to relieve the material of strains. 2000 w. Trans Am Soc of Mech Engs—May, 1899.

See also **PIPE FLANGE.**

### FLANGING MACHINE.

**Hydraulic.**—Hydraulic Flanging Machine. Illustrated description of machine and methods of operation. 1000 w. Am Mach—June 10, 1897.

### FLAT HEAD.

Experiments on the Strains and Stresses on Flat Cylinder-Heads (Untersuchungen ueber die Formänderungen und die Anstrengung Flacher Boden). C. Bach. A very thorough series of tests, the deformations being carefully measured for various pressures. Both cast and wrought iron heads, 28-in. diameter, were tested. 3 articles, 2 plates. 20000 w. Zeitschr d ver Deutscher Ing—Oct. 9, 16, 23, 1897.

Investigations of Distortion and Resistance of Flat Heads. Prof. C. Bach. Reprinted from "American Machinist." The investigations cover flat heads of wrought and cast material, deducing formulae. Ill. 1200 w. Jour Am Soc of Naval Engs—Aug., 1898.

Investigation of Distortion and Resistance of Flat Heads. C. Bach. Translated and abridged by Gus C. Henning, from the "Zeitschrift des Vereines Deutscher Ingenieure." Investigations in this field, covering flat heads of wrought and cast materials, giving tests. Ill. 1500 w. Am Mach—Feb. 17, 1898.

The Theory of Flat Heads (La Théorie des Fonds Plats). C. Walckenaer. A very full discussion of the experiments of Prof. Bach of Stuttgart upon the strength of flat heads of cylindrical vessels subjected to internal pressure. 12000 w. Revue de Mécanique—Dec., 1897.

### FLAX MACHINERY.

Flax Scutching and Flax Hackling Machinery. John Horner. Illustrated detailed description of machines used, their operation, and the processes to which the flax is subjected from the raw state till fitted for market as "dressed line." 5400 w. Engng—Sept. 4, 1896.

Flax Scutching and Flax Hackling Machinery. John Horner. Read before the Inst. of Mech. Engs., at Belfast. Illustrated description of machines and processes. 2500 w. Eng, Lond—July 31, 1896.

### FLOATING BRIDGE.

See also **BRIDGE—Floating.**

Carriage and Passenger Floating Bridge. Illustrated description of a bridge built for the Southampton and Itchen Floating Bridge and Roads Company, which has proved an advance in general efficiency and economy. 1100 w. Engng—Nov. 26, 1897.

**Lynn, Mass.**—An Old Floating Bridge. C. J. H. Woodbury. Read before the Essex Inst., Mass. Describes a floating bridge at Lynn on the Salem and Boston turnpike, nearly a century old and still in use. 2700 w. Engng—Aug. 26, 1898.

### FLOATING DOCK.

The Floating Dock as an Adjunct to a War Navy. Lyonel Clark. Read before the International Congress, at Paris. Discusses the size and construction; the advantages, limitations and cost, making comparison with the graving dock. Ill. 7000 w. Engs' Gaz—Sept., 1900.

**Algiers, La.**—Algiers Floating Dry Dock. A description of the floating structure being built at Sparrow's Point, Md. 900 w. Marine Rev—Sept. 28, 1899.

Great Floating Dock. Plans and information concerning a structure recently contracted for by the United States, which will be the largest floating dock in the world. 800 w. Marine Rev —April 20, 1899.

Naval Docks of the United States. Illustrated detailed description of the machine being built for the government at Baltimore. It is large enough and strong enough to lift the oceanic. 2000 w. Am Mfr & Ir Wld—June 28, 1900.

New Orleans and Algiers Dry Dock. Particulars relating to the location of the new dry dock, and the natural advantages which make it a judicious selection of site for the purpose of docking the United States war-ships of the larger size 1200 w. Bradstreet's—March 14, 1896.

Proposed United States Naval Floating Dock to be Located at New Orleans. Gives a brief history of the development of this form of dock, merely mentioning the appropriation of the U. S. Congress for the construction of a steel floating and graving dock to be located at Louisiana. Ill. 1500 w. Marine Engng—July, 1898.

The Algiers Dry Dock. A description of the proposed dry dock to be built at Algiers, La., with specifications for material and workmanship. 1200 w. R R Gaz—Sept. 2, 1898.

The 15000-Ton Floating Dry Dock for the U. S. Naval Station at Algiers, La. Illustrated detailed description, with the reasons which influenced its construction. 2000 w. Eng News—May 3, 1900.

U. S. Floating Dry Dock at Algiers, La. Drawings and description showing the general construction of this large dock and the approaches, and discussing interesting features. 2500 w. Marine Engng—Feb., 1900.

**America.**—Floating Dry Docks in America. Waldon Fawcett. A brief account of the docks already acquired and in process of construction. 1200 w. Mod Mach—Jan., 1900.

**Bermuda.**—Floating Dry Dock for the British Navy at Bermuda. Brief illustrated description of a dry dock capable of lifting a ship of 10,000 tons displacement. 400 w. Ry & Engng Rev—Aug. 5, 1899.

**Brooklyn.**—700-Foot Floating Dock at South Brooklyn. Illustrated description of this large pontoon dry dock which is under construction, and of the method of docking a ship. 1400 w. Sci Am—April 21, 1900.

**Havana.**—A Floating Dry Dock for Havana. Illustrated official description of the dock, with explanation of the essential characteristics of floating docks. 1700 w. Sci Am—Oct. 16, 1897.

**Loanda, Africa.**—Floating Dock for Saint Paul de Loanda (Dock Flottant de Saint-Paul-de-Loanda). A full acount of this structure built at Rotterdam for the Portuguese government and successfully towed to Africa; with plate of details and photographs of trials. 1800 w. 1 plate. Le Génie Civil—Oct. 16, 1897.

Floating Dock for San Paulo de Loanda. Gives illustrated description of a steel dock recently constructed by order of the Portuguese government. 1800 w. Engng—Sept. 10, 1897.

The Floating Dock for the Harbor of Loanda (Schwimmdock für den Hafen von Loanda). With photograph of the dock afloat as well as longitudinal and cross sections. 1000 w. Zeitschr d Ver Deutschr Ing—Jan. 15, 1898.

**New Orleans.**—See **Algiers, La.**

**Stettin.**—The Stettin Floating Graving Dock. Reprinted from the "Engineers' Gazette." Gives briefly the history of floating docks, and describes the noteworthy features of the dock named. Ill. 3000 w. Jour Am Soc of Naval Engs—Aug., 1898.

### FLOATING SAND.

Floating Sand: An Unusual Mode of River Transportation. Fredrick W. Simonds. A description of a remarkable phenomena, which has never yet received a fully acceptable explanation, but which may be more or less related with formation and obstruction of river channels. 2500 w. Am Geol—Jan., 1896.

## FLOOD.

See also **LEVEE; RIVER REGULATION.**

Flow of River Floods. A suggestion for investigation from the study of the landslip at Gohna. 600 w. Ind Engng—July 4, 1896.

**Albany, N. Y.**—Flood Damage to the Hudson River Passenger Bridge and Station of the Delaware and Hudson Ry., at Albany, N. Y. An illustrated account of the damage to property. 1100 w. Eng News—Feb. 22, 1900.

**Austria.**—The High Water Catastrophes of 1897 in Austria (Die Hochwasser-Katastrophe des Jahres 1897 in Oesterreich). With graphical diagrams showing the drainage areas and rise in the rivers, compared with the rainfall. A valuable study in river hydraulics. 8500 w. I plate. Oesterr Monatschr f d Oeffent Baudienst—July, 1898.

The High Water Catastrophes of the Year 1897 (Ueber Hochwasserverheerungen im Jahre 1897). Ferdinand Wang. A review of the floods in mountain-torrents in Austria-Hungary, with a discussion of methods of regulation and control of such streams. 2500 w. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1898.

See also **FLOOD PREVENTION.**

**Forecasts.**—See **Predicting.**

**India.**—On Fighting Floods. Describes the rivers of India, classifying them as the tidal, the deltaic, the semi-deltaic, and the torrential. Discusses the crossing of these rivers and the protection of the structures. 5600 w. Ind & East Eng—July, 1898.

**Mississippi.**—Mississippi Floods. W. W. Knight. States the conditions that exist along this river, reviewing the work that has been done, and the plans proposed, with brief account of damages. 2000 w. Yale Sci M—Dec., 1897.

National Interest in the Mississippi. Discussion of the flood situation. 1200 w. Bradstreet's—April 17, 1897.

Suggestions for the Control of Mississippi River Floods. Samuel McElroy. Suggestions in the line of relief submitted by an expert in various flood cases. 900 w. Eng News—May 20, 1897.

The Floods of the Mississippi River. William Starling. A paper prepared before the recent flood. Part first is an interesting illustrated description of the basin, and the influences causing the floods. Serial. Eng News—April 22, 1897.

The Mississippi Flood of 1897. William Starling. Discusses the sources of the flood, the effect of the new levees upon the flood height, storms, channel erosion, strengthening the levees, breaking of the levees, etc., etc.—Ill. 12800 w. Eng News—July 1, 1897.

The Mississippi Flood. Brief illustrated account of the recent flood and the damage done by it. 1700 w. Harper's Wk—April 17, 1897.

The Mississippi Floods, Their Cause and Prevention. The full text of the report of the Committee on Commerce, of the United States Senate, prepared with unusual care after consulting many experienced engineers. 6500 w. Eng Rec—Jan. 28, 1899.

The Mississippi River Floods and Methods for Their Control. From the report of the committee on Commerce of the U. S. Senate. An examination of the causes, and necessary protection for property. 2400 w. Eng News—Jan. 26, 1899.

See also **LEVEE; RIVER REGULATION.**

**P. C. C. & St. L. Railroad.**—Damage by the March Floods on the P. C. C. & St. L. Illustrated description of the damages on various branches of this American road. 1100 w. R R Gaz—May 14, 1897.

**Predicting.**—Predicting Floods in Rivers. A review of the method employed by the government hydraulic engineer of Queensland in foretelling floods on the Brisbane River. 1800 w. Eng Rec—Sept. 16, 1899.

Flood Forecasts (La Prévision des Crues). A very thorough discussion of the relations between rainfall and the rise of rivers, showing how the floods in certain rivers of France are predicted in advance; together with a discussion of the methods used in other countries. 5000 w. Revue Technique—Feb. 10, 1899.

**Southern Railway.**—Floods Along the Southern Railway. B. C. Milner, Jr. Illustrated account of the damage, which was much less than anticipated. 1600 w. R R Gaz—July 16, 1897.

**U. S., Western.**—The Seasons and Causes of Western River Floods. James L. Greenleaf. Showing the conditions that govern the rise and fall of Western rivers. Ill. 4500 w. Eng Mag—March, 1897.

## FLOOD DISCHARGE.

Flood Discharges. George Chamier. An elaborate review of the run-off from different areas and a new formula for estimating it. 4500 w. Eng Rec—Jan. 21, 1899.

**Culverts.**—Capacities for Culverts and Flood-Discharge. Abstract of a paper by George Chamier, presented at a recent meeting of the Inst. of Civ. Engs., London. Gives a formula proposed for average cases, with the results of tests. 1200 w. Eng News—Jan. 26, 1899.

See also **CULVERT.**

## FLOOD PREVENTION.

See also **LEVEE; RIVER REGULATION.**

**Austrian Railway.**—The Prevention of the Flooding of the Embankment of the Austrian North-Western Railroad (Ueber die im Vorjahre von der Oesterr. Nordwestbahn getroffenen Massnahmen gegen eine Ueberfluthung des Bahndammes zwischen Bisamberg und Stockerau). A. Walzel. An illustrated account of the precautions taken and the effective work done at the time of the floods in the fall of 1899. 4500 w. Zeitschr d Oest Ing u Arch Ver—March 16, 1900.

**Eastbourne.**—Construction of the Most Recent Flood-Prevention Works in Eastbourne. R. M. Gloyne. Abstract of paper read before the Incorporated Association of Municipal and County Engineers, England. Describes works being executed for the purpose of obviating the periodical flooding to which parts of the town have been subject in times of heavy rainfall. Discussion. 2500 w. Builder—June 12, 1897.

## FLOOR.

See also **CONCRETE REINFORCED; FIREPROOF CONSTRUCTION.**

Floors. Fred T. Hodgson. Editorial on the requisites of a good floor, and how to construct one; bridging, causes of weakness, etc. Serial. Nat Build—April, 1897.

**American.**—American Floors. F. Maire. An article condemning the use of carpets tacked down, and claiming that their use is due to the poor flooring laid. Presenting the subject from the healthful and cleanly standpoint. 1200 w. Ill. Car & Builder—April 24, 1896.

**Artificial.**—Papyrolith and Other Artificial Flooring. Information of papyrolith, cork-stone, and Knoch's elastic flooring. 1200 w. Cons Repts—Aug., 1897.

**Ceramic-Mosaic vs. Marble.**—Ceramic Mosaic vs. Marble Pavement. H. C. Mueller. Setting forth the possibilities of burnt clay for flooring. 600 w. Br Build—Nov., 1898.

**Concrete.**—See **CONCRETE FLOOR; FIREPROOF CONSTRUCTION.**

**Concrete Reinforced.**—Tests of a Reinforced Concrete Floor. Describes investigations made at a Montreal office building. 800 w. Eng Rec—Feb. 3, 1900.

**Durability Test.**—Tests of the Wearing Qualities of Flooring Materials. A valuable series of tests to determine the relative durability of various flooring materials, with results, and valuable diagram. 600 w. Sci Am—July 3, 1897.

**Fireproof.**—See **FIREPROOF CONSTRUCTION—Floor.**

**Hardwood.**—Hardwood Floors. Edgar J. Spratling. Suggestions for the selection of flooring, and the laying, finishing and care. 1500 w. Am Arch—Aug. 20, 1898.

**Hollow-Tile.**—See **BUILDING MATERIAL; FIREPROOF CONSTRUCTION.**

**Loads.**—Uniform Safe Loads for Building Floors. F. E. Kidder. Read before the convention of the International Assn. of Building Inspectors, at Detroit, Mich. Gives the writer's opinions and gives a summary of what he believes combines absolute safety with proper allowance for economy. 2200 w. Arch & Build—Oct. 16, 1897.

**Railway Shops.**—Best Floors for Shops and Round Houses. Extracted from a committee report presented at the convention of Assn. of Ry Supts. of Bridges and Buildings. Ill. 2300 w. Ry & Engng Rev—Oct. 22, 1898.

**Reinforcing.**—Reinforcing a Warehouse Floor. Illustrated description of a method of strengthening floors by means of king post trusses. 600 w. Eng Rec—Aug. 25, 1900.

**Schürmann Sheet Iron.**—The Schürmann Solid Floor Construction with Sheet Iron Keys (Schürmann's Massivdecken auf Wellblecheisen). The use of stamped sheet metal keys enables a practical arch construction to be built between beams without special arch bricks or tiles. 2000 w. Schweizerische Bauzeitung—Aug. 7, 1897.

**Warehouse.**—Economy in Floor Construction. Corydon T. Purdy. Gives plans for the floors of a warehouse made to enable the owners to decide for themselves which would be most desirable. 500 w. Br Build—June, 1899.

**Wehler Brick.**—The Wehler Floor Brick (Der Wellenfalzziegel Patent Wehler). An improved hollow tile for floor and ceiling filling in connection with iron girders. A peculiar lock joint is used. 2000 w. Zeitschr d Oesterr Ing und Arch Ver—Aug. 6, 1897.

**FLOUR MILL.**

See also **MILL.**

Designing a Flour Mill. W. L. Burner. Illustrated by diagrams showing judicious arrangement of machinery with detailed explanations. 700 w. Am Miller—Jan., 1896.

The Best Milling Systems. From a paper by W. A. Holley, read before the Mich. Millers' Assn. Hints by a practical miller which will aid in the production of the maximum quantity of high grade flour, from the minimum quantity of wheat. The various systems in use are named and their common purpose is the same. 1500 w. Am Miller—Feb., 1896.

**Fire Hazard.**—See **FIRE HAZARD—Flour Mill.**

**Hungary.**—See **EXPOSITION—Budapest.**

**FLOW OF WATER.**

See **RIVER DISCHARGE; WATER FLOW.**

**FLUE.**

See **CHIMNEY; HEATING—Furnace Flue.**

**FLUME.**

See also **HYDRO-ELECERIC PLANT; IRRIGATION; WATER POWER.**

**Idaho.**—The Basic Company's Flume, Idaho. Illustrated description of this work and its construction, in connection with the installation of a water-power plant at Grimes Creek to furnish electric power needed at the company's works. 2000 w. Eng & Min Jour—Oct. 15, 1898.

**Idaho, Rapp's Creek.**—See **DITCH.**

**FLUOROSCOPE.**

See also **ROENTGEN RAY.**

**Bleyer Photo.**—On the Bleyer Photo-Fluoroscope. J. Mount Bleyer. Description of an instrument which is practically an adaptation of the fluoroscope to the needs of the physician and surgeon, and consists in combining of instantaneous photography with the fluorescent screen. 1600 w. Elec Eng—July 1, 1896.

**Edison.**—The Edison Fluoroscope Exhibit. A description of this exhibit at the Electrical Exposition in New York. 1800 w. Elec Eng—June 8, 1896.

**FLUOR SPAR.**

Flux Spar in Metallurgical Work. Discusses its use in the blast furnace, the open-hearth steel furnace, and the foundry cupola. 1000 w. Ir Trade Rev—Sept. 8, 1898.

**Alabama.**—The Fluxing Rocks of Alabama Geologically Considered. Henry McCalley. Describes the formation, location, etc., of the various groups, with remarks on their use. 1400 w. Eng & Min Jour—Jan. 30, 1897.

**Kentucky.**—Fluor Spar Deposits in Kentucky. Richard Moldenke. Describes this spar, and states the localities where it is found, and peculiarities of the deposits, the purposes for which it is used, etc. 2000 w. Ir Trd Rev—May 11, 1899.

**FLUX.**

**Blast Furnaces.**—On the Relative Merits of Limestone and Lime in Blast-Furnace Practice. Charles Cochrane. Read before the Iron and Steel Inst., England. Presents the results of a comparison of limestone and lime employed as flux at a furnace 90 feet high and about 34,500 cubic feet capacity, at Ormesby Ironworks, Middlesborough. Serial. Ind & Ir—May 13, 1898.

**Foundry.**—The Use of Fluxes in the Foundry. Walter J. May. On the few uses of fluxes and the general ignorance concerning why they are used. 800 w. Prac Engr—Nov. 10, 1899.

**Smelters.**—Flux for the Smelters. Description of a limestone quarry and plant extracting stone for the smelters. Illustrated by two views. 800 w. Aust Min Stand—March 5, 1896.

**FLY WHEEL.**

See also **STEAM ENGINE—Regulation; PULLEYS.**

Some Notes on Fly Wheels. Irving A. Taylor. Examines some points which the writer thinks were not carefully considered in Mr. Williams's article in the August number of "Elec Engng. 1200 w. Elec Engng—Nov., 1896.

**Boring.**—See **BORING—Fly Wheel.**

**Construction.**—A Canadian Example of Heavy Fly-Wheel Construction. Illustrated description of processes used in the construction of heavy fly-wheels. Taken from the Laurie Engine Company's shops, at Montreal. 800 w. Am Mach—June 3, 1897.

A New Construction for Fly Wheel. A. P. Brayton and Edward S. Cobb. Illustrated description. 1000 w. Min & Sci Pr—Aug. 22, 1896.

**De La Vergne.**—De La Vergne Fly-Wheels. An illustrated detailed description of the construction of these wheels. 1600 w. Am Mach—Feb. 11, 1897.

**Design.**—About Fly-Wheels. Their strength and how figured. 2200 w. Bos Jour of Com—Sept. 4, 1897.

A Note on Fly-Wheel Designs. A. J. Frith. A study of the effect of the arms of a fly-wheel on its rim, and regarding the mutual proportions. 1400 w. Trans Am Soc of Mech Engs, No. 832—Dec., 1899.

Fly-Wheel Designing. C. H. Benjamin. Practical suggestions, with an explanation of the necessary calculations. Ill. 3000 w. Mach, N. Y.—Oct., 1899.

The Arms of Fly-Wheels Cast in One Piece—A Method of Constructing Additional Diagrams. Henry Hess. Diagrammatic solutions, with explanations. 1200 w. Am Mach—Aug 12, 1897.

**Dynamo.**—See **DYNAMO—Fly-Wheel.**

**Molding.**—See **MOLDING—Flywheel.**

**Pump Regulation.**—See **PUMP—Flywheel Regulation.**

**Repair.**—A Broken Flywheel and How It Was Repaired. James McBride. Illustrates and describes the wheel and the method of repair which left it stronger than when first erected. 1600 w. Trans Am Soc of Mech Engs, No. 836—Dec., 1899.

**Rim Strength.**—Note on Strength of Wheel Rims. Albert K. Mansfield. Calling attention to the fact that under some conditions ribbing does not have a strengthening effect. Ill. 700 w. Trans of Am Soc of Mech Engs, No. 794—Nov., 1898.

**Rim Tension.**—See **CENTRIFUGAL FORCE—Diagram.**

**Rolling Mill.**—Rolling Mill Fly-Wheel. John Fritz. A review of the progress made in the construction of fly-wheels. Ill. 1500 w. Trans Am Soc of Mech Engs—May, 1899.

**Segmental.**—An Outfit for the Manufacture of Large Segmental Flywheels. Illustrations and brief notes relating to the special outfit used by the E. P. Allis Co. 500 w. Am Mach—May 10, 1900.

**Steam Engines.**—Fly-Wheels for Steam Engines. E. F. Williams. Discussion of the proper proportion of wheels under certain specified conditions, with rules for their construction and performance. 3000 w. Elec Engng—Aug., 1896.

**Steel Plate.**—A Fly Wheel Built of Steel Plates. Illustrated detailed description. The fly-wheel is also designed for a belt wheel. 400 w. Eng News—April 23, 1896.

**Structural Steel.**—Structural Steel Fly-Wheels. Thomas E. Murray. Read before the A. S. M. E. Deals with methods for constructing fly-wheels which will not be liable to burst, and takes the ground that the use of cast-iron for this purpose has reached its limit. Structural wheels of steel are advocated and an example of the construction of such a wheel is illustrated and described. 1400 w. Trans Am Soc of Mech Engs—Vol. XVII., 1896.

**Wrought Iron.**—Wrought Iron Fly-Wheels. Illustrates and describes important departures from ordinary fly-wheel construction, directed toward securing stronger and safer wheels, from designs by Mr. F. P. Sheldon for the Union R. R. Co., of Providence, R. I., and Mr. Edwin Reynolds, of the Edward P. Allis Co. of Milwaukee, Wis. 700 w. Power—Jan., 1896.

### FLY-WHEEL ACCIDENT.

Fly-Wheel Accidents. Read by Prof. Sharp before the Civ. and Mech. Engs.' Soc. Considers the causes of bursting, and gives illustrated description of various designs, including one by the writer. 2200 w. Ir & Coal Trds Rev—May 4, 1900.

**Cause.**—Cause of Fly-Wheels Bursting. W. K. Austin. Lessons from experience and observation. Jarring is considered a potent factor in the destruction of fly-wheels. 900 w. Power—Feb., 1896.

The Bursting of Small Cast-Iron Fly-Wheels. Charles H. Benjamin. Describes a series of experiments on small cast-iron wheels, at the Case School of Applied Science, for the purpose of investigating the causes of failure. Ill. 2800 w. Trans of Am Soc of Mech Engs, No. 795—Nov., 1898.

The Wheels and Why They Burst. Charles Henry Benjamin. Read before the Elec. Club of Cleveland. Includes also a description of a steel built up fly-wheel. 2800 w. St Ry Rev—Jan. 15, 1896.

**Electric Power Station.**—How to Avoid Fly-Wheel Accidents in Power Stations of Electric Railways. William Baxter, Jr. Describes a simple magnetic cut-out, which, if connected with the circuits as explained, will render it impossible for a generator to act as a motor. Ill. 2500 w. Power—Aug., 1896.

**Electric Station.**—See **DYNAMO—Run as Motor.**

**Königsberg, Prussia.**—The Breaking of a Fly-Wheel (Ueber den Bruch eines Schwungrades). H. Hagens. An illustrated description of a fly-wheel accident in an electric power station at Königsberg, Prussia. 600 w. Zeitschr d Ver Deutscher Ing—May 12, 1900.

**Providence, R. I.**—Fly-Wheel Accident at Providence, R. I. An account of the accident, on Sept. 22, at the factory of the Providence Rubber-Shoe Company. Ill. 1800 w. Power—Nov., 1897.

**Tacoma, Wash.**—Fly-Wheel Explosion at the Power House of the Tacoma Ry. Co., Tacoma, Wash. A. McL. Hawks. Description of accident which took place on July 11, 1897. Ill. 700 w. Eng News—July 29, 1897.

**Theory.**—Fly-Wheel Explosions (Ueber Schwungrad Explosionen). J. Goebel. A mathematical examination on the centrifugal stresses tending to produce explosions of fly-wheels. 1500 w. Zeit d Ver Deutscher Ing—March 4, 1899.

Fly Wheel Explosions (Ueber Schwungrad-explosionen). J. Goebel. An investigation into the stresses in the arms and runs of fly-wheels due both to rotation and to methods of construction, and a mathematical discussion of the action of the forces causing explosions. 5000 w. Zeitschr d Ver Deuscher Ing—March 26, 1898.

### FLYING MACHINE.

See **AERONAUTICS.**

### FOG SIGNAL.

See also **RAILWAY SIGNAL; SEA SIGNAL.**

Navigation in Foggy Weather (Navigation en Temps de Brouillard). E. Lacoine. A discussion of a system of signal stations, producing audible signals and forming a sort of block-system, for use in harbors and similar situations. 2000 w. Revue Technique—March 10, 1899.

**Guard Boats.**—The Prevention of Collisions at Sea During Foggy Weather. Describes a system for the prevention of collisions at sea during foggy weather, which was invented by N. Bottone. 1400 w. Steamship—March, 1899.

**Lacoine Phonesphore.**—Sound Signalling at Sea. Investigations recently made by Emile Lacoine. A statement of problems and varying conditions and his means of obtaining distances. Serial. Engng —Jan. 6, 1899.

**Mechanical.**—Mechanical Fog Signalling. Editorial discussion of fog signal requirements and the respective merits of human and mechanical agencies. 1600 w. Eng, Lond—July 10, 1896.

### FORCED DRAFT.

See **BOILER; BLOWER; COMBUSTION; MECHANICAL DRAFT.**

### FOREST.

**Fires, New Jersey**—See also **FIRE—Forest, New Jersey.**

**United States.**—Facts and Figures Regarding Our Forest Resources Briefly stated. B. E. Fernow. Forest area, character of forest growth, amount of standing timber ready for cutting, value, exports, imports, uses of timber in the arts, centers of production and many other interesting topics are treated in this circular. 8500 w. U S Dept of Agriculture Circ No. 11—1896.

### FOREST RESERVE.

**Adirondacks.**—The North Woods. Editorial presenting the importance of New York State owning this region, with extract from Gov. Black's message. 1200 w. Gar and For—Jan. 20, 1897.

**Mining.**—Mining and the Forest Reserves. Gifford Pinchot. A brief statement of the regulations prescribed under the law, showing that the reservation does not interfere with the development of mineral wealth, but is of positive value to the miners. 2800 w. Am Inst of Min Engs—Oct., 1898.

### FORESTRY.

Forestry in Relation to Physical Geography and Engineering. John Gifford. Considers the benefits derived from the forests, other than the value of the wood, and urges the importance of legislation for their protection. Ill. 6000 w. Jour Fr Inst—July, 1898.

National Instruction in Forestry. A statement of the new method of the U. S. Agricultural Department to teach the management of woods and forests. 800 w. Eng Rec—Nov. 5, 1898.

**Biltmore, N. C.**—Forestry at Biltmore. Some information regarding the methods employed on the estate of George W. Vanderbilt. 1000 w. Arch & Build—July 18, 1896.

**Maine.**—Forest Management in Maine. Austin Cary. Discusses the methods and work of the forester. 8800 w. Jour Assn of Engng Socs—Aug., 1899.

**Meteorology.**—Pseudo-Science in Meteorology. B. E. Fernow. A warning against erroneous observations, and fallacious conclusions, relating to effects of forest removal upon the water-flow, and upon meteorological phenomena, especially on water-flow in the western mountains. 1600 w. Science—May 8, 1896.

**River Regulation.**—The Significance of Afforestation in Preventing and Correcting Torrents. F. Fankhauser. Address delivered before the Bern Forestry Assn. Considers forestation the only lasting remedy, the one nature herself applies when not interrupted by man, and discusses the subject in full. 3300 w. Indian Forester—Dec., 1897.

**Shifting Sands.**—See **SANDS—Shifting.**

### FORGE.

**Water Spray Blast.**—Researches upon Forge Fires with Water Spray Blast (Versuche mit Schmiedefeuern und das Wasserstaubfeuer von Bechem & Post). Showing the higher efficiency gained by introducing moisture into the blast, with description of the apparatus. 3500 w. Stahl und Eisen —Sept. 15, 1897.

### FORGE SHOP.

Data Relating to Forge-Shop Design. Paul M. Chamberlain. Illustrated description of forge shop in the mechanical department of Michigan Agricultural College with special reference to air-blast and suction for smoke expulsion. 700 w. Ir Tr Rev—Dec. 5, 1895.

**Milwaukee High School.**—See **HEATING AND VENTILATION.**

**Nebraska University.**—The Forge Shop at the University of Nebraska. C. R. Richards. Illustrated detailed description. 600 w. Am Mach—Jan. 30, 1896.

### FORGING.

See also **SHAFT; STEEL MANUFACTURE.**

Blacksmithing Operations. B. F. Spalding. Working cold metal, drop forging, undercut dies, a mortised die, fatigue of metals, rate of stress and of recovery, proper heats, heavy drops. 2500 w. Am Mach—Oct. 15, 1896.

**Bethlehem Steel Co.**—Making Heavy Steel Forgings. Illustrated description of the plant and products of the Bethlehem Steel Co. 3500 w. Mach, N. Y.—Oct., 1899.

**Fatigue of Metal.**—Fatigue of Metal in Wrought Iron and Steel Forgings. H. F. J. Porter. Part first considers some of the defects in steel forgings which have caused their failure in the past and have tended to prevent their general use, showing that they were due to faulty methods of manufacture. Ill. Serial. Jour Fr Inst—April, 1898.

**High Carbon Steels.**—High Carbon Steels for Forgings. A. L. Colby. Read before the Eng's. Club of Philadelphia. The steel used in shafting, crank-pins, hammer-rods, with directions for selection of steel. 1100 w. Ir Age—Feb. 18, 1897.

**Hollow Steel.**—Hollow Steel Forgings. H. F. J. Porter. Read before the A. S. M. E. Describes and illustrates a method of forging hollow shafts or rolls, and gives substantial reasons for adopting it. Formulae for twisting moments, etc., of such forgings are given, and some accounts of notable forgings of this kind are presented. 2800 w. Trans Am Soc of Mech Engs—Vol. XVII—1896.

**Naval.**—The Manufacture of Naval Forgings. Remarks upon American practice in high requirement forgings, giving some examples from the Bethlehem Iron Co. 1800 w. Ir & Coal Trs Rev—March 27, 1896.

**Pumping Engines.**—Steel Forgings for Pumping Engines. H. F. J. Porter. Reviews briefly the history of the development of forging in the United States, and the processes which are considered the best practice for making steel forgings, the causes of defects, and the direction in which improvements are tending. Ill. 5000 w. Sib Jour of Engng—May, 1898.

**Steel.**—Steel Forgings. A discussion held Oct. 6, 1897, in connection with the society's visit to the Bethlehem Iron Works, in its "Excursion to the East" in September, 1897. 4000 w. Jour W Soc of Engs—Oct., 1897.

Steel Forgings. H. F. J. Porter. Illustrated historical review of the development of the art of forging in this country and of the circumstance leading to the erection of the Bethlehem Iron Co.'s plant; describes the processes in use there. 8400 w. Jour W Soc of Engs—Dec., 1896.

### FORGING MACHINE.

**Pneumatic.**—A Powerful Pneumatic Forging Machine. Illustrates and describes a machine used in the Burnside shops of the Ill. Cent. Ry., designed by Martin Kennedy. 900 w. Ry & Engng Rev—Feb. 24, 1900.

**Rice.**—The Rice Forging Machine at the Pope Mfg. Company. An illustrated detailed description of the machine and its operation. 3800 w. Ir Age—Aug. 24, 1899.

### FORGING PRESS.

**Dillingen, Germany.**—A Great Forging Press (Grosse Schmiedepressen). An illustrated description of the 10,000 ton hydraulic forging press built by Breuer, Schumacher & Co. for the Dillingen Iron Works, Germany. 1000 w. 2 plates. Stahl und Eisen—July 1, 1899.

**Hydraulic.**—The Forging and other Presses at the Kalk Machine Works (Schmiede und Andere Pressen der Kalker Werkzeugmaschinenfabrik). A paper by Herr Meune with valuable data and indicator diagrams showing the action of hydraulic forging presses performing given operations. 3000 w. Zeitschr d Ver Deutscher Ing—Aug. 6, 1898.

Veritable Power Hydraulic Forging Press (Presse Hydraulique à Forger, à Puissance Variable). Illustrated description of an English built machine giving three grades of pressure on the work. 800 w. La Revue Technique—Dec. 10, 1898.

**Operation.**—The Operation of Forging Presses (Ueber den Betrieb von Schmiedepressen). R. M. Daelen. A discussion of the power required to drive forging presses. Indicator diagrams are given showing the power developed by the engine for various conditions of the work. 1500 w. Stahl und Eisen—April 1, 1898.

### FORMING TOOL.

**Turret.**—Turret Forming Tool. H. Goldsmith. Illustrates and describes this tool, considers why so called, and the variety of work to which it is applied. 800 w. Mach, N. Y.—March, 1899.

### FORMULAE.

Formulae Explained. Otto Dietrich. The first of a series of articles explaining matters not understood by all engineers, mostly of a mathematical character. Serial. Sta Eng—May, 1897.

### FORTIFICATION.

See **COAST DEFENCE.**

### FOUCAULT CURRENTS.

See **ARMATURE—Eddy Currents; ELECTRIC MACHINERY—Eddy Currents; HYSTERESIS.**

### FOUNDATION.

See also **CAISSON; FOUNDATION FAILURE; TALL BUILDING; UNDERPINNING.**

Field Engineering Abroad. Condensed selections from papers by Sir Guilford Molesworth, with illustrations prepared from copies of original photographs. Part first treats of heavy foundations in loose and alluvial soil. Serial. Eng Rec—Feb. 20, 1897.

Foundations. Frederick Baumann. Considers important points with special reference to Chicago soil. Loads, areas, settling, materials, piling, wells, etc. Ill. 4000 w. In Arch—Dec., 1898.

Foundations. W. A. Truesdell. An embodiment of ideas and observations gathered during several years of practice. 4000 w. Wis Eng—Oct., 1896.

Important Problems in Construction. William W. Crehore. The present article is devoted to methods of building foundations. Ill. 3500 w. Br Build—Dec., 1898.

Notes on Foundations (Einiges über Fundamente). Adolf Francke. Particularly on the proper distribution of pressure. Formulae, with diagrams and examples. 600 w. Schweiz Bauzeitung—April 7, 1900.

**Arch.**—See **ARCH—Foundation.**

**Bridge.**—See **BRIDGE FOUNDATION.**

**Brick and Iron.**—A Brick and Iron Foundation for a German Building. Describes a spread foundation for a soil carrying but 8200 pounds per square foot. 600 w. Eng Rec—June 4, 1898.

**Buildings.**—Foundations of Buildings. S. Anglin. Read before the Manchester Soc. of Archts. Discusses what constitutes a good foundation and the working loads different foundations are capable of sustaining. 4500 w. Stone—Sept., 1900.

Foundations of Buildings. S. Anglin. Read before the Manchester Eng. Soc. of Archts. On the substructure or foundations of buildings in general, and of steel skeleton construction in particular. 4200 w. Jour Roy Inst of Brit Archts—Nov. 11, 1899.

Foundations for Buildings. Henry W. Hodge. Ideas of what should and should not be done, with descriptive examples. Ill. 3000 w. Br Build—Nov., 1899.

**Cantilever.**—Cantilever Foundations for Small Buildings. Describes the unusual conditions existing in the City of New York, often making secure foundations a matter of great expense, and gives a plan resorted to in the case of steel structures of moderate size. Ill. 1600 w. Eng Rec—Nov. 27, 1897.

Cantilever Foundations of an English Building. Illustrated description of the manner of supporting about half a warehouse under which runs a tunnel. 1000 w. Eng Rec—Aug. 5, 1899.

**Cathedral, N. Y.**—The Foundations of the New York Cathedral. From "Builders' Reporter." Brief account of the difficulties encountered and overcome in laying the foundations for the new cathedral at Morningside Park, New York. 900 w. Can Arch—Oct., 1896.

**Chicago Post Office.**—Chicago Post Office Foundations. Review of paper by William Sooysmith on the remarkable long-pile foundations of a 300x360 ft. building. Each pile carries 30 tons. 3600 w. Eng Rec—Nov. 26, 1898.

The Foundations of the New Post-Office and Government Building at Chicago. Describes the work of building foundations, carried down through the clay to hard material, for this massive and heavy masonry structure. Ill. 2400 w. Eng News—Jan. 27, 1898.

The Foundations for the U. S. Government Post Office and Custom House Building at Chicago. William Sooysmith. Gives a statement of the kinds of materials met with in constructing these foundations, and an illustrated description of the work. 4000 w. Jour W Soc of Engs—Oct., 1898.

**Concrete Footings.**—The Computation of Concrete Footings for Walls and Columns. Abstract of an article by George H. Blagrove, in the "Contract Journal," of London. Eng. 1100 w. Eng News—March 8, 1900.

**Concrete Steel.**—Foundations of the Franklin Building. Illutsrated description of unusual concrete and steel grillages. 500 w. Eng Rec—May 28, 1898.

**Croton Dam.**—See **DAM—Croton.**

**Dam.**—See **Herr Island Lock and Dam; DAM—Croton; DIAMOND DRILLING—Gila River.**

**Deep and Difficult.**—Deep and Difficult Bridge and Building Foundations. George E. Thomas. Extracts from a paper read before the W. Soc. of Engs. Briefly refers to difficult work accomplished by caissons, the freezing plan and pile-driving. 2000 w. Am Arch—Nov. 28, 1896.

**East River Bridge.**—The Foundations of the East River Bridge, New York. Illustrations and particulars showing the progress thus far made. 2200 w. Sci Am—Aug. 7, 1897.

See also **BRIDGE FOUNDATION.**

**Eccentric Loads.**—Eccentric Loads on Foundations. F. L. Douglas. The purpose of the article is to show an easy method for obtaining the maximum pressure under the heel of the footing, and applies to all cases where footings rest directly upon the earth, and also where grillage beams are used to distribute the loads over greater areas, and when slightly modified may be used in obtaining the proportion of total load carried by each of the several lower grillage beams when the loads are not symmetrically placed. 700 w. Eng News—May 20, 1897.

**Electric Machinery.**—Foundations for Electrical Machinery. P. I. Panamolo. The importance of substantial foundations and the disastrous results from settling. Ill. 1500 w. W Elect'n—April 28, 1900.

**Electric Power Station, New Orleans.**—Foundation for the Canal & Claiborne Electric Railway Power House, New Orleans, La. Illustrated description of a building foundation on soft ground presenting features of interest. 600 w. Eng News—Aug. 19, 1897.

**Electric Power Station, N. Y.**—Foundations for Kingsbridge Power Station for the Third Avenue Railway, New York City. Illustrated description of a construction consisting of a concrete cap carried by piles. 800 w. Eng News—May 17, 1900.

The Foundations of a Large Power House. Describes the methods of putting in a thick spread concrete base under the 70,000 H. P. station of the 3d Ave. Ry. Co., New York. 1200 w. Eng Rec—Dec. 16, 1899.

The Manhattan Railway Power-House Foundations. Illustrated description of the very heavy concrete foundations for a 431x204-ft. station to develop about 100,000 H. P. 2000 w. Eng Rec—Sept. 8, 1900.

See also **ELECTRIC POWER STATION—New York.**

**Electrolysis.**—See **STRAY CURRENT—Foundations.**

**Floating.**—Floating Foundations for Mexico City. J. A. Waddle. Describes a plan to make a solid framework by metal and concrete which shall resist injury from unequal settlement and damage by earthquakes. 900 w. Am Mfr & Ir Wld—April 19, 1900.

**Gasholder.**—Foundations for Metal Tanks. R. J. Milbourne. Discusses the conditions necessary in the provision of foundations. Ill. 2000 w. Jour Gas Lgt—Jan. 2, 1900.

See also **FOUNDATION FAILURE.**

**Gas Machinery.**—Effective and Defective Foundations for Gas Machinery. George D. Rice. Illustrates and notes defects in systems employed, weak floor foundations and the results in gears. 1200 w. Am Gas Lgt Jour—April 30, 1900.

**Grand Central Station.**—See **RAILWAY STATION—New York.**

**Grillage.**—Substructure Work in an Office Building. Illustrated description of the unusual grillage foundations of the Singer Building, New York. 900 w. Eng Rec—Feb. 26, 1898.

The Calculation of I-Beam Grillage Foundations. J. B. Nau. Submits an easy and rapid method of making these calculations, giving diagram. 1000 w. Eng News—April 20, 1899.

**Herr Island Lock and Dam.**—The Foundations of the Herr Island Lock and Dam, near Pittsburg, Pa. Illustrated description. 900 w. Eng News—Aug. 20, 1896.

**London Buildings.**—Foundations as Applied to London Buildings and Riverside Foundations. A. T. Walmisley. Read at meeting of the Architectural Assn., London. Observations on the subsoil of London, with particulars from named localities, and the systems in use. Discussion. Ill. 16000 w. Builder—May 28, 1898.

**Marsh.**—The Compressibility of Salt Marsh Under the Weight of Earth Fill. Eugene R. Smith. Tables of information obtained by the writer from investigations of reclaimed marsh land on the north shore of Great South Bay, at Islip, N. Y. The work is briefly described. 1100 w. Pro Am Soc of Civ Engs—Feb., 1897.

**Pneumatic.**—Pneumatic Foundations in New York. Illustrates and describes recent work where cylindrical wooden caissons were used with speed and success. 700 w. R R Gaz—Aug. 17, 1900.

Pneumatic Caisson Foundations for the Gillender Building, New York City. Illustrated description of an interesting foundation work recently erected at the corner of Wall and Nassau Sts., N. Y. 1500 w. Eng News—Jan. 7, 1897.

See also **CAISSON.**

**Power House.**—See **Electric Power Station; Sheet Piling.**

**Pressure Distribution.**—Distribution of Pressure in Irregular foundations (Druckvertheilung in gebrochenen Fundamentflächen). A reply by Prof. Mélan to the strictures of Prof. Spitzer, with diagram further elucidating the subject. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 26, 1897.

The Distribution of Pressure in Foundations (Ueber die Bedingungen einer gleichförmigen Druckvertheilung in den Fundamenten). A further discussion, by Rudolf Mayer, of the conditions existing between depth, load and cohesion for the uniform distribution of pressure. 3000 w. Zeitschr d Oesterr Ing u Arch Vereines—Jan. 15, 1897.

The Distribution of Pressure in Stepped Foundations (Ueber die Druckvertheilung in Absatzweise Verbreiterten Mauerwerksfundamenten). An examination of the manner in which the pressure of a pier is transmitted to the extended portion of the foundation. 2500 w. Zeitschr d Oesterr Ing u Arch Vereines—March 26, 1897.

The Distribution of Pressure in Irregular Foundations (Druckvertheilung in gebrochenen Fundamentflächen). A criticism by Prof. Spitzer, of Mélan's theory, together with a graphical demonstration of a method of determining the distribution of pressure, especially in arch piers. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 12, 1897.

**Pump.**—Suggestions Concerning Foundations. Henry H. Kelley. Illustrations and observations concerning construction and cost. 1200 w. Engr, Cleveland, O.—Oct. 1, 1900.

**Reconstruction.**—Removing the Pier of a 250-Ton Column. Illustrates a method of replacing masonry by steel to gain cellar space. 700 w. Eng Rec—May 28, 1898.

**Reinforcing.**—Repairing and Reinforcing Foundation Piers. Describes work found necessary in a recently constructed large office building in New York. Illustrations are given and methods explained. 1200 w. Eng Rec—Dec. 12, 1896.

**Sheet, Piling.**—Foundations for a Power House. George J. Loy. Describes means and methods employed for meeting unexpected difficulties in placing the foundations, arising from inability to keep the excavation clear of water. A final resort to sheet piling enabled the excavation to be completed and the foundation was built upon bearing piles. 1000 w. Engineers' Year Book, Univ of Minn—1896.

**Shoring Walls.**—Shoring the Walls of an Old Building. Illustrates method of carrying walls on small cylindrical piers. 2500 w. Eng Rec—Feb. 5, 1898.

**Siegel-Cooper Building, New York.**—Difficult Foundations of the Siegel-Cooper Building. Brief description of the new building in New York, with special work necessary on some of the piers on the Sixth Ave. front. 600 w. Eng Rec—Sept. 26, 1896.

**Soft Ground.**—A Novel French Method of Making Foundations in Soft Ground. A description of a method invented by Messrs. Dulac and Ducloux, in which a hole is driven in soft ground by a falling weight, and filled in with hard material. 1100 w. Eng News—Sept. 27, 1900.

**Steam Engine.**—An interesting Power Plant. A description of an ingenious way of enlarging an old foundation for a steam engine by the use of railroad iron. 800 w. Eng Rec—July 4, 1896.

Special Forms of Engine Foundations. E. A. Merrill. Illustrated description of an engine foundation specially adapted for situations where the building foundation is carried to bed rock from which it is necessary to isolate the engine foundation. 600 w. Am Elect'n—May, 1896.

See also Electric Power Station; STEAM ENGINE—Vibration.

**Steel.**—Stresses in Steel Foundations. Samuel B. Durand. An investigation of the principles governing the design of concrete steel building foundations. Serial. Eng Rec—March 11, 1899.

**Submerged.**—A New Method of Building Submerged Foundations. Describes a method devised by D. Jordan, with a view to expediting the construction and lessening the cost. Ill. 800 w. Sci Am—Aug. 14, 1897.

**Supporting Power.**—Apparatus for determining the Supporting Power of Soils (Ueber ein Apparat zur Ermittelung der Natürlichen Tragfähigkeit des Baugrundes). Describes improved methods of measuring the supporting power of the ground and investigates the laws by which it is governed. 4500 w. 1 plate. Oesterr Monatschr f d Oeffent. Baudienst—March, 1897.

The Supporting Power of Rocks and Soils. Hugh Leonard. An account of experiments made at Calcutta, with tabulated results. 700 w. Jour Roy Inst of Brit Archts—June 16, 1900.

**Tall Buildings.**—Concerning Foundations for Heavy Buildings in New York City. Charles Sooysmith. General considerations which show the danger of overloading the ground on which large buildings are placed. 4400 w. Trans Am Soc of Civ Eng —March, 1896.

Exchange Court Building, New York City. Describes and illustrates the pile and cantilever foundations of a 12-story office building. 500 w. Eng Rec—June 11, 1898.

Foundation Construction for Tall Buildings. Charles Sooysmith. Illustrated. Devoted principally to a description of the caisson method. 3800 w. Eng Mag—April, 1897.

Foundations of the Alliance Building. Illustrated description of the method of sinking 100 pneumatic caissons for the foundations of a building covering 27,000 sq. ft. ground area; also illustrates the steel grillages and wind bracing. 2700 w. Eng Rec—Sept. 22, 1900.

Foundations of the Meyer-Jonasson Building. Illustrated description of the construction of piers founded on the rock by the use of caissons, sunk by the water process; the building is situated at Broadway and Twelfth Sts., New York. A difficult piece of work. 2500 w. Eng Rec—April 4, 1896.

Preliminary Foundation Tests for the St. Paul Building. This building being erected at Broadway and Ann streets, New York, has an unusually great ratio of height to width, so that any slight settlement might be of a serious nature; hence the necessity of great care in foundations. The report of expert engineer's test is given. 700 w. Eng Rec—May 2, 1896.

Principles Governing the Design of Foundations for Tall Buildings. Randell Hunt. Read before the Technical Soc. of the Pacific Coast, April 3, 1896. The origin, characteristic construction with its advantages and disadvantages, etc. Serial. Arch & Build—Nov. 7, 1896.

Principles Governing the Design of Foundations for Tall Buildings. Randell Hunt. The origin of these buildings, necessity of providing for settlement, the importance of knowing the exact character of the soil upon which the structure is to be built, comments on principles and discussions of different constructions. 9800 w. Jour Assn of Eng Soc—July, 1896.

Some Details of Pneumatic Foundation Work. Illustrated description of the foundations of the Empire Building, corner of Rector street and Broadway, New York. 1300 w. Eng Rec—Dec. 11, 1897.

Substructures of Tall Buildings. A Review of Recent Developments and Typical Features. Frank W. Skinner. Emphasizes the need of thorough exploration of the soil below the site, and briefly describes methods used in recent high buildings. Ill. 4500 w. Trans of Assn of Civ Engs of Cornell Univ—1898.

Substructure of the Commercial Cable Building. Conditions and descriptions of caissons, plans, sectional elevations, underpinning adjacent foundation by hydraulic and pneumatic process; working platform and traveling derrick; sinking caissons and profile of stratification. Ill. Serial. Eng Rec—April 17, 1897.

The Commercial Cable Building. This building is between Broad and New Sts., New York. It was feared that sinking the caissons, to carry the foundations to bed-rock, would weaken adjacent foundations. The method used to reinforce them is described, with description of the foundations themselves, with general plan, elevation, and cross-section; also details of one of the caissons. 1000 w. R R Gaz—June 5, 1896.

See also Building; Cantilever; Grillage; Pneumatic; CAISSON; TALL BUILDING; UNDERPINNING.

**Testing.**—Testing Foundations Under Difficult Conditions. Describes methods of making borings in basements with low head room, and in regular use by occupants. 1300 w. Eng Rec—Oct. 20, 1900.

**Testing Instrument.**—Testing Instrument for Foundations (Fundamentprüfer). An instrument devised by Rudolph Mayer. By means of a spring the pressure which will counteract the ground at any point is determined. 1400 w. Wiener Bauindustrie Zeitung—Oct. 22, 1896.

**Uniform Pressure.**—The Conditions of Uniform Pressure in Foundations (Ueber die Bedingungen einer gleichförmigen Druckvertheilung in den Fundamenten). R. F. Mayer. A continuation of Prof. Mayer's interesting and valuable studies of the actual conditions existing in foundations of masonry piers. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 19, 1897.

**Vienna.**—Foundation Work in Vienna (Ueber die Fundirungsverhältnisse in Wien). Ferd. Dehm. An elaborate account of the strata underlying the city of Vienna with regard to the construction of building foundations. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—June 23, 1899.

**FOUNDATION FAILURE.**

**Brooklyn.**—Failure of Building Foundation Piers. Illustrates and describes the partial failure of a new 8-story, 120x110 ft. commercial building in Brooklyn. 1100 w. Eng Rec—Dec. 17, 1898.

**Gasholder, St. Louis.**—A Foundation That Failed and the Lesson it taught. B. E. Chollar. Read before the Western Gas Assn. Explains the cause of unequal settlement which damaged a gasholder tank in St. Louis. Discussion. 2200 w. Am Gas Lgt Jour—July 3, 1899.

**Vienna.**—The Fall of the Gumpendorf Slaughter-House in Vienna (Der Einsturz im Gumpendorfer Schlachthause in Wien). Illustrated description of the wrecking of a large building by the slipping of the foundation of a retaining wall. 1000 w. Zeitschr des Oesterr Ing u Arch Ver—Feb. 26, 1897.

**FOUNDING.**

**Bell**—See BELL FOUNDING.

**Grafting.**—See GRAFTING.

**FOUNDRY.**

See also CASTING; CUPOLA; FOUNDRY IRON; MOLDING.

Foundry Conditions Abroad. Martin Fox. Some general impressions of the conditions of molders and of the British foundry trade. 1200 w. Ir Trd Rev—Aug. 25, 1898.

Foundry Management. J. A. Murphy. Read at the Chicago meeting of the Am. Found. Assn. Discusses true and false economics, materials, tools, etc. 2500 w. Ir Age—June 14, 1900.

Foundry Practice at Home and Abroad. Recent developments and improvements. Serial. Ir & Coal Trs Rev—Jan. 31, 1896.

Foundry Practice at the Close of the 19th Century (Der Giessereibetrieb am Ende des Neunzehnten Jahrhunderts). A. Ledebur. A general review of the development of foundry practice during the latter half of the century, with a number of fine views and plans of the foundries of Borsig, at Berlin, and Sulzer Bros. at Winterthur. 12000 w. 7 plates. Zeitschr d Ver Deutscher Ing —April 22, 1899.

Latter Day Foundry Progress. Translation and comment by Dr. Richard Moldenke, of Prof. A. Ledebur's review of the development of foundry practice during the last half of the 19th century, as published in the "Zeitschrift des Vereins Deutscher Ingenieure." 3000 w. Ir Trd Rev—June 29, 1899.

**Modern Iron Founding.** C. W. B. Discusses the evils needing attention. Ill. Serial. Mech Wld—Sept. 22, 1899.

Modern Iron Foundry Practice. George R. Bale. Part first discusses the construction of moulds, and moulding sand. Serial. Prac Engr—Sept. 8, 1899.

Progress in the Iron Foundry. Dr. R. Moldenke. Read before the Pittsburg Foundrymen's Assn. Discusses scientific methods, cupola, practice, power, equipment, cast sheets, and the iron. The subject is treated more from the engineering standpoint than from the chemical. 4800 w. Ir Trd Rev—April 29, 1897.

The Melting of Iron in the Reverberatory Furnace and the Cupola. E. H. Putnam. A discussion of reverberatory-furnace construction, the quality of iron to be used, chilled castings, cupola management for chilled work, etc. 3000 w. Ir Trd Rev—Oct. 28, 1897.

**Appliances.**—Foundry Appliances. S. H. Stupakoff. Read before the Pittsburg Foundrymen's Assn. Discusses the equipment of the modern foundry, indicating directions where improvements may be made, possible economies, etc. 3700 w. Ir Trd Rev—May 26, 1898.

**Blast Furnace and Cupola.**—Blast Furnace and Cupola Practice. Edgar S. Cook. Paper read before the Philadelphia Foundrymen's Assn. Discusses the use of casting machines for foundry iron, the improvements in blast furnace practice, the points of resemblance between blast furnace and cupola practice, etc. Serial. Foundry—Sept., 1899.

Blast Furnace Compared with Cupola Practice. Edgar S. Cook. Read before the Foundrymen's Assn., Philadelphia. Discusses casting machines, fracture, sandy iron, temperature and sulphur, atmospheric moisture, chill, sampling, etc. 6300 w. Ir Age—May 11, 1899.

**See also CUPOLA.**

**Brass.—See BRASS—Foundry.**

**Buildings.**—Iron Foundry Buildings. O. Benson. Construction of roofs with reference to the use of powerful cranes, and of foundries, with reference to reducing the risks, and cost of insurance, etc. 1200 w. Foundry—April, 1896.

Modern Foundry Buildings. Armin Schotte. Read at the meeting of the Pittsburg Foundrymen's Assn. Considers the best construction to fulfill the conditions required, and recommends the "cementine" as the ideal construction. 2200 w. Ir Trd Rev—June 1, 1899.

**Burned Iron.**—Burned Iron. Edward Kirk. Its deceptive fracture is discussed, and how it should be judged. Also remarks on scrap. 1200 w. Foundry—May, 1900.

**Castings.**—Improvement in the Foundry. W. J. Keep. Calls attention especially to the loss occasioned by bad castings. 1200 w. Mach—Dec., 1896.

**See also CASTING.**

**Chemistry.**—Chemistry in Foundry Practice. S. S. Knight. An introduction to a series of articles relating to this subject. Part first deals with two alloys of iron, giving experiments of the writer. 2200 w. Foundry—Jan., 1898.

Dividing the Authority. E. C. Wheeler. On a chemist's position in a foundry. 1800 w. Foundry—April, 1899.

The Chemistry of Foundry Practice. Ernst A. Sjostedt. Paper to be discussed at Montreal meeting of the Federated Canadian Mining Inst. Notes and facts concerning the chemical changes taking place in the cupola. 2500 w. Can Min Rev—Feb., 1898.

The Training of Foundry Chemists. Edward Kirk. Read at the Chicago meeting of the Am. Found. Assn. Also discussion by Thomas D. West, and communication from Robert H. Richards. 3600 w. Ir Trd Rev—June 28, 1900.

**See also FOUNDRY IRON—Analysis.**

**Coke.—See also COKE—Analysis.**

**Compressed Air.—See COMPRESSED AIR—Foundries.**

**Coremaker.—See COREMAKER.**

**Costs.**—Foundry Costs. Abstracts of a series of reports made to the New England Foundrymen's Assn. 3500 w. Ir Age—Dec. 3, 1896.

**See also CASTING; COST-KEEPING.**

**Cupola.—See CUPOLA.**

**Design and Equipment.**—Design and Equipment of Foundries. R. P. Cunningham. Discusses the recent improvements in foundry construction and equipment. 2000 w. Foundry—April, 1900.

**Down Draft Core Oven.**—Down Draft Core Oven. W. L. Hayden. Part first is an illustrated description of the details above ground. Serial. Foundry—Dec., 1896.

**Education.**—Training Students in the Principles of Founding. Thomas D. West. Read at the Chicago meeting of the Am. Found. Assn. On the desirability of colleges training in this art. 2500 w. Ir Trd Rev—June 7, 1900.

**Elevators and Cranes.**—Foundry Elevators and Yard Cranes. G. A. True. Read at convention of the American Foundrymen's Assn. Describes devices introduced in modern foundries with great advantage. Ill. 2000 w. Ir Trd Rev—May 20, 1897.

**Equipment.**—Fitting Up a Foundry. Charles A. Hague. Describes and illustrates a foundry equipment recently fitted up with cupolas, pressure blowers, elevator, belted power outfit, and somewhat novel molding floor. 3300 w. Am Mach—Dec. 19, 1895.

**European.**—Some Observations of an American Iron Man Abroad. Archer Brown. General account of points noticed which differ from American ways. 1300 w. Foundry—Feb., 1898.

**Facings.**—Foundry Facings. H. F. Frohman. Read at Chicago meeting of Western Foundrymen's Assn. Discusses different kinds of facings for different kinds of work. 2000 w. Age of St—June 19, 1897.

The Mission of Foundry Facings. Henry Hansen. Discussion of statements made in paper by H. F. Frohman, presented before the Western Foundrymen's Assn. 1200 w. Am Mach—Sept. 2, 1897.

**Fireproof.**—Incombustible Foundry Buildings. O. Benson. Read at Cincinnati meeting of the Am. Foundrymen's Assn. Presents the advantages of steel construction and compares the cost with the wooden structure. Ill. 1600 w. Ir Trd Rev—June 23, 1898.

**Foreman.**—The Foundry Foreman. H. R. Ramp. A plea for higher salaries for competent foremen, in the interest of foundry owners. 800 w. Foundry—March, 1896.

**Fuel Ratio.**—The Real Fuel Ratio. L. C. Jewett. Read at Chicago meeting of the Am. Found. Assn. Discusses what takes place in an effort to reduce the fuel ratio, and gives a table based on heats of 20 tons a day and coke at $4 a ton. 800 w. Ir Trd Rev—June 21, 1900.

**General Electric Co.**—New Foundry of the General Electric Co. Illustrated description of the building known as "No. 33," of the Schenectady plant. 1800 w. Ir Age—April 6, 1899.

The New Foundry of the General Electric Co. Illustrated description of an iron foundry measuring 505x140 ft., with a 120x103 ft. wing. Explains the construction of oven doors swinging on ball bearings, and core carriages having pneumatic movement and automatic doors. 1200 w. Eng Rec—April 15, 1899.

**Goslar Exhibition.**—The Exhibition of Foundry Supplies at Goslar (Giesserei-Fachausstellung in Goslar). Describes many improved forms of molding machines, blowers and other foundry apparatus, as exhibited at Goslar, Hanover, in September, 1897. Three articles. 1000 w. 1 plate. Stahl und Eisen—Jan. 15, Feb. 1, 15, 1898.

**Gray and Malleable Iron.**—Gray Iron Work and Malleable. From the "Iron Molder's Journal." Some difficulties encountered by those who go from the gray iron into general jobbing on malleable iron, with suggestions as to best method of disposing of them. 1000 w. Ir Tr Rev—Oct. 8, 1896.

**Handling Materials.**—Handling Materials in a Foundry. W. J. Keep. Abstract of a paper presented at the Pittsburg meeting of the Am. Found. Assn. Illustrates and describes the methods in use at the works of the Michigan Stove Co., Detroit, Mich. 4000 w. Ir Age—May 25, 1899.

**"Hot Iron."**—Hot Iron. Edward Kirk. The effects of rapid and slow melting are discussed, and the foundry sense of the term "hot iron." 1200 w. Foundry—Oct., 1900.

**Isca, South Wales.**—The Isca Foundry at Newport, South Wales. Brief illustrated description. 900 w. Ir & Coal Trds Rev—Sept. 10, 1897.

**Japan.**—The Foundries of Japan. Irvin McDowell. A letter from Yokohama, giving much information of interest. 1600 w. Ir Trd Rev—March 24, 1898.

**Labor.**—The Labor Question in an English Foundry. R. A. Hadfield. A paper read before the Foundrymen's Assn., Philadelphia. Experiences of an English firm in averting strikes, shortening hours of labor and cultivating friendly intercourse with employees. 2000 w. Ir & Coal Trds Rev—July 24, 1896.

**Literature.**—The Growth of Foundry Literature. Thomas D. West. Mr. West takes a leaf from his personal experience as a writer for technical papers, and reviews the general effect of foundry literature upon the art of founding. 2000 w. Foundry—April, 1896.

**Lorain, O.**—The Lorain Foundry Company. Illustrated description of a completely up-to-date foundry, recently built and equipped, and considered to be a model establishment. 1000 w. Ir Age—Oct. 22, 1896.

**Manufacture.**—Modern Foundry Practice in Connection with Manufacture. John Morris. Machine moulding, and mixtures of iron found advantageous in practice are the topics chiefly touched upon in this paper. 2200 w. Engineers' Year Book, Univ of Minn—1896.

**Money-Saving Devices.**—Money Saving Devices in the Foundry. E. H. Putnam. Describes a sweep and its use in making a mold of a form illustrated. The sweep is also illustrated. 650 w. Foundry—April, 1896.

**Niles Tool Works.**—Foundry Practice, Niles Tool Works. Peter J. Connor. Brief illustrated description of methods. 600 w. Mach—Feb., 1897.

New Foundry of the Niles Tool Works, Hamilton, O. Illustrated description 600 w. Eng News—July 16, 1896.

**Sargent, Chicago Heights.**—New Steel and Iron Foundry of the Sargent Company. Illustrates and describes the new works at Chicago Heights, and the Tropenas process of making steel. 1300 w. R R Gaz—Aug. 31, 1900.

**South Africa.**—Some Notes on South Africa Foundries. James Cherrie. An account of a trip, with description of foundry work. 3000 w. Foundry—Nov., 1899.

**Statuary.**—The Founding of Statuary. Horace G. Belcher. Illustrated description of the work as executed in the foundry of Gorham Mfg. Co., at Elmwood, near Providence, R. I. Describes also the foundry, furnaces, ovens, etc. 3400 w. Foundry—Dec., 1896.

**Superintendence.**—Dividing the Responsibility of Foundry Superintendency. Thos. D. West. Argues against relieving the foreman of responsibility for securing right grades of iron in castings. 2600 w. Foundry—Sept., 1898.

**Testing.**—How Can a Founder Determine the Value of New Devices and Fluxes which Are Recommended to Him? A plea for systematic testing of foundry materials and appliances. 900 w. Foundry—March, 1896.

**Trolley System.**—See **OVERHEAD TRAMRAIL.**

**U. S. Southern.**—The South's Foundry Interests. E. H. Putnam. Progress in the past the index for the outcome in the future. 4500 w. Tradesman—Jan. 1, 1897.

**Venting Tool.**—The Venting Tool. Thomas F. Kennedy. Condemns the usual practice in foundries and the means used for venting; describes how to make a small vent wire, discussing handles and large vent wires. 2500 w. Metal Work—Nov. 6, 1897.

**Vulcan, England.**—The Vulcan Foundry and its Early Engines. Clement E. Stretton. A list of early English engines, with partial measurements. 800 w. Ry Wld—April, 1896.

**Walker & Pratt, Watertown, Mass.**—The Walker & Pratt Foundry at Watertown, Mass. Illustrated detailed description of a very fine plant. 3000 w. Am Mach—Feb. 1, 1900.

**Worthington, Elizabethport, N. J.**—A Modern Foundry. An account of a visit to the Worthington foundry at Elizabethport, N. J., describing the work, and calling attention to the general use of the molding machine. 2000 w. Am Mach—Oct. 7, 1897.

## FOUNDRY IRON.

See also **CASTING; CAST IRON; CUPOLA; FOUNDRY; PIG IRON.**

Freaks of Foundry Iron. Dr. A. B. Harrison. Read at meeting of W. Penna. Central Min. Inst. Some analysis of foundry iron and a series of physical tests. 1800 w. Am Mfr & Ir Wld—Jan. 8, 1897.

Foundry Irons. Edward Kirk. Short descriptions of the various irons, their characteristics and uses. 4500 w. Foundry—March, 1900.

Foundry Iron. Herbert Pilkington. Abstract of a paper read before the South Staffordshire Iron & Steel Inst. On the need of iron-founders, in England, becoming more familiar with the chemical constituents of their iron, and the behavior of iron of given analysis. 2500 w. Ir & Coal Trds Rev—Jan. 26, 1900.

Furnace Facts About Foundry Iron. Charles W. Friend. Read before the Pittsburg Foundrymen's Assn. Facts about foundry iron as seen from a manufacturer's standpoint, with tests made to determine iron of suitable analysis for various kinds of work. 1200 w. Ir Trd Rev—March 31, 1898.

How to Gain a Knowledge of the Nature of Cast Iron. Plain pointers upon practical iron founding, in the form of questions and answers. Serial. Foundry—July, 1896.

**Analysis.**—Analysis in the Foundry. Stuart B. Marshall. Discusses various elements and their effects, and considers chemical analysis the only true selling guide. 1800 w. Ir Trd Rev—March 15, 1900.

Chemical Hints to Foundrymen. Guy R. Johnson. Read before the Foundrymen's Assn. The elements and their effects are considered seriatim. Seventeen tables of tests and analysis are given. 2700 w. Ir Age—March 11, 1897.

Foundry Chemistry in Practice. Letter from foundry in the northwest, engaged in the manufacture of agricultural machinery. Details concerning the use made of chemical analysis. 800 w. Ir Trd Rev—July 29, 1897.

How to Secure Uniformity in Pig Iron Analysis. Extracts from letters drawn out by paper of Thomas D. West before the Pittsburg Foundrymen's Assn. 2800 w. Ir Trd Rev—May 5, 1898.

How to Secure Uniformity in Pig Iron Analysis. Further extracts from letters called out by paper of Thomas D. West before the Pittsburg Foundrymen's Assn. 1800 w. Ir Trd Rev—May 12, 1898.

Necessity of Well Mixed Furnace Casts and Correct Pig Iron Analyses. Thomas D. West. Read at Cincinnati meeting of Am. Foundrymen's Assn. Advises the uses of chemical analysis, and discusses the need of uniform casts of pig iron, and how to obtain them. 1600 w. Ir Age—June 16, 1898.

Need of Greater Uniformity in Pig Iron Analyses. Thomas D. West. Read by title before the Pittsburg Foundrymen's Assn. Considers the value of chemical analyses, and factors that affect the results, giving tables. 2000 w. Am Mfr & Ir Wld—April 15, 1898.

See also **CAST IRON—Physics; IRON ANALYSIS; PIG IRON—Grading.**

**Fusibility.**—Comparative Fusibility of Foundry Metals. Thomas D. West. Read at the Cincinnati meeting of the Western Foundrymen's Assn. Gives tabulated results obtained by the writer and discusses them, and shows the economy and advantages to be obtained by using chilled pig metal in foundries and in Bessemer-steel works. Serial. Am Mfr & Ir Wld—Oct. 22, 1897.

**Fusibility Tests.**—Comparative Fusibility of Foundry Irons. Thomas D. West. Read before the Pittsburg Foundrymen's Assn., June 28, 1897. A valuable paper giving experiments and results, with description of test cupola used. Also discussion. 3000 w. Ir Trd Rev—July 1, 1897.

**Grading.**—See **PIG IRON.**

**Heat Influence.**—The Influence of Heat Upon Cast Iron. S. S. Knight. Observations upon the foundry methods in use, with suggestions set forth, which the writer claims to be an improvement. 1600 w. Foundry—Nov., 1896.

**Hydraulic Work.**—The Mixing and Melting of Iron for Hydraulic Work. R. G. Cunningham. Read before the Am. Found. Assn. Considers the effects of constituents of iron upon castings. 1800 w. Ir Age—June 7, 1900.

**Melting.**—Manipulation and Deterioration of Cast Iron. H. J. Grof. Characteristics of cast iron, and the scientific and frugal principles of melting it in cupolas. 1200 w. Foundry—March, 1898.

**Metalloids.**—Cast Iron in Foundings. Edward Kirk. How metalloids may be removed and how preserved while metal is in molten state. 1400 w. Am Mfr & Ir Wld—April 26, 1900.

See also METALLOID.

**Mixing.**—Mixing Irons. Edward Kirk. Suggestions for thoroughly mixing, and for mixing for a certain grade or class of work. 1500 w. Foundry—Sept., 1900.

**Mixtures.**—Changes in Foundry Mixtures. Eugene W. Smith. Read before the Western Foundrymen's Assn. Presents some of the mechanical changes due to handling, showing the absolute care that must be taken to obtain uniform results. 1200 w. Ir Age—Feb. 24, 1898.

Melting Iron and Control of Mixture. James A. Beckett. Read at the Detroit Convention of the American Foundrymen's Assn. Discusses the melting of iron by the use of the Victor Colliau cupola, and begins the consideration of mixtures in part first. Serial. Ir Trd Rev—May 27, 1897.

Regulating Foundry Mixtures. Thomas D. West. Read at meeting of Pittsburg Foundrymen's Assn. Information on this subject, claiming that silicon and sulphur are the cause of the difference in grades of iron. 1300 w. Ir Tr Rev—Jan. 28, 1897.

**Oxidation.**—Oxidation of Foundry Metals. Thomas D. West. Read before the Pittsburg Foundrymen's Assn., Jan. 31, 1898. Reports a series of original tests, and concludes that if it were possible to secure clean iron, free from all sand, rust or film of oxid, the loss of metallic iron due to oxidation would not be as large as has been generally supposed. 2500 w. Ir Trd Rev—Feb. 3, 1898.

**Phosphorus.**—Effects of Phosphorus on the Strength and Fusibility of Iron. Thomas D. West. Read at meeting of the Pittsburg Foundrymen's Assn. Gives experiments and results. 900 w. Am Mfr & Ir Wld—Feb. 4, 1898.

**Physical Tests.**—See Testing; METALLOGRAPHY; TESTING.

**Segregation.**—Segregation at Furnace and Foundry. Thomas D. West. Read before the Foundrymen's Assn. It is not the writer's intention to cover the question of segregation in cast iron, but to call up practical points which confront all in every day practice. 3200 w. Ir Tr Rev—Dec. 12, 1895.

**Standardizing.**—Making a Large Standardizing Casting. Thomas D. West. Read before the Pittsburg Foundrymen's Assn. Gives plan for obtaining 300 pounds or more of absolutely clean and uniform drillings for standardizing purposes. Ill. 1200 w. Ir Trd Rev—June 30, 1898.

**Standards.**—Standards for Testing Cast Iron. A report by the committee of the A. F. A., on the progress of cast iron. 3300 w. Ir Trd Rev—May 18, 1899.

The Utility of Chemically Standardized Iron Samples. Albert W. Smith. Read before the Am. Found. Assn. Discusses the circumstances that influence the manner of combination of the elements in chemical composition. 1500 w. Ir Age—May 25, 1899.

**Test Bars.**—Comparative Value of Test Bars. Thomas D. West. A criticism of statements in paper of Herbert E. Field, published in the Feb. number of this paper. 2000 w. Mach, N. Y.—April, 1898.

First Results of the A. F. A. Tests. A memorandum, from Dr. Richard Moldenke, chairman of the committee, relative to the first series of test bars and the results of the physical tests. Tables. 1000 w. Ir Trd Rev—March 9, 1899.

Influence of the Length of Span in Transverse Tests of Cast Iron. Dr. R. Moldenke. Describes a series of tests made and gives the averages of the results obtained. 1400 w. Eng News—Aug. 17, 1899.

Method of Casting Test Bars for the A. F. A. Testing Committee. Thomas D. West. Read before the Pittsburg Foundrymen's Assn. An illustrated description of the writer's method which has proved most successful. 3500 w. Ir Trd Rev—Nov. 24, 1898.

Second Series of A. F. A. Tests. Gives the results of transverse, tensile and compression tests of bars. 1000 w. Ir Trd Rev—April 13, 1899.

Test Bars and Their Relation to the Strength of Castings. Herbert E. Field. Considers that the test bars fail to accomplish the purpose for which they are used. 2800 w. Mach, N. Y.—Feb., 1898.

Test Bars in the Foundry. R. Moldenke. Read at meeting of the Pittsburgh Foundrymen's Assn. Urging the adoption of standard methods for testing the work. 1400 w. Ir Age—Nov. 25, 1897.

The Adoption of a Standard System of Test Bars for Cast Iron. Richard Moldenke. Read before the Am. Foundrymen's Assn., at Cincinnati. Describes the practice of testing in Germany, and discusses the subject in general, urging practical action by the association. 4800 w. Ir Trd Rev—June 9, 1898.

Utility of the Test Bar and Standard Systems for Comparative Tests. Thomas D. West. Read before the Foundrymen's Assn. Calls attention to various points in tests presented, and shows that the true utility of the test bar is simply comparative. 2000 w. Ir Trd Rev—Dec. 10, 1896.

**Testing.**—Difficulties Encountered in Testing Cast Iron. P. Kreuspointner. Read before the Pittsburg Foundrymen's Assn. Considers the question of solution and segregation affecting the physical qualities of cast iron, and difficulties because of the composition of its elements. 3200 w. Ir Trd Rev—April 28, 1898.

Mechanical and Physical Tests Compared. S. S. Knight. The writer believes the best results will be attained by the use of both chemical and mechanical tests. 3000 w. Foundry—Feb., 1897.

Physical Tests and Chemistry of Cast Iron. W. J. Keep. Read at the first national Convention of Foundrymen. Directions for testing with 16 tables and 3 charts. The tables are taken from the records of the Committee on Tests and Methods of Testing of A. S. M. E. 4800 w. Ir Tr Rev—May 14, 1896.

Physical Tests of Cast Iron in the Foundry. James A. Beckett. Showing that such tests are a necessity; discussing the transverse test, and the methods. 1800 w. Foundry—Dec., 1896.

Standard Physical Tests for the Product of the Blast Furnace and their Value. Thomas D. West. Discussion of this work. The writer claims that progress in the science of either making or mixing iron requires the study of the physical as well as the chemical properties. Ill. 5000 w. Trans Am Inst of Min Eng—April, 1896.

The Value of Physical Tests. S. S. Knight. Read before the Western Foundrymen's Assn. at Cincinnati. Discusses this subject and concludes that physical tests will be found valuable only as they are made on reliable apparatus, and that no system of testing will equal the ingenuity of a trained and competent man, with facilities to use his knowledge. 3000 w. Ir Age—Oct. 21, 1897.

See also METALLOGRAPHY; TESTING.

### FOUNTAIN.

**Electric.**—See ELECTRIC FOUNTAIN.

### FRAMEWORK.

See also BRIDGE DESIGN; SKELETON CONSTRUCTION; STEEL CONSTRUCTION; STRUCTURAL DESIGN; TALL BUILDING.

Notes on Framework in Space (Bemerkungen über Räumliches Fachwerk). A geometrical investigation of some of the points involved in the design of trussed domes, conical roofs, and framed structures in three dimensions. 5000 w. Zeitschr d Ver Deutscher Ing—April 24, 1897.

Notes on the Computation of Some Special Forms of Framework (Beitrag zur Berechnung einiger Besonderer Sprengwerksformen). G. Mantel. A graphical and analytical examination of certain forms of framed structures. Three articles. 5000 w. Schweizer Bauzeitung—Nov. 12, 19, Dec. 3, 1898.

**Arch.**—Computations for Double-Hinged Arch Frames under Horizontal and Inclined Forces (Berechnung des Zweigelenkbogens unter Einwirkung Wagerechter und Schräger Kräfte). An analytical and graphical discussion of the action of framed structures with especial reference to wind stresses. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—October 1, 1897.

**Building.**—An unusual Framed Building. Illustrated description of a building with sides and roof supported by a single truss system like an arch. 700 w. Eng Rec—Nov. 18, 1899.

**Columns.**—The Computation of the Upright Members of Iron Framework (Die Berechnung der Ständer Eiserner Wandfachwerke). L. Geusen. An elaborate mathematical paper discussing the influence of wind pressures and other sources of lateral stress, and giving many diagrams of various constructions with their analyses. Two articles. 12000 w. Zeitschr d Ver Deutscher Ing —Jan. 15, 22, 1898.

**Design.**—Some Fundamental Propositions Relating to the Design of Frameworks. Frank H. Cilley. Discusses the arbitrary nature of the distribution of stress in an indeterminate framework and the economic superiority of statically determined construction. 8500 w. Tech Quar—June, 1897.

The Double Console (Die Doppelkonsole). Luigi Vianello. A mathematical investigation of the distribution of forces in a framework composed of two horizontol truss beams with vertical connection. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 6, 1897.

**Graphical Methods.**—A Graphical Method for Calculating the Flat Base Frame of Framework Structures (Graphische Methode der Berechnung des Flachen Fussringes Räumlicher Fachwerke). Prof. Felix Jasinski. A mathematical article, with numerous diagrams. 2500 w. Schweiz Bauzeitung—May 5, 1900.

Notes on the Graphical Computations of Frameworks (Beiträge zur Graphischen Berechnung des Fachwerks). L. Geusen. A combination of Ritter's method of sections and moments, with the modern polar graphostatic diagram. Diagrams and 2000 w. Zeit Oesterr Ing u Arch Ver—Nov. 20, 1896.

The Internal Forces in a Framed Ring, Graphically determined (Die Innern Stabkräfte eines Belasteten Fachwerkringes, Graphisch Ermittelt). An excellent graphostatic investigation of a framed ring using the cord- and force-polygon method. 3500 w. Schweizer Bauzeitung—May 15, 1897.

**Joint Flexible.**—Experiments upon a Flexible Joint for Riveted Structures (Expériences sur un Joint Flexible pour Charpentes Metalliques Rivées). M. Mesnager. The advantages of providing flexibility in certain members of a riveted framework are shown by tests. The recommended forms of construction are illustrated. 2500 w. 2 plates. Ann des Ponts et Chaussées—2 Trimestre, 1898.

**Statically Indeterminate.**—The Exact Design of Statically Indeterminate Frameworks—An Exposition of Its Possibility, but Futility. Frank H. Cilley. An examination of certain questions in connection with ideal frameworks, of practical importance because at the foundation of actual designs. Mathematical. 14800 w. Pro Am Soc of Civ Engs—Oct., 1899.

The Exact Design of Statically Indeterminate Frameworks. An Exposition of Its Possibility, but Futility. Discussion of paper by Frank H. Cilley. 16800 w. Pro Am Soc of Civ Engs—April, 1900.

**Stresses.**—Secondary Stresses in Framed Structures. Thomas A. Clark. A mathematical study of stresses and their strains. 1200 w. Engs' Year Book, Univ of Minn—1900.

Secondary Stresses in Framed Structures. Thomas A. Clark. Formulas and principles from the writings of H. Mandula, of München. 1600 w. Engs' Year Book, Univ of Minn—1900.

**Wooden.**—The Deformation of Compression Members and the Stability of Large Wooden Frameworks (Sur la Déformation des Pieces Comprimées et la Stabilité des Grande Charpentes). A paper by M. Berard discussing the manner in which rupture takes place in wooden framework, based upon the work of deformation which occurs at the time of rupture. 1500 w. Comptes Rendus—April 4, 1898.

**FRANCHISE.**

See also **MUNICIPAL OWNERSHIP.**

Franchises. Robert E. McKisson. Address at Zanesville, O., before the Ohio Municipal League. Discusses the need of correcting the abuses of franchises in American cities, favoring municipal ownership of water and lighting plants. 1600 w. Pro Age—Feb. 15, 1899.

**Cities' Remuneration.**—Remuneration to Cities for Franchise Rights. T. S. McMurray. Read at the Detroit meeting of the League of American Municipalities. Believes in municipal control of all public utilities, but as this must come gradually favors the paying of a fair remuneration for these rights. Discusses the problem. Also general discussion. 4500 w. Pro Age—Sept. 1, 1898.

**Electric Lighting, Montclair, N. J.**—A Model Electric Lighting Franchise for Montclair, N. J. A copy of the ordinance granting the franchise, with remarks. 2500 w. Eng News—Dec. 5, 1895.

**FRANKLIN.**

See also **ELECTRICITY—Biographical History.**

**FREEZING POINT.**

**Aqueous Solution.**—On the Freezing-Points of Dilute Aqueous Solutions. E. H. Loomis. Describes the continuation of an elaborate series of experiments, with a tabulated presentation of the constants determined. 6000 w. Phys Rev—Jan-Feb., 1896.

**FRICTION.**

See also **BEARINGS; CAR BEARINGS; LOCOMOTIVE AXLE BEARING; LUBRICATION.**

Friction and Lubricating Oils. The laws controlling friction, which are generally credited to Gen. Morin, are discussed. 1500 w. Bos Jour of Com—March 6, 1897.

Modern Data on the Phenomena of Sliding Surfaces. John H. Cooper. These articles deal with all the phenomena of frictional contact. Serial. Mach—Jan., 1896.

**Bearings.**—Friction of Bearings. J. H. Holmes. A learned discussion of the friction of bearings other than plain, parallel, sliding contact bearings. The subject is ably treated. 1800 w. Power—Feb., 1896.

**Electric Machinery.**—Friction Losses in Electrical Machinery (Die Reibungsverluste in Elektrischen Maschinen). G. Dettmar. A very complete investigation of journal friction in dynamos and motors taking into account the various temperatures and pressures. Two articles. 10000 w. Elektrotech Zeitschr—June 1, 8, 1899.

**Engine Cylinders.**—Internal Engine Friction. Editorial review of Walter W. Houfe's paper, elsewhere indexed. The paper is criticised as advancing a plausible theory, but as not covering the whole ground. 1800 w. Eng, Lond—Nov. 22, 1895.

Internal Friction in Steam Engines. Walter William Houfe. A paper read at the Inst of Marine Engs., Stratford. Regards what is called "cutting" in steam cylinders as more properly described by term abrasion, and seeks causes and remedies for this action. First part treats of causes. Serial. Marine Eng—Nov. 1, 1895.

**Hydraulic Machinery.**—See **HYDRAULIC INTENSIFIER—Frictional Losses.**

**Screws.**—Experiments on the Friction of Screws. Albert Kingsbury. Presented at the N. Y. meeting. Describes method and apparatus and gives tabulated results with formula upon which calculations are based. 1500 w. Trans Am Soc Mech Eng—Dec., 1895.

**Steam Engine.**—See **STEAM ENGINE—Friction.**

**Theory.**—The Molecular Theory of Friction between Polished Solids (Théorie Moleculaire du Frottement des Solides Polis). Marcel Brillouin. A brief paper before the French Academy, treating of friction in connection with the molecular theory of work and heat. 1000 w. Comptes Rendus—Feb. 6, 1899.

**FRICTION WHEELS.**

See also **CONE WHEELS.**

Experiments with Friction Wheels (Versuche mit Reibrädergetrieben). Describing a number of tests made with metal disk friction wheels, with wheels of paper, wood and cast iron; and with the Sellers variable friction gear. An electric motor furnished the power, and the measurements were made with a Prony brake. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 27, 1897.

**Paper.**—Paper Friction Wheels. M. W. Danielson. Gives results of testing eight kinds of paper friction wheels and suggests one more way of making them. 1000 w. Am Mach—Sept. 2, 1897.

**FRITZ.**

John Fritz, President of the American Society of Mechanical Engineers. Illustrated biographical sketch of a representative American mechanical and metallurgical engineer. 7000 w. Am Mach —Dec. 5, 1895.

**FROG.**

See **RAILWAY SWITCH—Frog; Hinged.**

**FUEL.**

See also **COAL; COKE; COMBUSTION.**

**Alcohol.**—A New Automobile Fuel, Electrolytic Alcohol. George H. Benjamin's account of automobolism in Russia, and of the low-priced, odorless fuel used. Ill. 1200 w. Elec Rev, N. Y. —Dec. 13, 1899.

See also **ALCOHOL; AUTOMOBILE—Acetylene and Alcohol.**

**California.**—The Fuel Question in California. John L. Howard. Read before the Pacific Coast Gas Assn. Considers the causes that make this state draw a greater variety of coals from more sources than any other country; discusses the progress being made by gas fuel; the use of oil for steam generation; and of electricity from water power. Discussion. 6500 w. Am Gas Lgt Jour—Aug. 14, 1899.

**Calorific Value.**—See **BOILER TESTS; CALORIFIC VALUE; COAL TESTS.**

**Cheap.**—Burning Cheap Fuel. W. H. Wakeman, in the "Woodworker." A discussion of the use of cheap fuel for steam-making purposes, the conditions that favor it and the causes of failure. 2500 w. Safety V—Nov., 1896.

**Coal Dust.**—See **COAL DUST FUEL.**

**Economical Production.**—Coal Distillation and Gas and Fuel Production in Bulk. Extracts from the address of George Bielby, at meeting of the Society of Chemical Industry. Considers the remedies for smoke combustion by the production of smokeless fuels, and the effect of coal distillation. 3000 w. Jour Gas Lgt—Sept. 5, 1899.

Mr. George Bielby on the Fuel of the Future. Extract from the presidential address before the Soc. of Chem. Ind. Examines the fuel problem in its relation to the smoke question, showing its magnitude and the need of the co-operation of all departments concerned. Ill. 8500 w. Gas Wld—Sept. 9, 1899.

The Economical Use of Fuel. From the presidential address of Mr. George Bielby before the Soc. of Chem. Ind. Shows the magnitude of the problem and discusses the remedies. 1200 w. Col Guard—July 14, 1899.

**Electric Energy.**—Influence of Cheap Fuels on the Cost of Electrical Energy. R. E. Crompton. Read before the Inst. of Elec. Engs., England. Discusses the three classes of cheap fuel available in England, and the form of furnace to burn them. Also editorial. 5500 w. Elec Rev, Lond—Dec. 1, 1899.

**Garbage.**—See **REFUSE DISPOSAL.**

**Gaseous.**—See **FUEL GAS.**

**Liquid.**—See **LIQUID FUEL.**

**Manitoba and North West Territories.**—The Mineral Fuels of Manitoba and the North West Territories. William Pearce. A subject of interest to settlers as a portion of the country is to a large extent a treeless plain. Coal, natural gas, and petroleum have been found. 2200 w. Eng & Min Jour —Aug. 8, 1896.

**Mineral.**—An Economic Study of the Mineral Fuels of the World (Volkswirthschaftliche Studie über die Mineralischen Brennstoffe der Erde). Prof. F. Kupelureser. An exhaustive compilation, with valuable comments, the figures being tabulated for all countries from 1870 to 1896. Three articles. 15000 w. Zeitschr d Oesterr Ing u Arch Ver—July 8, 15, 22, 1898.

**Natural Gas.**—See **NATURAL GAS.**

**Peru Mines.**—Fuel at the Caylloma Mines, Peru. Bernard Hunt. Abstract of paper read before the Inst. of Min. & Met., London. The fuel used at these silver mines, the cost, and purposes for which it is used. 1000 w. Eng & Min Jour—Dec. 17, 1898.

Fuel at the Caylloma Mines, Peru. Information concerning the difficulty in obtaining fuel at this silver mine, and the various expedients. Ill. 1100 w. Ir & Coal Trds Rev—Feb. 24, 1899.

**Sweden.**—The Fuel Question in Sweden. A résumé of interesting articles on this subject which have appeared recently in the Swedish press. 1800 w. Engr, Lond—Aug. 31, 1900.

**Working Value.**—The Working Value of Fuels. Thomas Fletcher. Reprinted from the London "Gas World." Considers the heating of living rooms by coal gas and plant houses by coke fired boilers, where the ventilation is controlled, the figures being for average work. 1000 w. Met Work—May 7, 1898.

**FUEL ANALYSIS.**

See also **COAL ANALYSIS.**

Methods of Fuel Analysis. A review of a work by G. Arth, with extracts showing its practical nature. 2000 w. Col Guard—June 4, 1897.

**FUEL COST.**

See **COAL COST.**

**FUEL EFFICIENCY.**

**Locomotive.**—See **LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST.**

**FUEL GAS.**

See also **BLAST FURNACE GAS; GAS ENGINE; GAS PRODUCER; NATURAL GAS; POWER.**

A Study of Various Combustible Gases (Etude sur Divers Gaz Combustibles). M. A. Lencauchez. A critical comparison between producer gas and gas distilled from wood, for heating and power purposes. An important paper. 20000 w. 2 plates. Mem Soc Ing Civ de France—May, 1899.

Dr. Lawson Tait on the Uses of Gas for Fuel. A critical examination of the hints and suggestions presented in a recent lecture advocating gas-heating. 2400 w. Jour Gas Lgt—June 13, 1899.

Fuel Gas. C. Francis Jenkins. On the change gas manufacture is undergoing, adapting it to wider uses. Ill. 1000 w. Sci Am—Aug. 12, 1899.

Fuel Gas. Arthur Kitson. Discusses the methods of converting solid and liquid into gaseous fuel, cost, etc. 5000 w. Trans of Assn of Civ Engs of Cornell Univ—June, 1897.

Fuel for Gas Motors. Aimé Witz. Read before the International Gas Congress, at Paris. Statements concerning the various gases used, and improvements made. 2000 w. Jour Gas Lgt—Sept. 25, 1900.

Gas as Fuel. F. Foveaux. Read before the Pacific Coast Gas Assn. A report of investigations made to improve the methods by which gas is burned in ordinary stoves. Followed by discussion. Ill. 2200 w. Am Gas Lgt Jour—Aug. 30, 1897.

Gas Used as Fuel. O. B. Server. The policy of gas companies in cheapening the cost of production at the expense of calorific value, is criticized in this able article, as tending to retard the use of gas as fuel. Notwithstanding this, its increasing use is predicted. A new rule is given for computing flow of gas through pipes. 1800 w. Dom Engng—Dec., 1895.

Industrial Gas. Frank H. Bates. Part first considers methods of gas analysis. Serial. Jour of Elec—April, 1899.

Some Notes on Gas as a Fuel. Discusses coal and its combustion and the loss in heating power in making "producer" gas. 2200 w. Ir & Coal Trds Rev—Feb. 2, 1900.

Producer Gas and Gas Producers. A. H. Sexton. The first part treats the subject from the chemical standpoint. Serial. Prac Eng—June 26, 1896.

The Important Future of Producer-Gas. A. Humboldt Sexton. Showing the advantages of gaseous fuel and the various methods of producing it. Ill. 4200 w. Eng Mag—Aug., 1896.

The Present Status of Fuel Gas. John R. Lynn. Read at meeting of the Ohio Gas Lgt. Assn. Discusses the possibility of manufacturing an economical gas for fuel purposes to take the place of natural gas, which is failing in quantity. 2800 w. Am Gas Lgt Jour—March 26, 1900.

The Production and Use of Combustible Gases (La Production et l'Emploi de Divers Gaz Combustibles). M. Lencauches. A supplemenary communication to the author's previous paper, describing a number of methods of generating gas for heating and power. 7500 w. Mem Soc Ing Civ de France—June, 1899.

**Analysis.**—Fuel-Gas Analyses in Boiler Tests. R. S. Hale. Describes a few of the devices and methods of obtaining the analyses of gases, with illustrative tests. Ill. 6500 w. Trans Am Inst of Mech Engs., Vol. XVIII.—May, 1897.

**Boiler Heating.**—A Gas-Burning Water Heater or Steam Boiler. Illustrated description of invention of John S. Coe. 800 w. Am Mach—March 18, 1897.

Experiments on Using Gasoline Gas for Boiler Heating. Herman Poole. Gives details of experiments made in Philadelphia with a 60 h. p.

boiler. 2700 w. Trans Am Soc of Mech Engs, No. 838—Dec., 1899.

Producer Gas for Firing Boilers. Presents the advantages of this system of firing for the purpose of raising steam and its certainty of giving smokeless combustion. 2400 w. Prac Eng—May 6, 1898.

**Boston.**—See **GAS ENGINES—Future.**

**Coal Gas.**—The Commercial Uses of Coal Gas. Thomas Fletcher. These notes are the result of more than thirty years' experience as to the practical working, results, advantages and drawbacks, of coal gas as a fuel. 3000 w. Gas Wld —April 8, 1897.

**Cost.**—The Cost of Fuel Gas. E. P. Reichhelm. On the value of this gas, showing that producer gas is often more expensive to use than illuminating gas. 800 w. Am Mach—June 30, 1898.

**Culm.**—See **CULM—Gas.**

**Electric Plant.**—Gaseous Fuel as a Means of Cheapening Electricity. Nelson W. Perry. Read before the Northwestern Elec. Assn., at Milwaukee. A discussion of the subject, and suggestions of means for securing the best economical results. 4400 w. W Elec—Feb. 13, 1897.

Gaseous Fuel as a Means of Cheapening Electricity. Nelson W. Perry. Suggestions for decreasing the expenses of electrical plants. 3500 w. Am Gas Lgt Jour—April 5, 1897.

**Erie Shops, Jersey City.**—See **GAS PRODUCER.**

**Europe.**—Direct Utilization of Producer Gas in Europe. E. P. Buffet. Abstract of a review of the results as far as known that have been obtained in Europe with the use of producer gas in gas engines, as given by Aug. Dutreux, in "Le Génie Civil." 2500 w. Am Mach—Jan. 26, 1899.

**Gas Manufacture.**—See also **GAS RETORT—Heating.**

**Loomis Plant, Bridgeport, Conn.**—See **GAS PRODUCER.**

**Mond.**—See **Steel Manufacture; GAS PRODUCER.**

**Natural Gas.**—See **NATURAL GAS.**

**Processes.**—A Comparison of Fuel-Gas Processes. F. L. Slocum. Extracts from a paper read before the New York section of the Society of Chemical Industry. Discusses coal gas production by distillation, including by-products, ovens, bituminous coal, water-gas producers, and producers of the Mond and Siemens type. 3300 w. Jour Gas Lgt—Aug. 17, 1897.

**Steel Manufacture.**—Mond Producer Gas Applied to the Manufacture of Steel. John H. Darby. Read before the Iron and Steel Inst. As Dr. Ludwig Mond has explained his process for the manufacture of the gas, in an address some time ago, the writer confines himself to the improvements and the application of the gas to the manufacture of steel. Serial. Min Jour—May 16, 1896.

**United States.**—The Failure of the Commercial Attempts to Supply Fuel Gas in the United States. F. H. Shelton. Read before the Western Gas Assn. A paper proposing to show that fuel gas as a whole, in every case where tried, has been a flat and total failure. Gives a brief account of all instances where it has actually been made and distributed in this country. Discussion. 21000 w. Am Gas Lgt Jour—June 7, 1897.

**FULLER'S EARTH.**

Fuller's Eearth. J. Ohly. Describes the manner of formation, the uses to which it is applied, the deposits, etc. 2500 w. Min Rept—March 29, 1900.

**South Dakota.**—The Fuller's Earth of South Dakota. An account of the deposits of Fuller's earth, which, next to Florida, are the most extensive thus far discovered in the United States. 800 w. Trans Am Inst of Min Engs—Sept., 1897.

**United States.**—The Occurrence of Fuller's Earth in the United States. David T. Day. Considers the characteristics and the development of the industry in the United States. 2200 w. Jour Fr Inst—Sept., 1900.

**FUME.**

**Collection.**—See **DUST; LEAD METALLURGY; METALLURGY; SMELTING.**

**Explosion.**—See **ZINC METALLURGY.**

**FURNACE.**

See also **ANNEALING; BLAST FURNACE; BOILER; COMBUSTION; FIRING; GRATE; IRON MANUFACTURE; IRON WORKS; MECHANICAL STOKING; METALLURGY; OPEN HEARTH; STEEL MANUFACTURE; STEEL WORKS.**

Practical Notes on Furnace Construction and Management. Herbert Lang. The author designs to present a series of letters on every-day aspects of smelting and other branches of metal production, with the object of eliciting discussion. Part 1st deals with furnace construction. 1800 w. Eng & Min Jour—Jan. 23, 1897.

**Andre Gas Heated.**—The Andre System of Gas Heated Ovens. P. Chevillard, in "Revue Industrielle." Describes an oven used in heating iron moulds used in the manufacture of glass lenses, and considers the wider application to ovens for bakers, pastry cooks, etc. Ill. 2000 w. Am Gas Lgt Jour—Dec. 14, 1896.

**Annealing.**—Steel Plate Annealing Furnace (Flusseisenblech-Glühofen). Hen. Wdowiszewski. Abstract of a Russian article by Director J. Q. Rayner of the Kulebaki iron works near Nijni Novgorod, giving an illustrated account of an annealing furnace there. 800 w. Stahl und Eisen—May 1, 1900.

**Bagasse.**—Furnace for Burning Green Bagasse (Four à Bruler la Bagasse Verte). A description of the furnaces used in the sugar plantations of the island Reunion, for burning the crushed cane for generating steam. 1800 w. Génie Civil—Nov. 6, 1897.

**Bagasse and Refuse.**—Megass and Refuse Furnaces. William Price Abell. An illustrated description of means and methods of using megass and other refuse as fuel and a résumé of progress in the art. 1800 w. Ind & Ir—Dec. 27, 1895.

See also **REFUSE DISPOSAL.**

**Coal Dust.**—See also **COAL DUST FUEL.**

**Down-Draught.**—The Down-Draught Furnace. A. B. Hazzard. Extract from paper read before the St. Louis Assn. No. 2, of Missouri N. A. S. E. Describes the three ways of setting a furnace, the common grate setting, the understoker, and the down-draught, with the principal features of the latter. 1200 w. San Plumb—May 1, 1897.

**Efficiency.**—Furnace Efficiency. A. Bement. Considers other losses than those arising from incomplete combustion and other conditions which may decide superiority. 2200 w. Power—Dec., 1899.

Furnace Efficiency. W. H. Booth. Considers things affecting the efficiency of a furnace, the importance of a fireman's duty and related matters. 1500 w. Am Mach—Aug. 16, 1900.

**Fittings.**—Furnace Fittings. Part first discusses furnace casing, and cold-air supply and connections. Serial. Met Work—June 3, 1899.

**Gas Heated.**—See **Andre Gas Heated.**

**Glass Manufacture.**—See **Andre; GLASS FURNACE.**

**Gauging Instrument.**—An Instrument for Gauging the Circularity of Boiler Furnaces and Cylinders, and Producing a Diagram. T. Messenger. Read before the Northeast Coast Inst. of Engs. & Shipbuilders, in South Shields. Illustrated description of apparatus for internally gauging and testing the circularity of cylinders designed particularly for use with cylindrical furnaces. 1600 w. Ind & Ir—Feb. 25, 1898.

**Heckmann.**—The Heckmann Furnace (Die Heckmann Feuerung). H. Biesinger. Describing and illustrating an improved form of regenerative furnace, adapted both for steam boilers and for metallurgical purposes. 2500 w. Zeitschr d Ver Deutscher Ing—June 17, 1899.

**Hardening.**—Continuous Hardening Furnace. An illustrated description of a furnace designed for hardening bicycle balls, but applied also to other work. 700 w. Engng—Aug. 19, 1898.

**Herreshoff Roasting.**—The Herreshoff Roasting Furnace. Peter S. Gilchrist. Illustrated description and statement of advantages claimed. 1800 w. Mod Mach—Feb., 1899.

**High Temperature.**—A New High Temperature Furnace. H. L. Gantt. A study of the actions carried on in the electrical furnaces, and other high temperature furnaces. Followed by discussion. 3500 w. Jour Fr Inst—Dec., 1896.

See also **ELECTRIC FURNACE.**

**Hot Air.**—See **HEATING.**

**Ingot Heating.**—Ingot Heating Furnace. Specifition, with illustrations of a new heating furnace, designed to heat cast-steel ingots. 1200 w. Am Mfr & Ir Wld—April 5, 1900.

**Megass.**—See **BAGASSE.**

**Morgan-Allen Continuous.**—The Morgan-Allen Continuous Heating Furnaces. Description illustrated by drawings in plan and section. Each charge of these billets pushes the others toward the drawing door. 600 w. Ir Age—Feb. 27, 1896.

**Muffle Coke Burning.**—An Improved Muffle Furnace for Burning Coke. T. Graham Martyn. Read before the Inst. of Min. & Met., London. Longitudinal and transverse sections are given with description and statement of advantages secured. 900 w. Col Guard—June 30, 1899.

**Murphy Automatic.**—A Test of the Murphy Automatic Furnace. A. W. Richter. A brief illustrated description of the furnace and test made, giving data and results. 1700 w. Sib Jour of Engng—April, 1899.

**Re-Heating.**—Re-Heating Furnaces for Iron and Steel. Fred. Mills. Considers some of the reheating furnaces in the districts of the West of Scotland and the Northeast Coast. Ill. 2200 w. Ir & Coal Trds Rev—April 22, 1898.

**Reverberatory.**—A Combination Retort and Reverberatory Furnace. Courtenay De Kalb. Brief illustrated description of a type of furnace possessing peculiarities intended to meet the necessities of laboratory instruction. 350 w. Trans Am Inst of Min Engs—Sept., 1897.

Reverberatory Air Furnaces; Malleable Practice. E. C. Wheeler. Considers these furnaces and claims that automatic stoking will solve the combustion question and cure all existing defects. 3500 w. Foundry—May, 1899.

Reverberatory Furnaces. R. H. Palmer. Considers two kinds of reverberatory furnaces, one using a blast, the other natural draft. Ill. 2700 w. Foundry—March, 1900.

**Roasting.**—Brown's Horseshoe Roasting Furnace. Illustrated description of a hearth furnace of the O'Hara type, having continuous stirrers, which stir the roasting ore and convey it to leaching tanks. The plant is erected in Montana. 1800 w. Engng—Nov. 29, 1895.

**Siemens.**—The Chemistry of the Siemens Furnace. A. M. Dick and C. S. Padley. Paper read before the West of Scotland Iron and Steel Inst. A comprehensive, elementary explanation. 1700 w. Col Guard—Feb. 14, 1896.

**Smokeless.**—Boiler Furnaces for Steam Power Installations. M. C. Huyett. Read at Atlantic City meeting of the Am. Soc. of Heat and Ven. Engs. Also discussion. Gives some fuel data as a basis for the discussion of mechanical smokeless furnaces. 2200 w. Heat & Ven—July 15, 1898.

See also **SMOKE PREVENTION.**

**Thwaite Reverberatory.**—The Thwaite Steel Furnace. Illustrated description. 700 w. Eng, Lond—Feb. 12, 1897.

**"Weardale."**—The "Weardale" Furnace. Henry William Hollis. Abstract of paper read at the Iron and Steel Inst. Illustrated description of the furnace and mode of working. 2500 w. Eng, Lond—May 14, 1897.

**Wegener.**—See **COAL DUST FUEL.**

**FURNACE GAS.**

See also **BLAST FURNACE GAS; COMBUSTION; PYROMETRY.**

The Presence of Hydrogen, Hydrocarbons and Nitrogen Peroxide in Boiler Furnace Gases. R. S. Hale. Collection of data showing that, though the presence of the nitrogen peroxide accounts for the missing oxygen, yet the amounts of carbon dioxide, oxygen and carbonic oxide in the gas can in no case prove the absence of hydrogen or hydrocarbons. 1200 w. Eng News—Feb. 18, 1897.

**Econometer.**—See **ECONOMETER.**

**Testing.**—The Rapid Testing of Gases from Industrial Furnaces (Sur l'Essai Rapide des Fumées dans des Foyers Industriel). H. Le Chatelier. A description of a simple apparatus employing the principle of the changes in color of heated copper. 1000 w. Bull de la Societe d'Encour—Jan., 1899.

**FURNACE LINING.**

See also **BLAST FURNACE—Lining; CUPOLA—Lining; FIRE BRICK.**

**Chrome Ore.**—Chrome Ore as a Furnace Lining. Stating that very good results were obtained by lining the furnace with two parts of powdered chrome ore to one of lime. The chrome ore should contain 36 to 40 per cent. of chrome sesqui-oxide. 400 w. Ir & St R Jour—Nov. 16, 1895.

**Refractory.**—Refractory Furnace Surfaces. W. H. Booth. Gives the writer's views on the importance of refractory lining and the faults in the present system of firing. 1200 w. Am Mach—April 28, 1898.

Refractory Material. Walter Hempel and Waclaw Jezierski, in "Chemische Industrie." Describes the results of an investigation of a peculiar mineral found in Norway, Southern Tyrol and the United States. 800 w. Am Mfr & Ir Wld—June 19, 1896.

**FUSE.**

**Blasting.**—See **BLASTING—Coal Mine; Fuse.**

**Electric.**—See **ELECTRIC FUSE.**

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**GALVANIZING.**

Galvanizing. W. T. Flanders. The process is described in detail. 3000 w. Ir Age—Feb. 27, 1896.

On an Improvement in the Art of Galvanizing George C. Reese. The object of the paper is to call attention to a recent advance in the art of galvanizing, by which many objectionable features are obviated, insuring greater rapidity, better quality, economy, and resulting in new forms of coated material. Ill. 2000 w. Jour Fr Inst—Oct., 1897.

**Electric.**—See **ELECTRO-GALVANIZING.**

**GALVANOMETER.**

See also **ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC METER.**

**Alternating Currents.**—On the Measurement of Alternate Currents by Means of an Obliquely Situated Galvanometer Needle, with a Method of Determining the Angle of Lag. Lord Rayleigh. From the "Phil. Mag." Describes a form of galvanometer suitable for the measurement of alternate currents, and how the instrument can be used to measure the power factor of a circuit. 2200 w. Elect'n—June 4, 1897.

**Ballistic.**—Ballistic Galvanometry with a Counter-Twisted Torsion System. C. Barus. Explains the use of the ballistic galvanometer by the writer, in a way somewhat different from the ordinary and states the advantages. 1800 w. Phys Rev—July, 1898.

Practical Work with the Ballistic Galvanometer. Lawford H. Fry. Describes methods which facilitate work with this instrument. 1700 w. Elec Rev, Lond—March 4, 1898.

The Ballistic Galvanometer and Some of Its Applications. W. H. Freedman. Explains the theory of the instrument, and gives mathematical demonstrations. 5000 w. Sch of Mines Quar—July, 1898.

The Ballistic Galvanometer in Theory and Practice. Ellis H. Crapper. The first of a series of articles on experimental work with this instrument. Defines and explains the theory. Ill. Serial. Elec Eng, Lond—Aug. 20, 1897.

**Coil Cross Section.**—Notes on the Best Form of Cross Section for the Coils of a Galvanometer. Frank A. Laws. Experimental determination of the curves bounding the best form of cross section for two cases are given, when the needle is indefinitely short. 700 w. Tech Quar—June-Sept., 1896.

**Crompton-D'Arsonval.**—Crompton improved bifilar d'Arsonval galvanometer. Illustrated description. 1200 w. Elec Eng, Lond—Dec. 13, 1895.

**D'Arsonval.**—See **MAGNETIC TESTING.**

**Mirror.**—A Sensitive Mirror Galvanometer. James F. Hobart. Illustrated description of an instrument intended to obviate, almost entirely, the necessity for skilled manipulation, yet which will give results closely approaching those received from a more costly instrument. 1300 w. Am Elect'n—Feb., 1898.

Principles and Efficiency of the Mirror Galvanometer (Konstruktiongrundsätse und Leistungsfähigkeit Unserer Spiegelgalvanometer). An elaborate investigation of improved galvanometers especially for the measurement of very weak currents. Serial. Zeitschr f Elektrochemie —April 5, 1897.

**Reading.**—On a New Method for Reading Deflections of Galvanometers. C. B. Rice. Describes a method recently devised by Prof. C. S. Hastings. 1200 w. Am Jour of Sci—Oct., 1896.

**Resistance.**—On the Best Resistance for a Sensitive Galvanometer. Frank A. Laws. A statement of the usual solution of the problem is given, and a solution under conditions other than those usually imposed. 1200 w. Phys Rev—Nov.-Dec., 1897.

On the Best Resistance for a Sensitive Galvanometer. Frank A. Laws. A statement of the usual solution of the problem of obtaining the proper adjustment of the galvanometer resistance to the work in hand, and deriving a solution under conditions other than those usually imposed. 1200 w. Tech Quar—June, 1898.

**Sullivan.**—The Sullivan Signalling Galvanometer. Illustrates and describes the instrument and its working, which enables a commander in war time to establish communication through any submarine cable. 1400 w. Elec Rev, Lond—Nov. 3, 1899.

**Suspension.**—On a Method of Delicate Suspension. Frank A. Laws. Calls attention of those engaged in physical work, especially electrical testing, to a device due to Dr. W. H. Julius, of Amsterdam, by which the effects of mechanical disturbance may be eliminated. 700 w. Elec Wld—Jan. 16, 1897.

See also **PHYSICS—Quartz Fibres.**

**Tangent.**—The Theory of the Tangent Galvanometer and its Modifications. J. Warren. Part first explains the instrument and the manner of determining the angle of maximum sensitiveness. Serial. Elec, Lond—Aug. 11, 1899.

**Telegraph Testing.**—A Universal Measuring Instrument for Telegraph Circuits (Ueber ein Universal-messinstrument für Telegraphenleitungen). Dr. F. Breisig. Paper before the Elektrotechnischer Verein describing a convenient form of galvanometer for telegraph testing work, with illustration and diagrams. 3200 w. Elektrotech Zeitschr—June 28, 1900.

**Thomson Astatic.**—Construction of a Thomson Astatic Galvanometer. H. S. Webb. Illustrated description of a galvanometer which has proved very useful for laboratory work, and may be made very sensitive. 2400 w. Am Elect'n—Jan., 1898.

**Wheatstone Bridge.**—The Galvanometer in the Bridge System. W. J. Murphy. Reports some experiments made which yielded rather remarkable results and led to an investigation and gave an additional reason for the use of the D'Arsonval type of galvanometer for bridge work. 700 w. Elect'n, Lond—Aug. 26, 1898.

**GALVANOSCOPE.**

**Telephone.**—Use of the Telephone as a Galvanoscope. George I. Hanchett. Shows modifications in the use of this instrument in testing, and indicates where it can be used to greater advantage than a galvanometer. Ill. 2000 w. Elec Eng, N. Y.—Dec. 23, 1897.

**GAOL.**

See **PRISON.**

**GARBAGE DISPOSAL.**

See **REFUSE DISPOSAL.**

**GARDEN.**

See **GREENHOUSE; LANDSCAPE ARCHITECTURE; PARK.**

**GAS.**

See also **GASES; GAS INDUSTRY; GAS LIGHTING.**

**Air Mixture.**—The Loss of Illuminating Power of 25- to 30-Candle Gas when Mixed with Air. E. G. Love. Read at Oct. meeting of the Am. Gas Lgt. Assn. Calls attention to a few points in connection with the deleterious action of air on coal-gas. Discussion. 2800 w. Pro Age—Nov. 1, 1898.

**Applications.**—Gas for Light, Heat and Power Transmission. Alton D. Adams. On the expanding field of gas utilization. 1600 w. Am Arch—Jan. 27, 1900.

See also **GAS ENGINE; GAS HEATING; GAS INDUSTRY; GAS LIGHTING;** etc.

**Blast Furnace.**—See **BLAST FURNACE GAS.**

**Calorific Value.**—See **CALORIFIC VALUE—Gas; Water Gas.**

**Carbonic Acid Influence.**—The Influence of Carbonic Acid on the Combustion of Coal and Carburetted Water Gas. Frederick G. Dexter. Read before the Incorporated Gas Inst., England. Gives valuable information as to the effect of carbonic acid in depreciating the illuminating and calorific values. Usually, the purer the quality of the gas the greater the injury to the illuminating value. Discussion. 3500 w. Gas Wld—June 17, 1899.

**Chemical Industry Society.**—President's Address at the Annual Meeting of the Society of Chemical Industry, London. Abstract. Deals with technical education, water gas, incandescent gas mantles, and other topics. 4000 w. Jour Gas Lgt—July 24, 1900.

**Combustion Products.**—On the Alleged Escape of Carbonic Oxide and Unconsumed Carbon from Coal-Gas Flames. Lewis T. Wright. A denial that danger or injury results in the ordinary use of coal gas either for lighting or heating as a result of unconsumed gases. Also contains some criticisms upon Mr. W. Thomson's experiments which appear to indicate that products of imperfect combustion may be present. 2500 w. Jour Gas Lgt—Nov. 19, 1895.

Recent Researches upon the Products of Combustion of Illuminating Gas (Nouvelles Recherches sur les Produits de Combustion du Gaz d'Eclairage). Dr. Grehant. An account of the latest investigations into the injurious products of burning gas, comparing various burners. 6000 w. Bull de la Société d'Encour—Feb., 1899.

The Products of Combustion of Illuminating Gas. Digest of an interesting paper by Prof. Gréhant presented to the Société d'Encouragement pour l'Industrie Nationale. Gives methods used by the writer in researches. Various types of gas burners were examined. 2700 w. Jour Gas Lgt—April 25, 1899.

**Combustion Researches.**—Researches on the Combustion of Illuminating Gas in Cooled Flames and Gas Motors. Dr. F. Haber and A. Weber. Account of researches carried out in the Chemical Tech. Inst., at Carlsruhe, at the instance of Dr. H. Bunte. Serial. Jour Gas Lgt—March 10, 1896.

**Explosive Mixtures.**—Explosive Mixtures of Combustible Gases. Frank Clowes. Methods for detecting and measuring minute and dangerous proportions of such gases. 4000 w. Gas Wld—June 13, 1896.

**Flame Temperature.**—See **Temperature; FLAME—Temperature.**

**Heating and Lighting Power.**—Heating and Lighting Power of Coal Gas. T. Fairley. On some of the results obtained, and precautions needed to give trustworthy measurements. 900 w. Am Gas Lgt Jour—Oct. 29, 1900.

**Hydrocarbons.**—The Condensable Hydrocarbons in Coal Gas. Wilfrid Irwin. Read before the Manchester Section of the Soc. of Chem. Ind. Considers the effect of high temperatures, vapor tensions, and the superiority of benzine for enrichment. 1800 w. Gas Wld—March 25, 1899.

**Hygiene.**—The Hygienic Effect of the Use of Gas. Thomas D. Miller. Read before the Western Gas Assn. An account of investigations made and conclusions reached; also reporting investigations of others. Discussion. 4000 w. Pro Age—June 15, 1900.

**Hygiene.**—See also **Poisoning.**

**Illuminating Power.**—Address of J. W. Carmichael before the Glasgow meeting of Scottish Gas Managers Discusses subjects of interest and importance and suggests that the illuminating power of gas in Scotland should be reduced to a uniform standard of twenty candles. Lengthy discussion. 10300 w. Gas Wld—April 7, 1900.

The Development of Candle Power. W. S. Allen. Paper read at the twenty-sixth annual meeting of the New England Assn. of Gas Engs. Treats of the demand for higher candle-power and some of the less well-known methods of obtaining higher candle power in gas, with discussion. 3300 w. Am Gas Lgt Jour—March 9, 1896.

Discussion of Mr. Newbigging's Paper on "Illuminating Power as Exhibited in the Parliamentary Returns." 2400 w. Jour Gas Lgt—Dec. 8, 1896.

Illuminating Power as Exhibited in the Parliamentary Returns. Thomas Newbigging. Read before the Manchester Dist. Inst. of Gas Engs. Investigations made with a view to ascertaining the money value of the concession made to the gas consumer. 1200 w. Jour Gas Lgt—Dec. 1, 1896.

See also **Luminosity; PHOTOMETRY.**

**Illumination.**—The Illumination Problem Again. W. H. Birchmore. A criticism of various papers that have dealt with this subject. 2500 w. Am Gas Lgt Jour—Oct. 15, 1900.

**Industrial Operations.**—The Extending Use of Gas in Industrial Operations. Frederick H. Shelton. Describing the different kinds of commercial gas and their applications in manufacturing. 4200 w. Eng Mag—Sept., 1897.

**Injurious Effects.**—The Deterioration of Leather Bookbindings. Extract from a paper by Douglas Cockrell at a meeting of the London Soc. of Arts. The conclusion reached was that gas is not the chief cause of damage, that it is likely to be in some degree injurious is admitted, and the need of proper ventilation shown. 1500 w. Jour Gas Lgt—April 17, 1900.

**Jubilee Illuminations.**—Gas at the Jubilee Illuminations. Describes some of the devices used. 2500 w. Jour Gas Lgt—June 29, 1897.

**Luminosity.**—The Cause of Luminosity of Hydrocarbon Flames. Wilfrid Irwin. Read at meeting of the Manchester Section of the Society of Chemical Industry. Combats Prof. Lewes' ideas, and gives experiment illustrating his own. 1600 w. Jour of Gas Lgt—June 15, 1897.

The Development of Light from Gas Flames. Vivian B. Lewes. Paper contributed to the N. Y. Gas Exposition. Arguments in favor of the acetylene theory of luminosity. 6000 w. Gas Wld—Feb. 6, 1897.

The Luminosity Limit of the Hydro-Carbon Flames. W. H. Birchmore. The first part treats of the changes produced in hydro-carbons by heat, and the physical changes involved in breaking a molecule. Serial. Elec Eng—Dec. 18, 1895.

The Luminosity of Flame. A. Smithells. Read before the Inst. of Gas Engs., London. States the difficulties relating to the study of flames, the chemical and physical character of soot, how carbon is set free in flames, cause of the glow of the separated carbon, etc. Discussion. 5500 w. Gas Wld—May 8, 1897.

The Source of Light in Flames. Arthur Smithells. Report of a lecture at the Royal Inst. A study of the flames of various gases. 2200 w. Gas Wld—March 20, 1897.

See also **Illuminating Power; PHOTOMETRY.**

**Natural.—See NATURAL GAS.**

**North of England Association.**—North of England Gas Managers' Association. An account of the half-yearly meeting at Newcastle. President's address, abstracts of papers and discussions, etc. 5800 w. Jour Gas Lgt—April 27, 1897.

**Oil.—See GAS MANUFACTURE; PINTSCH GAS.**

**Permanency.**—The Permanency of Illuminating Gas. William Young. Read before the N. Brit. Assn. of Gas Managers. Discusses on what the permanency depends, refers to the Aitken and Young system of condensing crude coal gases, etc. Serial. Gas Engs' Mag—Dec. 10, 1896.

The Permanency of Illuminating Gas. William Young. Read before the N. Brit. Assn. of Gas Managers. The effect of vapor tension and absorption of illuminating constituents by oil, modifications of permanency, etc. 6800 w. Gas Wld—July 25, 1896.

**Pintsch.—See PINTSCH GAS.**

**Poisoning.**—Gas Poisoning. W. B. M'Vey and J. E. Grinfield-Coxwell. Read before the Medico-Legal Society. Claims that the substitution of water-gas for coal-gas has greatly increased the danger of gas poisoning. Gives case with reports on conditions at various intervals. Discussion. 2500 w. Pro Age—Jan. 1, 1898.

"Gassing." Its Prevention and Cure. Review of two papers bearing on gas poisoning which were read and discussed at the Liverpool Section of the Soc. of Chem. Ind. The papers were by Arthur Carey and Douglas Herman. 2000 w. Jour of Gas Lgt—Feb. 9, 1897.

The Use of Oxygen in Gaseous Poisoning. Part first is an illustrated description of preventive and rescuing appliances, and will be followed by a code of rules. 3500 w. Pro Age—Dec. 15, 1896.

**Resin.—See RESIN GAS.**

**Spectroscopic Study.**—A Spectroscopic Study of Oxy-Coal Gas. An investigation by M. Jean S. Stas. 1100 w. Jour Gas Lgt—Dec. 31, 1895.

**Storage and Explosion.**—The Storage and Explosion of Compressed Gaseous Mixtures. Report of committee of British Board of Trade appointed to inquire into causes of this class of explosion and precautions necessary to be adopted. 2200 w. Jour Gas Lgt—March 10, 1896.

**Synthesis.**—The Synthesis of Commercial Gases. L. P. Lowe. Read before the Pacific Coast Gas Assn. Aims to give a simple description of the composition of commercial gases. 4000 w. Am Gas Lgt Jour—Aug. 27, 1900.

**Temperature.**—Report upon the Temperature of Gas Measurement. Report, tables and diagrams of the sub-committee appointed by the Institution of Gas Engineers (London). 800 w. Gas Wld—June 4, 1898.

Standards of Light and Temperature of Gas Measurement. Discussion at meeting of the Incorporated Institution of Gas Engineers, England. 2300 w. Gas Wld—June 18, 1898.

See also **FLAME—Temperature; PHOTOMETRY.**

**Testing.**—Testing Coal Gas. Norton H. Humphreys. Discusses a paper by T. Glover on the "Commercial Testing of Coal Gas." 3800 w. Jour of Gas Lgt—Dec. 29, 1896.

**Testing, British.**—Official Gas Testing. Commenting severely upon the frequent and unexpected changes in methods and standards instituted by the (English) Standards of Light Committee. 1600 w. Jour Gas Lgt—Aug. 30, 1898.

**Testing Continuous.**—On the Continuous Mode of Testing Gas. C. R. C. Tichborne. Read before the North of Ireland Assn. of Gas Managers. Describes in detail a process for estimating ammonia. 1600 w. Jour Gas Lgt—Aug. 15, 1899.

**Testing, London.**—The Revised Instructions of the Metropolitan Gas Referees. The portions in which changes have been made in the new instructions in regard to the testing of gas which have been prepared by the Metropolitan Gas Referees, London. 8000 w. Jour of Gas Lgt—May 31, 1898.

**Water.—See WATER GAS.**

**Wood.—See WOOD GAS.**

**GAS ACCIDENT.**

See also **GAS EXPLOSION; GAS FIRE.**

Accidents with Gas. William Paul Gerhard. Narrates various accidents and emphasizes the dangers arising from leakage. 2700 w. Am Arch—Aug. 6, 1898.

**GAS ACCUMULATORS.**

**Automobiles.**—High-Pressure Gas Accumulators for Automobiles. An article intended to suggest a new line of thought and experiment in connection with accumulators. 1200 w. Automotor Jour—Dec., 1899.

**GAS ANALYSIS.**

A Technical Analysis of Hydrocarbon, Vapor and Gases in Literature and Laboratory. Dr. W. H. Birchmore. Part first consists of an examination of methods and published work in this field, and will be followed by personal work of the writer. Serial. Am Gas Lgt Jour—March 22, 1897.

Improvements in the Analysis of Gas. On the method adopted by Dr. Otto Pfeiffer, of Magdeburg, and the faults of methods now in use. Ill. 2400 w. Gas Wld—April 29, 1899.

Laboratory Notes on Gas Analysis. John T. Sheard. Describes a modification of Hempel's apparatus which is capable of giving quite exact results. 1200 w. Gas Engs' Mag—July 11, 1898.

Some Recently Discovered Constituents of Coal Gas. Discusses the views of Berthelat and of P. Fritzsche, and the limited study that has been given the subject. 1200 w. Jour of Gas Lgt—Dec. 7, 1897.

The Decomposition of Hydrocarbons by Heat. Dr. F. Haber and Herr H. Oechelhaeuser. Abstract translation of paper recently published in the Journal für Gasbeleuchtung." The apparatus used is described with special methods of gas analysis devised for the work and experiments. Serial. Jour of Gas Lgt—Feb. 16, 1897.

**Apparatus.**—Apparatus for the Analysis of Illuminating and Fuel Gases. George E. Thomas in "Jour. Am. Chem. Soc." Illustrated description. 1200 w. Am Gas Lgt Jour—Jan. 8, 1900.

Modified Apparatus for Gas Analysis. E. Hankus, in "Zeitschrift für Berg und Hüttenwesen."

Illustrates and describes an apparatus designed by the writer, a modification of the Orsat apparatus, to enable hydrogen and gases of the $C_nH_{2n}$ series to be determined in the presence of carbon monoxide and methane in fire-damp and blast-furnace gases. 1400 w. Col Guard—March 3, 1899.

The Simple and Efficient Gas Analysis Apparatus. Dr. W. H. Birchmore. Describes and illustrates a simple and efficient apparatus, explaining the method of using. 1400 w. Am Gas Lgt Jour—June 27, 1898.

**Benzene and Ethylene.**—Determination of Benzene and Ethylene in Coal Gas. F. Haber. Abstract translation from the "Journal für Gasbeleuchtung." Describes the method and manner of carrying out the researches. 2000 w. Jour of Gas Lgt—May 29, 1900.

**Benzol.**—Estimation of Benzol in Illuminating Gas. Otto Pfeiffer. Summary from the "Journal für Gasbeleuchtung." Describes old methods of estimating and also the author's method. 2800 w. Gas Wld—Nov. 4, 1899.

**Carbonic Acid.**—The Estimation of Carbonic Acid in Flue Gases. A. H. Sexton. A paper read before the West of Scotland Iron and Steel Institute. 1200 w. Col Guard—March 20, 1896.

**Composimeter.**—Principle of the Gas Composimeter. Edward A. Uehling, in the "Stevens Indicator." The apparatus is based on the laws governing the flow of gas through small apertures. Explains the means of fulfilling the necessary conditions, and gives autographic records taken. Ill. 2200 w. Pro Age—Dec. 1, 1897.

Principle of the Gas Composimeter. Edward A. Uehling. Illustrated description of apparatus, and explanation of principle. 1800 w. Gas Wld—Jan. 15, 1898.

See also **PYROMETER—Pneumatic.**

**Fractional Combustion.**—The Estimation of Hydrogen, Marsh Gas and Nitrogen in Mixtures of Gases. E. Jäger. Abstract translation from the "Journal für Gasbeleuchtung." Describes a fractional combustion method which has given satisfactory results. 2000 w. Jour Gas Lgt—Dec. 13, 1898.

**Nitrogen.**—The Direct Estimation of Nitrogen in Gases. J. Kent Smith. Read before the Liverpool Section of the Society of Chemical Industry. Describes a method for the direct estimation of nitrogen in illuminating and other gases without the aid of gas analysis apparatus. 1200 w. Jour of Gas Lgt—April 25, 1899.

**Oxygen.**—The Estimation of Oxygen in Coal Gas. Presents the need of a rapid method of more accurately determining oxygen, and describes the method of Dr. Otto Pfeiffer, of Magdeburg. 2000 w. Jour of Gas Lgt—Aug. 17, 1897.

**Sulphur.**—A New Method for the Determination of Sulphur in Gas. A brief description of the method and apparatus devised by Antonio Longi, of Rome, as published in the "Gazetta Chemica Italiana," with editorial criticism. 2800 w. Jour of Gas Lgt—April 5, 1898.

On the Determination of Sulphur in Illuminating Gas and in Coal. Charles F. Mabery. Describes apparatus and a method thought to be more accurate and more easily applied than those in current practice. 2800 w. Am Chem Jour—March, 1896.

On the Measurement of Sulphurous and Sulphuric Acids in the Products of Combustion of Illuminating Gases. M. Dermstedt and C. Ahrens, in "Zeitschrift für Analytische Chemie." Review of an article by Uno Collan, continuing researches and describing experiments made. 2000 w. Pro Age—Feb. 15, 1897.

**Sulphur Test.**—The Double Sulphur Test for Bisulphide of Carbon. S. Carpenter. Gives a description of this test and the method of its manipulation. 2500 w. Jour of Gas Lgt—Nov. 22, 1898.

**GAS ASSOCIATION.**

See **GAS ENGINEER.**

**GAS BOTTLES.**

**High Pressure.**—High Pressure Gas Bottles. From paper by M. Perisse. Conditions under which explosions are likely to occur. Precautions to be observed in filling. Rules as to quantity permissible in bottles of given capacity. Government regulations, etc. 1200 w. Ind Engng—Jan. 4, 1896.

**GAS BURNER.**

Notes on Gas Burners. A. Gibb. Read at the annual meeting of the North of Ireland Assn. of Gas Managers. Good and bad burners and how the latter may give rise to discontent among consumers. 1400 w. Jour of Gas Lgt—Aug. 18, 1896.

**Argand.**—On the Efficiency of the London Argand at Different Rates of Gas Consumption, with Special Reference to its Use as a Gas Testing Burner. Lewis T. Wright. Paper read before the Incorporated Inst. of Gas Engineers. Disputes the statement, in King's Treatise on Coal Gas, that the maximum illumination of this burner is reached under all circumstances just as the lamp is about to smoke, and submits the action of this burner to a critical study. With discussion. 7800 w. Gas Wld—May 16, 1896.

**Deposits.**—Gaseous Compounds of Iron and Nickel with Carbonic Oxide and their Curious Effects on Burner Tips, etc. Henry Morton. Causes of the mushroom shaped deposits on burner tips experienced in the use of water gas, and their chemical composition. 1200 w. Stevens In—Jan., 1896.

**Self-Lighting.**—Automatic Gas Lighting (Gasfernzündung). Discusses the various methods of turning on and lighting a number of gas burners from a distant point. Electro-magnetic valves and platinum sponge lighters are described. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 5, 1898.

Self-Kindling by Chemical Means. Extract from an article in the "Journal für Gasbeleuchtung" on "Self-Kindling of Lighting Gas," by Dr. C. Killing. Considers the modern forms, or those used since the beginning of the century, and especially since the eighties. 800 w. Gas Wld—May 27, 1899.

Self-Lighting Gas-Burners. A review of articles by M. Pierron on the characteristics of some appliances for automatic ignition. Ill. 3000 w. Jour Gas Lgt—Oct. 16, 1900

The Besnard System of Automatically Lighting and Extinguishing Public Lamps. An illustrated description of an appliance for utilising gas pressure. 1300 w. Jour Gas Lgt—Dec. 5, 1899.

The Automatic Ignition of Gas by Chemical Means. J. B. Grimwood. On igniters depending for action upon the property of certain metals to absorb gases. Discussion. 5000 w. Am Gas Lgt Jour—Aug. 21, 1899.

The Auto-Lux from "La Nature." Illustrated description of an apparatus for lighting and extinguishing gas at a distance. 700 w. Sci Am Sup—March 11, 1899.

Self-Ignition, Far and Near. On the interesting installation recently made at the Waterloo Station of the South-Western Railway, England. 1800 w. Jour Gas Lgt—Aug. 1, 1899.

See also **KINEMATICS—Gas-Lighting Mechanism.**

**Self-Lighting, Electric.**—New System for the Instantaneous Lighting and Extinguishing of Gas Jets at Any Distance. Translated from Le Gas, by Herman Poole. Explains the system devised jointly by Mr. Egras, Doctor Guyenot, and Mr. Chateau. The power used is electricity. 2000 w. Am Gas Lgt Jour—April 26, 1897.

**Self-Mixing.**—See **INCANDESCENT GAS LIGHTING—Denayrouze.**

**Stoppages.**—Report of Burner Stoppages. Paul Doty. Read before the American Gas-Light Assn. Results of experience, experiment and research to discover the cause and cure of troublesome deposits. 7000 w. Pro Age—Nov. 1, 1897.

**GAS COKE.**

See also **COKE; GAS MANUFACTURE—Coke Fuel.**

**Electric Lighting.**—Gas Coke for Electric Lighting. Alton D. Adams. A comparison of the values of the gas and of the electric energy that may be derived from coke. 2000 w. Elec Wld & Engr—April 28, 1900.

**GAS COMPOSIMETER.**

See **GAS ANALYSIS—Composimeter.**

**GAS COMPRESSOR.**

Gas Compressors Actuated by Water Under Pressure. From "Revue Industrielle." Illustrated description of the Keith gas compressor. 1300 w. Sci Am Sup—June 9, 1900.

Intensified Gas Lighting With and Without Water Power. James Keith. Abstract of paper presented at Stirling meeting of the North British Assn. Describes Keith's automatic air and gas compressors and explains their advantages. Ill. 1500 w. Gas Wld—July 29, 1899.

**GAS CONGRESS.**

See also **GAS ENGINEER; GAS ENGINEERING; GAS EXHIBITION.**

**Paris, 1900.**—The International Gas Congress in Paris. A review of the proceedings and a résumé of the papers read. 20000 w. Jour Gas Lgt—Sept. 11, 1900.

The International Gas Congress. An account of the proceedings of the Gas Congress at Paris, with abstracts of the papers read. 18000 w. Gas Wld—Sept. 8, 1900.

The International Gas Congress. Opening address of the president, M. Theodore Vautier. A general review of gas engineering. 7000 w. Jour Gas Lgt—Sept. 18, 1900.

See also **GAS EXHIBITION—Paris.**

**GAS CONTAMINATION.**

**Holders.**—The Contamination of Gas in Holders. M. Ymonet, in the "Journal de l'Eclairage au Gaz." General observations on the causes of the contamination. 1200 w. Jour Gas Lgt—Jan. 10, 1899.

**GAS COOKING.**

See also **GAS HEATING; GAS METER.**

A Discussion of Various Methods Employed in the Introduction of Gas Stoves. Charles H. Nettleton. Read at the St. Louis meeting of the Am Gas Lgt Assn. Facts and practices in relation to the use of gas stoves, particularly gas cooking stoves. 7000 w. Pro Age—Nov. 2, 1896.

How Can We Make the Use of Gas More Universal? Henry L. Doherty. Read before the Am Gas Lgt. Assn. at Niagara Falls. States reasons why gas is not used more generally for cooking, discussing each in order. 4800 w. Am Gas Lgt Jour—Oct. 31, 1898.

On Cooking by the Aid of Gas, and the Ventilation of Kitchens. William Sugg. Read at meeting of Incorporated Gas Inst. at Bath, Eng. Historical retrospect, with the advantages of use of gas in cooking. Discussion. 6000 w. Gas Wld—June 19, 1897.

The Comparative Cost of Cooking by Gas and Coal. Thomas Fletcher. An attempt to fix the standards by which the relative costs can be compared, giving conclusions favoring the use of gas. 2000 w. Gas Wld—May 7, 1898.

The Gas-Stove Cooking Demonstration from a Gas Manager's Point of View. Norton H. Humphreys. Discusses the business methods for advertising gas cookers; the exhibitions, lectures, letting stoves on hire, and other expedients. 2800 w. Gas Wld—May 7, 1898.

**GAS DISTRIBUTION.**

See also **GAS INDUSTRY; GAS MANUFACTURE; GAS PIPE.**

Facts versus Logic in the Distribution of Gas. J. P. Gill. Criticism of a contribution by D. Coats Niven to the "Journal of Gas Lighting," in refrence to "the Distribution of Gas." 1200 w. Am Gas Lgt Jour—Jan. 24, 1898.

Gas Distribution. William H. Snow. Read before the New England Assn. of Gas Engs. Refers to pipes, cocks, gates, napthaline, etc., and is followed by discussion. 5800 w. Am Gas Lgt Jour—March 8, 1897.

Gas Distribution in Relation to Modern Municipal Development. Thomas Canning. Read before the Incorporated Gas Inst. at Bath, Eng. Discusses the size of mains, the precautions necessary in view of the newer condition of street paving, electrolysis of gas pipes, etc. 4800 w. Gas Wld—June 19, 1897.

Mr. D. Coats Niven on Gas Distribution. J. Skinner. A criticism of views advanced by Mr. Niven. 1600 w. Jour of Gas Lgt—Dec. 7, 1897.

The Distribution of Gas. D. Coats Niven. A reply to criticisms by Messrs. Skinner and Canning on a previous article of the writer. 2200 w. Jour of Gas Lgt—March 15, 1898.

The Distribution of Gas. D. Coats Niven. Remarks on two recent papers on this subject, one American, the other, English. 1200 w. Jour Gas Lgt—Oct. 12, 1897.

**Control.**—Gas Control from Meter to Burner. D. Macfie. A lecture delivered before the District Council for Edinburgh, Scotland, of the National Registration of Plumbers. The need of enlightenment in the proper use of gas. Points where gas fitters could educate their clients. 5000 w. Am Gas Lgt Jour—Feb. 8, 1897.

Gas Control from Meter to Burner. D. Macfie. Abstract of a lecture delivered in Edinburgh. Consideration of size of pipes, burners and many points of interest. 5000 w. Jour Gas Lgt—Jan. 19, 1897.

**Cowan Pressure System.**—The "Cowan Pressure System." J. Hepworth. Read at meeting of North British Assn. of Gas Managers. Notes on the object of this system, with short description of the apparatus. Discussion. 3800 w. Gas Wld—Aug. 6, 1898.

**Extension.**—Mains and Service: Their Extension and New Territory. George Light. An excellent paper outlining methods of procedure and mode of ascertaining whether a proposed extension will prove profitable to its constructors, with discussion. 3600 w. Am Gas Lgt Jour—April 6, 1896.

**Extinctions.**—Sudden Extinctions of Artificial Light. Norton H. Humphreys. Notes on what may be done in the way of guarding against failures, and the value of a safety bye-pass governor in gas distributing plants. 2300 w. Jour Gas Lgt—Nov. 15, 1898.

**Governors.**—All Sorts and Conditions of Governors. E. H. Millard. Read before the North of England Gas Managers' Assn. Considers governors used in gas manufacture. 3800 w. Jour Gas Lgt—Oct. 10, 1899.

Automatic Gas Governor. An illustrated description of a system of automatically regulating pressures and similar work, introduced by Frederic Maquaire. 900 w. Engng—April 29, 1898.

Automatic Gas-Station Governors. Henry O'Connor. Read before the Soc. of Engs., England. Describes the duty which the gas governor is called upon to perform, with the more recent gas governors in use. 7000 w. Jour Gas Lgt—May 4, 1897.

Automatic Gas-Station Governors. The Discussion of Mr. O'Connor's paper. 4000 w. Jour Gas Lgt—May 11, 1897.

Notes on the Working of a Self-Loading Governor. W. Whatmough. Read before the Manchester (Eng). District Institution of Gas Engs. Gives the results of the practical working of the self-loading governor in use at the Heywood Gas Works. Ill. 4700 w. Jour Gas Lgt—Sept. 12, 1899.

Notes on the Working of a Self-Loading Governor. W. Whatmough. Read before the Manchester Dist. Inst. of Gas Engs. Gives results of the working at the Heywood Gas Works. 2400 w. Gas Eng's Mag—Nov. 10, 1899.

See also **Pressure Regulation.**

**High Pressure.**—An Interesting Account of Changed Pressure Conditions in the Gas Supply of Clinton, Iowa. S. M. Highlands. Describes the raising of the pressure on the entire distributing mains with good results. 900 w. Am Gas Lgt Jour—Jan. 15, 1900.

A Note on Distribution. C. C. Carpenter. Read before the British Inst. of Gas Engs. Gives a description of the method adopted by the South Metropolitan Co. for getting the benefit of high pressure in the initial mains. Discussion. 3000 w. Gas Wld—May 6, 1899.

Distributing Gas at Pressures Higher Than Usually Obtained with a Holder. B. J. Allen. Read at meeting of New England Assn. of Gas Engs. Describes the method used by the Brookline Gas Light Co. Discussion. 4300 w. Am Gas Lgt Jour—Feb. 27, 1899.

High-Pressure System of Distribution. Fletcher W. Stevenson. Read at meeting of Inc. Inst. of Gas Engs. Describes this system as used at Sheffield, Eng. Discussion. 4800 w. Gas Wld—June 18, 1898.

Distributing Gas Under Higher Pressure. F. H. Shelton. Read before the Western Gas Assn., at Milwaukee. Considers whether it would not be of advantage to distribute gas at higher pressures than is common practice. Followed by general discussion. 7000 w. Am Gas Lgt Jour—July 17, 1899.

Pumping Gas Five Miles at Twenty Pounds Pressure. F. H. Shelton. Read before the New England Assn. of Gas Engs. Describes a recently constructed high-pressure system which has worked successfully from the start. General discussion also. 8000 w. Am Gas Lgt Jour—March 5, 1900.

The Distribution of Gas Under Pressure. A statement of a practical test of gas distribution under 20 pounds pressure. 1200 w. Eng Rec—March 10, 1900.

The Reduction of the Cost of Distribution by the Use of High Pressures. Fred. H. Shelton. Paper before the Paris Gas Congress, advocating the use of high pressure and showing its advantages; with illustrations. 5000 w. Gas Wld—Sept. 15, 1900.

See also **GAS MANUFACTURE—Modern Methods.**

**Inspection.**—Suggested Examinations in Gas Distribution. Norton H. Humphrys. Urging the proper inspection of the pipes and accessories for the supply and consumption of gas. 3000 w. Jour Gas Lgt—Oct. 26, 1897.

**Leakage.**—See **GAS PIPE.**

**Losses.**—How to Diminish Distribution Losses. P. H. Gibbons. A paper before the "Congrès International de l'Industrie du Gaz en 1900," at Paris, containing a general discussion of causes of losses and means of prevention. 3000 w. Pro Age—Sept. 15, 1900.

**Pressure Register vs. Gauge.**—The Theory of the Pressure-Register as Compared with the Common Gauge or U-Tube. B. R. Parkinson. Formulae and diagrams. 1500 w. Jour of Gas Lgt—Aug. 25, 1896.

**Pressure Regulation.**—The Automatic Regulation of Pressure in the Distributing Mains. William Reginald Chester. Read before the Incorporated Gas Inst., at Bath, Eng. Describes the apparatus invented by William Cowan and the satisfactory working. Discussion. 6500 w. Gas Wld—June 19, 1897.

See also **Governors.**

**Pumping.**—The Pumping of Gas. George J. Roberts. Read before the Am. Gas Lgt. Assn. Data to aid the engineer in determining the kind and size of pumping plant needed. 1700 w. Am Gas Lgt Jour—Oct. 30, 1899.

**Records.**—Distribution Records; Their Uses and Preservation. J. A. Mayers. Read before the Ohio Gas Lgt. Assn. Describes methods of keeping records. 5700 w. Am Gas Lgt Jour—April 3, 1899.

**GAS ENGINE.**

See also **BLAST FURNACE GAS; GAS MOTOR; GAS POWER; GASOLINE ENGINE; GAS PRODUCER; GAS TRAMWAY; OIL ENGINE.**

A Coming Revolution in Power. F. Jarvis Patten. The writer looks for a "gas age" and prophesies a wonderful revolution due largely to the perfection of the gas engine. 2000 w. New Sci Rev—Jan., 1896.

A Modern Motor. The advantages of gas engines in points of economy, efficiency, cleanliness and safety. 1700 w. Pro Age—Oct. 15, 1896.

An Improvement in Gas Engines (Eine Neuerung an Gaskraftmaschinen). A paper before the Berlin branch of the society by Dr. Petreano, showing the advantages of mixing and preheating the air and gas. 3000 w. Zeitschr d Ver Deutscher Ing—Feb. 6, 1897.

Gas Engines. George N. Crouse. Part first describes the Otto Method. Serial. Yale Sci M—Nov., 1898.

Gas Engines. J. Emerson Dowson. Abstract of a paper read before the Cleveland Inst. of Engs., Middlesborough, Eng. On the progress during recent years, its causes, the use of generator gas and its cost. 2600 w. Ir Trd Rev—April 20, 1899.

Gas Engines. W. F. Kelly. Abridged from a paper read before the Engineers' Club of Columbus, O. Brief consideration of the different types and the more important features, with remarks on cost, economy, durability, etc. 2500 w. San Plumb—Aug. 15, 1897.

Gas Engines. W. F. Kelly. Read before the Engineers' Club, Columbus, O. Brief reference to the earlier types showing the developments to the present successful type, with consideration of the theory upon which the gas engine operates. 4400 w. St Ry Rev—June 15, 1897.

Gas Engines. W. F. Kelly. Read before the Engineers' Club, Columbus, Ohio. Information concerning the efficiency, mechanical features, cost, use, etc. 3500 w. Am Gas Lgt Jour—July 5, 1897.

Gas and Gasoline Engines. M. T. Monogue. Endeavors to explain the care needed, the troubles arising and remedies, in this class of machinery. 1100 w. Sci Mach—March 1, 1897.

Gas and Gasoline Engines. The first of a series of articles aiming to give accurate information as to the use of such engines. Part first deals with heat as shown in the changing of volumes of gases. Serial. Am Mfr & Ir Wld—April 21, 1899.

Gas Engines and the Economy of Gasoline Engines for Small Power. John Wilkes. Read before the Engng. Assn. of the South. Considers the design, construction and operation of these engines, and reviews their history. 3500 w. W Elect'n—July 21, 1900.

Gas Engine Progress. C. V. Kerr. Read before the Nat. Assn. of Gas and Gasoline Engine Mfrs., at Chicago. Briefly traces the historical development from the beginning. 6300 w. Mod Mach—April, 1900.

Gas and Gasoline Motors. From "Revue Industrielle." Illustrated description of the Lair-Delay Gas Motor, exhibited at the Rouen Exposition. 1200 w. Sci Am Sup—April 3, 1897.

Gas and Oil Engines. Thomas L. Wilkinson. A review of the growth of the gas and oil engine industry, with brief history and testimony as to their efficiency and economy. 3300 w. Min Ind & Rev—Dec. 31, 1896.

Gas and Oil Engines. Thomas L. Wilkinson. Read before the Colorado Scientific Soc. in Denver. Part first considers the original Otto gas engine, comparing it with the modern Otto, noting the advancement. Serial. Am Mfr & Ir Wld—April 1, 1898.

Gas and Oil Engines. A discussion of engines of this class, explaining fundamental principles, design and operation. Ill. Serial. Power—Feb., 1900.

Gas and Petroleum Motors (Les Moteurs à Gaz et à Pétrole). G. Richard. A very fully illustrated series of descriptive articles covering the entire field of internal combustion motors as at present constructed in Europe and America. Three articles. 15000 w. Revue de Mécanique—Jan., March, May, 1897.

Gas for Motor Purposes. T. Ormiston Paterson. Read before the Incorporated Gas Inst., England. The author believes that gas has a great future awaiting it in this field. Gives data obtained by experiments with different gases and information bearing upon this subject. Discussion. 10000 w. Gas Wld—June 17, 1899.

Gas Power. J. Barton. Read before the Federated Inst. of Min. Engs., England. Giving some practical results of working engines with generator gas. 2500 w. Pro Age—July 1, 1898.

Gas Power. J. E. Dowson. Read at meeting of the Fed. Inst. of Min. Engs., London. Gives a historical sketch of gas engines, the alterations and improvements, the trials and cost of maintenance. 2300 w. Ir & Coal Trds Rev—May 20, 1898.

Gas Power. J. E. Dowson. Some interesting particulars relating to gas engines, and practical results of working them with generator gas. 2500 w. Gas Engs' Mag—Jan. 10, 1899.

Internal Combustion Engines. C. W. Hart and C. H. Parr. A thesis submitted for the degree of B. S. in mechanical engineering. Reviews briefly the experimental period of gas engines and discusses some of the applications. A few engines are illustrated and described. Covers the most important work which has been done in developing the internal combustion engine. Serial. Wis Eng—Oct., 1896.

Modern Gas Engines. Frederick Grover. The first part is introductory and historical. Serial. Prac Eng—Nov. 15, 1895.

Recent Developments in Gas Engines. Dugald Clerk. Read before the Inst. of Civ. Engs. A review of advances made in the construction and efficiency of gas engines. Part first considers mainly the engines working in accordance with the Otto Cycle, with results of tests. Ill. Serial. Eng News—April 1, 1897.

Some Notes on the Modern Commercial Gas Engine. W. Carmichael Peebles. Read before the North British Assn. of Gas Managers. Gives briefly the history of the Otto cycle gas-engine, and the changes which have taken place since first brought out, recent improvements and the benefits from the invention. Also discussion. Ill. 5000 w. Jour of Gas Lgt—Sept., 1898.

Some Notes on the Modern Commercial Gas Engine. Carmichael Peebles. Read at meeting of the North River Assn. of Gas Managers. Gives briefly the history of the Otto cycle gas engine, the changes since first brought out, improvements in details, etc. 4500 w. Gas Wld—July 30, 1898.

Some Notes on the Modern Commercial Gas Engine. W. C. Peebles. A paper read before the North British Association of Gas Managers, sketching the history of the gas engine, the development of its important features, and making a particular argument for the engine made by the writer. 6500 w. Am Gas Lgt Jour—Sept. 12, 1898.

Some Recent Developments in the Gas Engine Field. Edwin Ruud. Abstract of a paper read before the Technische Verein, Pittsburg. A talk on the advantages and disadvantages of two classes most largely used, the gas consumption, water consumption, and the future outlook. Ill. 2300 w. Elec Eng, N. Y.—March 2, 1899.

Some Recent Developments in the Internal Combustion Engines. John A. Secor. Discusses progress in the use of gas and oil engines. Also general discussion. 11800 w. N. Y. R R Club—Sept. 20, 1900.

The Evolution and Future of the Gas Engine. Georg Lieckfeld. A review of the historical development of the internal combustion motor, showing the lines along which its future successful development may be expected. 3500 w. Eng Mag—July, 1899.

The Gas Engine and Its Mission. Sidney A. Reeve. Part first gives a brief historical review and discusses the general arrangement and methods of governing and of ignition, types of valves and color of paint. Serial. R R Gas—Jan. 7, 1898.

The Limits and the Possibilities of the Gas Engine. Sidney A. Reeve. A critique on Mr. George Richmond's article on the same subject published in the "Engineering Magazine" for Feb. Mr. Reeve, while conceding the value and interest of Mr. Richmond's paper, yet joins issue with him in several points. 3700 w. Pro Age—March 16, 1896.

The Modern Explosion Engine. E. S. Savage. Discusses the requisites of the explosion engine and its advantages, admitting the imperfections, but predicting a bright future. 2500 w. Eng's Year Book, Univ of Minn—1897.

The Problem of the Gas Engine. Herbert L. Towle. Considers the present problem is to abolish the elements of uncertainty, and to this end, the paper analyzes the factors on which ignition and combustion depend, and the methods thus far employed to control them. 3500 w. Am Mach—Dec. 1, 1898.

The Use, Care and Repair of Internal Combustion Motors. James W. Tygard. Calls attention to the fundamental differences between gas and steam engines, the ignition, starting, etc. 2500 w. Horseless Age, April 12, 1899.

**Acetylene.**—See **ACETYLENE MOTORS.**

**Alternators in Parallel.**—See **ALTERNATOR-Parallel.**

**American Practice.**—The Gas Engine in American Practice. George Richmond. Showing how the original devices imported from Europe have been modified by American builders and reviewing the present condition of gas engine practice in the United States. 4000 w. Eng Mag—April, 1898.

**Basel, Switzerland**—See **Test.**

**Benier.**—See **GAS PRODUCER.**

**Berlin Exhibition, 1896.**—See **Geneva and Berlin Exhibition.**

**Blast Furnace Gases.**—The Use of Blast Furnace Gases in Gas Engines at Works in Silesia (Verwendung der Hochofengase zum Betriebe von Gasmaschinen auf der Donnersmarckhütte und Friedenshütte). Papers read before the "Eisenhütte Oberschlesien," giving the results of practical operation. 3000 w. Stahl und Eisen—April 15, 1900.

See also **Oechelhauser; Seraing Test; BLAST FURNACE GAS.**

**Brussels Exposition.**—Gas and Petroleum Engines at the Brussels Exhibition. Some interesting information with illustrated description of engines contributed by British makers. Serial. Engng—Nov. 19, 1897.

**Budapest Exposition.**—Explosion Engines at the Budapest Exhibition (Die Explosionsmaschinen auf der Millenniums-Landesausstellung in Budapest 1896). Illustrating a great variety or recent gas and petroleum motors. 5000 w. Zeitschr d Vereines Deutscher Ing—March 27, 1897.

**Care.**—Care of Gas Engines. Extracts from a work by Mr. Hiscox, giving practical suggestions. 1100 w. Bos Jour of Com—May 1, 1897.

**Care and Management.**—Some Suggestions as to the Care and Management of Gas Engines. E. C. Hathaway. General suggestions for their operation and care. 1600 w. Am Gas Lgt Jour—May 8, 1899.

**Chicago Lake Crib.**—Gas Engine Plant in Lake Michigan. Brief illustrated description of the new intake crib located six miles from Chicago, its construction, and the electric-lighting equipment. 1200 w. Mod Mach—Feb., 1900.

**Classification.**—The Cycles of Gas and Oil Engines. James D. Roots. This first of a series of articles contains a table of classification, into ten types, explanation of reasons for so classifying. Serial. Engr, Lond—Sept. 3, 1897.

**Cockerill.**—See **Seraing Tests; Test, Cockerill and Westinghouse.**

**Compression.**—Investigations of Gas Engines, with Especial Reference to the Influence of the Compression (Untersuchungen am Gasmotor, insbesondere über den Einfluss der Kompression). E. Meyer. A mathematical discussion of data obtained from numerous tests, with numerous diagrams, made at the Technical High School at Hanover. Three articles, 10000 w. Zeitschr d Ver Deutscher Ing—March 18, 25, April 1, 1899.

**Cooling Water Uses.**—A Few Uses for Cylinder Cooling-Water of Gas Engines. O. F. Allen, in "The Gas Engine." Mentions a few means for saving the heat of cylinder-cooling water. 1500 w. Mech Wld—Aug. 4, 1899.

**"Cosmos" Vertical.**—The "Cosmos" Gas Engine. (Moteur à Gaz, "Cosmos"). Illustrated description of a very neat and simple vertical gas engine recently brought out in Paris. 1000 w. La Rev Tech—Feb. 10, 1897.

**Crane.**—See **CRANE—Gas Engine.**

**Cylinder Temperature.**—The Measurement of Cyclically Varying Temperature. Henry F. W. Burstall. This paper embodies results of attempts at measuring temperatures reached in the cylinder of a gas engine in progress since 1892. A very important paper with numerous diagrams and tables. 4500 w. Pro Age—March 16, 1896.

**Design.**—Gas Engine Design. E. W. Roberts. An explanation of the general principles. Ill. Serial. Mach, N. Y.—Nov., 1899.

Gas Engine Design. E. J. Stoddard. Discusses the explosive mixture and ignition. Ill. 2200 w. Mod Mach—Oct., 1900.

**Developments.**—Recent Developments in Gas Engines. Abstract of paper by Mr. Dugald Clerk, read before the Inst. of Civ. Engs., England. The writer reviews the great advances that have been made in gas engine construction, and concludes that it will yet be applied to railways and ships, just as it is now used in factories. Ill. 1800 w. Elec Rev, Lond—Feb. 7, 1896.

**Donaldson Compound.**—The Donaldson Compound Gas Engine. Illustrated description. 500 w. Elec Rev, Lond—Sept. 3, 1897.

**Economical Motors.**—Gas Engines as Economical Motors. J. Holliday. Principally a comparison of different systems, with four tables of data, and discussion. 6800 w. Gas Wld—June 13, 1896.

Gas Engines as Economical Motors. J. Holliday. The first part contains general remarks; discusses the advantages of subdivisions; comparison of systems, etc. Serial. Prac Eng—July 17, 1896.

**Economy.**—Gas Engine Economy. E. W. Roberts, in "The Gas Engine." Calling attention to needed improvements and means of securing the maximum economy. 1800 w. Min & Sci Pr—Oct. 5, 1900.

**Efficiency.**—The Determination of the Efficiency of Port Valves of 4-Cycle Internal Heat Engines. Hugh D. Meier. A general discussion, and record of experimental tests, with indicator cards. 3000 w. Horseless Age—Sept. 19, 1900.

The Efficiency of Steam and Gas Engines. Ed. C. de Segundo. Traces the development of the gas engine, and the limits of its economical use in the past, and refers to recent improvements which have greatly enlarged its usefulness. 2300 w. Jour Gas Lgt—April 3, 1900.

The Efficiency of the Gas Engine. Ed. C. de

Segundo. A comparison of the efficiency of the gas engine and steam engine, and an explanation of what is meant by "efficiency" as here used. 1200 w. Elec Rev, Lond—June 15, 1900.

**Electrical Control.**—Electrically Controlled Gas Motor. Illustrated description of an electrically controlled gas engine or motor, devised primarily for use in automatic railroad signals, but adapted to any purpose requiring a periodical motor. 1600 w. Ir Tr Rev—Dec. 10, 1896.

**Electric Generation.**—A Direct-Coupled Gas Engine and Dynamo. Illustrated description. 450 w. Eng Rec—Aug. 22, 1896.

Motive Power for Generating Electricity. Review of E. Tremlett Carter's "Treatise on the Theory of the Mechanical Equipment of Power Stations," quoting also from N. W. Perry's paper favoring the use of gas engines for generating electricity. 2000 w. Jour of Gas Lgt—Jan. 5, 1897.

The Gas Engine and Its Electric Applications. Charles Macdonald. Read before the Chicago Electrical Assn. A brief review of the history and development of the gas engine of the past and present. 4500 w. Elec—April 8, 1896.

The Use of Gas Engines for Dynamo Driving. John C. Kelley. Considers the cost of gas, the main reason why these engines are not more largely used. Discusses the cost as compared with England, and other causes affecting the sales. 1000 w. Elec Wld—Dec. 31, 1898.

See also **Electric Lighting; Electric Power Station; Electric Station.**

**Electric Ignition.**—Electrical Ignition of Gas Engines. H. J. Poddlesak. Discusses the methods of igniting the charges in a gas engine, especially favoring the inductor type of magneto-generators as a source of electric current for gas and vapor engine ignition. 4000 w. Mod Mach—Sept., 1900.

Care of Electric Igniters. P. I. Panamolo. Illustrates the usual form of connection employed, and the points needing examination and attention are discussed, and directions given. 1300 w. W Elect'n—April 14, 1900.

Electrical Ignition for Gas and Gasoline Engines. P. P. Nungesser. An explanation of the most successful igniting devices in use at the present time, and the important details requiring attention. 2000 w. Elec Wld & Engr—April 7, 1900.

**Electric Lighting.**—Cheap Electric-Light from Gas. Alton D. Adams. Some facts regarding the gas-engine and dynamo plant. 1600 w. Am. Arch—Jan. 20, 1900.

The Determination of the Cost of Electric Lighting by Gas Engine. J. L. Christy and S. A. Hasbrouck. Abstract of thesis submitted before the Stevens Inst. of Technology. Describes engine and gives tables of tests containing data taken at the engine; the averages for each test, and a table of comparison of costs at different loads. 1000 w. Am Gas Lgt Jour—Jan. 25, 1897.

Electric Lighting by Gas Engines. F. W. Richart. Discusses the problem of choosing an engine, the methods of governing, efficiency, faults and general operation. 2800 w. Technograph. No. XI.

Gas Engines for Isolated Electric Plants. Illustrated description of experiments with a 10 horse-power gas engine for isolated lighting at Racine, Wis. 700 w. Pro Age—Oct. 15, 1896.

**Electric Motors Compared.**—Gas Power and Electricity. (Gaskraft und Elektrizität). A discussion of the relative merits of gas and electric motors; also of the economy of gas engines for the driving of electric generators. 4000 w. Zeitschr d Ver Deutscher Ing—May 28, 1898.

**Electric Plant.**—See also **ELECTRIC LIGHTING—Chambor of Deputies, Paris; ELECTRIC PLANT—Church, Knoxville, Tenn.**

**Electric Power Station.**—A Producer-Gas-Engine Electrical Plant. Albion T. Snell. Description of the power station, gas engine, dynamo, motors, method of distribution and working of the electrical plant of Messrs. R. Maclaren's iron foundry in Glasgow. 1700 w. Elect'n—May 22, 1896.

Gas Engines for Tramway Power Stations. Explains the fundamental principles of the gas engine, and gives facts and information concerning their application to the working of tramways and light railways. Ill. 4800 w. Tram & Ry Wld—July 5, 1900.

Test of an Electric Railway Power Plant Driven by Gas Engines. E. Hill, Jr., and J. C. Brocksmith. Test made for a graduating thesis of a novel plant at Huntington, Long Island. 1600 w. Sib Jour of Engng—May, 1899.

The Gas Power Station of the Lausanne Electric Tramways (Station Génératrice à Gaz Pauvre des Tramways Electriques de Lausanne). P. Leprince-Ringuet. Description and illustration of 400 horse-power plant in 3 units, using producer gas, and driving the electric generators for the Lausanne electric tramways. 1200 w. 1 plate. Génie Civil—Aug. 20, 1898.

The Use of Gas Engines in Connection with Electric Power plants. Philip Dawson. The first of a series of articles discussing the conditions which will, by the adoption of gas engines, enable a great economy to be effected in the production of electrical energy. Serial. Engng—Aug. 10, 1900.

See also **Electric Generation; Electric Station.**

**Electric Railway Station.**—See also **Electric Power Station; ELECTRIC TRAMWAY—Zürich.**

**Electric Station.**—A Central Station Electric Plant Operated by a Gas Engine. J. C. Small. Read before the Western Gas Assn. Experience of the writer, with suggestions. Also discussion and letters on this subject. 4800 w. Pro Age—June 15, 1900.

A Gas Engine Central Station. J. J. Flather. Describes and illustrates an interesting installation at Lafayette, Ind., involving the most modern practice in gas engine construction and operation, and showing the economy obtainable under favorable conditions. 2400 w. Am Elect'n—June, 1898.

Failures of Gas Engines at Electric Lighting Stations. Gives records of failures, considering them more instructive than records of success. Three of the failures were recently recorded in the "London Electrician," namely at Belfast, Morecambe, and at Coatbridge. 1200 w. Eng News—Aug. 26, 1897.

Gas Engines and Electricity Supply Stations. Alton D. Adams. A careful presentation of the advantages possessed by gas as a means of transmission of energy, in connection with gas engines at the electric generating stations. 3000 w. Engineering Magazine—April, 1900.

Gas Engines in Central Electrical Stations. R. Knocke. Extracts from arguments as presented in "Polytechnic Journal of Dingler" favoring block stations with gas engines. 3000 w. Pro Age—Oct. 15, 1896.

Gas Engine Driving for Electric Plants (Elektrizitätswerke mit Gasmaschinenbetrieb). M. Krone. A critical comparison of the cost of operating generating stations by gas engines using producer gas, with steam engines and boilers, showing the economy of the former method. A description of the Clausthal plant is given. 6000 w. Zeitschr d Ver Deutscher Ing—Jan. 13, 1900.

Gas-Producing Plant and Gas-Engines for Electricity Works. Report by Prof. Henry Robinson on the Leyton Urban District Council's electricity station, giving information of interest to those who are concerned in deciding as to the relative merits of steam and gas plants. 2500 w. Elec Eng, Lond—Dec. 10, 1897.

Some Existing Gas-Driven Power Plants. Philip Dawson. A well illustrated article on the application of gas engines to drive electric power plants. Serial. Engng—Sept. 7, 1900.

The Future of Electrical Supply. Alton D. Adams. A discussion of the advantages of the gas engine as a motive power for electrical generating stations, and of the economy of gas as a means of transmitting power. 3000 w. Engineering Magazine—March, 1900.

The Leicester Gas-Power Electric-Lighting Station of the Midland Railway. Particulars as to the equipment and working of this station, which is one of the most successful in England. Ill. 1100 w. Elect'n, Lond—Dec. 17, 1897.

See also **Electric Generation; Electric Lighting; Electric Power Station; Electric Supply; ACCUMULATOR—Electric Station; ELECTRIC STATION—Kings Lynn, Eng.; Leyton.**

**Electric Station, Belfast.**—Gas Engines in the Belfast Electric Lighting Plant. Abstract from paper of Victor A. H. McCowen read before the Inst. of Mech. Engs. Illustrated description. 1800 w. Pro Age—Oct. 15, 1896.

**Electric Supply.**—Electrical Supply by Gas Companies. Alton D. Adams. Discussing the advantages due to the development of the gas engine. 1600 w. Sci Am—June 16, 1900.

**Engineering Works.**—Gas Engines as Motive Power in Engineering Works. A. R. Bellamy. Abstract of paper read at meeting of the Manchester Assn. of Engs. A discussion of the cost and some information concerning the methods adopted. Discussion. 3300 w. Jour Gas Lgt—March 14, 1899.

**Erie Shop, Jersey City.**—See **GAS PRODUCER.**

**Fairbanks-Morse.**—The Fairbanks-Morse Gas and Gasoline Engines. Presents some of the essential features of the engine made by this company. Ill. 1200 w. R R Gaz—Aug. 20, 1897.

**Flour Mill, Paris.**—Gas Engines in French Flour Mills. Describes in detail an engine which received a Grand Prix at the International Exhibition at Rouen, in 1896, and has recently been erected to supply 530 horse power in a flour mill in Paris. Ill. 1200 w. Engng—Aug. 13, 1897.

**French Chamber of Deputies.**—See **ELECTRIC LIGHTING—Chamber of Deputies, Paris.**

**Future.**—Cheap Fuel Gas in Boston and the Future of the Gas Engine. An editorial review of the industrial changes caused by the distribution of cheap fuel gas. 900 w. Eng Rec—Nov. 12, 1898.

Future of the Gas Engine. M. A. Hickman. On the expansion that may be looked for in connection with recent developments, especially in the large units. 1000 w. Mod Mach—Dec., 1899.

Oil and Gas Engines. James D. Roots. States the lines on which he considers future improvements will be made, and gives an account of experiments and conclusions drawn. 8800 w. Engng Mech—Sept., 1898.

**Garbage Fuel.**—A New Industrial Situation. Gives the views of Mr. George Westinghouse and of Prof. R. H. Thurston in regard to gas engines and improvements for utilizing gas. Ill. 2500 w. Power—April, 1900.

The Utilization of Garbage for Fuel. From "The N. Y. Times." Letters on this subject by George Westinghouse, R. H. Thurston and Cary T. Hutchinson. 2200 w. Eng Rec—Jan. 20, 1900.

See also **REFUSE DISPOSAL.**

**Gardie—Lorois.**—The Bates Thermic Engine Co. Illustrated description of a gas engine invented by M. Gardie, of Nantes, and improved by Maurice Lorois, now being exploited by the company named. Also editorial remarks and criticisms. 4000 w. Eng News—Oct. 22, 1896.

**Geneva Exposition, 1896.**—The Gas and Petroleum Motors at the Geneva Exposition, 1896 (Die Gas und Petroleummotoren auf der Schweizerischen Landesausstellung in Genf, 1896). Three articles containing many illustrations of the latest Continental practice and construction. 6000 w. Schweizerische Bauzeitung—Aug. 14, 21, 28, 1897.

**Geneva and Berlin Exhibitions, 1896.**—Gas and Petroleum Motors at the Geneva and Berlin Exhibitions of 1896 (Die Gas und die Petroleummotoren auf der Schweizerischen Landesausstellung in Genf, 1896 und auf der Berliner Gewerbeausstellung, 1896). With description of improvements in igniting, governing and efficiency. 8000 w. Zeitschr d Vereines Deutsch Ing—Jan. 2, 1897.

**Governing.**—Gas Engine Governing and Economy. W. H. Booth. Considers the methods of governing gas engines and the advantages of each. 900 W. Am Mach—Jan. 4, 1900.

**Guarantees.**—Gas Engine Guarantees Technically Considered. William T. Magruder. Abstract of a paper read before the National Assn. of Gas and Gasoline Engine Mfrs. Considers power ratings, regulation, cost of running and fuel consumption. 2800 w. Am Mach—Feb. 8, 1900.

Gas Engine Guarantees. William T. Magruder, Abstract of paper read at meeting of the Nat. Assn. of Gas and Gasoline Eng. Mfrs. Considers such guarantees as power ratings, regulation, cost of running and fuel consumption. 3500 w. Mod Mach—Dec.. 1899.

**Heat Utilization.**—Some Possibilities of Power Generation by Gas Engines and the Utilization of Rejected Heat. Reid T. Stewart. Abstract of paper Read before the Eng's Soc of W. Penna., with editorial comment. The writer shows that 75 per cent. of the total heat is discarded and suggests ways of utilizing this heat. 4500 w. Am Eng & R R Jour—May, 1897.

Utilizing the Waste Heat from the Gas Engine. Alton D. Adams. An analysis of the heat-losses and a practical suggestion of means for recovering them, with exact data of the building space to be heated per horse-power of engine. 2700 w. The Engineering Magazine—July, 1900.

**Hoisting.**—Gas vs. Steam Engines for Hoisting. General review, with numerous examples. Ill. 1800 w. Pro Age—Oct. 15, 1896.

**Ignition.**—Premature Ignition in Gas Engines. E. W. Roberts. Discusses the effects of ignition in advance of the proper time, the location of the ignition points, with illustrations of faults in engine design. 1500 w. Mod Mach—July, 1900.

The Gas-Engine Hot-Tube as an Ignition Timing Device. William T. Magruder. A record of data and results of a series of gas engine tests at the Ohio State Univ. 4000 w. Trans Am Soc of Mech Engs, No. 859—May, 1900.

See also **Electric Ignition.**

**Illuminating Gas.**—Experiments on the Combustion of Lighting Gas in Gas Engines. Describes the experiments made and gives results. 2200 w. Prac Eng—April 16, 1897.

**Kelly-Kelch.**—The Kelly-Kelch Gas Engine. Illustrated description of what is claimed to be something new in this line. 700 w. Am. Mfr & Ir Wld—Oct. 7, 1898.

**Kilmarnock.**—The American Kilmarnock Gas Engine. Illustrated detailed description. 1800 w. R R Gaz—May 20, 1898.

**Körting.**—The Körting Exhibit at the Paris Exposition of 1900 (Die Elektricität auf der Pariser Weltausstellung, Ausstellung der Firma Gebrüder Körting, Körtingsdorf bei Hannover). An illustrated general description of Körting gas engines directly connected to dynamos, on exhibition at Paris. 900 w. Elektrotech Zeitschr—July 26, 1900.

See also **Operating Cost; Paris Exposition; DYNAMO—Paris Exposition.**

**Large.**—A Practical Illustration of the Working of a Large Gas Engine. Ernest F. Lloyd. Gives curve of average working taken from engine at Lancaster, Ohio, with comments. 900 w. Am Gas Lgt Jour—May 17, 1897.

Discussion: "The Large Gas Engine; Its Present Development and Forecast of Its Future." Discussion of Mr. Lloyd's paper at the annual meeting of the Ohio Gas Lgt. Assn. 3000 w. Am Gas Lgt Jour—Feb. 22, 1897.

Large Gas Engines (Grosse Gasmaschinen). E. Meyer. A discussion of the development of the large gas engine, with especial reference to the use of producer and furnace gases, with illustrations of recent designs. 6000 w. 1 plate. Zeitschr d Ver Deutscher Ing—March 10, 1900.

Some Notes on Larger Types of Gas Engines. J. B. Crockett. Read before the Pacific Coast Gas Assn. Gives a brief history of the best known engines previous to 1892, and describes the latest improvements. Ill. General discussion. 6500 w. Am Gas Lgt Jour—Aug. 6, 1900.

The Economy and Efficiency of the Large Gas Engine. Dugald Clerk. Discussing the leading problems now awaiting solution before larger engines can be commercially successful; also, reference to improvements desired in producers for power gas. 2500 w. Engineering Magazine—February, 1898.

The Economy and Efficiency of the Large Gas Engine. Dugald Clerk. A review of the latest practice by a pioneer in this field with many illustrations of large engines. The prediction is made that gas engines as powerful as any steam engines will be built. 4000 w. Engineering Magazine—Jan., 1898.

The Large Gas-Engine. Its Present Development and Forecast of Its Future for Electrical Purposes. E. F. Lloyd. Brief review of the single-acting and double-acting engines and the advantages and improvements in detail and construction. 4000 w. Am Gas Lgt Jour—Feb. 15, 1897.

See also **Oechelhauser; Seraing Test; Westinghouse; BLAST FURNACE GAS.**

**Lean Gas.**—The Use of Motors with Lean Gas (Emploi des Moteurs à Gaz Pauvre). Charles Thonet. An examination of the advantages of producer and water gas for motive power, especially in electric power and lighting stations. 4000 w. Rev. Univ des Mines—Sept., 1900.

**Letombe Double-Acting.**—Double-Acting Gas Engine. (Moteur à Gaz à Double Effet). An illustrated description of the Letombe gas engine in which the regulation is effected by a variable compression controlled by the governor. Indicator diagrams, and a plate of working details are given. 2000 w. 1 plate. Génie Civil—April 1, 1899.

**Limits and Possibilities.**—Limits and Possibilities of the Gas Engine. George Richmond. A consideration of the means suggested for increasing the efficiency of the gas engine. 5000 w. Eng Mag—Feb., 1896.

**Machine Shop.**—A Gas Engine Drive in a Machine Shop. A. R. Bellamy. Extract from a paper read before the Manchester, (Eng.) Assn. of Engs. An account of the installation and cost of operation of a plant. 2300 w. Am Mach—April 13, 1899.

**Marine.**—See **GASOLINE ENGINE—Boat.**

**Mines.**—Gas and Gasoline Engines. E. W. Roberts. Their adaptability to mining work and their merits compared with other motors are discussed, with a description of the uses to which they may be applied and the conditions under which they insure efficiency, economy and convenience in mines. Ill. 4000 w. Mines & Min—Dec., 1897.

**New Era.**—The New Era Gas Engine. B. A. Illustrates and describes this engine. 800 w. Am Mach—May 18, 1899.

**Nijni-Novgorod Exposition, 1896.**—The Peteroleum, Gas and Naphtha Motors at the Nijni-Novgorod Exposition, 1896. (Die Petroleum,—Gas,—und Naphthamotoren der Ausstellung in Nischniji-Nowgorod, 1896). A variety of explosion motors were shown, including several portable petroleum motors for agricultural use. 4000 w. Zeitschr d Ver Deutscher Ing—Nov. 20, 1897.

**Oechelhauser.**—A 600 Horse-Power Two-Stroke Cycle Gas Engine Using Blast-Furnace Gas. A well illustrated description from the "Zeitschrift des Vereines Deutscher Ingenieure of a gas engine using blast furnace gas. 1 plate. 1500 w. Eng News—Sept. 27, 1900.

**Olin.**—The Olin Gas and Gasoline Engine. Illustrated description of an engine of the single-acting four-cycle type. 1000 w. Eng News—April 15, 1897.

**Operating Cost.**—The Operating Cost of Gas Power Plants (Die Betriebskosten von Gasmotorenanlagen). J. Körting. A discussion of the operative cost of gas engines as compared with steam, including all fixed charges, and considering various kinds of gas. 3500 w. Zeitschr d Ver Deutscher Ing—June 18, 1898.

**Otto.**—Latest Type of Otto Gas Engine. Brief illustrated description of this engine with the latest improvements, adapting it especially to larger sizes. 500 w. Am Mfr & Ir Wld—Aug. 31, 1899.

Otto Gas Engines (Sur les Moteurs à Gaz à Explosion). L. Marchis. Theoretical discussion, with diagram, of the thermodynamics of the gas engines of the Otto type. 500 w. Comptes Rendus—March 12, 1900.

**Otto-Crossley.**—Tests of an 100 Horse-Power Otto-Crossley Gas Engine. Abstract of the graduating thesis of E. H. Brown, of the Worcester Polytechnic Inst. Description of the plant and tests with conclusions. 1700 w. R R Gaz—Aug. 26, 1898.

**Paris Exposition.**—Explosion Motors at the Paris Exposition (Die Weltausstellung in Paris, 1900; Explosionsmotoren). Fr. Freytag. With numerous illustrations and descriptions of exhibited motors. Serial. Zeitschr d Ver Deutschr Ing—Aug. 18, 1900.

Gas and Oil Engines at the Paris Exhibition. Remarks on the leading types and a detailed description of the chief exhibits. Serial. Engr, Lond—Oct. 12, 1900.

The Gas Engine of the Paris Exposition. Illustrated detailed descriptions of types exhibited. 4000 w. Power—Oct., 1900.

See also **Körting; DYNAMO—Paris Exposition.**

**Perkins.**—A Simple Gas Engine. Illustrates and describes an arangement designed by Harry J. Perkins. 600 w. Am Mach—May 4, 1899.

**Planteau Balanced.**—Planteau Balanced Vertical Gas Engine (Moteur vertical Equilibré Système Planteau). Short illustrated description of a balanced vertical, one-cylinder gas engine, specially adapted for automobile vehicles. Balance is obtained by the use of a piston in each end of the cylinder, their movements being always equal and opposite. 500 w. La Rev Tech—Dec. 10, 1898.

**Power Generation.**—Power Generation by Steam Engine, Water Turbine and Gas Engine. Extract from paper by John B. C. Kershaw, read before the British Assn. The portion relating to gas engines, and the conclusions of the writer. 1800 w. Jour Gas Lgt—Sept. 25, 1900.

**Power Plants.**—Large Gas Engines in Modern Power Plants (Grosse Gasmotoren in Modernen Kraftbetrieben). Max Münzel. A paper before the Cologne branch of the Verein Deutscher Ingenieure, giving a well illustrated description of some large gas engine power plants. 4200 w. Zeitschr d Ver Deutscher Ing—March 31, 1900.

The Increasing Use of Large Gas Engines in Modern Power Plants (Ueber die Zunehmende Anwendung von Grossen Gasmotoren in Modernen Kraftbetrieben). H. Münzel. An address delivered before the Cologne branch of the Verein Deutscher Ingenieure, giving a well illustrated account of the use of gas engines in many large plants. Two articles. 6000 w. 1 plate. Stahl und Eisen—March 15, April 1, 1900.

**Practical Use.**—The Gas Engine in Practical Use. J. D. Lyon. Reviews the development of the gas engine and its increasing use as a factor in the production of power. Ill. 3800 w. Pro Engs' Soc of W. Penna—April, 1900.

**Pumping.**—See **Waterworks; PUMPING ENGINE—Gas, Gasoline and Oil.**

**Railway Shops.**—See also **GAS PRODUCER—Erie Shops, Jersey City.**

**Railway Water Station.**—See **RAILWAY WATER STATION—Gas Pumping Engine.**

**Research.**—Gas Engine Research. Report of Frederic W. Burstall to the Gas Engine Research Committee of the Inst. of Mech. Engs., England. Experiments to determine the effect produced on the economy of gas engines by altering one or more of the conditions governing their working. Also discussion. 5200 w. Jour Gas Lgt—Feb. 22, 1898.

**Requirements.**—Gas Engine Requirements. Sidney A. Reeve. An indictment of the shortcomings of gas engine builders. 2400 w. Elec—May 12, 1897.

**Royan.**—Gas Engines in the Casino of Royan. Illustrated description. 1400 w. Pro Age—Oct. 15, 1896.

**Safety.**—Safety in Gas Engine Installation. J. D. Lyon. Discusses points in the installation of gas engines to secure safety. 1600 w. Ir Trd Rev—Aug. 2, 1900.

**Seraing Tests.**—Blast-Furnace Gas Engine. Report of tests, conducted under direction of Prof. H. Hubert, of Liege Univ., with the Delamare-Deboutteville and Cockerill 600 horse-power gas engine, consuming blast-furnace gas. 2200 w. Mod Mach—Aug., 1900.

Communication on the Test of the First Blast-Furnace Gas Blowing-Engine. (Mittheilungen über die Versuche mit der Ersten Hochofengas-Gebläsemaschine). Preliminary account of a successful test of the large Delamare-Cockerill blowing-engine at Seraing, Belgium. 500 w. Stahl und Eisen—April 15, 1900.

Experiments on the Direct Use of Blast-Furnace Gases in Motors (Expériences sur l'Emploi Direct des Gaz des Hauts-Fourneaux dans les Machines Motrices). Aimé Witz. A detailed account of the tests made at Cockerill's works at Seraing, Belgium. 2500 w. Revue Universelle des Mines—Aug., 1898.

On a Blowing Engine Worked by Blast-Furnace Gas. Adolphe Greiner. Read before the Iron and Steel Inst. Abstract of the results obtained at the Cockerill Works with the first blowing engine worked by blast-furnace gas ever employed in any iron works. . 1200 w. Engng—May 11, 1900.

Testing a 600 Horse Power Blast-Furnace Gas Engine. An account of the results of tests made with the Delamare-Deboutteville and Cockerill engine. Ill. 1500 w. Col Guard—June 22, 1900.

Test of Blowing Engine Using Blast-Furnace Gas (Essai d'une Machine Soufflante à Gaz de Haut Fourneau). Abstract of a report of H. Huber, Chief engineer, of a test of a 600 horsepower at Cockerill gas engine using blast-furnace gases, at Seraing; with tables. 6000 w. Revue Tech—July 10, 1900.

Test of a 600 Horse Power Blast-Furnace Gas Engine (Versuche an der 600 Pferdigen Gichtgasmaschine mit Gebläse, System Delamare-Deboutville und Cockerill in Seraing). E. Meyer. An illustrated account of the tests made on this large blowing engine, using blast furnace gases. 4500 w. Stahl und Eisen—July 15, 1900.

See also **Test, Cockerill and Westinghouse; BLAST-FURNACE GAS.**

**Silesia.**—See **Blast Furnace Gases.**

**Simplex.**—Experiments with a Simplex Motor Using Blast-Furnace Gas. Account of an extended trial of a high-power single-cylinder engine, describing the manner and conditions of the test and giving many data. 2000 w. Gas Wld—Sept. 10, 1898.

**Sintz.**—See **GASOLINE ENGINE.**

**Steam Engines Compared.**—Large Gas Engines. Gives advantages as compared with steam engines, showing that in England they are worked with economy. 1200 w. Bos Jour of Com—Aug. 7, 1897.

**Street Car.**—See **GAS TRAMWAY.**

**Test.**—An Efficiency Test of a 125 Horse-Power Gas Engine. C. H. Robertson. Illustrated description of the plant of the Merchants' Electric Lighting Co., of Lafayette, Ind., with data concerning the performance of the engines. 5000 w. Trans Am Soc of Mech Engs, No. 835—Dec., 1899.

See also **Seraing Test.**

**Test, Basel, Switzerland.**—Experiments on a 160 Horse-Power Gas Engine, Driven with Producer Gas at the Bale Water Works, Switzerland, 1896. Summarized translation, by Bryan Donkin. The trials are of value in proof that a gas engine will work well and economically on producer gas from gas-works coke. Original in Zeitschr. des Ver. Deutsch. Ing. 2500 w. Jour Gas Lgt—Jan. 5, 1897.

**Test, Cockerill and Westinghouse.**—Test of Large Cockerill and Westinghouse Gas Engines. R. A. Millar and C. S. Gladden. An account of tests of two engines of exceptionally large power, with principal results. 2000 w. Sib Jour of Engng—June, 1900.

See also **Seraing Tests; Test, Westinghouse.**

**Test, Danbury, Conn.**—Test of Gas Engine Plant. Charles E. Barry. A description of the plant of the Danbury & Bethel Car and Electric Co. of Danbury, Conn., with account of test. 3000 w. Sib Jour of Engng—May, 1896.

**Testing Plant.**—Hydrocarbon Engine Testing. Plant of the Ohio State University. William T. Magruder. Presented at the Columbus meeting of the Soc. for the Pro. of Engng. Education. Describes a plant for the testing of gas, gasoline and oil engines as student exercises and research work. 1200 w. Mod Mach—Sept., 1899.

**Test, Otto.**—Test of Otto Gas Engine at Different Loads. A review of experiments on a 10 horse-power engine. 800 w. Eng Rec—July 21, 1900.

**Test, Westinghouse.**—Test of a 500 Horse-Power Gas Engine. Describes 5-hour tests, giving high results. 400 w. Eng Rec—July 7, 1900.

**Theory.**—On a Debated Point in the Theory of the Gas Engine. James D. Roots. Considers why the temperature actually produced only equals about 50 per cent. of what should be produced, calculated from the heat units supplied, suggesting a solution of this and other points. 2100 w. Engr, Lond—April 29, 1898.

The Theory of Gas Engines. (Esai sur la Theorie des Moteurs à Gas). Jules Deschamps. An elaborate mathematical study, based upon the theory of Clausius. Serial. Revue de Mecanique—July, 1900.

**Thermodynamics.**—The Thermal Cycle of the Gas Engine (Die Kreisprozesse der Gasmaschine). A. Stodola. A very full thermodynamic study of the action of the gas engine, including the Diesel motor, showing the practical application of the entropy diagram. An important paper. Two articles. 10000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Sept. 17, 24, 1898.

**Three-Cylinder Vertical.**—A Type of Three-Cylinder Vertical Gas Engine. Views illustrating the general construction of the 650-K.-W. gas engine which has been operated for some time at the works of the Westinghouse Elec. & Mfg. Co., Pittsburg, Pa., with description. 1000 w. Eng News—Sept. 21, 1899.

**Thwaite-Gardner.**—See **BLAST FURNACE GAS; GAS PRODUCER.**

**Two-Cycle.**—A New Two-Cycle Gas and Kerosene Engine. Illustrated description of two recent designs, known as Mietz and Weiss gas and oil engines, which bid fair to rival the four-cycle type. 1800 w. Eng News—Nov. 25, 1897.

See also **Oechelhauser.**

**Two-Cylinder.**—A Large Double-Acting Two-Cylinder Gas Engine. Illustrated description of a plant used for operating the dynamos of an electric railway. 1200 w. Eng Rec—Dec. 2, 1899.

**United Kingdom.**—Gas Engines: The Number in Use and Their Applications. Bryan Donkin. A summary of information obtained by sending circulars to the gas companies of the United Kingdom. 1000 w. Jour Gas Lgt—May 30, 1899.

**Valves.**—Gas Engine Valves. Herbert L. Towle. Discusses valves opening directly into the cylinder or combustion spaces, considering the types that have been used or attempted. Serial. Horseless Age—April 4, 1900.

The Valves of Internal Combustion Engines. James D. Roots. Considers recent and existing practice, giving illustrations. 4000 w. Engr, Lond—July 20, 1900.

**Waterworks.**—Gas Engines for Small Waterworks. Their advantage in economy and ease of operation is discussed. 700 w. Eng Rec—Oct. 8, 1898.

Gas and Gasoline Engines as Applied to Small Water Works Plants. Charles O. Rogers. Paper read at meeting of Engs' Soc. of W. Penna., Pittsburg. Gives an account of various pumping plants where gas engines were installed, with tests made. 3000 w. Am Mfr & Ir Wld—May 27, 1898.

See also **PUMPING ENGINE; WATERWORKS—Caledonia, N. Y.**

**Waterworks, East Pittsburg.**—The Gas Engine Pumping Plants of the East Pittsburg Water Company. George S. Davison. Illustrated description of works requiring a number of small pumping stations, where gas engines were found particularly useful. 1500 w. Eng Rec—Oct. 8, 1898.

**Westinghouse.**—A 650 Horse-Power Gas Engine Direct Connected to a 250 K. W. Electric Generator. Brief illustrated description of this Westinghouse engine. 700 w. Engs. News—May 4, 1899.

A 650 Horse-Power Gas Engine. Illustrates and describes a large three-cylinder gas engine of the Westinghouse type. 800 w. Col Guard—Aug. 4, 1899.

The Westinghouse Gas Engine. Illustrated description of the more important features of this engine, and its working. Also extract from a pamphlet issued by this company on "The Present Position of the Gas Engine." 2500 w. R R Gaz—Sept. 15, 1899.

The Westinghouse Gas Engine. Illustrated description of the novel features of a type of gas engine built in sizes up to 1500 horse-power. 1800 w. Eng Rec—Oct. 21, 1899.

See also **Garbage Fuel; Tests; STEAM ENGINE.**

**GAS ENGINE ACCIDENT.**

**Mill.**—See **STEAM ENGINE ACCIDENT.**

**GAS ENGINEER.**

See also **GAS CONGRESS; GAS ENGINEERING; GAS INDUSTRY; GAS MANUFACTURE.**

**American Association.**—Address of the President of the American Gas Light Association, at Its Twenty-Sixth Annual Meeting, Niagara Falls, N. Y. J. B. Crockett. Touches briefly on many questions of interest to this industry, considering the future outlook encouraging. 5500 w. Am Gas Lgt Jour—Oct. 24, 1898.

How Can We Make the Use of Gas More Universal? A discussion of the paper of Henry L. Doherty at the Niagara meeting of the Am. Gas Lgt Assn. 6500 w. Am Gas Lgt Jour—Nov. 7, 1898.

President's Address at Meeting of American Gas-Light Association, at Old Point Comfort. Charles H. Nettleton. Touches on many subjects of interest to the gas industry. 5500 w. Pro Age—Nov. 1, 1897.

Presidential Address of Mr. A. C. Humphreys at the Annual Meeting of the American Gas Light Association. Discusses important subjects in connection with the gas industry. 5400 w. Jour Gas Lgt—Oct. 31, 1899.

The Address of President Humphreys. A discursive but exceedingly practical address, for the most part dealing with administrative problems. 11000 w. Pro Age—Nov. 2, 1896.

**British Institute.**—Inaugural Address Before the Incorporated Gas Institute, England. E. Herbert Stevenson. Discusses the coal famine and the suggested amalgamation of the Institution of Gas Engineers and the Gas Institute. 5500 w. Gas Wld—June 16, 1900.

Inaugural Address of William Reginald Chester at the Meeting of the Incorporated Gas Institute. An extremely able survey of the past, present and future of the gas industry, in which the cost of production is compared with that of electric lighting, both arts being considered in the light of the most recent advances in each. 10700 w. Gas Wld—June 13, 1896.

President's Inaugural Address Before the Incorporated Gas Institute, at Belfast, Ireland. James Stelfox. An interesting review of the progress of gas lighting, and of subjects important to the industry. 6800 w. Gas Wld—June 25, 1898.

**British Institution.**—Inaugural Address Before the Institution of Gas Engineers. F. D. Marshall. The address discusses English and Continental methods of gas production, and subjects of interest to gas engineers. 7300 w. Jour Gas Lgt—May 2, 1899.

Inaugural Address Before the Institution of Gas Engineers, England. Corbet Woodall. The range and diversity of the lines of gas engineering practice, the progress, etc., with favorable remarks on inclined retorts and carburetted water gas. 6000 w. Gas Wld—May 8, 1897.

Presidential Address Before the Institution of Gas Engineers, England. G. E. Stevenson. Reviews the events which have affected the gas industry of England during the last year, discusses the inclined-retort system, carbonizing plant, carburetted water gas, etc. 5500 w. Jour of Gas Lgt—June 14, 1898.

President's Address Before the Institution of Gas Engineers. J. W. Helps. Considers coal gas and carburetted water gas under present conditions, and discusses the napthalene difficulty. 7000 w. Gas Wld—May 5, 1900.

**British Society.**—Inaugural Address of Mr. Henry O'Connor, before the Society of Engineers. Observations on the developments in gas engineering during recent years. 8500 w. Jour Gas Lgt—Feb. 6, 1900.

**Eastern Counties, Eng.**—Presidential Address at the Meeting of the Eastern Counties Gas Managers' Association, England. W. D. Child. Treating of matters connected with the manufacture and supply of coal gas. 7200 w. Gas Wld—Sept. 17, 1898.

Presidential Address of J. T. Joliffe, before Eastern Counties Gas Managers' Association. Considers temperature effects, coke and ammonia, manufacture, condensation, purification, fittings and incandescent lighting. 4800 w. Gas Wld—April 24, 1897.

**Education.**—Educational Work of a Gas Association. Alfred E. Forstall. A paper before the "Congrès International de l'Industrie du Gaz en 1900," at Paris, giving an account of the work of the American Gas Light Association in educating men and boys employed in gas-works. 2700 w. Pro Age—Sept. 15, 1900.

Self-Education in Gas Engineering. A. C. Humphreys. The misleading idea that special education in gas engineering will not be needed in the future is deprecated, and the lines along which such education must proceed are defined. 12000 w. Am Gas Lgt Jour—June 1, 1896.

**English Southern.**—Inaugral Address of D. Irving, before the Southern District Association of Gas Engineers and Managers. Considers the demand for coal, spontaneous combustion and matters of interest to the gas industry. 5000 w. Jour Gas Lgt—March 6, 1900.

**French Convention.**—The Technical Society of Gas Manufacture in France (Société Technique de l'Industrie du Gaz en France). A report of the Convention of the French Gas Light Association recently held in Paris discussing many questions of current interest. Two articles. 4000 w. Génie Civil—June 26, July 10, 1897.

Société Technique du Gaz en France. Abstract translations of technical papers read at this meeting. Description of the Kudlicz grate, of a hinged scoop, and paper on retort-houses. Ill. 1800 w. Jour Gas Lgt—July 18, 1897.

Convention of the Technical Society of the Gas Industry in France (Société Technique de l'Industrie du Gaz en France. Congrès de Nice). A general report, with abstracts of the papers presented. Two articles. 3000 w. Génie Civil—May 21, 28, 1898.

**German Association.**—Inaugural Address before the Association of German Gas and Water Engineers. W. von Oechelhaeuser. Deals principally with the social and moral obligations to workmen, the hygienic conditions, methods of work, etc. 6000 w. Jour Gas Lgt—June 19, 1900.

**Italian Conference.**—The Conference of Italian Gas Managers. Notes on the visits paid to the gas works in Turin, and to the General Exhibition then being held in the city. 1800 w. Jour Gas Lgt—Dec. 27, 1898.

**Manchester, Eng.**—Inaugural Address before the Manchester District Institution of Gas Managers. W. S. Haddock. Considers many matters connected with the gas industry. 4000 w. Jour Gas Lgt—March 1, 1898.

Inaugural Address before the Manchester District Institution of Gas Engineers. T. N. Ritson. Considers matters of interest to the gas industry. 8500 w. Jour Gas Lgt—Feb. 27, 1900.

Inaugural Address before the Manchester District Institution of Gas Engineers. R. G. Shadbolt. Review of progress in the gas industry. 6000 w. Jour Gas Lgt—Feb. 28, 1899.

**Midland Association, Eng.**—Inaugural Address of W. R. Cooper, before the Midland Assn. of Gas Managers. Topics discussed are the retort and its furnaces; condensation and the extraction of tar; the past and present of purification; carburetted water gas; electricity no longer a bogey, and the advantages of association. 6000 w. Gas Wld—Feb. 22, 1896.

Inaugural Address of J. T. Lewis before the Midland Assn. of Gas Managers, in Birmingham, Eng. Considers the labor problem, progress made in the carbonizing of coal for gas, coal handling in the retort house, etc. 8500 w. Gas Wld—Feb. 26, 1898.

Presidential Address Before the Midland Association of Gas Managers. J. Ferguson Bell. Reviews subjects of interest to the gas industry. 6700 w. Gas Wld—March 10, 1900.

**New England Association.**—Inaugural Address of Mr. C. D. Lamson before New England Association of Gas Engineers. A review of the past year, considering most of the subjects of interest in the gas industry. 8400 w. Am Gas Lgt Jour—March 1, 1897.

**North of England.**—Address of J. Holliday, President of the North of England Gas-Managers' Association. A general review of the industry, the changed conditions and outlook. 4500 w. Jour Gas Lgt—Oct. 5, 1897.

**Pacific Coast.**—Address of the President (T. R. Parker, of Napa, Cal.), Fifth Annual Meeting of the Pacific Coast Gas Association. A general talk on matters of interest. 3500 w. Am Gas Lgt Jour—Aug. 9, 1897.

**Scotland.**—Waverley Association of Gas Managers; Inaugural Address of President M'Laren, at the Duns meeting in Scotland. Reviewing the special difficulties confronting the small works. Discussion. 2500 w. Gas Wld—Sept. 10, 1898.

**Southern District, Eng.**—Inaugural Address of A. F. Browne, before the So. Dist. Assn. of Gas Engineers and Managers. Discusses the topics of labor-saving machinery, outside help; carbonizing coal in bulk; enrichment of hydrocarbon vapors; the question as to whether these vapors reside in the gas or in the tar; enrichment experiments; lime purification; automatic meters and gas stoves. 4800 w. Gas Wld—Feb. 22, 1896.

Inangral Address of J. W. Helps. Read at meeting of the Southern District Association of the Gas Engs. and Mangrs., London. General review of topics of interest in the gas industry, especially regarding the establishment of experimental works, handling of coal, etc. 7000 w. Gas Wld—Feb. 13, 1897.

**GAS ENGINEERING.**

See also **GAS CONGRESS; GAS ENGINEER; GAS INDUSTRY; GAS MANUFACTURE; GAS WORKS.**

Difficulties I Have Met With, and How They Have Been Overcome. W. Miller. Experiences of a gas engineer in practice. Discussion. 6000 w. Gas Wld—Aug. 22, 1896.

Wayside Notes. T. S. Cleminshaw. Discusses some questions of interest to gas engineers. 4400 w. Jour Gas Lgt—Sept. 13, 1898.

**Calculations.**—"27.68." Henry O'Connor. An explanation of the usefulness of these figures in various problems of gas engineering. 1200 w. Jour Gas Lgt—Aug. 15, 1899.

**Units.**—**Units in Gas Technics.**—Deals with points affecting the measurement of certain quantities which are of interest in gas affairs, and calculations relating thereto. Serial. Gas Wld—Nov. 2, 1895.

**Wolverhampten, Eng.**—An Example of Gas Engineering Work from Wolverhampton. Describes an interesting example of modern gas engineering. 2700 w. Jour Gas Lgt—Oct. 31, 1899.

**GASES.**

See also **BLAST FURNACE GAS; CHIMNEY GAS; GAS ANALYSIS.**

**Flow.**—The Efflux of Gases and Steam under Diminishing Pressure and Volume (Ueber den Ausfluss von Gasen und Dampfen bei Abnehmendem Druck und bei Abnehmendem Volumen). Dr. Weyrauch. A thorough mathematical treatment of the subject of the efflux of gases, as applied to the work of the engineer. Two articles, 6000 w. Zeitschr d Ver Deutscher Ing—Sept. 23, 30, 1899.

Calibration of a Pitot Tube in Gas Measurements. Forrest M. Towl. Illustrated description of tests and manner of using the tube, with tables. 1600 w. Trans of Assn of Civ Engs of Cornell Univ—June, 1897.

The Discharge of Gases and Vapours (Sur l'Ecoulement des Gaz et des Vapeurs). A translation of the paper Prof. Weyrauch recently published in the "Zeitschrift des Vereines Deutscher Ingenieure." 6000 w. Revue Technique—Nov. 10, 1899.

The Flow of Gas or Steam Through Pipes. Arthur J. Martin. Tables of the flow of gas or steam through pipes, with an examination of some of the formulae now in use. 2500 w. Engng—March 19, 1897.

See also **STEAM.**

**Liquefaction.**—See **LIQUEFACTION; LIQUID AIR.**

**Mixtures.**—On Gaseous Mixtures. Translation of notes by A. Leduc and by Paul Sacerdote. An examination of the received law. 1800 w. Jour Fr Inst—Oct., 1899.

**Solutions.**—Solutions of Solids in Gases. M. P. Villard. Summary of a communication to the French Physical Society. Experiments showing that gases possess the property of dissolving liquids or solids under ordinary circumstances. 2000 w. Gas Wld—Sept. 4, 1897.

The Solution of Solids and Liquids in Gases. M. P. Villard. Experiments showing that gas possesses sometimes considerable dissolving power. Serial. Am Gas Lgt Jour—Jan. 2, 1899.

**Vaporization Heat.**—The Relationship of the Heat of Vaporization of Gases to Their Density and also to Their Boiling Point. William L. Dudley. An investigation, from which is deduced the law that in any homologous series the heat of vaporization in a unit of volume of the vapor, under the same conditions as to temperature and pressure, is proportional to the density, and also to the absolute boiling point. 1400 w. Jour Am Chem Soc—Dec., 1895.

See also **EVAPORATION; HEAT—Latent; STEAM.**

**GAS EXHIBITION.**

**Paris.**—The Gas Industry of the Exposition of 1900. J. Leroy, in "La Nature." Illustrated account of the work done by the Compagnie Parisienne du Gas and the applications within the Exposition enclosure. 2000 w. Sci Am Sup—Sept. 15, 1900.

The Gas Pavilion. Description of the building and its arrangement, and of the lighting of the exhibition, especially the lighting of the parks of the Champ de Mars by the Paris Gas Co. 3200 w. Jour Gas Lgt—May 22, 1900.

Gas-Generating Plant at the Paris Exposition. Brief description of a model exhibited in the German section at the Champ de Mars. 1100 w. Sci Am—Oct. 27, 1900.

The Proposed Gas Exhibition and Congress of Gas Engineers at the Paris Exhibition. An outline of the arrangements made, with illustration of the gas pavilion. 1400 w. Jour Gas Lgt—Jan. 16, 1900.

**GAS EXPLOSION.**

See also **COAL MINE EXPLOSION; NATURAL GAS EXPLOSION; GAS ACCIDENT; GAS FIRE.**

A Curious Gas Explosion. Irvin Butterworth. Read at meeting of Ohio Gas Lgt. Assn. Describes the circumstances of the explosion, which occurred May 12, 1896, at the Ohio Institution for Feeble Minded Youth, two miles from Columbus, O. 2400 w. Am Gas Lgt Jour—Feb. 15, 1897.

Certain Phenomena of Gas Explosions. W. H. Birchmore. Describes experiments, and attempts at experiments, which show that the mechanism of gas explosion is a much more complicated process than is commonly assumed. 4500 w. Am Gas Lgt Jour—Oct. 11, 1897.

Note on Further Studies into the Phenomena of Gas Explosions. W. H. Birchmore. Describes experiments made to investigate the apparent antithesis between the wrecking and incendiary power of an explosion. 2400 w. Am Gas Lgt Jour—Aug. 1, 1898.

**Manchester.**—Explosion at Manchester Corporation Gas Works. An illustrated account of an explosion, resulting in the death of the manager, Mr. G. E. Stevenson, and the injury of others. Also a sketch of Mr. Stevenson's life. 4500 w. Gas Wld—Nov. 4, 1899.

**GAS FIRE.**

See also **COMBUSTION—House Fire; GAS ACCIDENT; GAS EXPLOSION; GAS HEATING.**

Gas as a Cause of Fires. Facts taken from a paper by A. Müller, published in the "Journal für Gasbeleuchtung," proving gas one of the safest illuminants. 900 w. Jour of Gas Lgt—Nov. 30, 1897.

Gas Conflagrations. From the N. Y. "Evening Post." On the dangers from gas main leakage, the cause of fires, effects on health, etc. 1000 w. Am Arch—Jan. 27, 1900.

**GAS FITTING.**

See also **ELECTRIC LIGHT FIXTURE.**

Pointers on Practical Gas-Fitting. Calls attention to important things in properly fitting a house. Serial. San Plumb—Oct. 2, 1899.

Sound Gas Fittings. Norton H. Humphreys. The importance of seeing that all fittings are gas tight. 2000 w. Jour Gas Lgt—Nov. 7, 1899.

The Extension of Gas Companies' Responsibility to Fittings Beyond the Meter. Frank A. Winstanley. Read before the Incorporated Gas Inst., England. Advocates the extension of the gas manager's control to all appliances necessary for the efficient use of gas. 3000 w. Gas Wld—June 17, 1899.

**Boston Regulations.**—Good Gas Fitting. Act and regulations issued by the Boston Board of Health. 1400 w. Dom Engng—March, 1899.

**Massachusetts.**—Gas Fitting as Required in Massachusetts. Illustrations which show methods of doing work in accordance with the new law licensing gasfitters and supervising the business of gas-fitting in the city of Boston. 150 w. Dom Engng May, 1899.

**Regulations, Boston.**—Revised Gas Fitting Regulations of Boston. A copy of the regulations adopted, with a series of illustrations showing how to do work properly. 1100 w. Met Work—Feb. 25, 1899.

**GAS FLAME.**

See also **GAS; FLAME.**

**GAS FUEL.**

See **FUEL GAS.**

**GAS GOVERNOR.**

See **GAS DISTRIBUTION—Governor.**

**GAS HEATING.**

See also **COMBUSTION—House Fire; GAS COOKING; HEATING; SMOKE PREVENTION—House Fires.**

Gas Heating (Ueber Gasheizung). Erwin Nicolaus. A general discussion of the subject, with table showing amount of products of combustion under various circumstances. Serial. 2 parts. 3200 w. Gesundheits Ing—May 31, June 15, 1900.

Gas Stoves. D. Decker. The proper conservation of energy, and the utilization of present waste forces that interfere with the economical distribution of gas. 5500 w. Am Gas Lgt Jour—Aug. 24, 1896.

Gas Stoves (Die Gasheizöfen). E. Nicolaus. Reviewing the development of the gas stove for warming rooms, and discussing the conditions necessary for healthfulness. Serial. Gesundheits-Ingenieur—Aug. 31, 1900.

Heating with Gas. J. H. Kinealy. Gives a description of a grate and hot-air furnace, referred to in a paper by F. Foveaux, read before the Pacific Coast Gas Assn. Also quotes from a paper giving some results of experience with gas for heating schools in Germany. Ill. 1700 w. Met Work—Jan. 22, 1898.

Relation of the Gas Company to the Stove Department. George E. Harris. Inducements for gas companies to put forth special efforts to encourage the use of gas stoves. 1400 w. Pro Age—Sept. 1, 1896.

The Efficiency and the Waste of Heat in Gas-Heating Appliances. Dr. Haber. Abstract. Gives a mode of calculation where there is no need for an analysis of the gas or for a determination of its specific gravity. 1200 w. Gas Wld—Feb. 19, 1898.

The Principles of Gas Heating with an Example. Illustrated description of a new gas heater for apartments in buildings. ·2000 w. Jour of Gas Lgt—Aug. 11, 1896.

**Bath.**—Faults in Gas Stoves for Heating Baths. A. Gartner. Investigations leading to the conclusion that gas stoves and bath heaters, without adequate ventilation, in small rooms, involve a direct danger to life. 2200 w. Gas Engs Mag—Oct. 10, 1900.

Faulty Gas Stoves and Bath Heaters. A. Gartner. From the "Journal für Gasbeleuchtung." Summary. Explains the difference between heating and lighting burners, discusses the dangers, and danger indicators. 2400 w. Gas Wld—July 21, 1900.

**Battery.**—Battery Gas Heaters (Batterie-Gasöfen). P. Schroeter. Describes improved forms of gas radiators for warming, including devices for control of temperature and for the removal of products of combustion; also data as to efficiency. 2500 w. Gesundheits Ingenieur—Dec. 31, 1898.

**Efficiency.**—The Determination of the Efficiency and Loss of Heat in Gas-Stoves. Abstract translation of article by F. Haber, in "Journal für Gasbeleuchtung." Gives a method for the estimation of the duty of a gas stove, much more simple than the methods in general use. 2000 w. Jour Gas Lgt—Dec. 14, 1897.

The Efficiency of Gas Heating (Der Nutzeffect der Gasheizung). Erwin Nicolaus. Discussion of the theory, practical results with a variety of gas stoves, and costs; with tables. 3500 w. Gesundheits Ing—June 30, 1900.

**Fittings.**—Gas-Fires and Gas-Stoves. W. Grafton. Discusses some of the principles involved in the manufacture of gas-fires, and where to look for failures should they occur. 1700 w. San Plumb—Dec. 1, 1896.

**Machines.**—Gas-Heating Machines. A variety of machines heating with gas fuel articles in process of manufacture, for hardening and tempering and for other purposes. 1400 w. Am Mach—Sept. 10, 1896.

**Tests.**—Trials of Gas Stoves. A summary of the more important results of a number of trials of heating with gas stoves, of which reports have been published by A. von Ihering, in the "Journal für Gasbeleuchtung." 2000 w. Jour of Gas Lgt—Nov. 17. 1896.

**Ventilation.**—Domestic Gas Firing and Its Relation to Heating and Ventilation. Extract from address by George Beilby, at recent meeting of the Society of Chemical Industry, bearing on the present position of this subject. 3500 w. Jour Gas Lgt—Aug. 29, 1899.

Ventilation of Gas-Heated Rooms. Donald McDonald. An exhaustive paper considering the subject of gas-lighting and gas-heating in its sanitary as well as economic phases, followed by a protracted, spirited and instructive discussion. 7400 w. Am Gas Lgt Jour—April 13, 1896.

See also **HEATING AND VENTILATION; VENTILATION.**

**GASHOLDER.**

See also **GAS DISTRIBUTION; GAS MANUFACTURE; GAS WORKS; TANK.**

On Gasholders. Baurath Hacker. Abbreviated translation of a paper from the Journal of the Union of German Engineers. Discusses the uncertainty as to the distribution of wind pressure in the usual modes of construction, etc. Ill. 2300 w. Gas Wld—Feb. 24, 1900.

**Columnless.**—Gasholder Without Columns. Illustrated description of the largest gasholder ever built without columns, erected at Middlesborough, England. 1100 w. Eng, Lond—Dec. 6, 1895.

The Columnless Gasholder. Editorial disapproving this type of gasholder and implying that no one of the type has yet met the requirements of a good gas-holder. 1800 w. Pro Age—Aug. 15, 1896.

**Concrete Tank.**—Some Notes on the Construction of a Concrete Gasholder Tank. C. W. Andrews. Read at meeting of the Ohio Gas Light Assn. Describes the construction, which cost about two-thirds of what a similar brick tank would have cost. Discussion. 3000 w. Am Gas Lgt Jour—March 27, 1899.

**Construction.**—Gasholder Construction. H. A. Allyn. Read before the New England Assn. of Gas Engs. Considers the determining of capacity, whether the holder shall be covered, materials to be used, and other details. Discussion. 9600 w. Am Gas Lgt Jour—Feb. 28, 1898.

**Construction Details.**—New Details in Gasholder Construction. E. Lloyd Pease. Short illustrated descriptions of details met with in the construction of modern gas-holders, in which some important matters are practically dealt with. 11000 w. Discussion. Gas Wld—June 13, 1896.

**Contamination.**—See **GAS CONTAMINATION.**

**Crown Inversion.**—The Inversion of an Untrussed Gasholder Crown. An account of an interesting operation in gasholder construction now in progress at the South Metropolitan Gas Company's Old Kent Road Station. 1700 w. Jour of Gas Lgt—June 15, 1897.

**Cups.**—The Action of Gasholder Cups. Considers the principles which govern their action. Part first discusses the approximate working conditions, general behavior of the water levels, action of cups when descending into tank, behavior of the gas entrapped in grip, and behavior of water-levels in grip. Serial. Gas Wld—Feb. 18, 1899.

**Curbs.**—Gasholder Curbs. John P. Leather. Calculation of strains. Serial. Gas Wld—April 24, 1897.

**English.**—Large Gasholder in England. Norton H. Humphreys. Considers gasholders about 230 feet in diameter and 150 feet high. Serial. Am Gas Lgt Jour—May 22, 1899.

**Foundation.**—See **FOUNDATION—Gasholder; FOUNDATION FAILURE.**

**Four-Lift, New York.**—The New Four-Lift Holder of the New York Mutual Gaslight Company. Walter A. Allen. Description of gasholder having a capacity of 4,500,000 cubic feet. 1800 w. Am Gas Lgt Jour—Dec. 7, 1896.

**Guide-Framing.**—The Guide-Framing of Gasholders. Abstract translation of a paper by Herr Hacker, of Berlin. Considers the uncertainty as to the distribution of the pressure of a wind on the ordinary guide-framing; three independent columns for guiding a gasholder; calculation of the ring around the crown, and of the forces transmitted to the columns; and the strain of the cups. Ill. 2700 w. Jour Gas Lgt—June 5, 1900.

**Housing.**—Should Gasholders in New England Be Housed or not? Fred. H. Shelton. A practical paper opposed to housing holders of 300,000 feet capacity and upward. It is admitted that smaller holders may be sometimes housed with advantage. A discussion follows. 8000 w. Am Gas Lgt Jour March 23, 1896.

**Middlesbrough, Eng.**—The New Holder at the Middlesbrough Gas Works. Illustrated detailed description of a new rope guided gasholder. 800 w. Jour Gas Lgt—Nov. 26, 1895.

See also **GASHOLDER ACCIDENT.**

**Old.**—A Curious Old Gasholder. Describes an old American gasholder. Ill. 700 w. Am Gas Lgt Jour—Feb. 28, 1898.

**Spiral Guided.**—Notes on the Construction, and Experience in the Working of the Gadd and Mason Spiral-Guided Holder at the Chester Gas Works. Robert Hunter. Read before the Incorporated Gas Inst., at Bath, Eng. A statement of reasons for adopting this holder, and experiences in its working during the past four years. 2700 w. Gas Wld—June 19, 1897.

**Stresses.**—Gasholder Design (Gasbehälterführungen). H. Hacker. Methods of computing the stresses on gasholders of various kinds are given, especial consideration being given to wind stresses. 2500 w. Zeitschr d Ver Deutschr Ing—Nov. 25, 1899.

**Telescoping, Single Lift.**—Telescoping a Single Lift Gasholder While in Use. L. F. Fogg. Description of the method and appliances used for the purpose stated. Also discussion. 1400 w. Am Gas Lgt Jour—Aug. 24, 1896.

**Three Lift, Manchester.**—The Large Treble Lift Gasholder at the Bradford Road Gas Works, Manchester, Eng. Illustrated description. 800 w. Jour Gas Lgt—June 8, 1897.

**Three Lift, Sutton, Eng.**—The Three-Lift Gasholder at Sutton. F. S. Cripps. Illustrated description with remarks on the construction. 1700 w. Jour Gas Lgt—May 24, 1898.

**Wind Influence.**—The Influence of Wind on Gasholders. M. Irminger. An account of experiments made by the writer with results. 2600 w. Jour Gas Lgt—May 4, 1897.

**Wind Pressure.**—See also **WIND PRESSURE—Buildings.**

### GASHOLDER ACCIDENT.

**Middlesbrough, Eng.**—The Accident to the Rope-Guided Gasholder at Middlesbrough. Report relating to the recent accident to the rope-guided gasholder at the Corporation Gas Works. 2000 w. Jour Gas Lgt—March 16, 1897.

The Middlesbrough Gasholder. Mr. Henry Woodall's report upon the accident that befell the rope-guided gasholder in February last. Facts of the case with the opinion of the writer. 2200 w. Gas Wld—July 10, 1897.

**St. Helens, Explosion.**—The Destruction of the St. Helens Gasholder. Illustrated account showing the amount of damage. 900 w. Jour Gas Lgt—May 23, 1899.

**St. Louis Cyclone.**—The Wrecking of Holder No. 1, Station C, of the Laclede Gas Company During the Recent Cyclone at St. Louis, Mo. D. L. Hough. Profusely illustrated description. 800 w. Pro Age—Aug. 1, 1896.

### GASHOLDER FAILURE.

**New York.**—The Destruction of a Mammoth Gasholder. An account of the collapse of the new gasholder of the Consolidated Gas Co., in New York. Ill. 2400 w. Ir Age—Dec. 22, 1898.

The Failure of a Large Gasholder in New York City. Views of the wreck showing the complete destruction, with explanation of the construction. 800 w. Eng News—Dec. 22, 1898.

The Gas Tank Failure of New York. Letters on this subject from Robert W. Prosser, George Rae, and W. H. Breithaupt. 2400 w. R R Gaz—Jan. 27, 1899.

Why the Gas Tank Failed. George Rae. Gives the opinion that the failure was due to faulty construction, or defects in design. 1600 w. Ill. R R Gaz—Jan. 6, 1899.

### GAS INDICATOR.

See **FIREDAMP.**

### GAS INDUSTRY.

See also **GAS; GAS ENGINEER; GAS ENGINEERING; GAS LIGHTING; GAS MANUFACTURE; GAS METER; GAS WORKS.**

**Accounts.**—Both Sides of the Ledger. Norton H. Humphrys. A consideration of the profits earned in the gas industry, and the means of ascertaining them. Serial. Jour Gas Lgt—Jan. 4 and 11, 1898.

The Balance-Sheet. J. H. Brearley. Read at meeting of the Manchester Dist. Inst. of Gas Engs. Considers the methods and their faults and the various items. 3300 w. Jour Gas Lgt —Nov. 29, 1898.

The Uniformity of Gas Accounts. C. O. G. Miller. Read before the Pacific Coast Gas Assn. The manner of keeping a record of the business is discussed. 3800 w. Am Gas Lgt Jour—Aug. 23, 1897.

**America.**—The Future of the Gas Business of America. M. S. Greenough. A retrospect and a forecast. 3300 w. Am Gas Lgt Jour—June 1, 1896.

See also **United States.**

**Appliances.**—Gas Appliance Exchanges. Fred R. Persons. Read at meeting of Ohio Gas Light Assn. Reasons why the sale of gas consuming devices should be separated from the gas industry proper. Discussion. 10000 w. Am Gas Lgt Jour—April 2, 1900.

**Bad Debts.**—How to Minimize Bad Debts. J. H. Penney. A discussion of sound business methods as applied to the business of manufacturing gas. 3400 w. Gas Wld—May 2, 1896.

**Berlin Deputation.**—A Berlin Deputation. Abstract of the chief points of reports given by a deputation sent on a circular tour to look into the question of coin meters and other improvements, with reference to carburetted water gas. 2000 w. Gas Wld—Feb. 5, 1898.

**Boston, Mass.**—The Gas Supply of Boston, Mass. J. H. Gray, in "Quarterly Journal of Economics." Abstract showing American financial methods as applied to gas undertakings. Serial. Jour Gas Lgt—July 10, 1900.

**British.**—Inaugural Address of Robert Porter. Reviews progress during the present reign, with comparison of the advantages of carburetted water-gas with coal-gas. 4000 w. Jour Gas Lgt —March 2, 1897.

A Retrospect of the Year 1895. Review of the gas industry for the year. 4700 w. Jour Gas Lgt—Dec. 31, 1895.

Thoughts and Recollections—1895. A review of the gas industry for the year, in which progress, though slow, has not been wanting. 7000 w. Gas Wld—Dec. 28, 1895.

A Retrospect of the Year 1896. Review giving especial attention to the gas industry. 3500 w. Jour Gas Lgt—Dec. 29, 1896.

Gas Supply. Editorial review of the past year in England. 500 w. Engr, Lond—Jan. 1, 1897.

A Retrospect of the Year 1897. Deals principally with the gas industry in England. 4500 w. Jour of Gas Lgt—Dec. 28, 1897.

A Retrospect of the Year 1898. A review of the industry of gas-lighting in Great Britain, with some reference to artificial lighting by other means. 4500 w. Jour Gas Lgt—Dec. 27, 1898.

Gas Supply. Editorial summary of the year 1898. 1200 w. Engr, Lond—Jan. 6, 1899.

The Gas Undertakings Returns. On the nature of the changes made and the principal totals as shown in the recently issued report for the United Kingdom. 1200 w. Jour Gas Lgt —Dec. 27, 1898.

**By-Products Market.**—The Residuals Market. W. E. Price. Read before the Southern District Association of Gas Engineers and Managers. A few particulars and statistics of the condition, past and present, of the market in residuals of gas works, followed by discussion. 5600 w. Gas Wld—Nov. 14, 1896.

**Coal Cost.**—Gas Coal: Its Present Price and Effect Upon the Gas Industry. Discussion, opened by R. G. Shadbolt, before the Eastern Counties Gas Mgrs. Assn. 3300 w. Gas Wld—April 21, 1900.

The Cost of Coal. Norton H. Humphrys. Discusses how the increased price of coal has affected gas works, and means of covering the increase in expenditure without raising the price of gas. 3000 w. Jour Gas Lgt—June 12, 1900.

**Consolidation.**—Gas Interests Consolidating. Explains the gas situation in Chicago and in Greater New York. 1000 w. Bradstreet's—Nov. 6, 1897.

**Consumers.**—An Unprofitable Consumer. Norton H. Humphrys. Discusses the use of slot-meters, fuel gas, etc., and how to convert an unprofitable customer into a profitable one. 3700 w. Jour of Gas Lgt—Oct. 2, 1900.

**Diagrams, Sales.**—Diagrammatic Outlining of Gas Sales on Fuel and Illuminating Account. The method is illustrated by actual diagrams with explanatory text. 300 w. Am Gas Lgt Jour—May 11, 1896.

**Differential Rates.**—See **Rates.**

**Electric Competition.**—How to Avoid Competition in a Small Town. E. G. Schmidt. Read before the Ohio Gas Light Assn. Gives the experiences of the Sandusky (O.) Gas Lgt. Co. and recommends the combining of the electric light and gas interests. 2500 w. Am Gas Lgt Jour—March 28, 1898.

**Electric Supply.**—See **GAS ENGINE.**

**England.**—See **British.**

**Europe.**—Some Notes on European Gas Matters. Walter S. Allen. Read before the New England Assn. of Gas Engs. Impressions received during a visit to Europe, noting matters of interest at various points. Discussion. 8500 w. Am Gas Lgt Jour—March 7, 1898.

**Forms.**—Some Forms and Their Uses. Walton Forstall. Forms from various sources for the preservation of information connected with the gas industry. 4000 w. Am Gas Lgt Jour—April 24, 1899.

**Good Gas.**—Why Good Gas? A. W. Wilkinson. Read before the Society of Gas Lighting. Discusses the various lights with which gas has had to compete, and the necessity of making the best gas even if it increases the cost. 1800 w. Am Gas Lgt Jour—Nov. 1, 1897.

**Heating and Power.**—The Use of Gas for Purposes Other Than Lighting. C. W. Blodget. Read at Detroit meeting of the Western Gas Assn. Showing the desirability and almost the necessity of securing other uses for gas than lighting, and the means of advancing this industry. Discussion. 5800 w. Pro Age—June 1, 1898.

See also **GAS—Applications; GAS ENGINE; GAS HEATING.**

**High Wycombe, Eng.**—A New Policy in Gas Supply. The policy announced by the High Wycombe Gas Light and Coke Co., which marks a new era in the history of the gas industry. 800 w. Builder—Sept. 16, 1899.

**Hiring Apparatus.**—Letting Gas Apparatus on Hire. Norton H. Humphrys. An exposition of a plan becoming more and more common in England. Faults pointed out and suggestions of remedy. 3000 w. Gas Wld—June 13, 1896.

**Increasing Consumption.**—Ways and Means of Increasing Gas Consumption. H. Pooley. Read before the meeting of the North British Assn. Treats the subject with reference to the relation between manufacture and consumption, and with regard to the creation of an additional demand. 3000 w. Gas Wld—July 31, 1897.

**Indiana.**—Gas in Indiana. From the Indianapolis "Journal." On the situation in Indiana gas affairs, and the changes that have taken place during the past ten years. 1300 w. Pro Age—Sept. 15, 1897.

**Inspection.**—A House-to-House Inspection Wanted. Norton H. Humphreys. Comments on the universal popularity of electricity for shop window lighting, with inquiry as to the cause. Suggests canvassers, or inspectors visiting from house to house to secure business and remedy defects in lighting. 1800 w. Jour Gas Lgt—March 29, 1898.

**London.**—London Gas: Its Supply and Quality. An account of the manner in which the gas supplied is tested to ascertain its lighting power, purity, and pressure. 2200 w. Builder—March 5, 1898.

The Gas Industry. Some interesting items relating to the manufacture of gas in London, taken from the last annual report. 1500 w. Builder—June 4, 1898.

The Gas Supply of the Metropolis. On the bills before the English Parliament. 2000 w. Engr, Lond—July 6, 1900.

The Price of Gas in London. Abstract of a memorandum on the increase of charges made by gas companies, due to the high price of coal. 2000 w. Engr, Lond—July 20, 1900.

The Rise and Development of the London Gas Supply. W. J. Liberty. Read at meeting of the Gas Engineering Soc., London. Abstract. Reviews the history of the companies. 1800 w. Jour Gas Lgt—March 20, 1900.

**London Prices.**—A History of Gas Prices in London. Review of a book by Laurence W. S. Rostron, giving also early history of gas supply in London. 1400 w. Jour Gas Lgt—Jan. 16, 1900.

**Municipal Control.**—Municipal Control. C. W. Quilty. Read before the Pacific Coast Gas Assn. A legal, commercial, and political review of the question of municipal ownership. 3500 w. Am Gas Lgt Jour—Aug. 23, 1897.

Governmental Control of the Price of Gas. Alfred E. Forstall. Read at Denver meeting of Am. Gas Lgt. Assn. Reviews the systems of regulation prevailing in various places. 4200 w. Am Gas Lgt Jour—Oct. 29, 1900.

Public Control of Rates. George McLean. Read before the Western Gas Assn. Also discussion. Considers it unjust and inexpedient on the part of public service corporations to oppose the principle of public control. 8000 w. Pro Age—June 1, 1900.

See also **Regulatory Acts.**

**Municipal Ownership.**—See also **Philadelphia; MUNICIPAL OWNERSHIP—Gas Supply.**

**New York History.**—A Sketch of the History of the Gas Supply of New York. The present article reviews the subject up to the close of the Civil War. Serial. Jour Gas Lgt—Oct. 2, 1900.

**New York State.**—New York State Gas Statistics. Interesting facts from the 15th Annual Report of the Bureau of Labor Statistics of New York for the year 1897. 1600 w. Pro Age—Oct. 1, 1898.

**Office.**—The Manager's Town Office. N. H. Humphreys. Read before the So. Dist. Assn. of Gas Engs. and Mgrs., England. Recommendations helpful in advancing the business of the gas industry. 4800 w. Gas Wld—Nov. 11, 1899.

**Paris.**—The Gas Supply of Paris. Edward Conner. Interesting particulars connected with the Paris supply, with account of its development. 2000 w. Plumb & Dec—April 1, 1898.

**Paris Accounts.**—Paris Gas Accounts. Report of income, expenditure, capacity, etc. 1500 w. Gas Wld—July 3, 1897.

**Philadelphia.**—Municipal Gas in Philadelphia. John I. Rogers. The article contains the substance of a study made by the writer concerning the published statement of Mr. Dolan, that the works had been run at a loss for three years. A paper of interest in determining whether Philadelphia's municipal experiment was a failure. 6000 w. Munic Affairs—Dec., 1897.

Private Control of Gas in Philadelphia. A statement of the condition of affairs. Poor gas, poor works, poor management under municipal control, and the offers of private companies to make all necessary improvements at great cost, yet sell the gas cheaper than under the present management. 4400 w. Pro Age—Sept. 15, 1897.

Some Recent Municipal Gas History. Edward W. Bemis. Discussing the lease of the Philadelphia gas works, for thirty years, to a private company, after fifty-six years of public ownership and operation. 4500 w. Forum—March, 1898.

The Arguments on the Appeal in the Matter of the Lease of the Philadelphia Gas Works. An examination of the arguments. 2000 w. Am Gas Lgt Jour—Feb. 7, 1898.

The Municipality and the Gas Supply, as Illustrated by the Experience of Philadelphia. L. S. Rowe. Presents a careful examination of the history of these works, the causes of the defects connected with the city management, the conditions under which the lease was effected, with a discussion of questions of public policy, concluding that the step taken marks a retrograde movement. 6700 w. An of Am Acad—May, 1898.

The Philadelphia Gas Lease. Frederic W. Speirs. Gives the history of the gas franchise in this city, and discusses the terms of the lease, claiming that it proves nothing but the power of aggregated capital in politics. 4600 w. Munic Affairs—Dec., 1897.

The Philadelphia Gas Works. Clinton Rogers Woodruff. A statement of the condition of gas affairs in this city. 2700 w. Harper's Wk—Oct. 16, 1897.

**Profit-Sharing.**—Profit-Sharing, or Payment by Results. G. W. Lupton. Read before the Manchester Dist. Inst. of Gas Engs. Also discussion. Discusses this scheme favorably. 3900 w. Jour Gas Lgt—Nov. 28, 1899.

**Prospects.**—The Present and Future Prospects of Gas for Lighting, Heating and Power Purposes. Henry R. Lordly. Discusses the impetus given the industry by the invention of the Welsbach burner, and other appliances for lighting, heating and motive power. Ill. 6500 w. Trans of Assn of Civ Engs of Cornell Univ—1898.

**Publicity of Accounts.**—The Relation of the Gas Supply to the Public. John H. Gray. Reviews the history of the gas industry and considers that the only road to reform lies through legislation, by which the accounts and books of the companies shall be kept in a uniform manner and then given to the state and ultimately to the public. 4200 w. Munic Af—June, 1898.

**Rates.**—Differential Rates as Between Consumers of Gas for Lighting and for Purposes Other Than Lighting. Thomas Newbigging. Read before the Incorporated Gas Inst., England. Discusses the practice of gas companies in the United Kingdom, which seems to be unfair to customers who use gas only for lighting. Discussion. 11000 w. Gas Wld—June 17, 1899.

Differential versus Uniform Prices for Gas. Sedgwick Dean. Read before the Michigan Gas Assn. Reviews the claims of the systems. 2000 w. Pro Age—March 1, 1900.

Differential Rates as Between Consumers of Gas for Lighting and for Purposes other Than Lighting. A paper called out by the statements made by Thomas Newbigging. Serial. Jour Gas Lgt—Aug. 22, 1899.

In Favor of Differential Prices for Gas. R. B. Anderson. Read before the North of Ireland Assn. of Gas Mgrs. Advocates the adoption of differential rates where the prices are high. Discussion. 7500 w. Gas Wld—Aug. 12, 1899.

**Rates, Regulations.**—See **Municipal Control.**

**Regulatory Acts.**—Regulatory Acts by City Councils. The Indianapolis and other cases. Reviews recent attacks by municipalities on gas corporations, with editorial comment. 7000 w. Pro Age—Sept. 15, 1897.

**Reports.**—See **GAS WORKS—Technical Reports.**

**Sales.**—Gas Sales in the United States, Canada, England and Germany. Extract from the presidential address of Charles H. Nettleton, at the meeting of the American Gas Lgt. Assn. 1000 w. Eng News—Jan 20, 1898.

See also **Diagrams, Sales.**

**Selling.**—Selling Gas. I. C. Copley. Read at meeting of Western Gas Assn. The writer enumerates the conditions he considers essential, and considers the sale of gas for fuel. Discussion. 9400 w. Pro Age—June 1, 1897.

Selling Gas. Henry L. Doherty. Holds that undue importance is assigned to the retort house as a source of losses, and points out where losses may come in along the whole line of operations until the consumer is reached. Serial. Am Gas Lgt Jour—April 6, 1896.

**Small Towns.**—The Management of Lighting Plants in Small Towns. Thomas D. Petch. Read before the Pacific Coast Assn. Hints on the management, leakages, meter testing, purification, etc., with discussion. 3500 w. Am Gas Lgt Jour—Aug. 16, 1897.

**Stokers.**—Methods for Giving Stokers an Interest in Their Work. I. Hedde. Read before the International Gas Congress, at Paris. Considers the technical means, general methods of arousing interest, giving an account of the means employed and the proposed solution. Serial. Jour Gas Lgt—Oct. 2, 1900.

**Summer.**—A Means of Largely Increasing the Summer Sendout of Gas. J. C. Lord. Read at meeting of Texas Gas and Elec. Light Assn. The writer's experience is given, followed by discussion. 4200 w. Am Gas Lgt Jour—May 10, 1897.

**Taxation.**—The Taxation of Gas by Local Authorities. Isaac Carr. Read before the Incorporated Gas Inst., at Bath, Eng. On the system of applying gas profits to the relief of local rates. 3300 w. Gas Wld—June 19, 1897.

**Texas.**—Recent Developments in Texas. Thomas D. Miller. Gives a brief historical sketch of the gas industry in the state, the coals used, etc. Discussion. 2800 w. Pro Age—June 1, 1898.

**United Kingdom.**—See **British.**

**United States.**—See also **America.**

**United States, 1897.**—Review for the Year 1897. A lengthy review of the events of the gas industry in the United States during the year. 1600 w. Pro Age—Jan. 15, 1898.

### GAS LEGISLATION.

**British.**—The Necessity for Amendments in the Gas Works Clauses Acts of 1847 and 1871. W. F. Cotton. Presented at Belfast meeting of the Incorporated Gas Inst. Calls attention to the particulars in which the defects of the acts work confusion and lead to litigation. 4400 w. Gas Wld—June 25, 1898.

Some Disputed Points in Gas and Water Works Legislation. Thomas Newbigging. Read before the Manchester Dist. Inst. of Gas Engs. Also discussion. Considers the proper amount of the reserve fund, and the borrowing powers. 6000 w. Jour Gas Lgt—Nov. 28, 1899.

### GAS LIGHT.

See also **GAS; GAS BURNER; GAS LIGHTING.**

### GAS LIGHTING.

See also **GAS; GAS INDUSTRY; LIGHTING.**

Dr. Brunte on Incandescent Lighting, Acetylene, and the Development of Flame Illumination. Abstract translation of lecture at Leipsic, before the German Assn. of Gas and Water Engs. Deals with the developments of flame illumination during the last twenty years. Serial. Jour Gas Lgt—Feb. 22, 1898.

**Birmingham Centenary.**—Centenary of Gas-Lighting in Birmingham, Eng. From the Birmingham "Post." Historical review, giving figures of growth, output, and charges under the corporation. 1300 w. Arch, Lond—Sept. 2, 1898.

**City.**—Some Plain Words About City Gas Supplies. Discusses the bad system of managing this business as manifested in Boston, Brooklyn and New York, and suggests the principles on which the supply of a city should be managed. 2000 w. Eng News—Dec. 17, 1896.

**Domestic.**—The Gas in Your House. Some useful things that the consumer ought to know. Burners, meters, variation of pressure, use of globes, etc. 2300 w. Dom Engng—April, 1897.

The Use of Gas for Domestic Lighting. Vivian B. Lewes. Society of Arts, Cantor Lecture. The principles of illumination and the measurement of light—illuminating value and illuminating effect—domestic lighting—flat flame, argand and regenerative burners are discussed. 7300 w. Pro Age—Dec. 1, 1896.

**Electric Compared.**—See **LIGHTING.**

**Great Yarmouth.**—See **ELECTRIC LIGHTING.**

**History.**—The Early Days of Gas. Articles from the "Dundee Advertiser." The history of the discovery of coal gas and its earliest use as an illuminant. 1500 w. Gas Wld—Aug. 28, 1897.

**Incandescent.**—See **INCANDESCENT GAS LIGHTING.**

**Interior.**—Some Further Experiments on Interior Illumination. Alten S. Miller. Read before the American Gas Light Assn. A continuation of the study of this subject, giving results of experiments made. Short discussion. 1800 w. Am Gas Lgt Jour—Nov. 22, 1897.

The Illumination of Inclosed Space. W. H. Birchmore. Part first states the problem and the means of solving it, with review of progress in interior illumination. Serial. Am Gas Lgt Jour—Nov. 29, 1897.

Another View of Interior Illumination. F. N. Morton. Read at meeting of the Am. Gas Lgt. Assn. Discusses indirect lighting, describing experiments and the success attained. 4200 w. Am Gas Lgt Jour—Oct. 23, 1899.

Some Experiments in Interior Illumination. Carter H. Page, Jr. Read before the Am. Gas Lgt. Assn. Investigations of the difference between the loss in candle power of a source of light with and without globes of various densities. Also discussion. 6000 w. Am Gas Lgt Jour—Nov. 16, 1896.

Some Experiments in Interior Illumination. C. H. Page, Jr. Illustrated description of photometric tests. 1200 w. Pro Age—Nov. 2, 1896.

**Paris.**—Public Lighting in Paris. Auguste Levy. Brief review, especially of recent work. 2200 w. Gas Wld—Oct. 6, 1900.

**Primitive Appliances.**—Primitive Lighting Appliances. Illustrated description of an interesting collection. Extract from article by Prof. Drehschmidt and Dr. E. Engels, in "Journal für Gasbeleuchtung." 1200 w. Gas Wld—Jan. 2, 1897.

**Self-Ignition.**—See **GAS BURNER.**

**Street.**—General Street Lighting. Walton Clark. The relation of street lighting to public health, safety, and morals is dwelt upon at some length and is followed by a general consideration of the problem of street lighting, with discussion. 8000 w. Pro Age—July 1, 1896.

Street Lighting. Andrew Hickenlooper. Address at meeting of the Ohio Gas Light Assn. Interesting historical review, with general discussion. 16800 w. Am Gas Lgt Jour—April 9, 1900.

See also **LIGHTING.**

**Street Water Heating.**—See **HOT WATER—Street Lamps.**

**Suburban.**—Suburban Gas Lighting. Describes work in a suburban dwelling, of unusual excellence. 2000 w. Dom Engng—Nov., 1899.

### GAS LIQUOR.

See **AMMONIA—Gas Liquor; GAS MANUFACTURE.**

### GAS MAIN.

See **GAS DISTRIBUTION; GAS PIPE.**

### GAS MANAGER.

See **GAS ENGINEER.**

### GAS MANTLE.

See **INCANDESCENT GAS LIGHTING—Mantles.**

### GAS MANUFACTURE.

See also **GAS ENGINEER; GAS ENGINEERING; GAS INDUSTRY; GAS PURIFICATION; GAS RETORT; GAS WORKS.**

Address by Prof. Charles F. Chandler, of Columbia College. Delivered at Madison Sq. Garden, Feb. 4. The popular fallacies which are held in regard to gas and gas companies. 4200 w. Pro Age Sup—March, 1897.

Gas Manufacture and Appliances. Henry O'Connor. It is proposed to examine not only the reasons for the several steps in gas manufacture, but also the constructive details of the works, preparation of the various pieces of machinery, strength of parts, tests of apparatus, etc. Serial. Gas Wld—Jan. 2, 1897.

Manufacture of Illuminating Gas. The present article is an illustrated description of the methods used at the 14th St. Station, New York. Serial. Sci Am—Oct. 6, 1900.

Principles Involved in the Production of Gas by Different Processes, and Their Relative Values. W. Young. Read before the N. British Assn. of Gas Mgrs. Discusses in detail the use of coke, destructive distillation, how gas should be tested, and the best gas to supply, etc. 13800 w. Jour Gas Lgt—July 31, 1900.

Some Practical Observations on Gas Manufacture. S. Carpenter. Suggestions offered in the hope that they may be of service to those who have attained responsible positions in gas works because of natural ability rather than liberal education. Deals with the production and purification of gas. 2700 w. Jour of Gas Lgt—Sept. 21, 1897.

The Investigation of Gas Processes. A. C. Humphreys. Read before the Pacific Coast Gas Assn. Review of experiences of one who has been investigating claims of gas processes for 25 years. Denounces the Hall process, which was recently tested. General discussion. 7500 w. Am Gas Lgt Jour—Aug. 13, 1900.

The Manufacture of Coal Gas. Illustrated detailed description of process using fuel-gas for heating and retorts, and describing various devices in use. 2500 w. Sci Am Sup—Feb. 10, 1900.

The Manufacture of Coal Gas. J. G. Newbigging. Lecture delivered at Macclesfield, Eng. Abstract. Describes the process and the apparatus, and refers to other matters of interest. 1800 w. Gas Engs' Mag—April 11, 1898.

**Address.**—Inaugural Address of A. Bell before the North British Association of Gas Managers. Treats of the education of the gas engineer, need for commercial methods in the industry, the relative merits of sulphate of ammonia and nitrate of soda, etc. 3500 w. Gas Wld—July 31, 1897.

Inaugural Address of C. Stafford Ellery, before the Incorporated Gas Institute at Bath, Eng. The address deals largely with local matters, presents the value of chemistry in the gas industry, discusses carburetted water gas, and the amount of light that can be obtained from a ton of coal by different methods, etc. 7500 w. Gas Wld—June 19, 1897.

**Air Mixture.**—See **GAS.**

**Air Regulation.**—Regulating the Addition of Air to Gas. Herr Irminger. Shows how the amount may be easily regulated by means of a small rotary exhauster. 800 w. Jour of Gas Lgt—March 15, 1898.

**Alkali Works Report.**—The Report of the Chief Inspector Under the Alkali Act. The Constitution and Analysis of Ammoniacal Liquor. From the report of R. Forbes Carpenter, giving the results of examinations of the constitution of various ammoniacal liquors from English and Scotch sources. 4000 w. Jour Gas Lgt—Sept. 11, 1900.

The Alkali Works Report. Harold G. Colman. On the parts of the report of interest to gas manufacturers, and also an extract on the desulphurizing of gas liquor. 4000 w. Gas Wld—Sept. 1, 1900.

Treatment of Foul Gases from Sulphate Plants. An account of interesting experiments extracted from the annual report of the Chief Inspector under the Alkali Acts, in England. 3400 w. Gas Wld—Aug. 25, 1900.

See also **GAS WORKS—Nuisance.**

**Ammonia.**—See also **AMMONIA.**

**Apparatus.**—The Construction of Inclined Gas-Retorts, Charging Apparatus, and Conveying Machinery. Maurice Graham. Read before the Birmingham (Eng.) Assn. of Mech. Engs. Discusses the most efficacious means for the transmission of coal and its carbonization in gas-works. Ill. Serial. Jour of Gas Lgt—March 15, 1898.

See also **GAS PURIFICATION; GAS RETORT.**

**Ascension-Pipes.**—Stoppages in Ascension-Pipes. Norton H. Humphrys. Considerations offered in the hope of aiding those having this trouble to contend with. 3500 w. Jour Gas Lgt—Feb. 23, 1897.

Stopped Ascension-Pipes. S. Carpenter. Observations and suggestions arising from the experience of the writer. 1700 w. Jour Gas Lgt—Jan. 12, 1897.

**Automatic Stoking.**—Automatic Stoking and Inclined Retorts. William R. Chester. Read at meeting of Incor. Gas Inst. The two successful systems of automatic stoking are considered and the successful development of inclined retorts. Also general discussion. Ill. 6500 w. Gas Wld—June 16, 1900.

**Belfast.**—Cost of Illuminating Gas in Belfast. Consular report on the cost of the material and labor required for the manufacture of gas ready for consumption. The price to consumers is 60 cents per 1,000 cubic feet. 500 w. Con Repts—April, 1897.

**Benches.**—Regenerative Benches. Howard C. Slater. Read at meeting of the Western Gas Assn. Considers their advantages and management. Also general discussion. 5000 w. Am Gas Lgt Jour—May 28, 1900.

**Bench Firing.**—Isolated Generators for Bench Firing. Extracts from letters of English gas engineers on this subject, with comments and discussion. 4300 w. Am Gas Lgt Jour—June 20, 1898.

Isolated Generators for Bench Firing. Presented at Milwaukee meeting of the Western Gas Assn. Reports of Fred. Bredel, William Steinwedell, and Irwin Butterworth, with discussion. Ill. 7500 w. Pro Age—July 15, 1899.

**Building Construction.**—See **GAS RETORTS—House Construction; GAS WORKS.**

**By-Products.**—By-Products and Adjuncts of the Gas Industry. H. Bunte. From the proceedings of the annual meeting of the German Gas and Water Engineers at Berlin. Remarks on the mutual relation of these products from the economical and commercial point of view. 1100 w. Am Mfr & Ir Wld—July 9, 1897.

Cheap Gas and Coke for Boston and Suburbs. Digest of the testimony of H. M. Whitney before the Legislative Committee on Manufactures, giving description of the process of coking, utilization of residues, and gas statistics of Massachusetts and Great Britain. 2200 w. Sci Am Sup—April 18, 1896.

Dr. Bunte on By-Products and Auxiliary Materials. Translation from the "Journal für Gasbeleuchtung," slightly abbreviated, of a paper presented at the meeting of the German Assn. 1700 w. Jour Gas Lgt—Aug. 31, 1897.

Gas Purification with Recovery of By-Products. Dr. J. Bueb. Abstract translation of a paper read at a recent meeting of the German Assn. of Gas and Water Engs. A paper of much interest, with editorial. 5000 w. Jour Gas Lgt—Aug. 1, 1899.

Gas Purification, with Recovery of By-Products. The discussion on Dr. Bueb's paper. 2200 w. Jour Gas Lgt—Aug. 8, 1899.

Notes on Residuals. Charles Hunt. Paper read before the Incorporated Inst. of Gas Engineers. Economies possible in the treatment of residuals and other interesting details concerning these products, with discussion. 6400 w. Gas Wld—May 16, 1896.

Notes on the Recovery of Residual Products from Coal Gas During the Process of Purification. W. Foulis. Read before the Conference of the British Inst. of Civ. Engs. Brief presentation of methods in use, with discussion. 7000 w. Jour Gas Lgt—June 13, 1899.

Recovery of By-Products from Gas-Purifying Matter. Dr. Auerbach. Read before the Assn. of Rhenish Gas and Water Engineers. Considers the nature of the gas which enters the purifiers, the nature of the mass serving for purification, and the treatment of the purifying matter during use. 1600 w. Am Mfr & Ir Wld—May 14, 1897.

The Decomposition of Gas Oil, Phenol, and Creosote by Heat. A summary of researches carried out by Dr. E. Müller at the Chemical Technical Inst. at Carlsruhe. Abstract translation from the "Journal für Gasbeleuchtung." Serial. Jour Gas Light—June 7, 1898.

The Nitrogenous By-Products of Gas Works. States the extreme gravity of the conditions of gas manufacture in England, showing how largely the commercial success depends on the returns from the by-products, and briefly examines some of the processes for the recovery of cyanogen. 2800 w. Engr, Lond—Jan. 22, 1897.

See also Alkali Works Report; Ammonia; Cyanide; Nitrogen; Tar; AMMONIA; COAL TAR; GAS INDUSTRY; GAS PURIFICATION.

**Carbonizing.**—A Few Hints on Carbonization. S. Carpenter. Suggestions to young gas managers and students. 2200 w. Jour Gas Lgt—Sept. 27, 1898.

A New Departure in Carbonizing, Having for Its Objects the Prevention of Naphthalene Troubles and the Providing of Cheap Enrichment. S. and T. Glover. Read at meeting of Inc. Inst. of Gas Engs. Gives an account of the process adopted and measure of success attained. Discussion. 9500 w. Gas Wld—June 18, 1898,

The Carbonizing Plant of a Modern Gas Works. F. D. Marshall. Read at meeting of Inct. Inst. of Gas Engs. Describes the carbonizing plant of the Frederiksberg works of the Danish Gas Co., giving costs, working results, etc. Discussion. Ill. 10000 w. Gas Wld—June 18, 1898.

**Carburation.**—Apparatus for Producing a Gas for Welsbach Lights (Appareil à Produire le Gaz Aérogène). MM. de Perrodil and de Morsier. A paper treating of the advantages of a gas rich in hydrocarbons for Welsbach lights, with description of the van Vriesland carburator-compressor; and the resulting discussion. 6000 w. Mem d l Soc d Ing Civils de France—No. 7, 1900.

The Carburation of Coal Gas. Charles E. Botley and C. F. Botley. Read before the Inst. of Gas Engs., London. A statement of the naphthalene difficulty at Hastings, and the method of overcoming it, giving an account of the investigations. Appendix and discussion follow. 16000 w. Gas Wld—May 8, 1897.

**Carburine.**—On Three Years' Use of Carburine as an Enricher. Joseph Davis. Read before the Incorporated Gas Inst. at Bath, Eng. Results of experience during the last three years in working the Maxim-Clark process. Describes apparatus and method of working it. Also discussion. 8000 w. Gas Wld—June 19, 1897.

**Charging Apparatus.**—Charging Apparatus for Small Works. R. Watson. Read at meeting of Southern District Assn. of Gas Engineers and Managers, in England. Describes a method of scoop-charging. Discussion. Ill. 8800 w. Gas Wld—Nov. 13, 1897.

Charging Apparatus for Small Works. R. Watson. Illustrates and describes a simple, efficient and cheap scoop-charging apparatus. 2000 w. Gas Engs Mag—May 10, 1898.

The Bronder Improved Apparatus for Discharging Retorts. Illustrated description as given in the specification. 3600 w. Am Gas Lgt Jour —Dec. 27, 1897.

The Brouwer-Rouget Coke-Conveyer and Retort-Charger. Illustrated description. 700 w. Jour Gas Lgt—June 21, 1898.

The Mechanical Charging and Discharging of Gas Retorts (Chargement et Déchargement Mécaniques des Cornues à Gaz). An illustrated description of the Brackenburg hydraulic apparatus, as applied to the Lachomette retorts and furnaces. 1800 w. 1 plate. Génie Civil—March 10, 1900.

See also Conveyer.

**Charging Apparatus, Kemmerling.**—The Kemmerling System of Mechanical Chargers and Drawers for Gas Retorts. G. Velleman. A description of the Kemmerling apparatus which has been used for four years at Kalk with complete success. Translated from "Revue Universelle des Mines," etc. 5500 w. Pro Age—Oct. 1, 1897.

**Chemical Processes.**—Chemical Processes in Gas Works. W. Leypold. Abstract of a lecture given at the general meeting of the Assn. of German Chemists at Hamburg. Serial. Jour Gas Lgt—Feb. 1, 1898.

**Chemistry.**—The Application of Chemistry in the Management of Small Gas Works. Suggestions of methods and description of tests that may be of use to a manager who is not a chemist. 2000 w. Jour of Gas Lgt—Nov. 23, 1897.

**Coal Tests.**—See CALORIFIC VALUE; COAL TESTS.

**Coke Fuel.**—Gas Coke for Generator Fuel. C. M. Converse. Read before the Pacific Coast Gas Assn. Relates the difficulties met in learning how to use this fuel, and how they were overcome. Discussion. 3800 w. Am Gas Lgt Jour —Aug. 22, 1898.

**Coke Ovens.**—See COKE OVEN—By-Products; COKE OVEN GAS.

**Contamination in Holders.**—See GAS CONTAMINATION.

**Conveyor.**—The Brouwer Quenching Conveyor of the Gas Works at Saint-Quentin and Fontainebleau, France. Translated from "Journal des Usines à Gaz." Illustrated account of operation. 500 w. Pro Age—Feb. 1, 1898.

See also Charging Apparatus.

**Coyne Process.**—Improvement in Gas Manufacture. Describes the process patented by John Coyne, of Pittsburg, whereby he asserts that 50,000 cubic feet of gas is secured from a ton of coal. Ill. 1400 w. Am Mfr & Ir Wld—June 14, 1900.

**Cyanides.**—A Method for the Estimation of Ferrocyanides in Old Purifying Material. E. Donath and B. M. Margosches, in "Zeitschrift für Angewandte Chemie." Describes the process and method of applying to old purifying material. 1200 w Am Gas Lgt Jour—Feb. 19, 1900.

Cyanides in Gas Manufacture. Herman Poole. Discusses the question of the quantity of cyanides from gas that is wasted, and how to remedy the matter. 3500 w. Am Gas Lgt Jour —Nov. 22, 1897.

Cyanides in the Gas and Waste Products at Columbus, O. E. E. Eysenbach. Read before the Western Gas. Assn. Gives the results of quantitative determinations, and concludes that higher percentages are necessary before the cyanides can be extracted economically. Discussion. 1500 w. Am Gas Lgt Jour—July 3, 1899.

Dr. Bueb's Cyanide Recovery Process. A review of a communication by Dr. Scharrer, published in the "Journal für Gasbeleuchtung," with arguments showing that Dr. Bueb's process follows very closely the process used at Beckton. 2000 w. Jour Gas Lgt—Jan. 9, 1900.

Notes on Cyanogen as a Gas Works Residual. G. P. Lewis. Read before the Inst. of Gas Engs., London. Considers cyanogen compounds, recovery from crude gas, extraction from spent oxide, etc., with discussion. 10000 w. Gas Wld —May 8, 1897.

Notes on Cyanogen in the Manufacture of Coal Gas. M. G. Perthius. Gives results of some experiments made by the author on the production of cyanogen in retorts. 900 w. Gas Wld—Oct. 16, 1897.

The Absorption of Hydrocyanic Acid from Illuminating Gas. Dr. A. Smits. Paper communicated to the International Gas Congress, Paris, on the production of yellow prussiate (ferrocyanide) of potash by the wet process. 900 w. Jour Gas Lgt—Sept. 18, 1900.

The Production and Consumption of Cyanides. Part first presents the necessity of the gas manager keeping informed on the progress of processes for gold recovery in order to anticipate the demand for cyanides; and also to keep informed regarding its production from other sources. Serial. Jour Gas Lgt—May 10, 1898.

The Production and Manufacture of Cyanides in Gas Works. Dr. Bueb. A paper before the International Gas Congress, Paris, giving a process of extracting cyanogen from illuminating gas by contact with a solution of an iron salt. 2000 w. Jour Gas Lgt—Sept. 18, 1900.

The Production of Cyanide in Gas Works. Illustrated description of process and apparatus. 700 w. Am Mfr & Ir Wld—March 6, 1896.

Transformation into Alkaline Ferrocyanides of the Sulphocyanides Produced During the Manufacture of Illuminating Gas. M. Andre Dubosc. Communicated by the author to the Industrial Society of Rouen. Examines the importance of the by-products comprised under the general classification of sulpho and ferrocyanides. 1300 w. Am Gas Lgt Jour—Feb. 8, 1897.

See also By-Product.

**Details.**—President's Address Before the Waverley Association of Gas Managers. W. B. McLusky. A review of the working details of small gas works, considering carbonizing, coal temperature and purification, and unaccounted for gas. Also discussion. 5400 w. Jour Gas Lgt—Sept. 19, 1899.

Wrinkle Department at the Meeting of the Western Gas Association. Results of experiences, opinions, methods, and other practical information make up this paper, which is edited by a member of the association. 6800 w. Am Gas Lgt Jour—June 1, 1896.

**Efficiency.**—Gas Versus Electricity Direct from Coal. D. M. Dunning. Showing that the invention of Dr. Jacques offers no serious menace to the gas industry. 3200 w. Eng Mag—Sept., 1896.

**Enrichment.**—Enrichment of Coal Gas. George H. Harper. Read at Detroit meeting of the Western Gas Assn. A summary of what is known concerning this question, discussing the methods in general use. Followed by a contribution to the discussion by W. W. Goodwin, entitled "Enrichment of Coal Gas by Acetylene," and a general discussion. 11000 w. Pro Age—June 1, 1898.

Enrichment of Coal Gas. George H. Harper. A summary of what has been said and written on this subject. Serial. Gas Engs' Mag—Feb. 10, 1899.

Enrichment of Coal Gas. O. M. Gregory. Read before Pacific Coast Assn. A comparison of results of three months trial with each of three enrichers—namely, shale, gasoline, and petroleum oil. Experiments were made in San José, Cal. Discussion. 2800 w. Am Gas Lgt Jour—Aug. 31, 1896.

Notes on the Enrichment of Coal Gas. The first of a series of articles making a study of methods of enrichment. 3200 w. Jour Gas Lgt—Sept. 7, 1897.

The Carbonization of Cannel and Shales for Gas-making Purposes. Samuel Glover. Read before the Inst. of Gas Engs. How to make the best use of enrichment material when it is subjected to distillation or decomposition of heat. 6200 w. Gas Wld—May 5, 1900.

The Enrichment of Coal Gas. George Livesey. Read before the Inst. of Gas Engs. Considers whether enrichment is advisable. General discussion. 6000 w. Gas Wld—May 5, 1900.

The Self-Enrichment of Coal Gas. R. G. Shadbolt. Read at Eastern Counties' Gas Managers Assn., Retford. An exceedingly interesting account of a series of persistent experiments resulting in the development of a new method for which a patent has been secured. The method is simple and requires no labor expenditure after the apparatus (illustrated) has been installed. An average enrichment of two candles is claimed as the result. Discussion postponed till ensuing meeting. 4500 w. Gas Wld—Sept. 19, 1896.

The Self-Enrichment of Coal Gas. Mr. Shadbolt. Résumé of a former paper and the results of further experiments, followed by discussion. Read at Peterborough, Eng., before Eastern Counties' Gas Mgrs. Assn. 3800 w. Gas Wld—April 24, 1897.

**Enrichment, Acetylene.**—See **ACETYLENE—Enriching Gas.**

**Equer's Apparatus.**—Equer's Apparatus for Manufacturing Gas. A summary of the scope of this apparatus, with illustrations. 1500 w. Am Gas Lgt Jour—Jan. 23, 1899.

**Exhausters.**—Gas Exhausters and Gas Exhausting Plant. R. Hargraves. Abstract of paper read at meeting of the Manchester, Eng., Assn. of Engineers. Reviews the introduction and development of exhausters, the engines usually used for driving, and shows that the best plant for exhausting coal gas was far behind the present practice. Discussion. 4000 w. Jour Gas Lgt—March 28, 1899.

Gas Exhausters and Gas Exhausting Plant. R. Hargraves. Condensed paper read before the Manchester Assn. of Engs. Shows that the most up-to-date plant for exhausting coal gas is behind good engineering practice of the present day. 2200 w. Gas Engs' Mag—Aug. 10, 1899.

The Automatic Regulation of the Speed of Exhausters. Matthew Dunn. Read before the North of England Gas Managers' Assn. Describes an appliance, and its working, proved to automatically regulate the speed of exhausters when driven either by gas or steam engines. Also discussion. 6800 w. Jour of Gas Lgt—Oct. 5, 1897.

**Exhausting and Condensing.**—Gas Exhausting and Condensing. C. C. Carpenter. Paper read before the Southern District Assn. of Gas Engineers and Managers, with discussion. A consideration of and dissertation upon what are ordinarily the first two stages in dealing with coal gas after it leaves the foul main of the retort-house. 4000 w. Gas Wld—Nov. 16, 1895.

**Fitchburg.**—Some Comparisons of Gas Making, from 1853 to December, 1896, and Some of the Writer's Experiences at the Small Gas Works at Fitchburg. The paper is almost entirely devoted to gas-making in Fitchburg, and is followed by short discussion. 2500 w. Am Gas Lgt Jour—March 22, 1897.

**Fogarty Process.**—See **AMMONIA—Fogarty Process.**

**Furnaces.**—Furnace Jottings. Maurice Graham. From "Journal of Trade Journals," Birmingham, England. On the system of inclined retorts, and the successful working of a furnace. 2300 w. Am Gas Lgt Jour—July 28, 1897.

See also **GAS RETORT.**

**Governor.**—See **GAS DISTRIBUTION.**

**Hanley, Eng.**—Inaugural Address of Mr. John Young, before the Midland Association of Gas Managers. The address is largely confined to experiences in Hanley. Carburetted water gas, naphthalene deposits, and other subjects of interest are discussed. 6000 w. Gas Wld—Feb. 27, 1897.

**Hexane.**—The Decomposition of Hexane by Heat. F. Haber and H. Samoylowicz. Main features of some recent German experiments. 1200 w. Gas Wld—Sept. 5, 1896.

**History.**—Notes Upon the Early History of Gas Manufacture. H. C. Slaney. Read before the Brooklyn Engs'. Club. Reviews the history of this industry, its works and accessories. Ill. 3500 w. Pro Age—May 15, 1899.

**Hydraulic Mains.**—A Difference in Hydraulic Mains. P. Egan. Read at North of Ireland Assn. of Gas Managers, and followed by discussion. Treats of pitched mains and choked ascension-pipes. 2000 w. Jour Gas Lgt—Aug. 24, 1897.

The Evolution of the Hydraulic Main. William Carr. Read before the Incorporated Gas Inst., England. Shows how the hydraulic main was made to serve its purpose in the early days of its use, and reviews the improvements made necessary by changed conditions. Discussion. Ill. 11500 w. Gas Wld—June 17, 1899.

The Hydraulic Main and Its Fittings. L. A. Guyatt. Read before the Eastern Gas Mgrs.' Assn., England. Illustrates and describes a form of tar-overflow used in the Vauxhill and Bankside works of the South Metropolitan Gas Co. 1700 w. Gas Engs' Mag—May 10, 1899.

The Work of the Hydraulic Main and Condenser. S. Carpenter. Explains the working of the wet main and what the writer has found best in his experience. Serial. Jour of Gas Lgt—Dec. 7, 1897.

**Incandescent Fire Frame.**—See **GRATE—Coke.**

**Lewes' Method.**—Lewes' Method and Apparatus for Manufacturing Gas. Description as given in the patent specification. Ill. 3000 w. Am Gas Lgt Jour—Dec. 26, 1898.

**Liquid Fuel.**—See Oil Fuel; **LIQUID FUEL.**

**Lubrication.**—See **LUBRICATION—Gas Industry.**

**Manjak.**—See **MANJAK.**

**Mechanical Charging.**—See **Charging Apparatus.**

**Modern Methods.**—Modern Methods of Manufacturing Gas; With a Description of Its Distribution under High Pressure. Frederick H. Shelton. Reviews the processes, and their advantages and disadvantages, and advocates high pressure distribution. Also discussion of the paper. 4800 w. Pro Engs' Club of Phila—July, 1900.

**Naphthalene.**—A Method of Preventing Naphthalene Obstructions. Dr. Bueb. A paper before the International Gas Congress, Paris, giving a process of abstracting naphthalene from gas by bringing the latter, as it leaves the tar extractor, into intimate contact with a tar oil of very high boiling point. 1000 w. Jour Gas Lgt—Sept. 18, 1900.

Naphthalene in Modern Gas Manufacture, and the Carburetting of Illuminating Gas. William Young and Thomas Glover. Read before the Incorporated Gas Inst., at Bath, Eng. An account of the methods hitherto employed in reference to naphthalene, and an account of the new methods devised by the authors. 4500 w. Gas Wld—June 19, 1897.

Naphthalene from Retort to Point of Deposition. William Young. Shows the important part the crystalline condition of the naphthalene plays in producing troubles, and considers the remedies. Discussion. 9800 w. Gas Wld—June 16, 1900.

The Presence of Naphthalene in Coal Gas. Wilfred Irwin. Read before the Inst. of Gas Engs. Its detection and extraction are discussed, and a table is given showing the condensable constituents of gas produced by a ton of Lancashire coal carbonized at a high temperature, with comments. Lengthy discussion. 8000 w. Gas Wld—May 5, 1900.

Young and Glover's Naphthalene Remedy. Reproduction of the patent specification. 2500 w. Gas Wld—Sept. 11, 1897.

**Nitrogen.**—History of Nitrogen in Coal. Herman Poole. The object of the article is to recount some of the sources of the nitrogen in coal and to trace its history through its various changes. 2000 w. Am Gas Lgt Jour—Feb. 7, 1898.

Nitrogen in Coal. William Foulis. Abstract of address before the Incorporated Institution of Gas Engineers. Suggestions pointing out the direction in which further investigations may be made to recover the greater portion of the nitrogen now lost in the coke. 1400 w. Am Mfr & Ir Wld—July 17, 1896.

The Recovery of Nitrogen in Coal Distillation. W. Carrick Anderson, and James Roberts. Extract from a paper read before the Scottish section of the Soc. of Chem. Ind. An account of experimental investigations concerning the way nitrogen distributes itself on heating, and obstacles to be overcome. 6000 w. Gas Wld—Jan. 20, 1900.

**Nitrogenous Products.**—On the Nitrogen and Nitrogenous Products of Coal. Dr. Knublauch. Paper read before the German Gas Assn. A record of several years experiments at the Cologne gas works, and in the author's own laboratory. 1000 w. Pro Age—May 1, 1896.

**Oil.**—Determining the Gas-Making Value of Mineral Oils. Dr. F. Helfers. Abstract translation from the "Zeitschrift fuer Angewandte Chemie." Results of tests made by the use of Wernecke's Laboratory Gas-Making Apparatus, which gives correct results from the gasification of 1.4 oz. of oil. 1300 w. Jour Gas Lgt—March 23, 1897.

Some Notes on an English Oil Gas Process. F. Egner. Describes R. W. Herring's method as used at the Corporation Gas Works, Huddersfield, Eng. 1600 w. Am Gas Lgt Jour—July 5, 1897.

See also **PINTSCH GAS.**

**Oil and Tar Fuel.**—Some Notes on Oil and Tar Burning. Benjamin J. Allen. Read before the New England Assn. of Gas Engs. An account of experiments from the experience of the writer, with general discussion. Ill. 5000 w. Am Gas Lgt Jour—March 26, 1900.

**Oil Fuel.**—The Application of Oil for the Production of Illuminating Gas. C. Hunt. Read before the Midland Assn. of Gas Managers. Gives brief historical review, extant processes, effect of temperature, the Peebles process, etc. 4500 w. Gas Wld—Feb. 27, 1897.

The Use of Crude Petroleum for Firing Benches. R. M. Powers. Read before the Pacific Coast Gas Assn. On the employment of oil as a fuel under benches. Also general discussion. 3700 w. Am Gas Lgt Jour—Aug. 6, 1900.

**Oil Heater.**—An Efficient Oil Heater. E. C. Jones. Read before the Pacific Coast Gas Assn. Illustrates and describes a heater which has successfully heated both crude oil and distillates for two 12-foot generators, making 1,000,000 feet of gas each per 24 hours, but running alternately. Discussion. 4800 w. Am Gas Lgt Jour—Aug. 22, 1896.

**Practical Notes.**—Practical Notes on Gas Manufacture. S. Carpenter. Notes and facts from experience intended for help of those who have not had a liberal education. Serial. Jour Gas Lgt—Oct. 2, 1900.

**Pressure Delivery to Holders.**—The Rapid Delivery of Gaseous Bodies into Reservoirs under Pressure (Ueber Beziehungen der Pressungen Gasförmiger Körper an Stauflächen in Hoher Geschwindigkeit). Paul Fuchs. An examination of the action of a pressure-blower in delivering gas into a holder; with curves showing the effects of various pressures and velocities. 1200 w. Gesundheits Ingenieur—Feb. 15, 1900.

**Purification.**—See **GAS PURIFICATION.**

**Recuperator Benches.**—Recuperator Benches for Coke and Coal Firing. Daniel R. Russell. Read before the Pacific Coast Assn. Explains the conditions requisite for the installation of semi-recuperator benches, and their operation, giving a table of comparative results. Discussion. 3800 w. Am Gas Lgt Jour—Aug. 23, 1897.

**Regenerative System.**—The Advantages of the Regenerative System for Small Gas Works. John Lyne. Read before the Incorporated Gas Inst., England. An account, based upon the author's experience at Wexford, of the benefit resulting from the adoption of this system. Discussion. 5800 w. Gas Wld—June 17, 1899.

**Regenerator Furnaces.**—Regenerator Furnaces for Small Gas Works. W. B. Randall. Read before the So. Dist. Assn. of Gas Engs. & Mangrs. Describes furnaces and their workings; clinkering; effect upon residuals, etc., and is followed by discussion. 4800 w. Gas Wld—Nov. 14, 1896.

**Regenerator Settings.**—Observations on the Construction and Working of Regenerator Settings. W. J. Jenkins. Read before the Eastern Counties' Gas Managers' Assn. The diversity of retort settings, advantages and disadvantages of different methods, practical considerations and useful modifications. 4400 w. Am Gas Lgt Jour—Oct. 12, 1896.

Observations on the Construction and Working of Regenerator Settings. W. J. Jenkins. Read at the Eastern Counties' Gas Managers' Assn., Retford. The aim of the paper is to point out divergencies from a reasonable theory as found in many types of construction and to evoke discussion on the opinions advanced. 4200 w. Gas Wld—Sept. 19, 1896.

Experiences with Regenerative Settings. Frank Prentice. Read before the Eastern Counties Gas Managers' Assn. A record of troubles and partial failures. Followed by discussion. 4200 w. Jour Gas Lgt—Sept. 14, 1897.

**Reminiscences.**—Reminiscences of Gas Manufacturing and Kindred Matters. F. H. Eichbaum. Personal experiences, with brief discussion. Read at annual meeting of Pacific Coast Assn. 3400 w. Am Gas Lgt Jour—Aug. 16, 1897.

**Retort.**—See **GAS RETORT.**

**Reversible Reactions.**—Reversible Reactions in Gas-Making. Abstract translation of paper by Dr. Smits, in "Het Gas." Explains the reactions. 1200 w. Gas Wld—Feb. 24, 1900.

**Review, 1887-96.**—Nine Years Ago and Now. William Foulis. Inaugural address on the recent progress in the manufacture of gas. 5500 w. Gas Wld—May 16, 1896.

**"Rouen" Furnace.**—The Rouen Furnace for Carbonic Oxide (Four à Oxyde de Carbone dit "Four de Rouen"). An illustrated description of the improved regenerative gas furnace for heating gas retorts by producer gas. 2500 w. Génie Civil—May 8, 1897.

**Separator.**—An Oil-Tar Separator and Its Results. J. R. Lynn. Read before the Western Gas Assn. Illustrated description of the apparatus used by the Detroit Gas Co.—and the results. Discussion. 5700 w. Pro Age—June 1, 1897.

Decanter-Separator for Tar and Liquor. M. G. Ymonet. Read before the Société Technique du Gas en France, 1899. Abstract. Illustrates and describes the method. 500 w. Gas Wld—Aug. 26, 1899.

**Steam Raising.**—Economical Methods of Raising Steam in Gas Works. C. Drury. Read at meeting of the North of England Gas Managers' Assn. Shows the need of steam in gas works and discusses the methods whose cheapness recommends them, giving especial attention to heating the boiler by means of waste gases from the retort settings. Discussion. 3800 w. Jour Gas Lgt—May 3, 1898.

**Sulphate of Ammonia.**—See **AMMONIA.**

**Tar.**—The Prevention of the Thickening of Tar. Abstract translation of a paper read by Herr G. Liegel before the German Assn. of Gas and Water Engs., at Cassel. States difficulties arising from this trouble, the researches made, and the author's manner of working his retorts, which has resulted in freedom from all troubles arising from thick tar. 3700 w. Jour Gas Lgt—Sept. 5, 1899.

A Commentary on Herr G. Liegel's Paper on Preventing the Thickening of Tar, with a Practical Illustration. Frederic Egner. 1700 w. Am Gas Lgt Jour—Oct. 16, 1899.

The Utilization of Coal Tar by Distillation. Edward J. Elles. Read at meeting of Mich. Gas Assn., at Port Huron, Mich. Data relating to the production of pitch, light and heavy oils and ammoniacal liquor obtained from actual results by the distillation of coal tar from the plant of the Detroit Gas Co. Ill. 8200 w. Pro Age—March 1, 1898.

See also **COAL TAR.**

**Temperatures.**—Observations on Retorting and Condensing Temperatures. Forbes Waddell. Read before the North British Assn. of Gas Mgrs. An account of experiments made by the writer with the view of saving of heat and returning it to the setting, and of cooling the products more gradually. Gives results and discussion. 4000 w. Jour Gas Lgt—Aug. 14, 1900.

Temperatures in Condensation. W. H. Barthold. Read before the Western Gas Assn. Also discussion. An account of experience at Grand Rapids, Mich. 5300 w. Pro Age—June 1, 1900.

The Effect of Temperature upon Gas. W. E. McKay. Read before the New England Assn. of Gas Engs. Gives table for carburetted water-gas saturated with aqueous vapor, no other vapors being present, showing the changes made by change of temperature, with discussion of the subject by the writer and members. 8400 w. Am Gas Lgt Jour—March 8, 1897.

**Widnes, Eng.**—The Cheapest Gas in the World. An interview with Mr. Isaac Carr, manager of the gas works at Widnes, Eng., as to how this gas is produced. 2500 w. Gas Wld—July 16, 1898.

## GAS METER.

See also **GAS INDUSTRY.**

Dry Meters, Their Advantages and Defects. Abstract translation of paper by W. Asselbergs. Comparison of wet and dry meters, with illustrated description of the Haas meter. 2200 w. Gas Wld—Sept. 22, 1900.

Gas and Gas Meters. Herbert S. Wynkoop. Discusses the causes of poor gas, and the accuracy of gas meters. Ill. 3000 w. Pop Sci M—June, 1900.

Measurement of Gas. C. W. Hinman. Read before the New England Assn. of Gas Engineers. Concerning the apparatus used for measuring, the requisites of gas meters, diaphragms, capacity, etc., with discussion. 4800 w. Am Gas Lgt Jour—March 15, 1897.

Wet and Dry Meters. P. Bigeard. Read before the International Gas Congress, at Paris. A discussion of the two methods, their advantages and disadvantages. 1500 w. Jour Gas Lgt—Oct. 2, 1900.

**Automatic.**—A Field for the Automatic Gas Meter. Edward A. Harman. A discussion of the automatic meter as a factor in extending the use of gas for lighting and cooking; and showing the simplification in accounting effected by its use. 1200 w. Eng Mag—March, 1899.

Gas Supply by Automatic Meter. H. O. Eldridge. Read at meeting of So. Dist. Assn. of Gas Engs. and Mgrs., England. Also discussion. Outlines the conditions and success attained at Tottenham. 5500 w. Gas Wld—Nov. 11, 1899.

Automatic Meters: With a Comparison of the Price Charged for Gas Consumed by Slot and Ordinary Consumers. Paper read before the N. Brit. Assn. of Gas Mgrs., with discussion. 8500 w. Gas Wld—Ang. 4, 1900.

Gas Supply by Automatic Meter. H. O. Eldridge. Read before the So. Dist. Assn. of Gas Engs. and Mgrs. Discusses the difficulties, troubles and successes of supply by automatic meters. 2300 w. Gas Engs' Mag—Jan. 10, 1900.

The Automatic Coin Meter. Norton H. Humphrys. Discusses their use, referring to recent papers and their discussions. 2700 w. Jour Gas Lgt—Dec. 12, 1899.

The Popularization of Gas. A. Dougall. The coin-meter system is the principal topic, but the general supply of gas and hire of fittings are also treated, and a form of agreement for such service is presented. 8400 w. Gas Wld—June 13, 1896.

See also **Prepayment; Slot Consumption.**

**English Manufacturers.**—Amalgamation of Meter Makers. Reports the union of four companies in the North of England, and gives a short account of the origin, progress and present position of each. 1500 w. Gas Wld—Sept. 25, 1897.

**Evolution.**—The Evolution of the Gas Meter. C. H. Dickey. A defence of the gas meter as an honest indicator of gas consumption. 1500 w. Am Gas Lgt Jour—Aug. 24, 1896.

**Prepayment.**—My Experience with Prepayment Meters. R. Ross. Read before the North of Ireland Assn. of Gas Managers. Gives an account of the difficulties met, but reports satisfactory results. Discussion. 2800 w. Gas Wld—Aug. 13, 1898.

Notes on Prepayment Meters. A. H. Strecker. Read before the Am. Gas Lgt. Assn. Gives deductions drawn from experience. 2800 w. Am Gas Lgt Jour—Oct. 30, 1899.

Prepayment Meters. M. Van der Horst. Three months' experience with these meters in Utrecht, Holland. 1800 w. Pro Age—July 15, 1896.

Prepayment Meters. John D. McIlhenny. Read at meeting of Ohio Gas Light Assn. A discussion of results, cost, etc. 5000 w. Am Gas Lgt Jour—April 9, 1900.

Slot Cookers and All About Them. E. W. T. Richmond. Shows the penny-in-the-slot device to have been known before the Christian era, briefly considers the modern applications, and sketches the history of the prepayment system in connection with automatic meters and the growth of gas-cookers in this connection. Ill. Serial. Jour Gas Lgt—Nov. 15, 1898.

The Prepayment Meter. C. H. Raynor. Read at Detroit meeting of the Western Gas Assn. Reports the experiences of various companies using these meters, and the advantages of their use. Discussion. 7000 w. Pro Age—June 1, 1898.

The Prepayment Meter System. Part first deals with its history and development. Serial. Gas Engs' Mag—Nov. 10, 1899.

See also **Automatic; Slot Consumption.**

**Prepayment, Holland.**—Results with Prepayment Meters, in Holland. P. Boisius. Read before the International Gas Congress, at Paris. Particulars of results attending the adaption of this system. The general conclusion is favorable. 2500 w. Jour Gas Lgt—Sept. 25, 1900.

**Prepayment, Manchester.**—Prepayment Meters in Manchester, England. Charles Nickson. A brief account of the difficulties, increased demand for gas, and the financial results from their introduction. One year's collection of pennies amounted to 4,727,541, or a weight of 44 tons. 900 w. Gas Wld—Sept. 24, 1898.

**Prepayment, Perth, Scotland.**—Experiences with Prepayment Meters. A. Wilson. Read at meeting of North British Assn. of Gas Managers. An account of the experiences in Perth, Scotland, where over 1100 are in use. Discussion. 2000 w. Gas Wld—Aug. 6, 1898.

Experiences with Prepayment Meters. Andrew Wilson. Read before the North British Association of Gas Managers. Describes the introduction and management of over 1000 such meters at Perth; the results were very satisfactory. Discussion. 2200 w. Am Gas Lgt Jour—Sept. 19, 1898.

**Reading.**—X-Rays on the Gas Bill. An explanation of the method of meter reading and making of charges, with the aim of removing the district and misunderstanding of the general public. 3300 w. Am Gas Lgt Jour—Dec. 6, 1897.

**Slot Consumption.**—Slot Consumption Where Meters and Fittings, etc., are Supplied. George Helps. An opinion on paying averages, and one way of obtaining them. 2500 w. Jour Gas Lgt—Aug. 28, 1900.

**Temperature Influence.**—The Application of the Expansion of Fluids to the Correct Measurement of Gas Passing Through Meters. W. W. Fiddes. Deals with the unaccounted for gas, resulting from temperature effects upon the action of meters. With discussion. 6400 w. Gas Wld—May 23, 1896.

The Measurement of Gas in Relation to Temperature. George Livesey. The effect of temperature upon gas metering and the need of some way of ascertaining how much a record of measurement may be vitiated thereby is the burden of the paper. 1600 w. Gas Wld—May 23, 1896.

**Testing.**—Meter Testing. Paul Doty. Read before the Michigan Gas Assn. A description of meter testing and records and results of testing over 5000 meters. 1800 w. Pro Age—March 1, 1900.

**Testing-Station.**—A Gas-Meter Testing-Station. A sketchy description of equipment and methods in the testing-station, London, Eng. 2000 w. Jour of Gas Lgt—Feb. 11, 1896.

**Unions.**—Standardizing of Meter Unions. Robert S. Carlow. Read at Belfast meeting of the Incorporated Gas Inst. A résumé of the reports and discussions of the North British Assn. Followed by discussion. 4000 w. Gas Wld—June 25, 1898.

## GAS MOTOR.

See **GAS ENGINE; GAS TRAMWAY.**

### GASOLINE.

**Supply.**—The Supply of Moto-Car Spirit or Petrol. George Herbert Little. Notes that a great majority of these vehicles use products of petroleum and discusses the facilities for a proper supply and distribution of the oil known as moto-car spirit and petrol. 1800 w. Automotor Jour—Nov. 15, 1898.

### GASOLINE-ELECTRIC TRAMWAY.

The Patton Gasoline-Electric Motor for Street Railways. Describes a self-contained motor car, driven by electricity which is generated by a gasoline engine and electric dynamo on the car. 600 w. Eng News—Nov. 11, 1897.

### GASOLINE ENGINE.

See also **GAS ENGINE; GASOLINE VEHICLE; OIL ENGINE.**

A New Gasoline Motor. From "La Nature." Illustrates a motor and carbureter and explains the process by which it manufactures its supply of gas for itself. 1200 w. Sci Am Sup—Jan. 14, 1899.

Economy in Small Power. A comparison between steam and gasoline engines from the user's standpoint. 2800 w. Ir Age—April 6, 1899.

The Gasoline Engine. H. S. Pell. Read before Toronto No. 1 Canadian Assn. of Stationary Engs. Discusses the main features of the gasoline engine, the characteristics of the fuel, etc. 3800 w. Can Elec News—March, 1900.

The Gasoline Engine. E. W. Roberts. Briefly discusses the nature of gasoline, the advantages and uses of the gasoline engine and the principles of construction. 1500 w. Home Study—Jan., 1899.

**Air Compressor.**—See **AIR COMPRESSOR—Gasoline.**

**Automobile.**—Liquid Fuel Motors for Vehicles (Fahrzeugmotoren für Flüssige Brennstoffe). Hugo Güldner. A fully illustrated account of many types of liquid fuel motors. Serial. Zeitschr d Ver Deutscher Ing—April 28, 1900.

The Oil Engine for Motor Cars. Considers the oil engine as it is and as it ought to be, chiefly with view to its application to self-propelled vehicles. Serial. Engr, Lond—Jan. 6, 1899.

See also **GASOLINE VEHICLE.**

**Banki.**—Tests of the Banki Motor (Versuche am Banki-Motor). E. Meyer. A discussion of the data and results of this new internal combustion motor, showing the excellent results obtained. Illustrations showing the construction of the motor are given. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 11, 1900.

The Banki Motor and Other Heat Motors (Der Banki Motor und die Wärmemotoren). E. Schimanek. A general description of the Banki internal-combustion motor, and a comparison of its performance with other motors; based on the recent tests. Three articles. 12000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 10, 17, 24, 1900.

**Bidaud.**—Improved Gasoline Motor (Noveau Moteur à Essence de Pétrole). An illustrated description of the Bidaud motor, well adapted for use on automobiles. 1000 w. Génie Civil—Oct. 1, 1898.

**Boat.**—Double-Acting Oil Engines for Boat Propulsion. Illustrated general description. 500 w. Engng—April 24, 1896.

The Gasoline Engine in Boats. Herbert L. Towle. A comparison of the engine power in steam and gasoline launches, with discussion of speed, etc. Ill. Serial. Am Mach—Oct. 12, 1899.

Marine Gasoline and Gas Engines as Used in Modern Motor Boats. Cecil H. Peabody. A statement of the principle of these engines and the difficulties in their design and construction. Serial. Marine Engng—June, 1898.

See also **Griffin; Wolverine; BOAT; GASOLINE YACHT.**

**Borax Mine.**—Gasoline Engines and Borax Mines. The successful application of these engines to an arid region and their adaptability to trying conditions are described. There is a cut of a direct connected air compressor, and a view of a borax mine. 800 w. Min & Sci Pr—March 7, 1896.

**Car.**—See **CAR—Automotor; Gasoline Motor.**

**Classification.**—See **GAS ENGINE.**

**Cooling.**—The Cooling of Explosion Motors. Extracts from the report of MM. Grouvelle and Arquembourg, at the International Congress. Discusses the two systems commonly employed. Ill. Serial. Horseless Age—Aug. 22, 1900.

**Daimler.**—A Small High Speed Gasoline Motor. W. O. Amsler. Illustrated description of a special design by Mr. Gottlieb Daimler, of Cronstadt, Germany. 1700 w. Sib Jour of Engng—March, 1897.

See also **GASOLINE VEHICLE.**

**Dawson.**—The Dawson Oil Motor. A general description explaining the principles, with a detailed account of its construction. Ill. 1700 w. Automotor Jour—April, 1900.

**De Dion.**—The De Dion Motor and Its Antecedents. Outline history of the light and heavy oil-engine, considering the De Dion and Bouton patents. 2800 w. Automotor Jour—April, 1900.

**Electric Ignition.**—A Storage Battery Spark Ignition. Hugh Dolnar. An illustrated detailed description of a spark outfit for mechanically propelled vehicles. 2000 w. Am Mach—Aug. 9, 1900.

Electric Ignition of Petrol Motors. E. C. Rimington. Considers briefly the principles of the induction coil, which is used to obtain the spark in the cylinder of the engine, the construction and the causes of failure to insure ignition. 2700 w. Automotor Jour—April, 1900.

See also **GAS ENGINE; GASOLINE VEHICLE.**

**Griffin Launch.**—The Griffin Oil Launch Engine. Illustrated detailed description. 1600 w. Engng—Nov. 24, 1899.

**Hoskins.**—The Hoskins Gasoline Motor for Street Cars. This motor car is built in the United States and is being tested at Dayton, Ohio. All machinery is beneath the body of the car, the engines are in motion constantly and engage with the drivers by means of friction pulleys. 700 w. Eng News—March 12, 1896.

**Mines.**—Gasoline Engines in Mines. Brief illustrated description of gasoline engine hoisting and pumping installations in California. 900 w. Min & Sci Pr—Dec. 7, 1895.

**Mors Vertical.**—The New Mors Vertical Petroleum-Spirit Motor. Illustrates and describes a new motor of the vertical twin-cylinder type, capable of working up to 8 h. p. 900 w. Ind & Ir—Aug. 4, 1899.

**Nijni-Novgorod Exposition, 1896.**—See **GAS ENGINE.**

**Otto.**—Tests of a 10 H. P. Otto Gasoline Engine. H. A. Soverhill. Tests made to determine the gasoline consumption per brake and indicated horse-power per hour, the mechanical efficiency of the engine, and also a heat balance. Ill. 1000 w. Tech, No. 14—1899-1900.

The New Otto Petroleum Motor (Nonveau Moteur à Pétrole "Otto"). The principal novelty lies in the valve gear, which is operated by an eccentric, giving much less noise than a gear and cam motion. The petroleum is used as a spray, with tube ignition and the usual Otto cycle. Serial. Le Génie Moderne—Oct. 15, 1897.

**Pattern Making.**—See **PATTERN MAKING.**

**Peugeot.**—The Peugeot Petroleum Motor. Describes a recently designed motor, to be used in mechanically propelled carriages. Ill. 2000 w. Engng—May 21, 1897.

**Philippines.**—Gasoline Engines in the Philippines. Hints to exporters, illustrating changes made by native workmen, and the incorrect erection of the machines. 2100 w. Am Mfr & Ir Wld—Oct. 25, 1900.

**Pumping Plants.**—Gasoline Engines in Pumping Plants. Gives the cost of operation of a number of plants supplying railway divisions. 2000 w. Eng Rec—Nov. 18, 1899.

Tests of Gasoline Engines in Pumping Plants. Gives the results of a number of tests by J. W. Ledoux. 500 w. Eng Rec—Feb. 11, 1899.

See also **GAS ENGINE—Waterworks.**

**Pumps.**—Gasoline and Oil Engines for Pumps. Illustrated comparison of the cost of pumping small volumes of water by internal combustion engines and steam, and a description of two water-works having kerosene-engine plants. 1200 w. Eng Rec—Dec. 24, 1898.

**Railway.**—See **CAR—Automotor; Gasoline Motor.**

**Regulators.**—Speed Regulators for Petroleum Engines. Anthony G. New. Considers the method of regulating the speed of the engine by varying the time of ignition, and compares it with the tube-ignition engine, fitted with hit-and-miss governor. 1000 w. Automotor—May 15, 1899.

**Secor.**—The Secor Oil Motor. Hugh Dolnar. Reply to the criticisms of Mr. J. D. Lyon. 700 w. Am Mfr & Ir Wld—Nov. 9, 1899.

Secor's Kerosene Burning Motor. Hugh Dolnar. Illustrated description with comments. 1800 w. Am Mach—Oct. 5, 1899.

Some Inaccuracies Corrected. J. D. Lynn. A criticism of statements made by Hugh Dolnar in an article published in the "American Machinist." 700 w. Am Mfr & Ir Wld—Oct. 19, 1899.

**Sintz.**—The Sintz Gas and Gasoline Engines. The Sintz gasoline oil engine is illustrated and described. It is an American engine, operating with a two-stroke cycle. 1000 w. Eng News—Aug. 12, 1897.

**Two-Stroke.**—Two-Stroke Oil Engines. The advantages and the practical difficulties are considered briefly. 1500 w. Auto Jour—June, 1900.

**Watertown, S. D., Electric Station.**—Gasoline Engine, 60 K. W., 220 Volt, Watertown, S. D., Central Station. F. W. Springer. Illustrates and describes a plant consisting of two Otto engines, and explains the conditions which led to this solution of the problem. 1200 w. Elec Wld & Engr—Sept. 9, 1899.

**Wolverine Marine.**—Some Grand Rapids Marine Engines. Baxter Aslakson. The Wolverine gasoline engine is illustrated and described in detail. 2000 w. Am Mach—Sept. 14, 1899.

### GASOLINE LAUNCH.

See **GAS ENGINE—Boat; Griffin Launch; Wolverine Marine; GASOLINE YACHT.**

### GASOLINE LOCOMOTIVE.

**Mine Haulage.**—Benzine Locomotive for Mine Haulage. E. Braun, in the "Zeitschrift für das Berg, Hütten und Salinen Wesen." Illustrates and describes the engine of the Deutz Gas Engine Co., giving facts relating to its economy and power. 4000 w. Ir & Coal Trds Rev—Feb. 9, 1900.

Petroleum Motors for Coal Mine Haulage. M. J. Kersten. Abstract of a paper in "Annales de Mines de Belgique." Describes a type of locomotive working with benzine, which is claimed to be safe and economical. 900 w. Eng & Min Jour—Dec. 16, 1899.

### GASOLINE MOTOR.

See **GASOLINE ENGINE; GASOLINE VEHICLE.**

### GASOLINE MOTOR CAR.

See **CAR—Gasoline Motor; GASOLINE VEHICLE.**

### GASOLINE PLANT.

**La Fox, Ill.**—Gasoline Pumping and Lighting Plant at La Fox, Ill. A plant installed by the C. & N. W. Ry., for supplying water for the tanks and lighting buildings and yard. Ill. 900 w. Ry & Engng Rev—Oct. 15, 1898.

### GASOLINE TRACTION.

See **GASOLINE ENGINE; GASOLINE LOCOMOTIVE; GASOLINE VEHICLE.**

### GASOLINE VEHICLE.

See also **AUTOMOBILE; GASOLINE ENGINE; GASOLINE LOCOMOTIVE; MOTOR CYCLE.**

A New Petroleum-Spirit Motor-Vehicle. Brief illustrated description, giving details of some parts of the construction of a vehicle of the four-wheeled dog-cart type. 800 w. Ind & Ir—Sept. 1, 1899.

Gasoline Automobiles. William Baxter, Jr. Illustrates and describes the principle on which gasoline motors act, and various applications to vehicles. 3400 w. Pop Sci M—Oct., 1900.

Gasoline Motors for Automobiles. George Kellogg Barrett. Outlines the features to be kept in mind in designing a gasoline engine for automobile use. 1800 w. Mod Mach—Feb., 1900.

Light Oil Motors. John Henry Knight. Presents the advantages and disadvantages of petroleum spirit in motor-cars, with brief discussion of electrical firing. 1500 w. Auto Jour—June 15, 1898.

Motor Cars and the Advantages of High-Speed Oil Engines. William Norris. The author illustrates, with the Pennington oil motor, how the force of inertia of the moving parts acts as a regulator and modifier of shock in the transmission of the explosive force to the crank. 1400 w. Ind & Ir—Nov. 13, 1896.

Oil Engines and Motor Cars. Anthony G. New. Considers the application of oil engines to motor cars. Part first deals with the car, the engine, and the interaction of car and engine. Serial. Engr, Lond—Jan. 5, 1900.

Petroleum Motor Vehicles. James D. Roots. Excerpt of paper read before the Soc. of Engs. Gives illustrated descriptions of vehicles constructed since 1885, and the progress made. 7000 w. Automotor—May 15, 1899.

**Acetylene and Alcohol.**—See **AUTOMOBILE.**

**Allday's & Onion's.**—The Allday's and Onion's Motor Car. Illustrated brief description of a four-seated petroleum-spirit motor car. 450 w. Ind & Ir—Dec. 1, 1899.

**"Balmoral."**—The "Balmoral" Motor Char-a-Banc. Illustrated description of a conveyance carrying 16 persons, and fitted with a two-cylinder, horizontal, petroleum-spirit motor. 900 w. Ind & Ir—Feb. 9, 1900.

**Bennett and Thomas.**—The Bennett and Thomas Petrol Motor. Illustrated description of a motor claiming the advantages of absence of vibration, noiseless, smooth running and simplicity. 1200 w. Auto Jour—Dec., 1899.

**Bollée.**—The Bollée Voiturette. Illustrated detailed description of a vehicle built on the lines of the tricycle. 2200 w. Sci Am Sup—May 5, 1900.

**Bolide Motor.**—The Bolide Motor and Mechanism. Illustrated description. 700 w. Automotor—Aug., 1899.

**Brouhot.**—The Brouhot Automobile Carriage (Voiture Automobile Brouhot et Cie). Brief description, with illustrations of a break and a phaeton, together with a plan showing the driving mechanism. A petroleum motor is used, with a variable speed gear device. 800 w. 1 plate. La Rev Tech—Aug. 25, 1898.

**Capel.**—Capel's Motor Car. Illustrates and describes a vehicle containing many features of novelty. 1300 w. Auto Jour—Aug., 1900.

The Capel Motor Carriage. Illustrated description of a carriage propelled by an internal combustion engine using petroleum spirit. 700 w. Engr, Lond—Aug. 3, 1900.

**Combination.**—See **Automobile.**

**Construction.**—Some Difficulties of Motor-Vehicle Construction. Deals with the difficulties to be found in the application of oil to the moving of road-vehicles. 2000 w. Auto Jour—Feb., 1898.

**"Cyclope."**—The "Cyclope" Petroleum-Spirit Motor. General view, detail drawings and description. 1000 w. Ind & Ir—Aug. 19, 1898.

**Darracq.**—La Voiture Darracq. Adapted from an article by L. Baudry de Saunier in "La Locomotion Automobile." Illustrated description of a vehicle designed for general use. 1000 w. Auto Jour—Dec., 1899.

**Daimler.**—The Improved Daimler Motor Vehicles (Ueber Neure Motorwagen der Daimler Motoren-Gesellschaft). K. Halibauer. With numerous illustrations of the application of this compact and convenient petroleum motor to launches, carriages, and heavy vehicles. 1800 w. Glaser's Annalen—March 1, 1899.

**De Dion.**—The De Dion et Bouton Road Motor. Illustrated description. Serial. Engng—Aug. 14, 1896.

See also **MOTOR CYCLE.**

**Electric Ignition.**—See **GASOLINE ENGINE.**

**Evelyn Ellis's.**—The Hon. Evelyn Ellis's Motor Vehicles. An interesting series of photographs of various vehicles, with brief descriptions. 400 w. Auto Jour—March, 1900.

**Gasoline Supply.**—See **GASOLINE—Supply.**

**Georges Richard.**—The Georges Richard Voiture. Illustrated description of the latest type. Condensed from "La France Automobile." 1200 w. Horseless Age—May 16, 1900.

The Georges Richard Carriage (La Voiture Georges Richard). Gaston Sencier. An account of the Richard petroleum automobile, describing the manipulation, and giving a list of the important events in which it has participated. 2500 w. Rev Tech—Nov. 25, 1899.

The Georges Richard Motor Carriage. Illustrates and describes this vehicle, its management, and care needed, giving also results of some races. 2000 w. Auto Jour—Dec., 1899.

**Gobron and Brillié.**—The Gobron and Brillié "Silent" Motor-Car. Illustrated description of the interesting features. 2100 w. Ind & Ir—Dec. 29, 1899.

**Henriod System.**—The Henriod System of Automobiles. Illustrates and describes the mechanical part of these carriages. 1400 w. Auto Jour—Sept. 15, 1899.

**Jeantaud.**—Automobile Traveling Vehicles. From "La Nature." Illustrates and describes the Jeantaud automobile carriage. 800 w. Sci Am Sup—Dec. 3, 1898.

**Landry-Beyroux.**—The Landry-Beyroux Motor Carriage. Illustrated description of a motor carriage at the recent Paris exhibition which presents several novel features. 800 w. Ind & Ir—Aug. 12, 1898.

**Lufbery.**—The Lufbery Gasoline Vehicle. An illustrated description of the vehicle, and particularly of the transmission gear 700 w., Horseless Age—Sept. 19, 1900.

**Mees.**—The "Mees" Petromobile. An illustrated account of the system introduced by Gustav Mees, noting the novel and interesting features. 3000 w. Auto Jour—March, 1900.

**"New Orleans" Voiturette.**—The "New Orleans" Motor-Voiturette. Brief illustrated description. 500 w. Ind & Ir—Feb. 2, 1900.

**Packard.**—The Packard Gasoline Carriage. Illustrated description. 800 w. Horseless Age—May 16, 1900.

**Panhard-Levasseur.**—The Panhard-Levasseur Road Motor. Illustrated detailed description. 2600 w. Engng—May 1, 1896.

**Physicians.**—A Gasoline Carriage for Physicians. Illustrated description of the "Aesculapius," a recently exhibited vehicle. 400 w. Auto Mag——April, 1900.

**Renault.**—The Renault Motor-Voiturette. An illustrated description of an application of the De Dion motor to light motor-vehicles. 500 w. Ind & Ir—Nov. 3, 1899.

**Rochet.**—The Rochet Motor Car. From "The Motor Car Journal." Illustrated detailed description. 1200 w. Sci Am Sup—Oct. 27, 1900.

**Roots and Venables.**—Roots and Venables Oil-Motors and Mechanism for Vehicles. An illustrated description of the latest model of this firm. It is intended for road vehicles and embodies their most recent improvements. 1600 w. Auto Jour—Jan., 1898.

**Vallée Racing Car.**—The Vallée Racing Car. Illustrates and describes a car constructed for racing, noting its special features. 600 w. Ind & Ir—Dec. 1, 1899.

**Vollmer.**—A New German Motor Carriage. Illustrates and describes a vehicle designed by Vollmer for ascending heavy grades regardless of the character of the road. 800 w. Auto Mag—June, 1900.

### GASOLINE YACHT.

See also **GAS ENGINE—Boat; Griffin Launch.**

Gasoline Yacht "Lady Francis." Drawings, photographs and description of a handsome vessel of this type recently completed. 700 w. Marine Engng—April, 1900.

### GAS PIPE.

See also **GAS DISTRIBUTION; PIPE; WATER PIPE.**

Gas Piping Topics. Considers incrustation and scale, means of prevention, set screws, hardening, cutting threads on gas pipes, keeping worn screws in service, double nut, tools, leaks, etc. Ill. 2200 w. Am Gas Lgt Jour—June 12, 1899.

Locating, Determining and Laying of Street Mains and the Distribution of Gas. J. P. Gill. Part first is largely preliminary remarks calling attention to important points. Also considers the survey of the town or city in which it is proposed to build gas works. Serial. Am Gas Lgt Jour—May 3, 1897.

Pipes and Piping: Patterns, Materials and Methods Best Suited for Plant and Line Construction and Maintenance. C. P. Russell. Suggestions of importance in the distributing department of gas plants, relating to the selection of proper piping, materials, etc. Serial. Am Gas Lgt Jour—Feb. 1, 1897.

Some Special Features in the Connecting Mains of a Provincial Gas Company's Stations. W. Doig Gibb. Read before the North of England Gas Managers' Assn. Notes refer to the Newcastle works, Gateshead works, the new works, and the North of Tyne governor-house in England. Ill. Discussion. 8800 w. Jour Gas Lgt—May 2, 1899.

**Alignment.**—Effect of Deflection in Alignment on the Flow of Gas in Street Mains. G. A. Hyde. Read before the Ohio Gas Lgt. Assn. Shows that right-angle deflections are objectionable and should be avoided. Ill. 800 w. Am Gas Lgt Jour—March 28, 1898.

**Buildings.**—Gas Piping in Buildings. John Lyman Faxon. Abstract of an article contributed to the Boston "Transcript." The dangers of gas fixtures and methods of avoiding them. 1800 w. Eng Rec—Feb. 18, 1899.

**Capacity.**—The Delivering Capacity of Gas Mains. Diagrams for blow of gases of different specific gravities. 1100 w. Gas Wld—Jan. 4, 1896.

**Coating.**—See **Service.**

**Dry.**—An Experience with Dry Mains. H. Kendrick. Read at meeting of Manchester Dist. Inst. of Gas Engs. (England). Describes the plant at Stretford, the stoppages, the system in use, with its advantages and disadvantages. Also discussion. 4700 w. Gas Wld—March 5, 1898.

**Engineering.**—Gas Pipe Engineering. Gives points on the inspection and remedying of defects. Ill. 1300 w. Am Gas Lgt Jour—June 19, 1899.

**Freezing.**—Dr. Bueb's Method of Preventing Freezing in Gas Services. Discusses this method, which consists in the addition of vaporized alcohol to the gas. 2000 w. Jour Gas Lgt—April 3, 1900.

How to Prevent the Freezing of Gas Pipes. Dr. Bueb. Describes a new method employed in Dessau, for preventing the stoppage of gas pipes by the freezing of either water or benzol. 800 w. Am Mfr & Ir Wld—Nov. 22, 1895.

**Harlem River.**—Laying a 24-inch Gas Main Across the Harlem River. G. H. P. McVey. An illustrated description of work undertaken by the Consolidated Gas Co., to connect Manhattan and the Bronx, New York. 1200 w. Sci Am—Sept. 15, 1900.

Submerged Gas Mains. An illustrated account of work done to connect the district beyond the Harlem River, known as the Bronx, with the mains of the Consolidated Gas Co., of New York. 1000 w. Pro Age—Sept. 1, 1900.

**Laying.**—A Few Practical Notes on Main Laying. Lester Price. Considers material for street mains, distribution, pipe laying, lead joints, back filling, etc. 2000 w. Am Gas Light Jour—March 20, 1899.

Laying Gas and Water Mains in Public and Private Streets. Arthur Graham. Read before the Manchester Dist. Inst. of Gas Engs. Also discussion. Advises a pushing policy. Laying mains and if necessary giving outlets free. 2800 w. Jour Gas Lgt—Nov. 28, 1899.

Mains and Main Laying. Comments on Mr. Forstall's paper read before the Am. Gas Lgt. Assn. 1800 w. Jour Gas Lgt—Jan. 3, 1899.

Material and Tools for Main and Service Laying. E. H. Millard. Read before the England Gas Managers' Assn. Gives experience and results in the practice of the writer; describes and illustrates by diagrams some appliances found useful. 2500 w. Pro Age—Dec. 1, 1896.

Notes on Mains and Main Laying. Walton Forstall. Read at meeting of Am. Gas Lgt. Assn. Discusses weight of pipe, methods of connecting and laying, special work, etc., giving an appendix and discussion. Ill. 10500 w. Am Gas Lgt Jour—Nov. 14, 1898.

**Leakage.**—Causes and Correction of Water and Gas Main Leakage. Gives statements made by various authorities concerning existing conditions, and discusses the remedy. 3500 w. Sci Am Sup—Dec. 23, 1899.

Elusive Leakages from Mains and Services. H. Tobey. Read before the North of England Gas Managers' Assn. Experience of the writer in tracing leakages to their source. 2500 w. Gas Engs' Mag—Dec. 10, 1896.

Elusive Leakages from Main and Service Pipes. H. Tobey. Paper read before the North of England Assn. of Gas Managers. Experience with gas leaking into a sewer pipe. Discussion. 5400 w. Gas Wld—May 9, 1896.

Leakage. E. H. Jenkins. Read before the Western Gas Assn. Careful consideration of the subject, followed by discussion. 11000 w. Am Gas Lgt Jour—June 14, 1897.

Leakage. J. M. Rusby. An outline of the methods employed and experience gained by the writer. Read before the American Gas Light Assn. 2400 w. Pro Age—Nov. 15, 1897.

Leakage in Mains and Services. J. M. Rusby. Remarks on methods of locating and correcting existing leakage, and means of avoiding. 1700 w. Gas Engs' Mag—April 11, 1898.

Reports of Gas Leaks. Their Management by a Large Company. W. R. Addicks. A statement of the system adopted in Boston, considering their management, when they occur, and the methods adopted to prevent their occurrence. Discussion follows. 7500 w. Am Gas Lgt Jour—March 22, 1897.

**Leakage Detection.**—Dry Insulator for the Detection of Leakages of Gas. Describes and illustrates a new apparatus for detection and location of leaks in gas pipes. 600 w. Sci Am Sup—Nov. 9, 1895.

The Bouvier System for Detecting Leaks in Gas Mains. An illustrated description of this system which consists essentially of an inverted siphon placed in the gas main at the end of each section occupying a definite district. Describes the method of testing. 1200 w. Pro Age—Feb. 1, 1898.

Localizing Leakages. W. Binse Randall. Read at meeting of the So. Dist. Assn. of Gas Engs. and Managers. Describes a method found to be economical and satisfactory. 2000 w. Gas Wld—Nov. 12, 1898.

The Detection of Leaks in Gas Mains. Describes and approves the system of M. Bouvier, giving two examples where its use made a considerable saving. 2000 w. Jour Gas Lgt—April 6, 1897.

**Location.**—The Systematic Location of Gas Mains and Other Pipes in the Streets as Opposed to the Popular Idea of a Subway. Donald McDonald. Read before the Western Gas Assn. Also discussion. Points out the objections to subways and outlines a plan considered less objectionable. Ill. 5400 w. Am Gas Lgt Jour—June 11, 1900.

**London Subway.**—A Notable Gas Engineering Feat in the City. Describes a unique piece of work made necessary by the construction of the Central London Railway. Ill. 1800 w. Jour Gas Lgt—May 16, 1899.

**Rust.**—Rust Deposits in House Pipes. F. B. Wheeler. Read at meeting of the Am. Gas Light Assn. Investigates what the rust consists of and where it comes from. Also discussion. 5500 w. Am Gas Lgt Jour—Nov. 15, 1897.

**Service.**—Service Pipes and Service Piping. T. Littlehales. Coating Service Pipes. A C. Humphreys. Two short papers read at the meeting of Am. Gas Light Assn., with discussion and illustrations. 3800 w. Am Gas Lgt Jour—Dec. 7, 1896.

**Service and Street.**—Street Main and Service Pipe. J. H. Fitzgerald. Read at meeting of the Texas Gas and Electric Light Assn., at Laredo. An outline of what the writer believes necessary in laying and carrying out the actual work to be done. Discussion. 5800 w. Am Gas Lgt Jour—April 18, 1898.

**Size Determination.**—Determining the Size of Gas Pipes. W. Graffton. Directions for determining the size of pipes needed to supply a certain number of lights. 700 w. Am Gas Lgt Jour—May 8, 1899.

**Steam Roller Damage.**—Gas Pipes and Steam Rollers. Norton H. Humphreys. Deals with the damaging effects of steam road rolling in gas-lighted towns, upon the gas pipes under streets. It appears that this has proved serious in some places. 3000 w. Jour Gas Lgt—March 31, 1896.

**Under-Water.**—Under-Water Gas Main Construction. Discussion at meeting of the New England Assn. of Gas Engineers, opened by John A. Coffin. Ill. 6000 w. Am Gas Lgt Jour—March 19, 1900.

See also **Harlem River.**

**Vitrified Clay.**—Vitrified Clay Pipe Instead of Iron for Gas Mains. Irvin Butterworth. Read before the Western Gas Assn., at Milwaukee. Considers the properties that indicate the suitability of vitrified clay pipes for this use. Discussion. 3000 w. Am Gas Lgt Jour—July 17, 1899.

**GAS PLANT.**

See **GAS PRODUCER; GAS WORKS.**

**GAS POWER.**

See **BLAST FURNACE GAS; FUEL GAS; GAS ENGINE; GAS PRODUCER.**

**GAS PRODUCER.**

See also **BLAST FURNACE GAS; GAS FUEL; GAS ENGINE; GAS MANUFACTURE; GAS WORKS.**

Gas Generators. Albert Sailler. A lecture delivered before the Austrian Assn. of Engs. and Architects. Translated from the "Zeitschrift für das Gas und Wasserfach." Discusses principally the metallurgical apparatus in which the fractional combustion of fixed carbon is involved, describing his own system, and giving results. 2500 w. Pro Age—Oct. 15, 1898.

Modern Types of Gas Producers. Part first is largely introductory, discussing the use of gas for industrial purposes, the processes for making gas which have recently come into use, and commences the consideration of the different types of producers. Descriptions of the Thwaite duplex producer and the Thwaite single vessel producer are given. 3200 w. Ir & Coal Trds Rev—Jan. 21, 1898.

Notes on Some Recent Forms of Gas Producer. A. H. Sexton. "Jour. of the West of Scotland Iron and Steel Inst." Calling attention to some new forms of producer for which great advantages are claimed. 2000 w. Am Mfr & Ir Wld—May 7, 1897.

**Benier.**—The Benier Gas Engine and Producer. Describes an engine and generator which have been proved to do their work satisfactorily. Ill. 1700 w. Engng—Sept. 23, 1898.

**Birstal, Yorkshire.**—Power from Producer Gas. W. H. Booth. Describes the new gas plant installed by Mr. Arthur Parritt, at Birstal, in Yorkshire, commenting on the advantages. 2300 w. Am Mach—Aug. 4, 1898.

**By-Products.**—The Recovery of By-Products from Producer Gas. A. Gillespie, in "Journal of the West of Scotland Iron and Steel Institute." The author disclaims a knowledge of the chemical value of the by-products of producer gas, but claims that if their recovery does not reduce the heat value of the gas enough to endanger its efficiency, he can show how they can be secured, —and then proceeds to explain the method and appliances needed for the purpose. 2000 w. Am Mfr & Ir Wld—Nov. 29, 1895.

**Daubers.**—Daubers Universal Gas Generator. General description. 1000 w. Am Mfr & Ir Wld—Aug. 21, 1896.

**Efficiency.**—The Efficiencies of Gas Producers. Charles Frewen Jenkin. A paper read before the Inst. of Civ. Engs., being a historical summary of the various types of gas producers with the results of tests of cold gas efficiency shown in diagrams. Serial. Col Guard—March 27, 1896.

**Electric Station.**—See **GAS ENGINE—Electric Station.**

**Erie Shops, Jersey City.**—A Gas Engine and Fuel-Gas Producer Power Plant. Illustrated detailed description of the plant recently erected at the new shops of the Erie R. R., in Jersey City. 1000 w. Eng News—Nov. 23, 1899.

Gas Engines and Producer Gas. Reports the results attained at the new power plant of the Erie R. R., at Jersey City, giving an illustrated description of the installation. 2800 w. Am Engr & R R Jour—Nov., 1899.

The 400-H. P. Gas Producer Plant for the Erie Railroad. Illustrates and describes the main features. 1000 w. R R Gaz—Sept. 29, 1899.

**Feed-Device.**—An Automatic Feed-Device for Gas Producers. C. W. Bildt. An illustrated description of a feed-device constructed and patented by the writer which has given satisfaction. 2200 w. Trans Am Inst of Min Engs—Feb., 1896.

Automatic Feed-Device for Gas Producers. C. W. Bildt. Translation from "Jerukontoret's Annaler," illustrating and describing a new device constructed for the Stridsberg & Bjocrks Works at Trollhattan, Sweden. 1800 w. Ir Age—April 30, 1896.

**Fuel Handling.**—Gas Producers and the Mechanical Handling of Fuel for Same. O. L. Saunders. Discusses the rapidity with which producer gas is gaining recognition, the types of producers, processes and the important questions and details necessary to efficiency. 2200 w. Jour of Assn of Engng Soc—Nov., 1896.

**Gas Engines.**—Gas Producers and the Future of the Gas Engine. A. Bement, in "Modern Machinery." Discusses the methods being tried in Europe for utilizing blast-furnace gases, the use of water gas, etc. 2300 w. Pro Age—Oct. 1, 1898.

**Isolated Plant.**—Gas Plants in Large Buildings. Alton D. Adams. Suggestions as to the saving that could be effected by gas engine and producer plants. 2000 w. Am Archt—June 23, 1900.

**Kitson.**—The Kitson Gas Producer. Illustrated detailed description with favorable report of engineer John E. Fry, of Pittsburg, upon the merits of the invention. In the gas producer the fuel is kept constantly agitated, which agitation is claimed to prevent caking, clinkering and scaffolding of the fuel in the furnace. 2400 w. Ir Age—April 30, 1896.

The Kitson Gas Producer. John E. Fry. Enumerates the evils which the operator of the ordinary gas producer encounters, explains the principles involved, and describes the mechanism of the Kitson producer, and its operation. 6000 w. Ir Age—Sept. 30, 1897.

**Loomis, Bridgeport.**—A New Loomis Fuel Gas Plant. Illustrated description of the plant of the Citizens' Gas Company, of Bridgeport, Conn.; the largest fuel gas plant for general service in the world. 1200 w. Ir Age—Nov. 19, 1896.

**Mond.**—The Mond Gas Producer Plant. Abstract of the discussion on paper by H. A. Humphrey, read at a meeting of the Institution of Civil Engineers. Serial. Col Guard—Oct. 29, 1897.

The Mond Gas Producer Plant and Its Application. Herbert Alfred Humphrey. Read before the Institution of Civil Engineers, England, March, 1897. Deals with recent advances in gaseous fuel, describes the Mond producer and recovery plant, giving tests, applications, etc., with tabulated data. Ill. 9600 w. Col Guard—Oct. 22, 1897.

The Mond Gas Producer Plant. Discussion by correspondence of a paper by H. A. Humphrey, read before the Institution of Civil Engineers. 5000 w. Col Guard—Nov. 5, 1897.

**Regenerator Effects.**—Regenerator Effects on Producer Gas. Jno. E. Fry. Letter to the editor, containing discussion of paper by John H. Darby, and examining his views. 1000 w. Ir Age—July 2, 1896.

**Retort Bench Heating.**—Separate Gas Producers for the Heating of Retort Benches. G. Eichelbrenner. Read before the International Gas Congress, at Paris. Illustrates and describes an installation near some coal mines, in grounds undergoing subsidence, and discusses the advantages and disadvantages of the system adopted. 1500 w. Jour Gas Lgt—Sept. 25, 1900.

**Thwaite.**—A Modern Gas-Power Plant. Horace Allen. The gas generator described is of 300 h. p. capacity, and works on the Thwaite patent continuous cycle. Reports of tests is given. 1300 w. Engr, Lond—Oct. 29, 1897.

Tests Made on a Modern Gas Power Plant at a Textile Factory. An account of tests of a Thwaite gas generator of 300 I. H. P. capacity. Ill. 300 w. Elec Rev, Lond—Nov. 5, 1897.

**Thwaite Motor Car.**—Thwaite's Motor Car Producers. Account of a series of tests with a Thwaite's "simplex" and a "duplex" gas producer. Numerous diagrams and voluminous data. 5500 w. Engr, Lond—Aug. 28, 1896.

## GAS PURIFICATION.

See also **GAS MANUFACTURE; GAS WORKS.**

Complete and Continuous Purification of Coal Gas in Closed Vessels Without Nuisance. Ernest J. Sutcliffe. Describes a method believed to be both feasible and practicable. The plan is a combination of the system of milk or cream of lime purfication, and of the Claus sulphur recovery process. 2700 w. Jour Gas Lgt—May 31, 1898.

Purification. A discussion before the Manchester District Inst. of Gas Engs. 7000 w. Jour Gas Lgt—Nov. 29, 1898.

Some Notes on Purification. A. L. Clarke. Read before the Eastern Cos. Gas Managers' Assn. Notes on hydraulic and foul mains, washing, and dry purification, with discussion. 4400 w. Gas Wld—April 22, 1899.

The Construction of and Mode of Working Purifiers. Henry M. Greene. Read at Belfast meeting of the Incorporated Gas Inst. The paper is mainly devoted to a description of the purifiers of the Moor Lane station, Preston, and an account of their working. Discussion. Ill. 6600 w. Gas Wld—June 25, 1898.

The Progress of Purifier Construction and Operation, with an instance. H. A. Mather. Describes and illustrates the system designed and erected by Henry M. Greene of the Preston (England) gas works. 2800 w. Am Gas Lgt Jour—Feb. 21, 1898.

The Purifying of Coal Gas. Stephen Carpenter. Describes process of purification found more convenient and economical than any other in which lime is employed. 2000 w. Jour of Gas Lgt—Aug. 9, 1898.

**Bog Oxide.**—See **Oxide.**

**By-Products.**—See **GAS MANUFACTURE.**

**Chemical.**—The Chemical Purification of Illuminating Gas. MM. Delseux and Renard. This paper took the prize of 750 francs offered by the Société Technique, France. The subjects of gas washing and gas purification, their necessity and purpose, with practical suggestions for their effective conduct are treated. 2800 w. Jour Gas Lgt—Nov. 12, 1895.

**Chemistry.**—Chemical Notes on Purification. Henry A. Mather. Read at meeting of the Am. Gas Light Assn. Reviews the formulas of the reaction between sulphuretted hydrogen and hydrated oxide of iron, and considers methods of chemical treatment of iron purifying materials. 2400 w. Am Gas Lgt Jour—Nov. 15, 1897.

**Claus, Belfast.**—On Experiments with the Claus System of Purification at Belfast. James Stelfox. Read before the Incorporated Gas Inst., at Bath, Eng. Reports the trial of the system on a large scale and the failure. Discussion. 8800 w. Gas Wld—June 19, 1897.

**Closed Vessel.**—A Closed Purifying Vessel. Henry G. Beatley. Read at meeting of the Mich. Gas Assn., at Port Huron, Mich. Presents the apparatus and discusses some of the advantages to be derived from its use. Ill. 3000 w. Pro Age—March 1, 1898.

**Doherty-Butterworth Box.**—Still Another Purifying Box. Irvin Butterworth. Read before the Ohio Gas Lgt. Assn. Illustrated description of the Doherty-Butterworth, or "Simplex" box, with a statement of some of the advantages. 3000 w. Am Gas Lgt Jour—March 28, 1898.

**Lime.**—The Use of Atmospheric Air with Lime for the Purification of Coal Gas. S. Carpenter. Remarks from the writer's experience. 800 w. Jour of Gas Lgt—March 9, 1897.

The Use of Lime for Gas Purification. S. Carpenter. An article written for young gas managers. Directions, with explanation of the effect, suggestions pointing out the proper method of using the different agents so as to produce beneficial results. 1600 w. Jour Gas Lgt—April 27, 1897.

**Lime-Iron Oxide.**—The Best and Most Economical Means of Purifying Gas. D. M. Nelson. Abstract of paper read before the North British Assn. of Gas Managers. Claiming that lime used in conjunction with oxide of iron was the best and most economical means of purifying gas. Short discussion. 3000 w. Gas Wld—Aug. 7, 1897.

**Noxious Air.**—Noxious Air in Purifying Houses. Comments on some recent researches by Herr H. Drehschmidt, the chemist of the Berlin Municipal Gas Works, with some of the technical results arrived at in the investigations. 3000 w. Jour Gas Lgt—Aug. 31, 1897.

**Oxide.**—Some New Ideas About Oxide Purification. B. E. Chollar. Read at meeting of Ohio Gas Lgt. Assn. A short paper and lengthy discussion. 3800 w. Am Gas Lgt Jour—April 16, 1900.

The Manufacture of "Oxide" in the Gas Works, from the Standpoint of the Man Outside. W. H. Birchmore. Discussion of points in the manufacture of oxide, and the variation in the products bearing this name. 2800 w. Am Gas Lgt Jour—Oct. 17, 1898.

See also **Revivification.**

**Oxide Spent.**—Cleansing Spent Oxide. A. E. Broadberry. Description of experiments performed at Tottenham, Eng., and diagram illustrating apparatus used. With discussion. 3000 w. Gas Wld—Nov. 23, 1895.

The Valuation of Spent Oxide. Dr. Lubberger, in "Journal für Gasbeleuchtung." Showing that it is often valued solely on the basis of the amount of prussian blue which it contains, and the methods of estimating, with other particulars. 1100 w. Jour of Gas Lgt—March 15, 1898.

The Value of Spent Oxide. Dr. Auerbach. Summary of paper read at meeting of the Assn. of Mid-Rhenish Gas and Water Engs. Discusses the quality of gas entering the purifier, the conditions of the purifying material, and the treatment of the material during use. 1600 w. Jour Gas Lgt—May 11, 1897.

See also **Spent Materials.**

**Oxide v. Weldon Mud.**—The Relative Activity of Bog Oxide and Weldon Mud as Purifying Materials. Discusses the intrinsic merits of bog oxide and of Weldon mud. 2000 w. Jour of Gas Lgt—April 19, 1898.

**Quadruplex Box.**—A Quadruplex Purifying Box; Why Not? F. H. Shelton. Read before the American Gas Light Assn. Calls attention to objectionable features in the present design, with illustrated description of design of writer claim, ing to be a decided improvement. 5500 w. Pro Age—Nov. 1, 1897.

**Revivification.**—Comparative Results With or Without the Use of a Continuous Oxide Revivifier. Moses Coombs. Read before the Ohio Gas Lgt. Assn. Gives a statement of results showing the improvement obtained by the use of a continuous oxide revivifier. Ill. 1200 w. Am Gas Lgt Jour—March 28, 1898.

Revivification of Oxide of Iron in Purifiers. Isaac C. Baxter. Read at meeting of Western Gas Assn. The methods are discussed and the advantages stated. Discussion follows. Ill. 5800 w. Pro Age—June 1, 1897.

Revivification or Regeneration of Purifying Material. Dr. W. Leybold. The method is described and the chemical action explained. Also manner of testing to determine whether the material is completely revivified. 1500 w. Pro Age—Feb. 1, 1897.

**Revivification Heat.**—The Heat of Revivification of Oxide. A critical review of paper by Herman Poole, published in the "Am. Gas. Lgt. Jour." 1800 w. Jour Gas Lgt—Feb. 15, 1898.

The Heat of Revivification. Herman Poole. Discussion of the chemical action going on in the purifying material and its subsequent revivification. 2000 w. Am Gas Lgt Jour—Jan. 3, 1898.

**Scrubbers.**—Tower Scrubbers and Horizontal or Washer Scrubbers. William Newbigging. Objections to tower scrubbers and suggestions for improvement, with discussion. 5400 w. Jour Gas Lgt—Dec. 3, 1895.

**Scrubbers and Purifiers.**—The Work of the Scrubbers and Purifiers. Stephen Carpenter. Describes the action of the scrubbers and the manner of working, with remarks on the size of lime and oxide of iron purifiers relatively to the make of gas. 1800 w. Jour Gas Lgt—April 19, 1898.

**Spent Materials.**—Enrichment of Purifying Materials and the Value of Spent Material. F. Auerbach. The aim of this article is to call the attention of gas works to the considerable value their spent material may attain, by the exercise of greater care in selection of fresh material in condensation and in washing. 1500 w. Pro Age—April 15, 1896.

See also **Oxide Spent.**

**Sulphur.**—Further Observations on Purification. S. Carpenter. Suggestions relating to the purification of gas from sulphur. 2800 w. Jour Gas Lgt—July 25, 1899.

**Temperature.**—Heat Developed During Purification. J. P. Gill. Presents a method of determining what will be the temperatures caused by the chemical reactions of the mass in the purifier and when removed therefrom. 1700 w. Am Gas Lgt Jour—Jan. 31, 1898.

**Washers and Scrubbers.**—Washers and Scrubbers. Edward A. Harmon. Reviews the conditions under which gas is liberated and discusses the functions of washers and scrubbers, the object and the methods. Describes the various forms of apparatus. 10500 w. Gas Wld—June 18, 1898.

**Weldon Mud.**—The Heat Developed During Purification by Means of Weldon Mud. A computation of the temperature which may supervene from the reactions which occur during the fouling and revivification of Weldon Mud. 1800 w. Jour of Gas Lgt—March 22, 1898.

See also **Oxide.**

**Yeadon's Mechanical.**—Yeadon's Mechanical Purifying Machine. Illustrated description of the machine and its operation. 1600 w. Jour of Gas Lgt—July 19, 1898.

## GAS RETORT.

See also **GAS MANUFACTURE; GAS WORKS.**

A Short History of a Long Life. C. M. Converse. Discusses the length of life of a bench of clay retorts. Read before the Pacific Coast Assn. 2200 w. Am Gas Lgt Jour—Aug. 23, 1897.

The Working of a Semi-Regenerative Setting. W. A. Reid. Describes work of the writer, and gives brief discussion. 1800 w. Jour Gas Lgt—Aug. 15, 1899.

**Charging and Discharging.**—See **GAS MANUFACTURE—Charging Apparatus.**

**Combustion.**—Combustion in Retort Furnaces. Otto Pfeiffer. Abstract translation from the "Journal für Gasbeleuchtung." Describes observations made, giving results. Ill. 2000 w. Jour Gas Lgt—Nov. 1, 1898.

**De-Scurfing.**—Billington's Patent Method of De-Scurfing Gas Retorts. S. S. Miller. Read before the Manchester District Institution of Gas Engineers. Describes a method which has given satisfaction at the Longport Gas Works, and is applicable to any works. Discussion. 2300 w. Jour of Gas Lgt—Nov. 30, 1897.

**Heating.**—Notes on the Heating of Gas Retorts. George Helps. Read before the Midland Assn. of Gas Mgrs. Discusses systems of firing, recuperators, waste gases, etc. 4000 w. Gas Wld—Oct. 28, 1899.

Notes on Modern Systems of Retort Heating. G. P. Lewis. Read before the British Inst. of Gas Engs. Deals with the principles of recuperative firing, giving a detailed comparative statement of the points at present under discussion in reference to the use of gaseous fuel in retort settings. Ill. 7500 w. Gas Wld—May 6, 1899.

Retort Heating. G. P. Lewis. The first of a series of articles discussing the principles and relative advantages of the several systems of heating retorts with gaseous fuel, and giving formulae that will assist in lessening the work of calculation. Serial. Gas Wld—May 14, 1898.

Retort Heating. G. P. Lewis. Observations on some points brought out in a recent paper by G. Helps. 1700 w. Gas Wld—Nov. 18, 1899.

See also **GAS PRODUCER—Retort Bench Heating.**

**House.**—A Modern Retort House. William S. Miller. Illustrated description of No. 5 retort house of the Cincinnati Gas Light and Coke Co. 5000 w. Pro Age—Nov. 2, 1896.

Waverley Association of Gas Managers. Half-yearly meeting at Dalkeith. The address of the president, W. McGiffen, on the practical working of the retort house, and the ensuing discussion. 4000 w. Jour Gas Lgt—Sept. 18, 1900.

**House Construction.**—Oven and Retort House Construction and Results. Discussion at meeting of the New England Assn. of Gas Engs. 7000 w. Am Gas Lgt Jour—March 12, 1900.

See also **GAS WORKS—Building Construction.**

**Inclined.**—An Additional Chapter on Inclined Retorts. Frederick Egner. Information concerning results with the sloping retorts. 2400 w. Am Gas Lgt Jour—June 21, 1897.

An Experience with Inclined Retorts. Esslingen, Germany. Ernest Kohler. Translated from the "Journal für Gasbeleuchtung." An account of the benches of inclined retorts erected in 1897. 1500 w. Am Gas Lgt Jour—April 17, 1899.

A Study of Inclined Retorts in Europe. Frederick Egner. Read before the Western Gas Assn. Observations gathered on a trip through England, France, Germany and Austria, made with the object of studying the "Inclined" or "Sloping" retorts. Discussion. 5000 w. Pro Age—June 1, 1897.

Hindrance to the Adoption of the Inclined Retort in America. Frederick Equer. Read at Detroit meeting of the Western Gas Assn. Presents the advantages and economy to be gained. Discussion. 3500 w. Pro Age—June 15, 1898.

Inclined Retorts. O. E. Brackenbury. A paper before the International Gas Congress at Paris, giving an illustrated account of up-to-date English practice with inclined retorts for carbonizing coal. 2800 w. Gas Wld—Sept. 8, 1900.

Inclined Retorts at Bankside. Charles C. Carpenter. Read before the Inst. of Gas Engs. In substituting inclined for horizontal retorts they were designed to fit the existing building. The reasons for adopting the various details are explained. Ill. General discussion. 7500 w. Gas Wld—May 5, 1900.

Inclined Retorts at Cambridge. Richard Brown.

Read before the Eastern Counties' Assn., England. Illustrated description of the installation and report of working. Also discussion. 4000 w. Gas Wld—Sept. 22, 1900.

Inclined Retorts at Cassel, Germany. Emil Merz. Abstract from a paper read at the German Assn. of Gas and Water Engs. A general description of the system and statement of its results, which have proved good. 1400 w. Am Gas Lgt Jour—Sept. 14, 1896.

Inclined Retorts at Salford. S. Y. Shoubridge. Read at Belfast meeting of the Incorporated Gas Inst. An account of these retorts with reasons for the modifications introduced. Tables of comparative results, costs, etc., with other particulars. Discussion. Ill. 6000 w. Gas Wld—June 25, 1898.

Inclined Retorts. B. W. Smith. Read before the Midland Assn. of Gas Mgrs. Describes the operation of the inclined retorts at the Smethwick gas works. 3000 w. Gas Wld—Oct. 28, 1899.

Inclined Retorts Up to Date. Frederick Egner. Read at the St. Louis meeting of Am. Gas Lgt. Assn. Causes of failures in the use of inclined retorts and the success which has finally been achieved by the system. Ill. 7500 w. Pro Age—Nov. 2, 1896.

Recent Experience in Working Inclined Retorts. Charles A. Craven. Read before the Incorporated Gas Inst., England. Gives reasons why this system is favored by the author, describing the experience at the Dewsbury works during 1898. Discussion. 8500 w. Gas Wld—June 17, 1899.

The Carbonization of Coal for the Production of Illuminating Gas. W. R. Herring. Read at the Edinburgh meeting of the Royal Scottish Soc. of Arts. Discusses the saving in labor and expense brought about by the application of the force of gravity to the charging of coal-gas retorts. 2800 w. Jour Gas Lgt—April 3, 1900.

The Construction and Working of Inclined Retorts. E. Drory. Read at meeting of Inc. Inst. of Gas Engs. The writer's experience of nine years, dealing with the construction and working of inclined retorts. 2800 w. Gas Wld—June 18, 1898.

The Construction and Working of Inclined Retorts. W. R. Herring. Read before the N. Brit. Assn. of Gas Mgrs. Considers the method of constructing and working an inclined retort bench and the underlying principles. Ill. Also discussion. 7500 w. Gas Wld—Aug. 4, 1900.

See also **GAS MANUFACTURE—Apparatus; Automatic Stoking; GAS WORKS—Leeds, Eng.**

**Rotatory.**—A Rotatory Retort and Water Gas Generator. Specifications of an apparatus for producing illuminating gas by the distillation of coal, shale, or carbonaceous tar. Ill. 2000 w. Gas Wld—April 29, 1899.

**Setting and Heating.**—Retort Setting and Retort Heating. C. C. Carpenter. Read at meeting of Southern District Assn. of Gas Engineers and Managers, in England. Considers the method of heating by the supply and even distribution of fuel gas to be recommended, and discusses the problem generally. Discussion. 5000 w. Gas Wld—Nov. 13, 1897.

Retort Setting and Retort Heating. F. D. Marshall. A letter to the editor making objections in some respects to the system advocated by Mr. Carpenter in a paper recently published. 1700 w. Gas Wld—Nov. 27, 1897.

**Settings.**—Retort Settings and Practical Results Obtained. William Ewing. Read at meeting of North British Assn. of Gas Managers. Describes the works of the Hamilton Corporation (Scotland), the difficulties and means of overcoming them. Discussion. Ill. 5000 w. Gas Wld—July 30, 1898.

Retort-Settings in 1850 and 1900. A drawing of the Crosthwaite system of 1850, for the setting of three retorts, with editorial. 2200 w. Jour Gas Lgt—March 13, 1900.

### GAS STOVE.

See **GAS COOKING; GAS HEATING.**

### GAS SUPPLY.

See **GAS; GAS DISTRIBUTION; GAS ENGINEER; GAS INDUSTRY.**

### GAS TESTING.

See **GAS—Testing.**

### GAS TRAMWAY.

See also **CITY RAILWAY.**

Gas Tram Cars. Illustrates and describes these cars, and the recent improvements made. 800 w. Engr, Lond—July 28, 1899.

Gas Tramways. A. Lavezzari. A short description of the cars and motor and their operation in actual practice. 2000 w. Pro Age—Jan. 15, 1897.

The Gas Railroad. Frederick Egner. An account of recent observations in the line of gas traction, showing that ordinary illuminating gas can be used to furnish economical means of propulsion for street railways. Ill. Serial. Am Gas Lgt Jour—July 12, 1897.

**Blackpool.**—See **Lancashire.**

**Dessau, Germany.**—The Dessau Gas Tram Cars. W. von Oechelhauser. An account of the present status of the Dessau installation and of the success reached in this method of propelling cars. 1200 w. Gas Wld—Nov. 30, 1895.

Gas Motor Tram Cars. Illustrated description of the Lührig system. 1200 w. Sci Am Sup—Aug. 22, 1896.

Gas Tramways (Gasbahnen). Hubert Nachtsheim. A very complete and fully illustrated description of the Lührig gas-motor tramway system as installed at Dessau, with discussion. 7500 w. 1 plate. Mitt d Ver f d Förd d Local-u Strassenbahnwesens—May, 1896.

The Lührig System of Gas-Motor Tramway Cars. G. Grosch. Brief description of a system said to be in successful operation in Dresden. 600 w. Ind & East Eng—July 11, 1896.

Gas Traction for Tramways. Illustrated description of a gas motor mechanism for driving street cars at Dessau. 1000 w. Jour Gas Lgt—Dec. 10, 1895.

**Hirschberg-Hermsdorf.**—The Hirschberg-Warm-Springs-Hermsdorf Gas-Road. Description of construction, equipment and projected operation of a road using gas-engine motors. The cost is said to be very low. Illustrated with maps of the line, and rail sections. 2000 w. Pro Age—Sept. 15, 1896.

**Lancashire.**—Gas Traction on the Blackpool, Lytham and St. Anne's Trams. W. Chew. Read before the Manchester (Eng.) District Inst. of Gas Engs. Describes the route, station and appliances and working, giving some results. 1300 w. Jour Gas Lgt—Sept. 12, 1899.

Gas Motor Tram Cars. Illustrated description of these cars recently put in operation by the Blackpool, St. Anne's and Lytham Tramways Co. 1000 w. Engr, Lond—July 17, 1896.

Gas Traction on Tramways at Blackpool, Lytham and St. Anne's. W. Chew. Read before the Manchester Dist. Inst. of Gas Engs. Information concerning this line successfully worked by gas. 1500 w. Gas Engs' Mag—Jan. 10, 1900.

**Lührig System.**—See **Dessau.**

**Neath.**—In Defence of Gas Traction and the Latest Example. Concerning the new installation at Neath, and stating some of the advantages. 1700 w. Jour Gas Lgt—Sept. 5, 1899.

**Pole.**—The Pole Gas-Motor Street Car. T. C. J. Bailey, Jr. Description of construction and trial of an experimental motor-car. 600 w. Eng News—Sept. 24, 1896.

### GAS TURBINE.

An Investigation of the Gas Turbine. W. O. Amsler. Mathematical and experimental investigation of the actions going on in the explosion chamber. 5000 w. Sib Jour of Engng—May, 1900.

### GAS WELL.

See **NATURAL GAS.**

### GAS WORKS.

See also **GAS ENGINEERING; GAS INDUSTRY; GAS LIGHTING; GAS MANUFACTURE.**

Modern Gas Engineering. M. S. Greenough. Gives a description of modern gas works, and indicates how they have been modified during the past few years. Also discussion. 6300 w. Jour Assn of Eng Soc—Feb., 1898.

**Amsterdam.**—The Amsterdam Gas Works. Henry H. Salomons. Read before the Incorporated Institution of Gas Engineers. Descriptive. 4000 w. Am Gas Lgt Jour—Aug. 9, 1897.

The Amsterdam Gas Works. Henry H. Salomons. Read before the Inst. of Gas Engs., London. Description of the works. 3500 w. Gas Wld—May 8, 1897.

**Belfast.**—The Belfast Gas Works. James Stelfox. Paper read before the Inst. of Mech. Engs. Illustrated description, historical and general. 4000 w. Engng—Aug. 28, 1896.

**Berlin.**—The Municipal Gas Works of Berlin (Die Städt. Gaswerke Berlins). Abstract of the report for 1898-99, with tables and general figures. 700 w. Gesundh Ingenieur—May 15, 1900.

**Birmingham, Eng.**—The Extension Scheme of the Saltley Gas Works, Birmingham, Eng. An account of the work now in progress and the further extensions to be made. 3000 w. Jour Gas Lgt—Oct. 18, 1898.

**Boston, Mass.**—Boston's Big Gas Project. From "Boston Daily Advertiser." An account of the project to establish a great coke and gas manufacturing plant, giving the important features of the undertaking. 1000 w. Am Mfr & Ir Wld—Oct. 29, 1897.

**Building Construction.**—Notes on Building Construction in Small Gas Works. S. B. Langlands. Read before the North of Ireland Assn. of Gas Mgrs. Calls attention to points of construction and states the writer's views concerning the advantages of certain treatments. 2400 w. Gas Wld—Aug. 19, 1899.

Notes on Building Construction in Small Gas Works. S. B. Langlands. Read before the North of Ireland Assn. of Gas Mgrs. Suggestions concerning site, arrangement and construction of buildings, etc. 1500 w. Gas Engs' Mag—Jan. 10, 1900.

See also **GAS RETORT—House Construction.**

**Crystal Palace.**—A de Brouwer Coke-Conveyor and a Carburetted Water-Gas Plant at the Crystal Palace Gas Works. Illustrated description of these improvements. 5000 w. Jour Gas Lgt—Jan. 23, 1900.

**Design.**—Notes on the Design and Extension of Gas Plant. J. J. Humphreys, Jr. Read at meeting of New England Assn. of Gas Engs. Calls attention to facts of importance in planning works. Serial. Am Gas Lgt Jour—Feb. 27, 1899.

**Dimensions.**—Dimensions of Gas Plant. Ernest J. Sutcliffe. A tabulated statement of various opinions concerning the size of gas plant in proportion to the work required of it. 1800 w. Jour Gas Lgt—Oct. 17, 1899.

**Edinburgh.**—Gas Works at Edinburgh. A summary of Mr. Herring's report, as published in the "Scotsman," Edinburgh, Jan. 16, 1899. 1500 w. U S Cons Repts, No. 356—Feb. 21, 1899.

New Gas Works at Edinburgh. A review of Mr. Herring's report and the main features of construction as recommended for the new works which will replace a number of old establishments. 4400 w. Engr, Lond—March 24, 1899.

New Gas Works for Edinburgh. Extracts from the report of W. R. Herring, which gives an outline of the opinions of deputations sent to the English and Continental towns to collect information to guide in the laying out of the large gas works to be built on the banks of the Forth at Granton. Plan. 6400 w. Gas Wld—Jan. 21, 1899.

The Proposed New Site for the Edinburgh and Leith Gas Works. Reports of W. R. Herring and G. Livesey. 2500 w. Jour of Gas Lgt—Dec. 14, 1897.

**Electric Combined.**—The Relative Position of Consolidated Gas and Electric Light Plants. M. C. Osborn. Read at meeting of Pacific Coast Gas Assn. Why gas lost its popularity as an illuminant and the question of economy between running a consolidated plant, or a gas plant and electric lighting plant separately. Also discussion. 6000 w. Am Gas Lgt Jour—Aug. 17, 1896.

See also **ELECTRIC STATION—Combined Plant; GAS ENGINE.**

**Electric Combined, Faribault, Minn.**—The Plant of the Faribault Consolidated Gas and Electric Company. Oliver Field Allen. Illustrated description of a reconstructed plant. 3000 w. Engs' Year Book, Univ of Minn—1900.

**Elland-Cum-Greetland.**—A Descriptive Sketch of the Elland-Cum-Greetland Gas Undertaking. Address of Robert Porter to the Manchester District Institution of Gas Engineers. Also description of the coal elevating and conveying machinery used. Ill. 4000 w. Jour Gas Lgt—Aug. 31, 1897.

**Flood, Littlehampton, Eng.**—A Gas Works Under Water. An account of the catastrophe at Littlehampton, Eng., which left the inhabitants seven days without a supply of gas. 2300 w. Jour Gas Lgt—Jan. 24, 1899.

**Florida.**—Some Random Notes on Florida Gas Works. A few notes concerning the plants and their operation. 1900 w. Am Gas Lgt Jour—Dec. 13, 1897.

**Halifax, Eng.**—Halifax Corporation Gas Works. Illustrated description of a new purifying house. 800 w. Engr, Lond—June 10, 1898.

**Halle, Germany.**—The Municipal Gas and Water Works at Halle on Saale (Die Städtischen Gas und Wasserwerke zu Halle a. S.). A full report of the construction and operation of the plant, with plan showing the arrangement of the gas works and of the sand filters. 3500 w. 1 plate. Gesundheits-Ingenieur—Oct. 31, 1899.

**Ireland.**—Impressions of Small Gas Works in Ireland. Percy Griffith. Read before the N. of Ireland Assn. of Gas Mgrs. Considers the ownership, capital, accounts, condition of works and mains, price, residual products, etc. 3500 w. Jour Gas Lgt—Aug. 21, 1900.

**Labor-Saving Appliances.**—Labor-Saving Appliances in Gas Works. C. C. Carpenter. Read before the Conference of the British Inst. of Civ. Engs. Considers the practice of the South Metropolitan Gas Works, of London. Discussion. 6500 w. Jour Gas Lgt—June 13, 1899.

Modern Improvements in the Plant of Gas Works: Especially With Reference to the Saving of Manual Labor. J. T. Westcott. Briefly outlines methods used in earlier works, and shows the laber-saving appliances now in use in the retort house. 3000 w. Am Gas Lgt Jour—Dec. 25, 1899.

**Leeds, Eng.**—Inclined Retorts at Leeds. An account of a visit of inspection to the gas works, and the opening of the new retort-house. 3500 w. Gas Wld—Oct. 22, 1898.

The Development and Extension of the Leeds Gas Undertaking. An account of a municipal gas undertaking whose policy has been rewarded by marked success, the extension of the works, new inclosed retort house, etc. 4000 w. Jour Gas Lgt—Oct. 25, 1898.

**Leith.**—See **Edinburgh.**

**Longton, England.**—New Gas-Producing Plant at Longton, Eng. Description of new works with plan. 1500 w. Jour of Gas Lgt—Oct. 25, 1898.

**Machinery.**—Gas-Works Machinery. Discussion on paper by E. A. Harmon. 4500 w. Jour Gas Lgt—June 14, 1898.

Gas-Works Machinery. Edward A. Harmon. Read at meeting of London Soc. of Engs. Remarks on the special requirements for machinery in gas works, to meet the conditions, with a review of many of the mechanical appliances. 7500 w. Jour Gas Lgt—June 7, 1898.

**Municipal Ownership.**—See **GAS INDUSTRY—Municipal Control; Philadelphia; MUNICIPAL OWNERSHIP—Gas.**

**Newcastle-under-Lyme.**—Newcastle under Lyme Corporation Gas Works. F. A. Winstanley. Description of works and plant. 1800 w. Gas Engs' Mag—May 10, 1897.

**Nuisance.**—The Nuisance Question in Gas Works. Frederick H. Shelton. Read at meeting of New England Assn. of Gas Engs. Discusses what constitutes a nuisance, and precautions that will avoid grounds for complaint. Also discussion. 3800 w. Am Gas Lgt Jour—March 6, 1899.

See also **GAS MANUFACTURE—Alkali Works Report.**

**Paris.**—The Visit to the Clichy Works of the Paris Gas Company. A description, with plan of these large and complete works, which were visited by the delegates to the International Gas Congress. 1000 w. Jour Gas Lgt—Sept. 11, 1900.

**Paris Exposition Model.**—See **GAS EXHIBITION.**

**Philadelphia.**—See **GAS INDUSTRY.**

**Ponce, Puerto Rico.**—The Gas Works at Ponce, Puerto Rico. D. L. Hough. Brief historical account of the gas business in Puerto Rico. 4509 w. Am Gas Lgt Jour—Nov. 13, 1899.

**Preston, Eng.**—A Study of the Preston Gas Works. Contains particulars of one of the best conducted gas works in England, made so by the skill with which its engineering has been designed and carried out. 2700 w. Jour Gas Lgt—Nov. 5, 1895.

**Sheffield, Eng.**—Gas Works Extensions at Sheffield.

Detailed description of the new station. 3200 w. Gas Wld—Nov. 19, 1893.

**Simmering.**—See Vienna.

**Sleaford, Eng.**—New Gas Works at Sleaford. Illustrated detailed description. 1200 w. Gas Wld—Dec. 28, 1895.

**Technical Report.**—Monthly Technical Report of Operation in Coal-Gas Works. W. E. Steinwedell. Read before the Western Gas Assn. Suggestions of system of recording operations and converting the data into proper form for reference. With discussion. 3500 w. Pro Age—June 1, 1900.

Monthly Technical Report of Operations in Coal Gas Works. W. E. Steinwedell. Read before the Western Gas Assn. Also discussion. Gives a form and suggestions. 4500 w. Am Gas Lgt Jour—June 11, 1900.

**Torquay, Eng.**—Inaugural Address Before the Southern District Association of Gas Engineers, England. R. Beynon. Deals with experiences met with in the Torquay gas works. 6000 w. Gas Wld—Feb. 12, 1898.

**Valuation.**—The Valuation of Gas Works for Assessment. William Newbigging. Read before the Belfast meeting of the Incorporated Gas Inst. Principally devoted to showing how faulty are the present methods. Discussion. 7000 w. Gas Wld—June 25, 1898.

**Vienna.**—Gasholder and Retort-house of the Vienna Gas Works (Gas Behältergebäude und Ofenhaus der Wiener städt. Gaswerke). Description and plates of the pretentious architecture of these important works. 2500 w. and 2 plates. Wiener Baudindustrie Zeitung—April 8, 1897.

An Examination of the Construction of the City Gas Works at Simmering (Besichtigung des Baues des Städtischen Gaswerkes in Simmering). Showing photographic views of retort house, gasholder, etc., in course of construction for this important suburb of Vienna. 2000 w. Zeitschr d Oesterr Ing u Arc Ver—Dec. 24, 1897.

**Zürich.**—The New Gas Works of the City of Zürich at Schlieren (Das Neue Gaswerk der Stadt Zürich in Schlieren). A. Weiss. A complete account of the new gas works constructed in an outlying suburb, since the consolidation of the old city of Zürich with the surrounding districts. Serial. 1 plate. Schweizer Bauzeit—Oct. 28, 1899.

**GAS WORKS MANAGEMENT.**

See **GAS INDUSTRY; GAS MANUFACTURE; GAS WORKS.**

**GATE.**

**Drawbridge.**—Gate for the Wallabout Drawbridge, Brooklyn, N. Y. An ingenious device by which a wide gate can be quickly closed and not occupy much space. The article is illustrated by views and detail drawings. 900 w. Eng News—March 26, 1896.

**Dry Dock.**—See also **DRY DOCK—Entrance; PUMPING MACHINERY—Dry Dock.**

**Railway Crossing.**—See **GRADE CROSSING—Gate.**

**GATEHOUSE.**

See also **RESERVOIR—Gate.**

**St. John, N. B.**—Spruce Lake Gatehouse. Illustrated description of a gatehouse at St. John, N. B. 1200 w. Fire & Water—Sept. 8, 1900.

**GAUGE.**

See also **WEIGHTS AND MEASURES.**

**Decimal.**—A Decimal Gauge for Wire and Sheet-Iron. R. W. Raymond. Summary of a report of Mr. Albert Ladd Colby, favoring the adoption of a decimal system of gauging all materials in thousandths of an inch. 1600 w. Trans Am Inst of Min Engs—March, 1897.

See also **DECIMAL SYSTEM.**

**Micrometer.**—See **MICROMETER—Gauge.**

**Planer.**—A New System of Gauges for the Planer. Illustrated description of a gauging appliance in use by the Bullard Machine Tool Co., Bridgeport, Conn. 500 w. Am Mach—Sept. 8, 1898.

**Pressure.**—See **PRESSURE GAUGE.**

**Standard.**—Metrological Standards and Gauging Implements. J. Richards. A very interesting historical sketch, presenting facts relating to grinding calipers and gauges that are not generally known. 5000 w. Jour Assn Engng Socs—May, 1896.

**Steam Engine.**—See **TOOL.**

**GAUGING.**

**Casks.**—The Gauging of Casks (Du Jaugeage des Tonneaux). D. Dujon. Discussing the existing formulas, and especially the gauging of partially filled casks both when on end and lying on the side. 2000 w. Rev Tech—July 10, 1897.

**Furnace.**—See **FURNACE—Gauging Instrument.**

**GEAR.**

See also **GEAR CUTTING; MECHANICAL CONNECTIONS.**

**Arm Proportions.**—Gear Arm Proportions. Henry Hess. Formula and diagrams, with description of method. 1100 w. Am Mach—April 29, 1897.

**Automobile.**—See **Variable Speed; AUTOMOBILE—Gearing.**

**Back.**—See **PULLEY—Stepped.**

**Band-Sawing.**—See **BAND-SAWING—Bevel Pinion; MACHINE TOOL—Band Saw.**

**Bevel.**—See also **BICYCLE—Chainless; GEAR CUTTING.**

**Bevel Computing Machine.**—A Bevel-Gear Computing Machine. An illustrated description of instrument for the determination of the various angles required in the construction of bevel gears. The design of James Gleason. 600 w. Am Mach—March 24, 1898.

**Bevel Curves.**—Bevel-Gear Curves. H. W. Alden. A table, or set of curves, to cover all ratios, with explanatory text. 1000 w. Am Mach—Oct. 8, 1896.

**Bicycles.**—See **Bevel; BICYCLE—Gears; GEAR CUTTING—Bevel.**

**Breakage.**—A Study of the Causes Which Lead to Breakage of Gears and Pinions. Charles F. Uebelacker. The first part deals with the gearing of electric motors on street cars, in which the conditions are severe. Diagrams, and formulae are presented, but the discussion is in the main practical in character. Serial. St Ry Jour—April, 1896.

**Cast-Iron.**—The Construction of Cast-Iron Gear Wheels. Herbert Aughtie. Suggests a method of moulding gear wheels that does not involve the use of a machine, while at the same time largely avoiding the sources of expense and inaccuracy inherent in the alternative methods in general use. 2000 w. Prac Eng—April 23, 1897.

**Circular Wheel-Teeth.**—Circular Wheel-Teeth Archibald Sharp. The treatment is mathematical. The author, having previously described a method of drawing circular wheel-teeth having a very small variation in their angular velocity-ratio, investigates the problem in a more general manner in this series of articles. Serial. Ind & East Eng—March 21, 1896.

**Design.**—The Practical Delineation of Gear Teeth (Sur le Tracé Pratique des Engrenages). M. Le Cornu. The curves are assumed to be circular arcs, and the variation from uniform angular velocity is deduced. 1000 w. Comptes Rendus—July 19, 1897.

**Eccentric.**—Eccentric Gears. Frank Richards. Results of investigations of eccentric gears as employed for the quick return service. Diagram. 2000 w. Am Mach—April 22, 1897.

**Electric.**—See also **Grisson.**

**Electric Driving.**—Electric Driving by Toothed Gearing (Elektrischer Antrieb Mittels Zahnradübertragung). O. Lasche. Especially devoted to the influence of the form of tooth upon the wear. The conditions of durability in electric tramway service are considered. Three articles. 10000 w. Zeitschr d Ver Deutscher Ing—Nov. 18, Dec. 2, 9, 1899.

**Electric Inertia Stress.**—Inertia Stress of Electric Gears. J. H. Macalpine. A statement of the problem, investigations made, methods used, etc. 13600 w. Jour Am Soc of Nav Engs—May, 1900.

**Elliptic.**—Elliptic Gears. Illustrates cases where elliptical gear wheels are employed to advantage. 900 w. Prac Engr—Aug. 18, 1899.

**Epicyclic.**—Epicyclic Gearing. Illustrates and explains its principles of operation and its application in machine design. Serial. Mach, N. Y. —Aug., 1899.

**Fellows.**—See **Spur-Bevel; GEAR CUTTING.**

**Form.**—New Forms for Gear Teeth (Neuere Zahnformen). G. Lindner. Especially discussing the effect of shortening the points of the teeth to avoid undercutting of low numbered pinions. The special forms of rack and pinions teeth for rack railways are also discussed. 5000 w. Zeitschr d Ver Deutscher Ing—March 10, 1900.

The Best Form of Curve for Gear Teeth Profiles. Replies to a letter of inquiry sent to constructors in regard to preferred practice. 2000 w. Am Mach—March 17, 1898.

**Grisson Tramway Motor.**—The Grisson Driving Gear (Grisson-Getriebe). R. Grisson. An illustrated description of a gear for use with tramway motors. Two heart-shaped cams engage with rollers mounted on a driven disk. 3500 w. Die Elektrizität—Nov. 25, 1899.

**Humpage Epicycloidal.**—Gearing for the Reduction of Angular Velocity. From "La Nature." Particulars and illustrations of the Humpage Epicycloidal angular velocity reducer with progressive gearing. 1100. Sci Am Sup—Feb. 17, 1900.

**Helical.**—Helical Gearing. Cisnarf. Practical information supplementing the theoretical information given in text-books. 1500 w. Mach—March, 1896.

Helical Gear Teeth. A. M. Mortley. An illustrated description of method of building helical gears. 800 w. Mach, N. Y.—June, 1897.

**Lathe.**—See **LATHE—Cones and Back Gears.**

**Life.**—The Life of Gears. H. S. Cooper. Reasons for the determination to use only a rawhide pinion and a metal gear. 1500 w. St Ry Jour—March, 1897.

**Long Teeth.**—Long Gear Teeth. Horace L. Arnold. A discussion of the subject from a machine shop point of view. 2000 w. Am Mach—Jan. 7, 1897.

**Metric.**—Dimensions of Gear Teeth in the Metric System. Peder Lobben. Explains the application of the metric system to gear calculations. 350 w. Am Mach—June 30, 1898.

**Molding.**—See **MOLDING—Gears.**

**Octoid.**—The Octoid System of Gear Teeth. An illustrated explanation of the term "octoid," and its difference from the involute system. 600 w. Am Mach—Sept. 7, 1899.

**Proportion.**—Proportion of Gear Teeth. Samuel Webber. A criticism. The author considers that shearing strength instead of tensile strength should be the basis of formumae and presents a formula accordingly. 1600 w. Mach, N. Y.—Sept., 1896.

**See-Saw, Tennessee Exposition.**—Unit System of Gearing at the Tennessee Exposition. S. Groves. Describes the special form of gearing employed in the operating mechanism of the see-saw, designed by A. J. Dyer. Ill. 1500 w. Ir Trd Rev—Oct. 28, 1897.

**Speed Changing.**—See **Variable-Speed; CONE WHEEL.**

**Spiral.**—Designing Spiral Gears by the Quadrant Method. W. H. Croker. Descriptive article, with diagrams. 2000 w. Am Mach—Sept. 20, 1900.

Spiral Gearing. W. H. Van Dervoort. How to design and cut spiral gears. Ill. 3500 w. Mach, N. Y.—June, 1898.

**Spur.**—Spur Gear Arithmetic. Arthur B. Babbitt. The object of the article is to explain in as clear a manner as possible the underlying principles of gearing, and give concise rules or formulae for the solution of problems. Seial. Mach, N. Y.—July, 1897.

**Spur-Bevel.**—The Fellows Spur-Bevel Gear. Illustrated detailed description of a curious gear. 1100 w. Am Mach—Feb. 22, 1900.

**Spur Construction.**—The Construction of an Accurate Large Spur Gear. An outline of the methods employed in the construction of a difficult piece of work. 1200 w. Am Mach—Dec. 3, 1896.

**Steel.**—Steel Gearing. R. Grimshaw. Formulae for properly proportioning and general remarks. 1400—w. Mach—Nov., 1896.

**Strength.**—Strength and Wear of Gear Wheel Teeth. Bell Crank. A critical review of the subject with reference to recent articles on the same subject which have appeared in this paper. 1800 w. Mach—March, 1896.

The Strength of Gear Teeth. John H. Barr. A study of the subject by the writer with results. 1000 w. Sib Jour of Engng—June, 1897.

The Strength of Gear Teeth. Robert A. Bruce. An investigation based on equation given in paper of Wilfred Lewis. 2000 w. Am Mach—May 31, 1900.

The Strength of Gear Teeth. Henry Hess. Diagrammatic solution of the load that may be imposed on a gear tooth, with discussion of formulae. 1500 w. Am Mach—Feb. 18, 1897.

**Strength Chart.**—A Strength of Gear Chart. John B. Mayo. Chart with explanation. 1500 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Strength Computer.**—Cox's Strength of Gears Computer. Illustrated description of an instrument for calculating the strength of toothed gears, with a set of tables for working out questions connected with gearing. 400 w. Am Mach—July 29, 1897.

See also **COMPUTER.**

**Strength Diagrams.**—Diagrams for Relative Strength of Gear Teeth. Forrest R. Jonca. Diagrams constructed with a view to facilitating the determining of the sizes and pitches of gears which are suitable to withstand a known or assumed pressure transmitted to them by an intermeshing gear. 2200 w. Trans Am Soc of Mech Engs, Vol. XVIII—May, 1897.

Strength of Gear Teeth. Charles L. Griffin. Diagram offered for the convenient use of the method of designing by the use of a factor of strength. 1000 w. Mach, N. Y.—Sept., 1896.

**Strength Table.**—Table of Strength of Cut Gear Teeth. Henry Hess. A table prepared to allow the pitch and the face to be found with very little arithmetic. It is based on Lewis' method of calculating the strength of gear teeth. 800 w. Am Mach—July 7, 1898.

Table of Strength of Gears. John Fitch. Gives a table for calculating the proper dimensions of gearing. 1000 w. Am Mach—Jan. 19, 1899.

**Tumbler.**—Tumbler Gearing. P. J. Connor. Illustrates a useful device for reversing the motion of driven shafts. 500 w. Mach, N. Y.—Dec., 1899.

**Variable Speed.**—A Hydraulic Variable Speed Gearing. An illustrated description of a patent of Mr. Hall and the important points secured. 1300 w. Engr, Lond—Jan. 19, 1899.

Automobile Tricycle with Variable Speed Gear (Tricycle Automobile à Vitesse Variable). Ch. Gruet. Describing a practical form of variable gear to be used in connection with a petroleum motor, enabling a smaller motor to be used, and permitting low gears to be obtained for ascending grades. 2000 w. Revue Technique—April 10, 1899.

Speed-Changing Gears for Motocycles and Phaetons. Illustrates and describes several speed-changing mechanisms, showing the necessity for their use with the gasoline motor. 1200 w. Sci Am Sup—Oct. 14, 1899.

See also **BICYCLE—Gear; CONE WHEELS—Automobile Gear.**

**Windmill.**—Note on Old Windmill Gearing. C. W. Hunt. Trans Am Soc of Mech Engs, Vol. XVIII.—May, 1897.

See also **WINDMILL.**

**Worm.**—Modern Practice with Worm Gearing. F. A. Halsey. A presentation of the general conditions of successful practice as in use at present. Prof. Barr's theory of worm efficiency is examined and the most efficient thread angles are given, based largely upon the experiments of Wilfred Lewis. 2000 w. Am Mach—Jan. 13, 1898.

The Construction of Worm Gearing. Herbert Aughtie. Calls attention to some points not too obvious to ordinary mechanics. Ill. 1100 w. Prac Eng—Nov. 29, 1895.

**Worm Design.**—Laying Out a Worm and Worm Gear. W. L. Cheney. The nature of a worm gear and the proper method of laying it out to secure satisfactory results. 2200 w. Mach—Oct., 1896.

**Worm Driving.**—Experiments with Wormwheel Driving (Versuche mit Schneckenradgetrieben). R. Stribeck. A record of quantitative tests of efficiencies of worm gear driving at various pressures and speeds; being a continuation of experiments published last year. A valuable paper. 3500 w. Zeitschr d Ver Deutschr Ing—Oct. 15, 1898.

**Worm, Hindley.**—The Construction of the Hindley Worm. An illustrated account of the methods of manufacture of these worms as practiced at the works of the Sprague Electric Elevator Co. Serial. Am Mach—March 25, 1897.

See also **Worm Sprague.**

**Worm Researches.**—Researches in Worm Gearing (Versuche mit Schneckengetrieben). A very thorough investigation by Prof. Stribeck, showing the form and pitch adapted to give the best efficiency, with investigations as to lubrication; many diagrams. 7500 w. Two articles. Zeitschr d Ver Deutscher Ing—Aug. 14, 21, 1897.

**Worm Sprague.**—Electrical Tests of the Efficiency of Worm Gearing. Diagrams showing results of actual tests upon the double-worm elevator of the Sprague Electric Elevator Co. 1800 w. Am Mach—Jan. 21, 1897.

The Sprague Worm-Geared Electric Elevators. Illustrated description of an example of the most modern approved practice in worm gearing. 1100 w. Am Mach—Nov. 5, 1896.

See also Worm Hindley; **ELECTRIC ELEVATOR—Sprague.**

**Worm Teeth Action.**—The Action of Involute and Cycloidal Teeth in Worm Gearing (Eingriffverhältnisse der Schneckengetriebe mit Evolventen und Zykloidenverzahnung). Ad. Ernst. A very full examination into the duration and nature of contact in various cases, with especial reference to the question of wear. Serial. Zeitschr d Ver Deutscher Ing—Sept. 15, 1900.

**GEAR CUTTING.**

See also **GEAR.**

The Generation of Gear-Tooth Outlines (Die Erzeugung der Zahnformen für Räder). Hermann Fischer. A general review of the various mechanical methods of generating the shapes of teeth for spur and bevel gearing directly in the gear-cutting machines. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 1, 1898.

The Geometrical Generation of Irregular Surfaces in Machine Construction. Henry Roland. Giving the history and practice of the modern method of producing theoretically correct tooth forms by the movement of the surfaces. 3000 w. Eng Mag—April, 1900.

**Bevel.**—A New System of Bevel Gear Making. Illustrates and describes some late machines designed by O. J. Beale, of the Brown & Sharpe Manufacturing Co. 1100 w. Am Mach—April 6, 1899.

Bevel Gear Cutting at the Pope Mfg. Company. Part first illustrates and describes the Brown & Sharpe bevel gear generating machine. Serial. Ir Age—Sept. 7, 1899.

Cutting Bevel Gears with Correct Teeth. Gives illustrations with brief descriptions of the most prominent machines used in accurate bevel gear cutting. 1500 w. Mach, N. Y.—June, 1898.

Cutting Bevel Gears. J. M. Lynch. What a workman should know in order to cut bevel gears with a rotary cutter. Ill. 2800 w. Mach, N. Y.—June, 1898.

"Planed" Bevel Gear Teeth. George B. Grant. The definition of "planed" as applied to gear teeth is given, and the four methods now in use for cutting the teeth of bevel gears are explained. 5500 w. Am Mach—Dec. 3, 1896.

The Rice Bevel Gear Cutting Machine. An illustrated detailed description of a bevel-gear cutting machine based upon an entirely new principle. 2800 w. Am Mach—May 10, 1900.

The Warren Bevel-Gear Generating Machine. Illustrated description of a machine for the construction of the gears of the Columbia chainless wheel. 1000 w. Am Mach—March 24, 1898.

See also **Fellows; BAND-SAWING; BICYCLE—Chainless.**

**Bevel and Worm.**—On the Machine-Cutting of Accurate Bevel and Worm Gears. J. H. Gibson. Read before the Inst of North-East Coast of Engs. & Shipbuilders. A brief illustrated description of two machines from the writer's designs, which have been satisfactorily worked for over a year, with notes on machine-cut gearing generally. 5400 w. Ind & Ir—March 26, and April 2, 1897.

**Bilgram.**—The Bilgram Machine for Cutting Gear Teeth. Drawings and description, taken from letters patent recently issued. 2200 w. Ir Age—Oct. 11, 1900.

**Brown & Sharpe.**—A New Line of Automatic Gear Cutting Machines. Illustrated description of machines of the Brown & Sharpe Mfg. Co. 900 w. Am Mach—July 15, 1897.

**Fellows.**—Some Things Seen at the Works of the Fellows Gear Shaper Company—New Features of the Gear Shaper. Illustrated description of interesting tools. 1600 w. Am Mach—Feb. 15, 1900.

The Fellows Gear Shaper. Illustrated description of a new machine and a new system for cutting gears. 2800 w. Am Mach—Dec. 9, 1897.

The Fellows Machine and Cutter for Generating Gear-Teeth. Report of the Franklin Inst. committee, investigating the invention of E. R. Fellows. Ill. 2500 w. Jour Fr Inst—Aug., 1900.

See also **GEAR—Spur-Bevel.**

**Hoe Rack.**—Originating the Hoe Rack. John Randol. Illustrates and describes the making of an machine for cutting rack teeth, requiring great accuracy. 4000 w. Am Mach—Aug. 18, 1898.

See also **DIVIDING ENGINE.**

**Index Plate.**—See **INDEX PLATE.**

**Mechanism.**—The Mechanism of Gear-Cutting Machines. L. D. Burlingame. Part first deals with indexing for gear-cutting, and considers the styles of indexing mechanism most commonly in use, and the methods to insure accuracy. 2800 w. Mach, N. Y.—June, 1898.

**Newton Machine Tool Works.**—A Large Gear Cutter. Describes a gear-cutting machine of unusual size, which has recently been added to the equipment of the Newton Machine Tool Works. 500 w. Am Mach—Oct. 21, 1897.

**Prime Number.**—Cutting Wheels With Prime Numbers of Teeth. Richard Inwards, in the "English Mechanic and World of Science." Illustrates and describes the method. 900 w. Prac Engr—Feb. 23, 1900.

**Rice.**—See **Bevel.**

**Rotary.**—A System of Cutting Bevel Gears with Rotary Cutters. Herbert Innes Jacques. Illustrates and briefly describes a method by means of which bevel wheels may be cut, it is believed, with the nearest approach to accuracy obtainable with rotary cutters. 1700 w. Am Mach—June 7, 1900.

Experimental Investigation of the Cutting of Bevel Gears with Rotary Cutters. Forrest R. Jones and Arthur L. Goddard. Abstract of a thesis presented by Mr. Goddard for the degree of B. S. in mechanical engineering. Describes apparatus constructed and used experimentally in order to obtain the proper setting for gears of different centre angles. 2500 w. Am Soc of Mech Engs—Dec., 1896.

**Spiral.**—Some Points About Cutting Spiral Gears—A Special Spiral Gear Cutting Machine. A. L. de Leuw. Briefly considers methods of cutting, and related subjects, and gives an illustrated description of a machine built at the Niles Tool Works. 3500 w. Am Mach—Jan. 11, 1900.

**Spiral on Lathe.**—Cutting Spiral Gears on the Lathe. George R. Martin. Illustrated description of the work. 400 w. Am Mach—June 21, 1900.

**Trimmer.**—A Gear Trimmer. A. H. Cleaves. Illustrates and describes a device used in retouching small brass gears, which the writer believes would be very useful in similar work. 700 w. Mach, N. Y. —Jan., 1899.

**Warren.**—See **Bevel.**

**Worm.**—See **MACHINE TOOL—Swedish.**

**GEARING.**

See **GEAR; GEAR CUTTING.**

**GEM.**

See **DIAMOND; PRECIOUS STONE; RUBY; SAPPHIRE.**

**GENERATING SET.**

See **ALTERNATOR; DYNAMO: ELECTRIC PLANT; ELECTRIC POWER STATION; ELECTRIC STATION; STEAM ENGINE.**

**GENERATOR.**

**Electric.**—See **ALTERNATOR; DYNAMO.**

**GEODOSY.**

See **SURVEYING.**

**GEOLOGICAL SURVEY.**

See also **GEOLOGY; MINERAL REGION; SURVEYING—Mine.**

**European.**—Cost of European Geological Surveys. R. A. Schneider. Part first considers the work as carried on in Russia and Germany. 2000 w. Eng and Min Jour—Oct. 10, 1896.

**Mining Property.**—A Geological Survey of a Mining Property. T. C. Hopkins. The details which must be determined, and how they should be shown on the map and notes. 1800 w. Mines & Min—Nov., 1899.

**South Wales.**—Geological Survey of South Wales and Monmouthshire. A. Strahan. Read before the British Assn., at the Bristol meeting. An explanation of the work and the revision of the coal fields. 2500 w. Col Guard—Nov. 4, 1898

**United States.**—State Work in Mining Interests. Favorable comment on the work of geological surveys, and argument for the extension of the interests of mining. 900 w. Min & Sci Pr—Aug. 29, 1896.

See also **MINING.—U. S. Geological Survey.**

**GEOLOGY.**

See also **COAL GEOLOGY; GOLD GEOLOGY,** etc.; **MINERAL REGION.**

On the Relation of Geology to Engineering. Boyd Dawkins. The "James Forrest" lecture, delivered before the Inst. of Civil Engs., England. Considers questions that have been answered by the combined results of both sciences; the movement of water in the rocks, the deposition of superficial débris, the folds, etc. Serial. Engng—March 25, 1898.

**Conglomerates.**—Metal-Bearing Conglomerates. Information concerning these deposits which have been found in various places and worked with profit. 1500 w. Min & Sci Pr—July 29, 1899.

**Dykes.**—To Trace an Invisible Dyke. George H. Stone. Describes a new method by which the course of a dyke may be discovered from sand, rocks and boulder beds on the surface. 1700 w. Mines & Min—Nov., 1897.

**Enrichment of Deposits.**—See **MINERAL VEIN.**

**Faults.**—Faults. Albert Williams, Jr. Recovery of faulted beds and veins, relation of folds to faults and of both to metalliferous deposits, practical hints, etc. Ill. 6500 w. Mines & Min—Feb., 1898.

**Great Lakes.**—See **GREAT LAKES—Geology.**

**Horses and Breccia.**—Horses and Breccia. An explanation of these terms, as applied to mining, and of their causes. 1000 w. Min & Sci Pr—June 2, 1900.

**Iron.**—See **IRON GEOLOGY.**

**Laccolites.**—Laccolites and Their Relation to Ore Deposits. Illustrated description of interesting geological features, showing the difference between postular uplifts and true laccolites. Serial. Min & Sci Pr—Dec. 30, 1899.

**Leadville, Col.**—Some Notes on the Geology of Leadville, Colorado. Describes the sedimentary deposits in their order, ore deposits, etc. 2300 w. Min & Sci Pr—May 20, 1899.

**Mining Engineering.**—See **MINING ENGINEERING.**

**Ore Deposition.**—Some Principles Controlling the Deposition of Ores. C. R. Van Hise. A statement of the principles, and an explanation of their application to ore deposits, and their classification. 54000 w. Trans Am Inst of Min Engs—June, 1900.

The Genesis of the Deposition of the Ores of Metals in the Earthcrust. Carl Wulsten. Gives the writer's views, study and work. 1800 w. Min Rept—April 6, 1899.

The Source of Gold and Other Metals. Henry A. Gordon. Abstract of a paper read before the New Zealand Inst. of Min. Engs. Discussing where metallic substances come from and quoting the opinions of many writers. 4000 w. N Z Mines Rec—Aug. 16, 1898.

See also **GOLD GEOLOGY; MINERAL VEIN.**

**Ore Deposits.**—Origin and Classification of Ore Deposits. Charles R. Keyes. Considers the basis of classification and presents the scheme which commends itself to the writer. 10000 w. Trans Am Inst of Min Engs—June, 1900.

The Nature and Yield of Metalliferous Deposits. Bennett H. Brough. Describes the principal ore deposits of the world. Ill. 8300 w. Jour Soc of Arts—July 20, 1900.

**Rock Classification.**—Lecture Notes on Rocks. J. F. Kemp. A very instructive discussion on the composition and classification of rocks. A tabular scheme is presented. 7000 w. Sch of Mines Quar—Nov., 1895.

**St. Petersburg Congress.**—The International Geological Congress at St. Petersburg. Dr. Persifor Frazer. Interesting account of excursions arranged by the Russian government, which enabled geologists to get a clear idea of the extent and value of the mineral fields, with other interesting information. 2500 w. Eng & Min Jour—Nov. 20, 1897.

**Tasmania.**—The Ingenous Rocks of Tasmania. W. H. Twelvetrees and W. F. Petterd. Investigations of the igneous petrology of this island. 5800 w. Trans of Aust Inst of Min Engs—Vol. V.

**Topography.**—See **GEOLOGICAL SURVEY; TOPOGRAPHY—Geology.**

**Veins.**—See **MINERAL VEIN.**

**GERMANY.**

See also **EDUCATION; ENGINEERING COMPETITION.**

British View of Germany's Industrial Development. From the report of Mr. Gastrell, commercial attache to the British embassy in Berlin. Thinks success is due to mercantile enterprise and thoroughness of the people. 1200 w. U S Cons Repts, No. 357—Feb. 23, 1899.

Report on the Economic Position of the German Empire in 1900 by Mr. Gastrell, Commercial Attaché to Her Majesty's Embassy at Berlin. Considers Germany's important position, development of trade, maritime interests, present commercial policy, finances, expenditure of army and navy, with many tables for comparison. 10800 w. Brit Dip & Cons Repts, No. 2400—April, 1900.

Industrial Advance in Germany. Michael G. Mulhall. Considers the development of the last 20 years, the increase in population and energy; the agriculture, forestry, manufactures, hardware, sugar, mining, shipping, railways, and banking; the wealth and finances; attributing all to the advanced state of instruction in every part of the empire and among all classes of people. 3500 w. N Am Rev—Jan., 1898.

Some Factors in the Industrial Progress of Germany. Editorial on the report of T. R. Mulvany, the British consul at Düsseldorf, on trade in Germany. 2500 w. Engng—May 27, 1898.

**GIBRALTAR.**

See **COAST DEFENCE.**

**GILBERT.**

See **ELECTRICITY—History.**

**GIN-POLE.**

**Water Tower Erection.**—The Use of a Gin-Pole for Erecting a Water Tower at Montezuma, Iowa. An economical device which is worthy of notice. This framed pole was 4 by 4 ft. in section, and afterwards carried the supply pipe from the tank, and was boarded up and packed to act as a frost box. Ill. 200 w. Eng News—Jan. 9, 1896.

**GIRDER.**

See also **BRIDGE; BRIDGE ERECTION.**

A 128-Foot Plate-Girder Railroad Bridge. Illustrated description of its details and method of transportation and erection. 2000 w. Eng Rec—June 16, 1900.

A Long Double-Track Plate-Girder Span. Illustrated description of a railway span 105-ft. carrying express trains at full speed on a curved track. 1500 w. Eng Rec—Oct. 21, 1899.

A Seventy-One Ton Plate-Girder. Illustrated description of a heavy 87-ft. girder and method of its shipment. 900 w. Eng Rec—Oct. 6, 1900.

**I-Beam.**—The Strength of I-Beam Girders with Reinforcing Plates. C. F. Blake. Describes a method of calculating the size. 400 w. Am Mach—Oct. 4, 1900.

**Bridgeport, O.**—Long Span Plate-Girder Bridge. Illustrated description of a railway span 105-ft. long and 9½-ft. deep, at Bridgeport, O. Explains both design and erection. 1000 w. Eng Rec—Jan. 14, 1899.

**Counterbracing.**—Counterbracing Girders. Considers the two methods usually adopted for counterbracing the open webs of trusses and girders. 2000 w. Engr, Lond—July 27, 1900.

**Cross Section.**—Contribution to the Question of the Cross Section of Continuous Plate Girders (Beitrag zur Frage der Querschnittsermittlung Kontinuirlicher Blechbalken). A. Meves. A graphical examination of a method by which the greatest bending moment, and consequent section, may be obtained with little labor for any given conditions. 2500 w. Zeitschr d Ver Deutscher Ing—Feb. 6, 1897.

**Depth.**—New Formulas for Finding the Economical Height of Plate Girders. Henry Szlapka. Formulas given are simpler than those generally used and claimed to be theoretically exact within the limits of the assumption. 500 w. Eng Rec—March 27, 1897.

The Depth of Girders. Discusses the conditions and economic depth of girders. 2300 w. Engr, Lond—Aug. 17, 1900.

**Draw.**—See **BRIDGE—Plate Girder Draw.**

**Erection.**—See **BRIDGE ERECTION—Plate Girder.**

**Height.**—See **Depth.**

**Indian Railways.**—Bridge Girders, Indian State Railways. Drawings, details and particulars of spans with 6, 10, 12 and 20 feet. 250 w. Ind Engng—Jan. 14, 1899.

**Irregular Loading.**—See **BEAM.**

**Lifting.**—See also **DERRICK.**

**Lifting Four Stories.**—Lifting a 24-Ton Girder Four Stories. Describes a difficult undertaking carried out during one night when the streets were free from traffic. 1000 w. Eng Rec—Nov. 11, 1899.

**Location on Curve.**—A New Formula for So Locating Two Plate Girders Relative to a Curve as to Bring Equal Loads to Each. Henry Szlapka. Applied, strictly speaking, to plate girders without a cover plate only, but is a very close approximation also in case of girders with plates. 250 w. Eng News—March 4, 1897.

**Madison, N. J.**—Plate Girder Park Foot-Bridge at Madison, N. J. Illustrated description. 200 w. Eng News—Aug. 23, 1900.

**Manchester.**—Fixed Girder Bridge Over Great Ducie Street, Manchester. J. Gilchrist. Description of a metal bridge under conditions made difficult by want of room for construction. 3300 w. Engng—Oct. 30, 1896.

**Northern Pacific R. R.**—See **BRIDGE—Plate-Lattice Girder.**

**Plate-Lattice.**—Plate-Lattice Girders. Discusses plate-lattice girders and compares them with the solid-sided girders, and doubts their being more economical. 2000 w. Engr, Lond—Jan. 21, 1898.

See also **BRIDGE—Plate-Lattice Girder.**

**Vierendeel.**—Portal Construction Applied to Girder Work. Illustrates a novel Belgian bridge. 1100 w. Eng Rec—Feb. 26, 1898.

The Vierendeel Arcade Girder (Pont à Arcades, Système Vierendeel). A. Morizot. A long illustrated description, with the theory of the truss. Serial. Rev Tech—March 10, 1900.

### GLASS.

**Cut.**—The Manufacture of Cut Glass. Charles H. Garlic. Illustrated description. 3000 w. Safety V—March, 1896.

**Iridescent.**—Iridescent Glass. Charles E. Benham. Cause of iridescence. How produced by atmospheric influences, and artificial imitations of these effects. 2000 w. Engng—Oct. 9, 1896.

**Leaded.**—Stained and Leaded Glass Work. Richard Matthews. History of the manufacture; part first is confined to ancient work. Illustration. Serial. Ill Car & Build—April 16, 1897.

**Paving and Building.**—New Uses of Glass. An account of glass used as a material for paving; also for the construction of houses. 900 w. U S Cons Repts, No. 354—Feb. 18, 1899.

**Plate.**—Plate Glass. C. W. Brown. Brief review of the history of this industry, the manufacture and use. 2000 w. Jour of Pro of Am Inst of Archts—1899.

**Plate, St. Gobain, France.**—The Saint Gobain Plate Glass Manufactory. Illustrated description of the details of plate-glass making. 1800 w. Sci Am Sup—Jan. 14, 1899.

**Soluble.**—Soluble Glass in House-Construction. C. Colné. On the properties, application and use of soluble glass, which is in favor in Europe. 2500 w. Am Arch—Feb. 12, 1898.

**Strength Tests.**—Experiments on the Strength of Glass (Recherches sur la Résistance Mécanique du Verre). A report of the tests of the resistance of glass to bending and tension, giving a very full report of the methods and results obtained by M. Grener upon glass and of the Saint Gobain Works. 4000 w. Bull de la Soc d'Encour—June, 1899.

**Window.**—Continuous Operation in the Manufacture of Window Glass. Robert Linton. Especially devoted to the history of the development of the continuous tank furnace as opposed to the older melting pots; with illustrations of German, French, and American furnaces. 3000 w. Eng Mag—Nov., 1898.

**Wire.**—See **WIRE GLASS.**

### GLASS FURNACE.

**Andre.**—See **FURNACE—Andre.**

**Baudoux and Gobbe.**—The Baudoux and Gobbe Small Tank. Description of an innovation in the shape of a small capacity of glass-melting furnace for the manufacture of window glass. 1300 w. Am Mfr & Ir Wld—March 20, 1896.

**Open Hearth.**—Open Hearth Glass Furnaces (Fours à Bassins pour Verriers à Vitre). The Gobbe furnace, as used at the Jumel glass works in Belgium, gives much better results than pot melting. Producer gas is used and the homogeneous glass drawn from beneath the surface of the molten charge. A modification of the furnace is used for firing porcelain, etc. 3500 w. 1 plate. La Rev Tech—Jan. 10, 1898.

Open Hearth Furnaces in Glass Works. From "La Nature." Illustrated description. 1400 w. Sci Am Sup—Sept. 5, 1896.

### GLASS HOUSE.

A House of Glass. Jules Henrivaux. From the "Revue des Deux Mondes." An account of the project to construct a house entirely of glass for the Paris Exposition of 1900. 2200 w. Chau—Jan., 1899.

### GLASS WORKS.

See also **GLASS.**

**Belgium.**—The Glass Works of Val Saint-Lambert (Les Cristalleries du Val Saint-Lambert). A general descriptive account of the great glass works of Belgium, where 4500 employés are engaged in the production of the finest cut-glass ware. 3000 w. La Rev Tech—Feb. 25, 1898.

### GLOW LAMP.

See **INCANDESCENT LAMP.**

### GLUE.

**Testing.**—Glue Testing. S. Rideal. Gives the chemical examination and physical tests, etc. 4000 w. Builder—April 15, 1899.

### GLUING APPARATUS.

Purdue University Steaming and Gluing Apparatus. J. D. Hoffman. Illustrated description. 400 w. Am Mach—April 12, 1900.

### GLYPTIC MODEL.

See **GRAPHICS—Diagrams.**

### GOLD.

See also **PRECIOUS METALS; SILVER.**

Alchemy Redivivus. Alexander E. Outerbridge, Jr. An account of the various efforts to obtain gold, and of investigations showing how widely this metal is diffused. 1200 w. Pop Sci M—Sept., 1897.

Gold: Its Occurrence and Extraction. Joseph Campbell. Lecture delivered before the Melbourne Chamber of Commerce. Part first explains the nature of gold, the chemistry, the occurrence, etc. 4000 w. Aust Min Stand—July 15, 1897.

Gold. Showing that its physical characteristics differ from every other metal. 1000 w. Bos Jour of Com—Aug. 28, 1897.

Gold: The Coming Golden Age. Almarin B. Paul. Extracts from an address before the California Pioneer Assn. Presents the history of the increase in volume of the world's gold since its discovery in California, with reasons and explanations for the future. 1400 w. Min & Sci Pr—Oct. 23, 1897.

The World's Quest for Gold. G. J. S. Historical review of the gold supplies, with comparison of the production of the past and present. 1600 w. Bankers' Mag, Lond—Dec., 1897.

**Cost of Production.**—Cost of Gold Production. Editorial review of the present cost of milling gold ores, with reference to the report of the Robinson Gold Mining Co., which is regarded as a model of clearness and information of technical value. 1800 w. Eng & Min Jour—April 25, 1896.

See also **GOLD METALLURGY; GOLD PRODUCTION.**

**Distribution.**—The Occurrence of Gold. W. H. Storms. Shows the wide distribution of gold and the need of careful study even where indications are absent. 1200 w. Min & Sci Pr—Feb. 10, 1900.

The Wide Distribution of Gold. Arthur Lakes. New and unexpected formations in which it is often found, and why new districts are not often discovered. 1600 w. Mines & Min—Jan., 1900.

**1896.**—Gold and Silver. Review of 1896 in the production of these metals, and a comparison with 1895. Gold mining in the South and in Cripple Creek, Leadville, Mexico and other countries are separately treated. 9500 w. Eng & Min Jour—Jan. 2, 1897.

**Ferric Chloride Action.**—The Action of Ferric Chloride on Metallic Gold. Parker C. McIlhiney. Experiments the result of which help to account for the solubility of gold in mine waters and in other waters containing iron, acid, and common salt. 600 w. Am Jour of Sci—Oct., 1896.

**Melting Point.**—See MELTING POINT—Silver and Gold.

**Oceanic.**—See Sea Water.

**Production.**—See GOLD PRODUCTION.

**Proof.**—Proof Gold and Silver. Cabell Whitehead. Describes the method of preparing pure gold and silver in use at the mints. 1100 w. Eng & Min Jour—Dec. 30, 1899.

**Sea and River.**—Gold from the Sea and River. Discusses the probability of gold existing in this quarter, and the chemist's explanation of how it gets there. 1100 w. Mach—April 15, 1897.

**Sea Water.**—Oceanic Gold. Henry Wurtz. A letter to the editor calling attention to an article in the London "Chemical News" by M. A. Liversidge with discussion of the subject and matters related. 1800 w. Eng & Min Jour—Nov. 21, 1896.

The Electrolytic Marine-Salts Company. History of the company, with editorial comment, showing how readily the American public are humbugged. 2400 w. Eng & Min Jour—July 30, 1898.

**Structure.**—Microscopic Structure of Gold and Gold Alloys. Thomas Andrews. An account of a series of experiments to determine the microphysical structure. Part first considers the structure of pure gold. Ill. 1000 w. Engng—Sept. 30, 1898.

See also GOLD ALLOY; METALLOGRAPHY.

**Transvaal.**—Gold Thefts and Illicit Gold Buying on the Rand. A. von Dessauer. Considers measures for overcoming this evil. 2000 w. Jour of Chem & Met Soc of S Africa—Oct., 1898.

**Transmutation from Silver.**—See ARGENTAURUM.

**Wastage, Bengalese Jewelers.**—The Wastage of Gold in the Course of Preparing Jewelry in Bengal. Issan Saran Chakrabarti. The loss in melting is usually a little over one-fourth pie per tola of gold melted. An exposition of Indian goldsmith practice. Serial. Ind Engng—March 14, 1896.

**GOLD ALLOYS.**

**Liquation.**—On the Liquation of Certain Alloys of Gold. Edward Matthey. Abridged from a paper read before the Royal Society. Calls attention to very irregular distribution of the metals in alloys of gold, zinc and lead, and suggests addition of silver to secure homogeneity. 1000 w. Nature—July 16, 1896.

The Liquation of Certain Alloys of Gold. F. H. M. A discussion of valuable facts brought out in a paper by Edward Matthey in "Philosophical Transactions." Experiments are given and conclusions drawn by Mr. Matthey. 1000 w. Can Min Jour—Nov., 1896.

**Metallography.**—Influence of Small Quantities of Impurities on Gold and Copper. J. O. Arnold and J. Jefferson. The experiments showed that metals with relatively high atomic volumes when alloyed with gold, made the alloy fragile, while those of about the same atomic volume produced little effect. The article is illustrated by twelve microscropic sections of alloys of gold and copper with bismuth, silver, aluminum, silicon, antimony, sulphur and oxygen. 3600 w. Engng —Feb. 7, 1896.

See also METALLOGRAPHY.

**GOLD ASSAYING.**

See ASSAYING; COPPER ASSAYING.

**GOLD BEACH.**

See also GOLD DREDGING; GOLD PLACER; GOLD REGION.

**California.**—Gold-Bearing Beach Sands of California. Arthur Lakes. How they are formed, deposited, and concentrated by the waves of the ocean. 900 w. Mines & Min—March, 1899.

**Cape Nome.**—See GOLD REGION.

**New South Wales.**—The Auriferous Beach Sands on the North Coast (N. S. W.). J. E. Carne. A full description from the annual report of the New South Wales Department of Mines. Serial. Aust Min Stand—March 12, 1896.

**New Zealand.**—Auriferous Beaches on the West Coast. Mr. Macfarlane. These beaches contain gold in immense quantities, intimately associated with magnetite and other minerals. Gives conclusions reached as to the source of the gold, and to the probability of good returns from the working of these beaches. 2000 w. N Z Mines Rec—Nov. 16, 1897.

Notes on the Auriferous Iron-Sands of New Zealand. Alexander McKay. Describes these deposits, and the manner of working the beaches. 1200 w. N Z Mines Rec—April 16, 1898.

**Pacific.**—Beach Sands of the Pacific Coast. W. J. Adams. Discusses their origin, methods of working, devices used, etc. Ill. 4500 w. Mod Mach—April, 1900.

**GOLD BEATING.**

Gold Beating. O. G. Holt. An interesting description of the process which is practiced very much as it was three thousand years ago. 1800 w. Sci Am—July 30, 1898.

**GOLD BULLION.**

See also ASSAYING; BULLION; GOLD METALLURGY; MINTING; SMELTING.

**Electrolytic Refining.**—Electrolytic Methods of Bullion Refining. John B. C. Kershaw. An account of Dr. Wohlwill's method for refining gold bullion, giving details of the process. The advantages claimed over the older methods, are those of greater economy and convenience. 2300 w. Elect'n, Lond—June 3, 1898.

**Melting.**—Sending Gold to Market. "Crucible." Advises the melting of small parcels of gold before transporting, and explains how easily it may be accomplished by the use of plumbago crucibles. 1500 w. Aust Min Stand—Aug. 26, 1897.

**Parting Low-Grade.**—A Plant for Parting Low-Grade Bullion. F. Gutzkow. Illustrated description of the plant used by the writer. 1500 w. Eng & Min Jour—Aug. 21, 1897.

**Refining.**—The Refining of Base Lead Bullion Containing Silver, and High in Gold. G. H. Blakemore. Describes the operation of refining base bullion. 10000 w. Trans of Aust Inst of Min Engs—Vol. V.

**GOLD DETERMINATION.**

See ASSAYING.

**GOLD DISTRICT.**

See GOLD REGION.

**GOLD DREDGING.**

See also GOLD BEACH; GOLD MINING; GOLD PLACER; GOLD REGION.

A Modern Dredger Mining Plant. Illustrates and describes dredgers the motors of which are operated by alternating current. 700 w. Min & Sci Pr—March 24, 1900.

A New Form of Dredge for River-Bed Placers. J. M. Sweeney. Describes a proposed method for cleaning up the bedrock of streams containing gold deposits which claims to overcome the objections to known methods, and can also be used for any deposit of gravel or sand. Ill. 1600 w. Eng & Min Jour—Dec. 25, 1897.

Dredging: Its Present and Future Outlook. J. G. Hyde. On the chief difficulties yet to be overcome in gold dredging. 1000 w. N Z Mines Rec—Nov. 16, 1899.

Dredging for Gold. Gives a detailed account of the evolution of the modern dredge as used for gold recovery. Ill. 5200 w. Aust Min Stand (special)—June 1, 1899.

Dredging for Gold. C. C. Longridge. Gives a review of the history of gold dredging, the various dredges used, etc., in part first. Serial. Engng—April 21, 1899.

Dredging for Gold. Robert Norman Bell. The construction of dredges which successfully work gravel which cannot be profitably handled by other means. 1600 w. Mines & Min—March, 1899.

Dredging for Gold. J. W. H. Piper. On the advantage of the bucket-dredge as a gold producer. 2100 w. Aust Min Stand—May 10, 1900.

Dredging for Gold. Theo. F. Van Wagenen. Considers the problem of gold recovery by dredging, the conditions, etc. Ill. Serial. Min & Sci Pr—Jan. 27, 1900.

Gold Dredging. R. H. Postlethwaite. Discusses the conditions it is necessary for a dredge to fulfill in order to operate successfully. 2200 w. Mines & Min—March, 1900.

Gold Dredging. John M. Sweeney. Illustrated description of devices for obtaining gold from placer deposits with a limited water supply, giving results of experiments and practical trials. 3800 w. Mines & Min—July, 1899.

Hydraulic Dredging, or the Working of Deep Alluvial Deposits by Elevation with Centrifugal Pumps. A. S. Kenyon Illustrates and describes the system in use. 3000 w. Trans of Aust Inst of Min Engs—Vol. V.

Notes on Dredging for Gold. John W. Gray. Information of dredges used and the success of the work both in America and New Zealand. 2300 w. Min & Sci Pr—Nov. 13, 1897.

Notes on Gold Dredging. J. W. H. Piper. Read before the N. S. W. Chamber of Mines. An illustrated article, showing the great advantage of the bucket dredge as a gold producer. 1700 w. B C Min Rec—Aug., 1900.

**Australasia.**—Gold Dredging in New Zealand, Victoria and New South Wales. George Robson. Descriptive paper read before the New South Wales Chamber of Mines, giving information concerning the process with general discussion. 2800 w. N Z Mines Rec—Jan. 16, 1900.

Notes on Gold Dredging in New Zealand and New South Wales. J. W. H. Piper. Read at meeting of N. S. W. Chamber of Mines. Showing the immense advantage of the bucket dredge as a gold producer. 1700 w. N Z Mines Rec—June 16, 1900.

See also **New South Wales; New Zealand.**

**Australia.**—Australian Dredging Progress. Explains the various operations usually confused with dredging proper, and gives an account of the work erroneously called hydraulic dredging in Victoria and New South Wales. 5500 w. Aust Min Stand (special)—June 1, 1899.

Hydraulic Dredging. Description, with illustrations of working of the Yackandandah leases in Australia, by dredging for gold. 2500 w. Aust Min Stand—June 30, 1898.

**Ball System.**—Gold Dredging and Gold Saving. Perry F. Nursey. Describes the invention of Charles Ball for automatically securing the gold. Also reviews the systems of dredging which have been used from the earliest time to the present. 1800 w. Ind & Ir—Oct. 29, 1897.

The Ball Gold Dredger. Describes a combination dredger and gold saver in use in South Africa and in Madagascar. 2300 w. Engr, Lond—Oct. 8, 1897.

**Borneo.**—Gold Dredging in Borneo. An interesting interview with T. R. Toby, who has been recently on an exploring and prospecting trip in West Borneo. Considers the country sure to become a great gold producer. Ill. 2400 w, Aust Min Stand—March 15, 1900.

**British Columbia.**—Gold Dredging in British Columbia. R. Luid Watson. An illustrated description of the dredging plants and methods of operation used on the Fraser River. 2500 w. Mines & Min—Aug., 1900.

**California.**—Gold Dredging in California. R. H. Postlethwaite. Information of the work in the Feather River, near Oroville, Cal. 1400 w. Min & Sci Pr—July 8, 1899.

Gold Dredging at Oroville, Cal. H. G. Parsons. An account of the work, the types of dredges in use, etc. 1000 w. Min & Sci Pr—July 7, 1900.

**Electric.**—Electrically Operated Power Dredges. Illustrated description of machinery for mining developed by the Bennett Amalgamator Manufacturing Co. 2000 w. Elec Wld—March 5, 1898.

**Idaho.**—Gold Dredging on Snake River in Idaho. F. Powell. Discusses the reasons for the numerous failures, the dredger used, cost, etc. Ill. 1800 w. Eng & Min Jour—Oct. 6, 1900.

**Law.**—The Law as to Dredging in Rivers for Gold. R. W. Raymond. Some information on points bearing upon this subject. 900 w. Eng & Min Jour—March 5, 1898.

**Montana.**—Gold Dredging in Montana. Eugene B. Braden. Illustrated description of dredging experiments in this state, with their results. 2500 w. Eng & Min Jour—Nov. 20, 1897.

Handling Refractory Placer Ground. Illustrated description of a gold dredging plant at Bannack, Mont. The bucket dredge uncovers the river bottom and then makes a dam further up stream; the water is pumped from the pit below and the rich gold gravel excavated to rock by hand. 1400 w. Min & Sci Pr—Nov. 30, 1896.

Placer-Mining Dredges on Grasshopper Creek, Montana. Illustrated description of the ladder dredge used for this work. 1000 w. Eng News—Oct. 14, 1897.

**McDougall.**—Alexander McDougall's Dredging System. Illustrates and describes a dredging machine for use in placer mining. 2100 w. Mod Mach—July, 1899.

Gold-Bearing Gravels of the West. Condensed from paper by Alexander McDougall. Illustrates and describes the McDougall plant for placer mining. 1400 w. Min & Sci Pr—July 15, 1899.

**New South Wales.**—Dredging the N. S. W. Rivers. A. O. S. M. Suggests the advisability of testing the rivers known to contain auriferous gravel, and gives a brief history of this industry in New Zealand. Ill. 1300 w. Aus Min Stand—March 17, 1898.

Dredging in New South Wales. An interview with Mr. C. L. Garland regarding the progress made in dredging for gold, which gives promise of satisfactory results. 2000 w. Aust Min Stand—June 9, 1898.

Notes on Gold Dredging, with Reference to the Introduction of the Industry into New South Wales. J. B. Jaquet. A report upon the results obtained and the machinery used. 7500 w. N Z Mines Rec—Sept. 16, 1898.

See also **Australasia; Australia.**

**New Zealand.**—Dredging for Gold. J. B. Jaquet. Official report of the industry in Otago, N. Z. Ill. Serial. Aust Min Stand—Sept. 22, 1898.

Gold Dredging in New Zealand. Historical sketch of the dredging industry in Otago, from a paper by W. H. Cutten, with tables showing dimensions and cost, operations and returns. 3700 w. N Z Mines Rec—Sept. 16, 1899.

Dredging: Its Present and Future Outlook. J. G. Hyde. From the inspecting engineer's report. Considers the chief difficulties to be overcome, and improvements needed. 1000 w. N Z Mines Rec—Nov. 16, 1899.

Gold Dredging Experience in New Zealand. A description of some working devices, and results of operations. 1000 w. Min Reporter—Sept. 13, 1900.

Gold Dredging in New Zealand. P. G. Morgan. Describes the alluvial deposits showing the conditions which led to this industry, giving the history of early attempts at dredging, and describing types of dredges used. Ill. Serial. Eng & Min Jour—Aug. 4, 1900.

Gold Dredging in New Zealand. Illustrated description of one of the largest dredges used, and its cost and working. 1800 w. Engng—April 13, 1900.

Gold Dredging in New Zealand. W. M. Mackinnon. Illustrated description of the methods used in the district of Otago. 1500 w. B C Min Rec—Dec., 1899.

River Dredging for Gold. R. H. Postlethwaite. A résumé of dredging as carried out in the river Molyneaux, in New Zealand. 1500 w. Min & Sci Pr—Sept. 4, 1897.

Some Notes on Alluvial Mining in New Zealand. Jno. W. Gray. Notes taken mainly from information given in the Government report, showing unabated interest in alluvial mining. 1600 w. Min & Sci Pr—Feb. 25, 1899.

The Origin and Progress of Gold Dredging in New Zealand. W. H. Cutten. A fully illustrated paper showing the methods of operating the gold dredging apparatus in the waters of New Zealand, and the wonderfully rich results which have been obtained. 3000 w. Eng Mag—Feb., 1900.

The Saving of Fine Gold on Dredges. John Hayes. From the report of the Dept. of Mines on the Goldfields of New Zealand, for the year 1899-1900. Discusses the losses of gold in dredging, and means of overcoming the difficulty. 1500 w. N Z Mines Rec—Aug. 16, 1900.

The Waiau River as a Gold Dredging Channel. Ro. Carrick. Gives a description of dredging ground peculiar to this basin. 1600 w. N Z Mines Rec—Nov. 16, 1899.

See also **Australasia.**

**Spoon and Grab.**—Spoon and Grab Dredges. J. W.

Jaffray. Read before the N. S. W. Chamber of Mines. Discusses the efficiency and economy of these dredges. 2800 w. Aust Min Stand—July 28, 1900.

**Yukon.**—Yukon Dredging. R. H. Stretch. Considers it exceedingly questionable whether such operations in Alaska would meet with success. and gives reasons for the opinion. 1200 w. Min Ind & Rev—May 19, 1898.

**GOLD FIELD.**

See **GOLD REGION.**

**GOLD GEOLOGY.**

See also **GEOLOGY; GOLD MINE; GOLD PLACER; GOLD REGION; MINERAL REGION; MINERAL VEIN.**

A List of Some of the Rocks and Minerals in Which Gold Has Been Found. E. Lidgey. 900 w. N Z Mines Rec—Oct. 16, 1899.

Gold: Its Origin and Law. Robert A. Moon. From the Melbourne "Argus." Showing reasons for believing that gold may possess something of a fixed or natural mode of occurrence in stratified country. Serial. Aust Min Stand—Aug. 19, 1897.

Popular Fallacies Regarding Ore Deposits. Albert Williams, Jr. Some information of interest to miners of the precious metals. 1800 w. Can Min Rev—Nov. 30, 1899.

The Geological Age of Gold. Dan De Quille. Concludes that gold bearing veins have been formed in all ages, but locally at different times. 1600 w. Eng & Min Jour—July 18, 1896.

The Minerals Which Accompany Gold, and Their Bearing upon the Richness of Ore Deposits. T. A. Rickard. Abstract of a paper read before the Inst. of Min. and Met., Lond. Discusses this question of indicative minerals and how far they determine the value of the deposit, giving examples from the writer's experience. 4000 w. Eng & Min Jour—April 23, 1898.

**Australia.**—See **Indicator Veins.**

**Black Hills, Dakota.**—The Bear Butte Mineral Formation. Robert W. Barrell. An illustrated description of the interesting Black Hills mining region and an account of its peculiarities. 3400 w. Mines & Min—June, 1900.

The Occurrence and Behavior of Tellurium in Gold-Ores, More Particularly with Reference to the Potsdam Ores of the Black Hills, South Dakota. Frank Clemes Smith. Results obtained in the study of the refractory gold-ores of the Potsdam sandstone. Ill. 6000 w. Trans Am Inst of Min Engs—Sept., 1896.

The Potsdam Gold-Ores of the Black Hills of South Dakota. Frank Clemes Smith. An explanation of the classification used by the author, with description of the region, deposits, ores, etc. Map. 8800 w. Trans Am Inst of Min Engs—Sept., 1897.

See also **GOLD METALLURGY; GOLD MILLING; GOLD MINING; GOLD REGION.**

**British Columbia.**—The Occurrence of Free Milling Gold Veins in British Columbia. Wm. Hamilton Merritt. Read before the Canadian Min. Inst. Describes veins of high-grade ore, the granite and schistose quartzite. 1700 w. Can Min Rev—April 29, 1899.

**California.**—A "Pocket" Horizon in Trinity County, California. Oscar H. Hershey. Describes the geology of this region and the conditions governing the distribution of the gold "pockets." 1600 w. Min & Sci Pr—Dec. 11, 1897.

Gold Formation in California. W. H. Storms. Considers the formation of the Sierra Nevada, the great fissure system, faults, veins, gravels, etc., and the needs of the present time in this mining region. 3500 w. Min & Sci Pr—Jan. 29, 1898.

The Mother Lode of California. Ross E. Browne. Locates and describes the lode, the ores, quartz bodies, gold product, treatment of ores, giving cost of production, methods of opening the mines, etc. Ill. 5500 w. Min & Sci Pr—Jan. 29, 1898.

A Few Miles of the Mother Lode in California. R. W. Petre. The almost uniform results of deep mining on a few miles of the Mother Lode have caused it to be regarded by many as unfailing. 2000 w. Eng & Min Jour—Nov. 27, 1897.

Mysteries of the Ancient Rivers of the Forest Hill Divide, Placer Co., Cal. An account of the discovery of what is presumed to be a continuation of the rich channel worked in former years in the Dix mine, with information concerning these channels. Ill. 1500 w. Min & Sci Pr—March 18, 1899.

The Buried Rivers of California as a Source of Gold. J. R. Scupham. How these rich and peculiar formations have been preserved. Modern instances of similar volcanic action covering river beds. Some particulars in regard to the returns which have been made by drifting on the ancient bed rock. 4000 w. Mines & Min—Nov., 1898.

Some Characteristic Features of Veins in Granite in California. W. H. S. Describes a peculiar gold-bearing vein formation. 2800 w. Min & Sci Pr—April 22, 1899.

See also **GOLD REGION.**

**California Mother Lode.**—The Mother Lode of California. Arthur Lakes. A description of what is supposed to be the largest vein system in the world. Its location, position, and extent; the peculiarities of its formations and the various kinds and qualities of the minerals. Ill. 4200 w. Mines & Min—Jan., 1899.

The Great Mother Lode of California. Harold W. Fairbanks. Abstract of a lecture delivered before the San Francisco Gold Mining Exchange. Explains the meaning of the term mother lode, and describes its features. 2500 w. Eng & Min Jour—Sept. 12, 1896.

**Colorado.**—Ore Occurrence in the Red Mountain District, Colorado. Arthur Lakes. Some of its peculiarities and the causes of them. 2800 w. Mines & Min—June, 1898.

Rosita and Silver Cliff. Arthur Lakes. The peculiar forms of the ore formation found in the necks of old volcanoes in Colorado; what they are composed of and the means by which they were deposited. Ill. 3300 w. Mines & Min—March, 1898.

The Geology and Vein Systems of the Mount Wilson Mining District, Colorado. Frank L. Nason. Illustrated description of this region and the character of the ore deposits. 2200 w. Eng & Min Jour—June 9, 1900.

**Cripple Creek.**—A Peculiar Ore Body. Arthur Lakes. Describes a peculiar mine near Cripple Creek and how the method of working resulted in a serious accident. 1200 w. Mines & Min—July, 1898.

Ore-Shoots of Cripple Creek. Arthur Lakes. Treats of their appearance, nature and shape, and how they differ from veins. Describes the peculiarities in some of the mines of Raven Hill, Gold Hill, Bull Hill, Battle Mountain and Beacon Hill. Ill. 2500 w. Col Eng—June, 1897.

**Deceptive Appearances.**—Deceptive Appearances of Ores. Arthur Lakes. Notes some common mistakes. 800 w. Mines & Min—Sept., 1898.

**Enrichment.**—See **MINERAL VEIN.**

**Glacial Epoch.**—The Glacial Epoch—Its Relation to Alluvial Gold Deposits. L. O. Beal. Reviews the evidence of glaciation, and gives his own opinion in explanation of the ice movement. Illustrates the means by which alluvial gold was gathered and re-distributed, and other geological work. Ill. Serial. Aust Min Stand—Oct. 20, 1898.

**Granite.**—An Occurrence of Free Gold in Granite. George P. Merrill. Description of a specimen in the national museum. 800 w. Am Jour of Sci—April, 1896.

Gold in Granite and Plutonic Rocks. William P. Blake. Examples showing that we must recognise such rocks as truly gold bearing. 2800 w. Trans Am Inst of Min Engs—July, 1896.

**Indicator Veins, Australia.**—A Study of Some Ore Deposits. F. D. Johnson. The first paper read at the inaugural meeting of the A. I. M. E. Discussion of the "indicator" and lode systems of deposits in Australia. 2800 w. Aust Min Stand—Jan. 30, 1896.

The Indicator Veins, Ballarat, Australia. T. A. Rickard. A valuable article. The indicator is a thin bed of decomposed slate with pyrite, lying parallel to the gold bearing strata. A glossary of stamp mill terms used in America, giving the English and Australian equivalent, accompanies the article. 2000 w. Eng & Min Jour—Dec. 14, 1895.

**Mashonaland.**—See **GOLD REGION.**

**Montana.**—The Mineral Formation of the Golden Leaf Mines. Robert W. Barrell. Describes an unusual formation in southwestern Montana. 1600 w. Eng & Min Jour—July 17, 1897.

**New South Wales.**—Saddle Reefs at Hargraves, New South Wales. J. Alex. Watt. Description of these reefs with illustrations. 2800 w. Aust Min Stand—June 9, 1898.

The Wolumla Gold Field. J. E. Carne. Report on the geology and auriferous resources of this gold field in the southern district of New South Wales. Serial. Aust Min Stand—Dec. 16, 1897.

**New Zealand.**—The Geology and Veins of the Hauraki Gold Fields. James Park. Read before the New Zealand Iust. of Mining Engs. Abstract of paper on one of the most interesting gold-bearing areas of New Zealand. 2800 w. N Z Mines Rec—Nov. 16, 1897.

**Nova Scotia.**—A Peculiar Lode Formation. C. E. Willis. Read before the Mining Society of Nova Scotia. Illustrated description of a discovery in Nova Scotia. 700 w. Can Min Rev—May, 1898.

**Nuggets.**—See **GOLD NUGGET.**

**Origin.**—Note on the Formation of Gold Ore. K. von Kraatz. Translated by H. V. Winchell. Arguments to account for gold in its various forms. 2500 w. Am Geol—Aug., 1896.

The Genesis of Certain Auriferous Lodes. Continued discussion of paper by Dr. John R. Don, presented at the Chicago meeting, Feb., 1897. 1500 w. Trans Am Inst of Min Engs—Aug., 1898.

The Genesis of Certain Auriferous Lodes. Discussion of the paper by Dr. John R. Don, presented at the Chicago meeting, Feb., 1897. 4500 w. Trans Am Inst of Min Engs—June, 1898.

The Genesis of Certain Auriferous Lodes. John R. Don. A valuable condensed paper, giving original work, with tabulated results. Ill. 25000 w. Trans Am Inst of Min Engs—Nov., 1897.

Theories of the Formation of Lode Matter. F. Sandberger. Translated from the German. Diccusses the ascension and lateral secretion theories from a chemical, geological standpoint. 6500 w. Aust Min Stand—May 26, and June 2, 1898.

See also **MINERAL VEINS.**

**Panama.**—Age and Origin of Certain Gold Deposits on the Isthmus of Panama. Oscar H. Hershey. Of interest because the veins are of recent origin as compared with most gold-bearing ledges. 2000 w. Am Geol—Aug., 1895.

**Placer.**—See also **GOLD PLACER—Origin.**

**Pockets.**—Origin and Age of Certain Gold "Pocket" Deposits in Northern California. O. H. Hershey. A statement of what the author considers the correct theory of the mode of formation. 2000 w. Am Geol—July, 1899.

**Sierra Nevada.**—The Primary Gold Deposits of the Sierra Nevada. Waldemar Lindgren. Information of the age, occurrence, character and forms of the deposit, with conclusions relating to their origin. 3300 w. Engng Jour—Feb., 1896.

**South Africa.**—The Deposition of Gold in South Africa. S. Czyszkowski. Translated by H. V. Winchell. The subject deals with the theories of the origin of the gold deposits in the unique auriferous region of the Transvaal. 7000 w. Am Geol—May, 1896.

**Tellurium.**—See **Black Hills.**

**Transvaal.**—Auriferous Conglomerate of the Transvaal. George F. Becker. A consideration of the nature of this wonderful deposit, and the theories advanced to account for the deposition. 7800 w. Am Jour of Sci—March, 1898.

See also **Witwatersrand.**

**U. S. Southern.**—The Genesis of the Gold Ores in the Central Slate Belt of the Carolinas. H. B. C. Nitze. Considers the structure of the deposits, the causes of the formation of the spaces occupied by the deposits, and the manner of filling these spaces. 2200 w. Eng & Min Jour—June 19, 1897.

**Vegetable Lixiviation.**—The Lixiviation of Gold Deposits by Vegetation. Emil E. Lungwitz. Discusses this subject, giving report of personal experiments. 3000 w. Eng & Min Jour—April 28, 1900.

**Veins.**—See **MINERAL VEINS.**

**Vulcan Mine, Colorado.**—Ores of the Vulcan Mine. Arthur Lakes. A strange mine in Colorado with remarkable formations and a peculiar gold-bearing rock. 2000 w. Mines & Min—July, 1898.

**Western Australia.**—Reef Disturbance in Westralia. Paper recently read by Mr. Horsley, before the Mine Managers Inst. of W. A. Discusses the clauses and effects of the disturbance of reefs from the decomposition of rocks. 1600 w. Aust Min Stand—Dec. 9, 1897.

**Witwatersrand.**—The Extension of the Main Reef Westward of the Farm Witpoortje. Mr. Draper. Read before the Geol. Soc. of South Africa. An attempt at a geological explanation of the Witwatersrand formations. 4000 w. Min Jour—March 14, 1896.

The Rand Conglomerates. Mr. Kuntz. A paper read at a meeting of the Geological Society of South Africa. It gives the various theories as to the origin of the formation and the contained gold deposits. 4000 w. Min Jour—Nov. 16, 1895.

The Witwatersrand Banket, With Notes on Other Gold-Bearing Pudding Stones. George F. Becker. Part first is introductory, giving an outline of the geological position and the relations to the auriferous regions of Southern Africa. Serial. Min & Sci Pr—Jan. 15, 1898.

**Yukon.**—Geology of the Yukon. Condensed from advanced sheets of work by Josiah Edward Spurr. Describes the rocks and the disturbances they have undergone, in part first. Min & Sci Pr—Jan. 22, 1898.

Preliminary Notes on the Surface Geology of the Yukon Territory. Otto Nordenskjold. Report of observations made on a journey between the Alaska coast and Dawson City. 3500 w. Am Geol—May, 1899.

## GOLD METALLURGY.

See also **AMALGAMATION; CHLORINATION; CYANIDE PROCESS; ELECTRO-METALLURGY; GOLD BULLION; GOLD MILLING; METALLURGY; SMELTING.**

Metallurgy of Gold. H. Van F. Furman. Its occurrence, its properties and metallurgical processes for extracting it from ores. Crushing and pulverizing machinery; amalgamation methods; concentration; chlorination and bromination; the cyanide process, smelting process, new methods; melting, assaying and parting gold bullion. 6000 w. Col Eng—Oct., 1896.

**Amalgamation.**—See **AMALGAMATION.**

**Antimony Ores.**—The Treatment of Antimony Ores. Discussion of the New Halloway-Longridge process for extracting gold from antimony ores. It is interesting because little is known of the metallurgy of antimony. 1800 w. Min Jour—Feb. 22, 1896.

**Arrastra.**—See **ARRASTRA.**

**Bailey Process.**—An Improved Process of Extracting Gold Ores. Describes the process patented and perfected by J. W. Bailey, of Denver, Col., and the experimental plant in operation at Cripple Creek. 1500 w. Aust Min Stand—July 2, 1896.

An Improved Process of Extracting Gold Ores. William M. Grosvenor, Jr. Description of experimental plant established at Cripple Creek, and that has been in operation about seven months. The process has been patented by J. W. Bailey, of Denver. The plant is interesting in its complete autormatic and rapid operation. 1500 w. Eng & Min Jour—May 2, 1896.

**Black Hills.**—The Metallurgy of the Refractory Gold Ores of the Black Hills of South Dakota. Frank Clemes Smith. Brief review of the source of these ores, their discovery and process of treatment. 3400 w. Technic—1897.

See also **GOLD MILLING; GOLD MINING; GOLD REGION.**

**Blanket-Table.**—An Improved Blanket-Table. Thomas White. Before the Australasian Inst. of Min. Engs. Gives a description of improvements for simplifying the working of blanket-tables, and supplying a cheap and easily worked concentrator. Also discussion. Ill. 2200 w. Can Min Rev—Nov. 30, 1898.

**Bromine Process.**—The Bromine Extraction Process. Particulars of the process, furnished by Horace F. Brown. 1800 w. N Z Mines Rec—Jan. 17, 1898.

The Engelhardt Bromine Gold Extraction Process in Operation. D. C. Pret and H. Trachsler. Description of the successful treatment of tellurium ores at the bromination works of Pret, Trachsler & Co., at La Plata, Colo. 1400 w. Eng & Min Jour—Sept. 26, 1896.

Treatment of Roasted Gold Ores by Means of Bromine. Richard W. Lodge. Reprinted from "Trans. of Am. Inst. of Min. Engs.," Florida meeting, March, 1895. Experiments where bromine seemed to have many advantages over chlorine. 800 w. Tech Quar—Dec., 1896.

**Cassel-Hinman Process.**—The Cassel-Hinman Gold and Bromine Recovery Process. Editorial discussion of this new process, considering especially its feasibility from a metallurgical point of view. Thinks the statements made by the company need careful investigation before meriting the attention of investors. 1800 w. Eng & Min Jour—June 18, 1898.

The Cassell-Hinman Gold and Bromine Process. Parker C. McIlhiney. This process is for the extraction of gold from low grade ores, and those which will not give up their gold to amalgamation. 2200 w. Jour Am Chem Soc—May, 1896.

**Chemical.**—Gold Extraction Processes and New Solvents. J. Ohly. Part first describes the process of M. de Rigaud, and the substitution of bromine for chlorine in the chlorination process. Serial. Min Rept—April 26, 1900.

The Extraction of Gold by Chemical Methods. T. K. Rose. Discusses the various processes, with their advantages and disadvantages. 2500 w. Nature—March 11, 1897.

The Chemical Precipitation of Gold. P. de Wilde. A reply to the discussion on the writer's process of gold extraction, and also a paper by William Bettel, replying to the paper given. 6300 w. Jour of Chem & Met Soc of S Africa—Feb., 1899.

**Chili.**—Notes on the Treatment of the Gold Ores of the Guanaco Mineral District, Desert of Atacama, Chili. G. M. Barber. Brief account of the difficulties encountered and the irregular and singular occurrence of the gold, with partial description of the treatment of the ore. Serial. Min Jour—Jan. 23, 1897.

**Chlorination.**—See **CHLORINATION.**

**Colorado.**—Cyanide, Chlorination and Amalgamation in Colorado. R. B. Turner. Condensed from report of State Bureau of Mines. Information of the treatment of ores by these processes at Cripple Creek and various other points, with the cost and manner of applying. 3000 w. Min & Sci Pr—May 21, 1898.

**Concentration.**—Advanced Methods of Concentration. J. W. Neill. An extempore address at the Salt Lake session of the International Mining Congress. A discussion of wet concentration, matte smelting, and other processes. 4200 w. Min & Sci Pr—July 30, 1898.

Concentration and Treatment of Low Grade Ores. Edmund B. Kirby. The problems involved and history of the process. Discussing the advantages and disadvantages of the German, the Missouri, the Lake Superior, and the Stamp mill systems. 6000 w. Mines & Min—Feb., 1899.

Concentration. S. J. Hallett. Describes coarse and fine concentration. 1600 w. Min Rept—Oct. 6, 1898.

Concentration of Gold Ores. T. K. Rose. Review of a book by Henry Rosales. 1600 w. Nature—Nov. 7, 1895.

Concentration Plants for Small Mines. F. L. Bartlett. Presents the advantages of concentration and describes some simple and cheap plants, urging less costly and complicated mills. Ill. 3000 w. Eng & Min Jour—May 7, 1898.

Dry Concentration of Gold Ores. Referring to the various methods adopted in dry treatment and describing its application to a North Wales, Australia, mine. 1300 w. Aust Min Stand—Sept. 28, 1895.

Improvements in the Dressing of Gold Ores. F. Hille. This excellent paper describes the various up to date methods used in the concentration of fine material and gives illustrations of the Belharz, Spitzlutte percussion table, Laszlo amalgamator and Krupp's amalgamating table. 6000 w. Can Min Rev—March, 1896.

The Concentration of Gilpin Co. Ores, as Carried on at the Golden Concentrating Works. John Gross. Describes the method and gives graphical plan. 1800 w. Min Ind & Rev—March 18, 1897.

The Concentration of Low Grade Ores. Edmund B. Kirby. Read before the International Gold Mining Convention. Reference is made to the various processes and their application to different grades of ore; the history of ore concentration and the improvements made in it are reviewed; the four different systems noticed, etc. Serial. Min Ind & Rev—July 15, 1897.

See also **GOLD MILLING; METALLURGY.**

**Concentration Test.**—Notes on the Results of Some Laboratory Concentrating Tests of the Ores of Faribault Brook, C. B. F. H. Mason. Read before the Min. Soc. of Nova Scotia. Describes experiments. 1400 w. Can Min Rev—April 29, 1899.

**Concentration Water.**—A Means of Economizing Water in Concentration. Edward H. Johnson. Brief illustrated description of apparatus and method. 700 w. Jour of Chem & Met Soc of S Africa—Oct., 1898.

**Concentrator.**—The New Peck-Monthna Concentrator. George W. Winter. Illustrated description of the Peck concentrator at the Peck-Montana mill. 1300 w. Eng & Min Jour—March 31, 1900.

**Crushing.**—Dry and Wet Crushing of Gold Ore. History of the substitution of wet for dry crushing and showing the tendency back to dry crushing by rolls, followed by a leaching process for extraction of the gold. 2000 w. W Min Wld—Dec. 7, 1895.

Dry Crushing at a South African Gold Mine (Luipaard's Vlei Estate and G. M. Co., Ltd.). George H. Furner. Describes the process and gives points in favor of dry crushing. Ill. 1400 w. Min & Sci Pr—Dec. 10, 1898.

Notes on Dry and Wet Crushing. Frank Merricks. Read before the Inst. of Min. and Met., London. A discussion of the best treatment for different kinds of ores. 1800 w. Col Guard—Dec. 9, 1898.

See also **ORE CRUSHER.**

**Cyanide Process.**—See **CYANIDE PROCESS.**

**Dewey-Walter Process.**—See **Sulphuric Acid Process.**

**Dry Crushing.**—Dry Crushing Experiments. Franklin White. Detail results of tests of gold ores for the purpose of recovering the gold in the tailings and sluices. Wet crushing consisted in crushing, amalgamating, concentrating, cyaniding of sands, of sluices, and retreatment of concentrate; the dry process would require crushing, cyaniding, concentration, possibly amalgamation on small scale, and treatment of concentrates. 2000 w. Aust Min Stand—Nov. 2, 1895.

Dry Crushing and Royalty. Consideration affecting the adoption of fine crushing and cyanide treatment of the entire mine output. 60 per cent. is estimated as being won by amalgamation at present in South Africa. 1200 w. Aust Min Stand—Dec. 14, 1895.

See alco **ASSAYING—Estimation.**

**Dry Placer Machines.**—See **GOLD PLACER.**

**Dry Separation of Copper.**—The Dry Separation of Gold and Copper. Franklin R. Carpenter. Explains a separating process recently patented, giving notes of literature examined and experiments made. 1100 w. Eng & Min Jour—Feb. 12, 1898.

**Electrolytic.**—Development of the Electro-Depositions of Gold in the Transvaal. Emile Andreoli. Facts and figures taken from a recently published report of the Rand Central Ore Reduction Co., Limited, showing surprising progress during the last year. 1700 w. Elec Rev, Lond—Nov. 22, 1895.

Electrical Precipitation of Gold. Edgar Smart. Explains the principal features of the ore treatment process, and the apparatus used. 2800 w. Aust Min Stand (special)—June 1, 1899.

Electro-Deposition and Recovery of Gold. E. Andreoli. Extract from paper read before the Society of Chemical Industry, London. Gives experiments made by the writer, and a chance discovery which led to a series of tests. 1000 w. Eng & Min Jour—July 24, 1897.

Methods of Gold Extraction by Electrolysis. C. A. Mulholland. Part first notes the causes of wasted energy on useless contrivances and reviews the attempts made to introduce electrolysis into the process of amalgamation. Serial. Aust Min Stand—Jan. 12, 1899.

The Electrolytic Separation of Gold (Ueber Goldscheidung auf Elektrolytischem Wege). Dr. E. Wohlwill. A general discussion of the chemical reactions in connection with the electrolytic separation of gold from solutions of chloride or of cyanide. Serial. Zeitschr f Elektrochemie—Feb. 20, 1898.

The Electrolytic Separation of Lean Gold-Silver Alloys (Ueber die Elektrolytische Scheidung Armen Güldischen Silbers). Dr. A. Dietzel. A paper read before the German Electrochemical Society, giving details of an apparatus and method for separating small proportions of gold from silver alloys. 2000 w. Zeitschr f Elektrochemie—July 27, 1899.

See also **Pelatan-Clerici; Zinc Process; CYANIDE PROCESS; ELECTRO-METALLURGY.**

**Experimental.**—Notes on Experimental Metallurgy. J. E. Clennel. An account of experimental methods used in America. 4800 w. Jour of Chem & Met Soc of S Africa—Dec., 1898.

**Fine Gold.**—Fine Gold Mining and Concentration. N. J. Fleck. On the excellent work accomplished with the river burlap machine. 1200 w. Eng & Min Jour—July 15, 1899.

See also **GOLD MINING—Flour Gold Loss; Losses.**

**Gippsland, Victoria.**—Loss of Fine Gold in Gippsland. Donald Clark. Concerning the serious loss that occurs in the treatment of the gold. 3200 w. Aust Min Stand (special)—June 1, 1899.

**Hydrometallurgy.**—Notes on the Hydrometallurgy of Gold and Silver. W. Geo. Waring. Calling attention to facts in hydrometallurgy that are not well understood, and stating that the advances of the present day do not consist in the discovery of new processes, but in improvements in manipulation of the old and well-founded methods. 2700 w. Eng & Min Jour—May 9, 1896.

See also **METALLURGY.**

**Jigging.**—Close-Sizing before Jigging.. Robert H. Richards. Experiments undertaken by the author for the purpose of investigating to what extent equal sized particles, interstitial currents, acceleration and suction bear on the results. 900 w. Engr, Lond—Sept. 11, 1896.

The Conditions Necessary for Equality of Velocity in Particles Settling Through Liquids. Luther Wagoner. The object of the discussion is to examine the facts about grains under one millimeter size. Abstract of published results of Prof. Richards are given. 900 w. Jour of Assn of Engng Soc—Aug., 1896.

**Johannesburg.**—The Surface Plant of the French Rand Gold Mining Co. (Installation de Surface des Mines d'Or de la French Rand Gold Mining Co.). J. Dupont. A general account of the stamp mills, cyanide plant, and other surface works of the French Rand Co., at Johannesburg. 2500 w. 1 plate. Génie Civil—Aug. 26, 1899.

**Kalgoorlie, Australia.**—The Extraction of Gold from Kalgoorlie Ores. Walter J. Studds. A comparison of percentage extraction and cost by smelting with that by battery amalgamation, concentration, and cyanidation. 2000 w. Aust Min Stand—April 29, 1897.

**Kinkead Waste Treatment.**—The Kinkead Waste Rock Experiment. Illustrated description of a newly designed plant to treat gold ore from the dumps of a California mine. The ore treated runs about $4 per ton in gold. 800 w. Min & Sci Pr—Jan. 25, 1896.

**Langhammer.**—A New Gold Saving Process. Dr. P. Langhammer. Describes the process; the main point is that the gold does not and must not come in contact with water until it reaches the chemical solution. 1500 w. Min & Sci Pr—Oct. 17, 1896.

**Leaching Vats Absorption.**—Absorption of Gold by Wooden Leaching Vats. Francis L. Bosqui. Gives results of observations tending to show that losses through this cause have been overestimated. 1000 w. Eng & Min Jour—Feb. 26, 1898.

**Losses in Mill Water.**—Losses of Gold in Mill Water. A. von Gernet. Gives results of experiments and calls attention to sources of danger of cyanide contamination. 1100 w. Jour of Chem & Met Soc of S Africa—Jan., 1899.

**Low Grade Ores.**—Notes on Milling of Low Grade Gold Ores. Edward W. Dee. Results of the experience and observation of a Colorado mine manager. Serial. Mod Mach—Aug., 1899.

Recovery of Gold from Low Grade Ores. Describes a new process recently tried with great success in California. 900 w. Sci Am—July 23, 1898.

See also **Refractory Low Grade.**

**MacArthur-Yates.**—The MacArthur-Yates Process of Gold Extraction, Dry Crushing, With Direct Amalgamation and Cyanidation. John Yates. From a paper read before the Federated Inst. of Min. Engs. Describes process, which is, in the main, the ordinary cyanide percolation process, the distinguishing feature being that the ore is subjected to a short preliminary agitation with the view of securing the amalgamation of as much of the gold as possible, and then raising the extraction. 900 w. Min Jour—Oct. 17, 1896.

See also **CYANIDE PROCESS.**

**Milling.**—See **GOLD MILLING.**

**New Zealand.**—Treatment of Gold Ores in the Hauraki Peninsula, New Zealand. A. H. Bromly. Describes some typical plants of this district, and gives general information. 2500 w. Eng & Min Jour—Nov. 12, 1898.

**Old Dump.**—Working Over an Old Dump. Describes an old dump in California being worked with profit, though first worked closely and economically. Describes the process employed by the old company and the present method. Ill. 2800 w. Min & Sci Pr—May 26, 1900.

**Patents, 1896.**—The Metallurgy of Gold. C. C. Longridge. Patents of 1896, with notes. 1800 w. Min Jour—Sept. 26, 1896.

See also **CYANIDE PROCESS.**

**Pelatan-Clerici Process.**—The Pelatan-Clerici Process at the De Lamar Mill, Idaho. D. B. Huntley. A full description of the process aiming to correct wrong impressions, and to answer queries. Ill. 1600 w. Eng & Min Jour—Aug. 7, 1897.

The Pelatan-Clerici Process at De Lamar. From the "De Lamar Nugget." Description of the operation of this process. The theory of the treatment is the solution of the bullion in the pulp by the use of cyanide and then recovering the values of electricity. 800 w. Min Ind & Rev—Jan. 28, 1897.

See also **CYANIDE PROCESS.**

**Permanganate Process.**—The Permanganate Process of Gold Recovery. Describes this process, but does not think it has any extensive future before it. 900 w. Eng & Min Jour—Nov. 11, 1899.

**Pyritic Ores.**—Practical Treatment of Pyritic Gold Ores at Gibbonsville, Idaho. A detailed sketch of the reduction plant, and the methods of treatment employed therein. 3500 w. Min & Sci Pr—April 3, 1897.

The Reduction Plant for Pyritic Gold-Bearing Ores, at Gibbonsville, Idaho. Bernard MacDonald. A brief description of the mines is given, followed by description of plant which has proved a success. 2000 w. Eng & Min Jour—Oct. 3, 1896.

See also **Sulphide Ores; PYRITES WORKS.**

**Refining.**—See **BULLION; GOLD BULLION; SMELTING—Lead.**

**Refractory.**—The Saving of Gold in Refractory Ore Bodies. Dr. Storer. Illustrated brief description of the two methods now used. 900 w. Aust Min Stand—Sept., 1896.

**Refractory Low-Grade, Brazil.**—Notes on the Treatment of Refractory Low-Grade Gold Ores at the Ouro Preto Gold Mine, Brazil. S. G. McCormick. Part first describes the former treatment of the ore and the present method of working, with the special local conditions. Serial. Min Jour—Jan. 23, 1897.

**Roasting.**—Roasting Gold Ores. H. Van F. Furman. Discussing the chemistry of the process and the ores to which it should be applied, describing the different methods. Ill. Serial. Mines & Min—April, 1898.

**Robinson Mining Co.**—See **GOLD—Cost of Production.**

**Siemens-Halske.**—See **Electrolytic; CYANIDE PROCESS.**

**Siliceous Ores, Black Hills.**—Wet Crushing and Cyaniding the Siliceous Ores of the Black Hills, South Dakota. John M. Henton. Describes the practice and gives table showing the conditions of the solutions and the precipitation during the month of Jan., 1900. 1100 w. Min & Sci Pr—March 10, 1900.

**Slimes.**—A Continuous Process of Slimes Treatment. A contribution to the discussion of paper by Ernest T. Rand. 1200 w. Jour of Chem & Met Soc of S Africa—July, 1899.

A Continuous Process of Slimes Treatment. Ernest T. Rand. Describes the process and gives some practical results. Ill. 2200 w. Jour of Chem & Met Soc of S Africa—May, 1899.

Discrepancies in Slime Treatment. W. A. Caldecott. Continued discussion of Mr. Caldecott's paper, with the writer's reply. 3000 w. Jour of Chem & Met Soc of S Africa—Oct., 1898.

Filter-Press Process of Gold Ore Slimes. William McNeill. Abstract of paper read before the Inst. of Min. and Met. in London. The process consists in the coagulation of the slimy particles by adding lime, settlement and treatment by weak cyandide solutions. 2800 w. Min & Sci Pr—June 17, 1899.

Filter-Press Treatment of Gold Ore Slimes. William McNeill. Illustrates and describes this method of treatment and gives the opinion that in many cases it will prove more advantageous than other methods. 2500 w. Eng & Min Jour—Dec. 31, 1898.

Notes on Sampling, Analyzing, and Treating Slimes. L. Ehrmann. Gives plan and description of an automatic sampler devised by the author, and discusses precipitation of slimes by milk of lime. 3300 w. Jour Chem & Met Soc of S Africa—June, 1899.

Slimes Treatment in Montana. Matt W. Aldersen. Describes an agitation system where flocculation or coagulation and subsequent settling of the slimes are secured, and the gold afterwards precipitated on zinc shavings. In use at the Schmidt & John's mill, at Silver Star, Montana. 1000 w. Eng & Min Jour—Dec. 24, 1898.

The Indirect Advantages of a Slimes Plant. John R. Williams. Notes claiming an increase in amalgamation and other profits. Discussion. 2000 w. Jour of Chem & Met Soc of S Africa—April, 1899.

The Lixiviation of Slimes. Alfred James. Compares the results obtained at Kalgoorlie with those of the Witwatersrand. 1100 w. Eng & Min Jour—April 1, 1899.

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The Solution of Gold in Accumulated and Other Slimes. W. A. Caldecott. Read before the Chemical and Metallurgical Society of South Africa. Reviews the operations involved in dissolving the gold in slimes containing reducing substances, with some details of laboratory practice. 2300 w. Min & Sci Pr—Sept. 18, 1897.

See also **Victoria**; **CYANIDE PROCESS.**

**Smelting.**—See also **SMELTING.**

**Sorting.**—Sorting Before Sizing. Robert H. Richards. Describes investigations made in studying this question, with data upon the laws defining the water-quantity and slope-angle best adapted for the treatment of the different slime-sorts upon slime-tables. 5000 w. Trans Am Inst of Min Engs—May, 1897.

**South African Society.**—The President's (Mr. John R. Williams) Inaugural Address. Reviews the work of the past few years in the recovery of gold, and the improvements made. 2200 w. Jour of Chem & Met Soc of S Africa—July, 1899.

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**Sulphide Ores.**—The Oxidizing of Sulphide Ores. C. Woodman. General remarks on recent advances in gold mining and extraction, with an account of the Koneman process. Serial. Aust Min Stand—Dec. 29, 1898.

Concentration of Auriferous Sulphides in California. Considers the value of concentrating machines and the canvas plant. 1400 w. Min & Sci Pr—Sept. 23, 1899.

See also **Pyritic Ores.**

**Sulphurets.**—A Metallurgic Revolution. Theo. B. Comstock. Mainly dealing with the increase in value of auriferous sulphurets, due to improved methods, etc. 1200 w. Eng & Min Jour—May 30, 1896.

Experimenting with and Processes by Which Sulphurets from the Plymouth Rock, Cal., Mine are worked. T. K. Code. Gives details of the experiments and results. The process by which the ores are now worked. Costs $6.50 per ton. 900 w. Min & Sci Pr—June 25, 1898.

**Sulphuric Acid Process.**—The Sulphuric Acid Process of Treating Lixiviation Sulphides. Frederic P. Dewey. Description of the Dewey-Walter process and its application, with its advantages. 7500 w. Trans Am Inst of Min Engs—July, 1896.

The Sulphuric Acid Process of Refining Lixiviation Sulphides. Frederic P. Dewey. Read before the Washington Section of the Am. Chem. Soc. A description of the Dewey-Walter process with summary of statistics. 3400 w. Jour Am Chem Soc—July, 1896.

**Tailings.**—Successful Treatment of Tailings by the Direct-Filling Process. F. Cardell Pengilly. A short description of the plant and method of treatment by this process as carried on at the mines of the New Kleinfontein Co. (Limited), in the Witwatersrand gold field, which has given good results. 1200 w. N Z Mines Rec—April 16, 1898.

The Gates Canvas Plant. W. S. Hutchinson. Description of plant and methods used at the Kennedy mill, near Jackson, Amador Co., Cal. The Gates methods are said to be adapted to any mill tails when their value is contained in the form of fine, rich, heavy material which escapes other methods of concentration. 1300 w. Min & Sci Pr—Oct. 3, 1896.

The Loss of Gold in Waste Tailings. Henry Rosales. An account of examinations made to determine the actual loss of gold as carried away in waste tailings. 2800 w. Aust Min Stand—April 8, 1897.

The Tailings Plant of the Montana Mining Company, Limited. C. W. Merrill. Illustrated description of the plant, with method of operating. 800 w. Eng & Min Jour—April 16, 1898.

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What Has Become of the Gold Run in the Tailings? B. C. Wilson. Read before the Min. Soc. of Nova Scotia. On the doubtful value of old tailings. 1800 w. Can Min Rec—Jan. 31, 1900.

See also **CYANIDE PROCESS.**

**Testing.**—Testing Gold Ores for Treatment by Concentration and Amalgamation to Determine the Best Method of Extraction. H. Van F. Furman. Describes laboratory work by which the kind of mill or the process suited to any ore can be determined before going to the expense of a mill test. Ill. 3200 w. Mines & Min—June, 1899.

**Tetra-Chloride of Sulphur.**—Complete and Cheap Gold Extraction. Camille Grollet. M. de Rigaud's process, which consists of treating the ores with tetra-chloride of sulphur. Abstract of a paper read before the Société des Ingenieurs Civils de France. 2500 w. Min Jour—April 18, 1896.

**Transvaal Exhibit, Paris.**—The Treatment of Gold Ore at the Transvaal Exhibit at the Trocadero. An illustrated account of a very interesting exhibit made by the government of the South African Republic. 1700 w. Sci Am Sup—Sept. 8, 1900.

**U. S. Southern.**—Metallurgy of Southern Gold. William M. Bowron. The field that was worked in every section prior to the exodus of '49. 4000 w. Tradesman—Jan. 1, 1897.

**Victoria.**—A Few Notes and Observations on the Reduction and Ore Dressing of Auriferous Quartz Veinstone in Victoria. Henry Rosales. Deals with the methods practiced on several of the gold fields of Victoria, especially the systematical treatment of slimes. 3400 w. Trans of Aust Inst of Min Engs—Vol. V.

**Zinc-Bearing.**—The Sadtler Process for Treating Zinc-Bearing Ores. A description of a process for the recovery of gold, silver, etc., from zinc-bearing ores. 2200 w. Eng & Min Jour—Sept. 29, 1900.

**Zinc Process.**—A Zinc Process for Precipitating Gold from Weak Solutions. T. L. Carter. Continued discussion of this paper. 5000 w. Jour of Chem & Met Soc of S Africa—Jan., 1899.

A Zinc Process for Precipitating Gold from Weak Solutions. T. L. Carter. A valuable contribution to the question of zinc or electrical precipitation. Discussion opened and to be continued at next meeting. 3500 w. Jour of Chem & Met Soc of S Africa—Oct., 1898.

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Notes on Gold Prepitation by Zinc Dust. George A. Packard. Describes the method as used at the Mercur mines in Utah. 800 w. Jour Chem & Met Soc of S Africa—June, 1899.

The "Electro-Zinc" Process, and Experimental Researches Which Led to Its Development. W. Battel. Describes experimental work and the writer's method of precipitating gold and silver by the "electro-zinc" process. Serial. Min & Sci Pr—Feb. 18, 1899.

See also **CYANIDE PROCESS.**

**GOLD MILLING.**

See also **CRUSHING MACHINERY; GOLD METALLURGY; METALLURGY; ORE CRUSHER.**

Certain Stamp Mill Practices. James W. Abbott. Some details of the work. 1400 w. Min & Sci Pr—Jan. 2, 1897.

Gold Milling. Gilbert E. Bailey. Preliminary work in selecting the processes and machinery suitable for a given ore. Observations on testing plants; classification of processes; sulphurets; ore stamping; situation, construction and arrangement of mills, etc. Serial. Mines & Min—Aug., 1898.

Notes on Gold Milling. E. B. Preston. Considers the importance of the site, the construction, mill details, and practices in the first part. Serial. Can Min Rev—April, 1896.

Notes on Milling Gold-Bearing Ores. The importance of a knowledge of metallurgy for the profitable milling of gold, the occurrence, processes, etc. 2800 w. Min Ind & Rev—Jan. 13, 1898.

Some Notes on Gold Milling. W. H. Vale. Results of the writer's experience, showing from an economic point of view, what he has found best suited to his particular work. 2200 w. Trans of Aust Inst of Min Engs—Vol. V.

Some Notes on the Milling of Gold Ores. John E. Hardman. Outlines the most prominent conditions of ores met with in practice, and discusses the selecting of the process for milling and its importance, the design of the plant, etc. 4000 w. Can Min Rev—April, 1897.

Suggestions as to Building a Mill. Considerations affecting the location of a stamp mill. 800 w. Aust Min Stand—Nov. 30, 1895.

The Adjustments and Control of the Stamp Mill. Courtenay De Kalb. Read before the Can. Min. Inst. The importance of determining the design of mill required, of guarding the details of practice, and adapting the treatment to the ore. 4500 w. Can Min Rev—April 29, 1899.

**Battery Frame.**—The "A" Battery Frame for Stamp Mills. Robert W. Barrell. Some of its advantages and a description of the method of constructing it. 1500 w. Mines & Min—Nov., 1899.

**Bearmouth, Mont.**—The Montana & Denver Reduction Company's Mill at Bearmouth, Montana. Fred. D. Smith. An illustrated account of this mill and the conditions that led to its erection. 1800 w. Eng & Min Jour—March 24, 1900.

**Black Hills, S. D.**—Gold Milling in the Black Hills, South Dakota, and at Grass Valley, California. T. A. Rickard. Comments suggested by visits to the stamp mills of both localities with valuable tables of cost, consumption of mercury, labor employed and illustrated descriptions of the later installations. 9000 w. Trans Am Inst of Min Engs—Feb., 1896.

See also **GOLD METALLURGY; GOLD MINING; GOLD REGION.**

**British Columbia.**—Milling of Rossland Ores. H. W. C. Jackson. A description of the British Columbia Bullion Extracting Company's Pelatan-Clerici Cyaniding plant. 1200 w. Can Min Rev—Dec. 31, 1898.

**Bryan Mill.**—The Bryan Mill as a Crusher and Amalgamator as Compared with the Stamp-Battery. E. A. H. Tays. Experience of the writer with the "Bryan roller quartz mill." 1800 w. Trans Am Inst of Min Engs—Sept., 1899.

See also **AMALGAMATION—Plate.**

**California.**—Concentration of Auriferous Sulphides in California. The milling plant of the Golden Gate gold mine at Sonora is considered a model of its kind, and a brief description is given. 800 w. Aust Min Stand—Jan. 30, 1896.

Mill Practice of the Utica Mills, Calaveras County, California. A description of the present practice in these mills. 5500 w. Trans of Am Inst of Min Engs—Dec., 1898.

Notes on Gold Mining in California. E. B. Preston. From Bulletin No. 6, California State Mining Bureau. The author gives the development of present practice in detail. A valuable contribution. Serial. Min & Sci Pr—Nov. 16, 1895.

Origin of the California Stamp. C. P. Stanford. An account of the early mills used and the first California stamp-mill, with the principal improvements. Ill. 3500 w. Min & Sci Pr—Jan. 29, 1898.

See also **GOLD MINING.**

**Colorado.**—Gold Milling in Colorado. John Roger. The first of a series of articles proposing to give an accurate description of three gold mills recently erected in Colorado, dealing with the subject more especially from a mechanical point of view. Ill. Serial. Engng—July 1, 1898.

**Cyaniding.**—Milling and the Cyanide Process. Arthur Lakes. Kinds of ores to which the different processes are applicable are discussed. 1500 w. Mines & Min—May, 1898.

The Stamp Milling of Gold Ores in Its Relation to Cyaniding. E. H. Johnson. Points out some things in milling practice which militate against the successful treatment of tailings and slimes. 1300 w. Chem & Met Soc of S Africa—Dec. 18, 1897.

See **CYANIDE PROCESS—Stamp Milling.**

**Douglas Island, Alaska.**—The Evolution of the 300-Stamp Mill on Douglas Island, Alaska. Henry Watson. Describes this new mill, giving an account of the crushing capacity and manner of operating. Ill. 2000 w. Min & Sci Pr—June 16, 1900.

**Economy.**—Water and Fuel Economy in Stamp Milling. A. W. Warwick. Facts and figures concerning the minimum amount of water that will supply a 10-stamp mill. 1200 w. Eng & Min Jour—May 5, 1900.

**Electric.**—Electricity in Gold Milling. H. M. Chance. A classification of the numerous methods by which it has been proposed to use electricity for the purpose. Followed by discussion. 2500 w. Pro Engs' Club of Phila.—Nov., 1896.

**Feed Water.**—An Improved Method of Introducing Feed Water to the Stamp-Mill Mortar. Bernard MacDonald. Read before the Canadian Mining Inst. Claims an increase of crushing capacity, decrease of sliming, and perforation of the bottom of the mortar to retain and protect the coarse gold from abrasion. 1200 w. Can Min Rev—Feb. 28, 1899.

**German.**—The German Gold Milling System. F. Hille. Advantages claimed for it over the methods generally employed in the United States. Ill. Serial. Mod Mach—April, 1899.

**Grass Valley, Cal.**—See **Black Hills, S. D.**

**Gravitation.**—Gravitation Stamp Mills for Quartz Crushing. D. B. Morison. Read before the Northeast Coast Inst. of Engs. & Shipbuilders, Newcastle-upon-Tyne. An analysis of the mechanics of the gravitation stamp battery, describing some recent developments. Ill. Serial. Ind & Ir—May 7, 1897.

**Hadley, N. Y.**—The Hadley, N. Y., Gold Mill and Its History. J. Nelson Nevius. Illustrates and describes the process which is being tried on a commercial scale at the mill of the Sacondaga Mining and Milling Co., near Hadley, Saratoga Co., N. Y. 1600 w. Eng & Min Jour—Sept. 3, 1898.

**Improvements.**—Recent Improvements in Gold Milling. H. M. Chance. Showing how gold milling processes have been lowered in cost and increased in efficiency. 3900 w. Eng Mag—June, 1896.

**Indicater Diagrams.**—Stamp-Mill Indicator Diagrams. Henry Louis. Describes a method, devised by D. B. Morison, of analysing the action of the ordinary gravity stamp, which has given light on the exact motion of the stamp-head, and promises to be of value in determining the efficiency of a new mill before setting it to its work. 2000 w. Trans of Am Inst of Min Engs—June, 1898.

**Lake of the Woods.**—Some Modern Forms of Milling Machinery. Frederick T. Snyder. Describes machinery designed to handle the gold ores of the Lake of the Woods, many of which are of low grade, but contain streaks of high value. The principal features were improvements in the detail of the existing methods. 2500 w. Can Eng—April, 1898.

**Materials.**—A Few Notes on Material used in Minin Machinery. H. W. De Courteney. Dissects the stamp mill into its principal parts, and discusses the metal which is best suited to each part. The various qualities of iron and steel as adapted to the use. 3800 w. Can Min Rev—April, 1897.

**Morison's Quick-Running.**—Morison's Quick-Running Stamp Mill. Illustrated description. 900 w. Engng—June 3, 1898.

**Nova Scotia.**—Free Milling and Chlorination of Gold Ores at North Brookfield, Queen's County, N. S. A detailed description of this new plant, which has cost over $80,000, and the process used. 2000 w. Can Min Rev—May, 1897.

**Steam.**—Notes on Steam and Other Stamps. C. H. Fitch. Summary of information from various sources showing the progress. 1800 w. Min & Sci Pr—March 4, 1899.

**Terminology.**—See **GOLD GEOLOGY—Indicator Veins.**

**Tremain.**—The Use of the Tremain Steam-Stamp with Amalgamation. Edwin A. Sperry. Vertical sections and description of the Tremain steam-stamp, with points of interest in regard to mill-practice in this line. 2400 w. Trans Am Inst of Min Engs—Dec., 1896.

**Utah.**—See **GOLD MINE—Utah.**

**Wardner, Idaho.**—New Bunker Hill and Sullivan Mill. An illustrated description of how one of the largest concentrating plants was built in four months. 800 w. Mines & Min—March, 1900.

**Witwatersrand.**—Milling the Gold Ores of the Witwatersrand. H. H. Webb and Pope Yeatman. A fully illustrated description of the mills of the various mining companies, showing the stamps, vanners, sorting belts, etc., with details of milling operations as conducted on the Rand. 4500 w. Eng Mag—June, 1898.

## GOLD MINE.

See also **GOLD BEACH; GOLD MINING; GOLD PLACER; GOLD REGION; MINE; MINERAL REGION; SILVER MINE.**

**Africa.**—See **Transvaal; West Africa.**

**Arizona.**—Mining in Gavapai County, Arizona. John F. Blandy. Favorable account of the mining progress of this region, which has five leading gold mines. 800 w. Eng & Min Jour—Feb. 27, 1897.

The Fortuna Gold Mine, Arizona. William P. Blake. Description of mine and manner of working. 1200 w. Eng & Min Jour—June 26, 1897.

**Australia.**—Mining in the Australian Alps. R. A. F. Murray. Notes on the development of these mines. 2900 w. Aust Min Stand—Feb. 11, 1897.

**British Columbia.**—A Description of the Bosun Mine. Howard West. Illustrated historical description. 2700 w. B C Min Rec—Aug., 1899.

Notes on Ymir Mine and Its Mill Practice. S. S. Fowler. Read before the Can. Min. Inst. Describes the region and its deposits, the progress in mining and the milling practice. 2800 w. Can Min Rev—Sept. 30, 1899.

**Bridge River, B. C.**—The Bridge River Gold Mining Camp. Frits Cirkel. Read before the Canadian Min. Inst. Describes location, deposits, etc. 3500 w. Can Min Rev—Oct. 31, 1899.

**California.**—Calaveras County Mines. Arthur Lakes. Illustrates and describes Angels Camp and the mother lode in Tuolumne County. 2400 w. Mines & Min—Dec., 1899.

California Gold Mines. Arthur Lakes. Illustrates and describes some typical mines situated in Grass Valley, Nevada Co., California, and their high-pressure water-power plants used for the production of compressed air. 3000 w. Mines & Min—May, 1899.

Mines of the Gold Belt. W. H. Storms. Considers particularly the mines in the counties of Madera, Mariposa, Tuolumne, Calaveras, and Amador in California. 2000 w. Min & Sci Pr—July 31, 1897.

Some Characteristic Mines of the California Gold Belt. W. H. S. Describes some of the characteristics peculiar to each type of vein. 1800 w. Min & Sci Pr—May 20, 1899.

The Empire Mines, Past and Present. George W. Starr. Historical review. Ill. Serial. Min & Sci Pr—Aug. 4, 1900.

The Emerson Shaft of the Wildman Mine, Sutter Creek, Cal. Illustrated description of a plant designed for deep mining. 700 w. Min & Sci Pr—Nov. 18, 1899.

The Upper Coffee Creek Mining District. Oscar H. Hershey. Arguments aiming to prove the permanent character of these mines. 1000 w. Min & Sci Pr—Dec. 16, 1899.

See also **GOLD GEOLOGY; GOLD MINING; GOLD REGION.**

**California, 1897.**—California Mines in 1897. Reviews the improvements in connection with the mining industry, and the work generally. 1200 w. Eng & Min Jour—Jan. 8, 1898.

**Central City, Colo.**—Topeka Gold Mine at Central City, Colorado. Arthur Lakes. A description of the peculiar formation of the veins found there. Ill. 3000 w. Mines & Min—Sept., 1899.

**Colombia.**—Notes on the Mines of the Frontino and Bolivia Company, Colombia, S. A. Spencer Cragoe. Describes the geographical formation and general features of the property, giving an account of mining costs, labor and transport, reduction, etc. 3600 w. Trans Am Inst of Min Engs—Aug., 1898.

The Gold Mines of the Remedios District, Republic of Colombia. Frank Owen. A full account of the location, production, ore treatment, etc., of the various gold mines in this district. The mines were producing in 1613, and had produced 50 million pounds sterling of gold up to 1886. Serial. Min Jour—Nov. 2, 1895.

**Colorado.**—Gilpin County, Colorado, Mines in 1899. Shows a very prosperous year, and gives information of interest. 1200 w. Eng & Min Jour—Jan. 13, 1900.

San Miguel County, Colorado, Mines in 1899. Reviews the work of this district for the past year. 3000 w. Eng & Min Jour—Jan. 20, 1900.

Some Mines of Rosita and Silver Cliff, Colorado. S. F. Emmons. Paper condensed from article published in the last Annual Report of the U. S. Geological Survey, descriptive chiefly of the four principal mines of the district. Ill. 1800 w. Trans Am Inst of Min Engs—March, 1897.

The La Plata Mountains of Colorado. Arthur Lakes. An illustrated description of the telluride veins and the Mancos contact. 2700 w. Mines & Min—Jan., 1900.

The Silver Pick Mine—Wilson, Colorado. M. B. Spaulding. A sketch of a mine presenting many novel features. 2800 w. Sch of Mines Qr—Nov., 1898.

**Colorado River, California.**—The Oldest Gold Mining Camp. Theo. Van Wagenen. An illustrated account of some old gold workings on the California bank of the Colorado River, dating from the last century. 2000 w. Min & Sci Pr—Sept. 8, 1900.

**Cripple Creek, Colorado.**—Cripple Creek, Colorado, Mines in 1899. Notes on the mining progress. 1200 w. Eng & Min Jour—Jan. 13, 1900.

Victor, Cripple Creek, Colorado. Arthur Lakes. An account of a gold-bearing vein found while excavating for the foundations of a hotel. 1400 w. Col Eng—Dec., 1896.

Description of Raven Hill, Cripple Creek, and Its Ore Deposits. Arthur Lakes. Some of the peculiarities of the vein as shown in the Elkton mine. 1700 w. Mines & Min—Nov., 1899.

Cripple Creek, Colorado, Mines in 1897. Reviews the work of the past year, showing the outlook to be very favorable. 1200 w. Eng & Min Jour—Jan. 8, 1898.

**Ecuador.**—Notes on the Gold Mines of Zaruma, Ecuador. J. Ralph Finlay. A general description of the mines and methods of mining, lumbering, etc. Ill. 3000 w. Trans Am Inst of Min Engs—April, 1900.

**Espiritu Santo, Cana.**—See **GOLD MINING—Darien, S. A.**

**Foley, Ontario.**—The Foley Mine, Shoal Lake, Ont. Description, with illustrations, of this celebrated gold mine, giving character of ore deposits, development and expenditures. 500 w. Can Min Rev—Feb., 1897.

**Georgia.**—The Columbia Mining Company, Georgia. W. H. Fluker. An illustrated account of some Georgia gold mines. 1000 w. Eng & Min Jour—Sept. 22, 1900.

See also **United States Southern.**

**Gippsland, Australia.**—Rokeby Gold Mining Company, Gippsland. A brief account of a promising property. 1200 w. Aust Min Stand—June 4, 1896.

**Guiana.**—See **GOLD REGION.**

**Hungary.**—The Gold-Silver Mines in Kapnik, Hungary. R. Helmhacker. Describes the deposit, and the extraction process in use. 4200 w. Min & Sci Pr—March 12, 1898.

Visit of the Mining Congress of Budapest to the Boicza-Bräder Gold Fields (Der Ausflug der Theilnehmer am Montanistischen Congresse zu Budapest nach den Boicza-Bräder Goldbergbauen). An interesting account of a trip of a body of specialists to the famous Hungarian gold mines. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 15 and 22, 1897.

**Independence.**—How the Independence Mine Was Discovered. T. A. Rickard. An account of the discovery of one of the most valuable gold mines ever uncovered. 1300 w. Eng & Min Jour—July 15, 1899.

**Korea.**—United States Gold Mine Concession in Korea. Some information relating to the value of the concession granted to James R. Morse for a period of twenty-five years, and other mining interests. 800 w. Cons Repts—Jan. 29, 1898.

**Kootenay, B. C.**—Kootenay Mines of British Columbia. From "Imperial Institute Journal." An interesting description of this gold producing region. 1100 w. Col Guard—Dec. 20, 1895.

**Lake of the Woods, Canada.**—Description of the Sultana Quartz Lode and the Sinking of the Burley Shaft in Bald Indian Bay, Lake of the Woods. J. Burley Smith. Ill. 2300 w. Can Min Rev—March 31, 1899.

**Lamartine, Colorado.**—The Lamartine Mine at Idaho Springs, Colorado. Arthur Lakes. An illustrated account of a celebrated gold and silver mine with a difficult drainage problem. 3000 w. Mines & Min—April, 1900.

**Magalia, California.**—The Magalia, Cal., Drift Mine. A. D. Gassaway. An account of the discovery, the channel, methods of working gravel, timbering, etc., with illustrations. Serial. Min & Sci Pr—April 8, 1899.

**Mercur, Utah.**—De La Mar's Mercur Mines, Utah. H. L. J. Warren. Part first gives a brief account of the mines, the rock formation and character of the ores, describing the operations of mining and method of extraction. Ill. 2000 w. Eng & Min Jour—Dec. 23, 1899.

Gold Mines of Mercur. Don Maguire. A description of one of the most peculiar formations of gold in the world. History of the early difficulties met with in treating the ore, the resulting ups and downs of the district, and its final success. 3000 w. Mines & Min—Sept., 1898.

Gold Mines of Mercur, Utah. Don Maguire. How the large bodies of low grade ores found there are profitably treated, with description of some of the peculiar ore deposits, the chemical problems their treatment presents, and the methods by which they are solved at the Golden Gate mines. 2700 w. Mines & Min—Oct., 1898.

See also **CYANIDE PROCESS; GOLD MINING; GOLD REGION—Utah.**

**Mexico.**—The Avino Mine, Mexico. An illustrated description of a modern plant which takes the place of a primitive one at one of the oldest mines in Mexico. 1500 w. Mines & Min—April, 1900.

The Avino Mine, Mexico. Illustrates and describes the effective concentrating plant and the mine. 1600 w. Aust Min Stand—June 7, 1900.

The Batopilas Mines, Mexico. Abstract of the general manager's report showing the present condition and prospects. Also editorial. 3800 w. Eng & Min Jour—April 14, 1900.

The Cebollitas Camp, Chihuahua, Mexico. Describes the mines of this camp, so rich in mineral wealth and so perfect in climate that work can be carried on all the year. 900 w. Eng & Min Jour—Sept. 23, 1899.

The Mining Camps of El Oro, Mexico. Robert S. Barrett. A descriptive account of a camp which the writer believes is destined to become one of the greatest gold mining camps of the world. 1200 w. Eng & Min Jour—July 22, 1899.

The Santa Elena Mine, Mexico. Illustrates and describes this mine, the development work, surface equipment, cyanide plant, etc. 1200 w. Eng & Min Jour—Sept. 2, 1899.

See also **SILVER MINE.**

**Montana.**—Montana Mines in 1897. Shows that the adoption of the single gold standard has been one cause of the renewed activity in placer mining and gives a brief summary of the principal mines. 1600 w. Eng & Min Jour—Jan. 8, 1898.

**Mount Lyell, Tasmania.**—Mount Lyell Up to Date. Describes the locality, conditions and surroundings of this mine in Tasmania. 3300 w. Aust Min Stand—March 17, 1898.

Some Notes on the Mount Lyell Mine, Tasmania. Sydney Fawns. A paper read before the Inst. of Min. & Met. Treats of the history, natural features, ore deposit, mine workings, treatment of the ore, and costs. 2200 w. Min Jour—June 27, 1896.

See also **MINE.**

**Mount Morgan, Australia.**—A Great Gold Mine. John W. Gray. The story of Mount Morgan, Australia, is briefly told. 1800 w. Min & Sci Pr—Jan. 15, 1898.

The Greatest Gold Mine in Australia. History of the Discovery of Mount Morgan as told by Edwin Francis Morgan, with scientific theories on the origin of the deposit. Ill. 4000 w. Aust Min Stand—Sept., 1896.

The Greatest Gold Mine in the World. Edgar Hall. A history of the Mount Morgan (Australia) Gold Mine, with abstracts from descriptions by various government geologists, T. A. Rickard, and London "Engineering." Serial. Aust Min Stand—Oct. 5, 1895.

The Mount Morgan Gold Mine. Periodical report giving the fullest information as to the work done and the result. Ill. 2500 w. Aust Min Stand—Dec. 24, 1895.

**New Zealand.**—A New Zealand Gold Mine. Facts concerning the Hauraki District, with illustrations of the Crown Mine. 500 w. Eng & Min Jour—Feb. 20, 1897.

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The Gold Mines of New Zealand (Les Mines d'Or de la Nouvelle-Zélande). F. Schiff. A general descriptive paper, with illustrations of the more important workings. 2500 w. Génie Civil—Aug. 27, 1898.

The O. P. Q. Quartz Mine, Waipori, Otago. An account of its development, with description of the working plant. 1300 w. N Z Mines Rec—Nov. 16, 1899.

The O. P. Q. Quartz Mine, Waipori, Otago. Describes the working and the working plant. 1700 w. N Z Mines Rec—Nov. 16, 1899.

See also **GOLD DREDGING.**

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The Gold Mines of North Carolina. Maxwell J. Gorman. A review of gold mining in this locality, with descriptions of the mines of greatest promise. 3300 w. Eng News—Nov. 19, 1896.

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**Oregon.**—See **GOLD PLACER.**

**Ore Reserves.**—See **ORE RESERVES.**

**Peru.**—Gold Mines of Peru. Report on the gold district of Carabaya, Peru, by the late civil engineer, E. J. Prew. 1700 w. Cons Repts—Jan., 1898.

The Santo Domingo Gold Mine in Peru. F. C. Fuchs. Illustrated description of the deposits and account of the working. 1800 w. Eng & Min Jour—July 7, 1900.

**Placer.**—See **GOLD PLACER.**

**Porphyry Dike, Montana.**—The Porphyry Dike Mines of Montana. L. A. Sisley. Describes the location, geology, workings, ore, etc. 1200 w. Eng & Min Jour—Oct. 2, 1897.

**Prospecting.**—See **PROSPECTING.**

**Republic, Washington.**—An Examination of the Ores of the Republic Gold Mine, Washington. T. M. Chatard and Cabell Whitehead. A report of investigations, showing the importance of thorough chemical examination of such gold-ores as do not readily yield their values. 1500 w. Trans Am Inst of Min Engs—Feb., 1900.

The Lone-Pine-Surprise-Consolidated Mines, Republic, Washington. M. H. Joseph. An illustrated account of these mines and the value of the ore already blocked out. 2700 w. Eng & Min Jour—May 26, 1900.

The Mountain Lion Mine, Republic, Washington. M. H. Joseph. Information of a valuable mine, with illustrations. 2000 w. Eng & Min Jour—March 10, 1900.

The Republic Mine, Washington. M. H. Joseph. An illustrated description of this first mine of a promising district. 1600 w. Eng & Min Jour—Nov. 5, 1898.

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The Republic Mining Camp, Washington. M. H. Joseph. A description of the country and camp, with historical account. Ill. 3300 w. Eng & Min Jour—Nov. 25, 1899.

**Rico, Colorado.**—The Enterprise Mine, Rico, Colorado. T. A. Rickard. Gives the history of the discovery, describes the rock, ore occurrence, veins, cross-veins, etc. Ill. 13500 w. Trans Am Inst of Min Engs—May, 1897.

**Russia.**—Russian Gold Mines. An extremely interesting article upon the railway projects and the methods used at the mines. Every mining man would do well to read the description of the novel method of concentration used. 3000 w. Mach, Lond—March 15, 1896.

The Gold Mines of the Russian Empire (Les Mines d'Or de l'Empire Russe). An illustrated account of the gold mines of the Ural and of Siberia, with statistics, methods of working and prospects with the introduction of railways. Two articles, 1 plate. 6000 w. Génie Civil—July 24, Aug. 7, 1897.

See also Ural; **MINERAL REGION.**

**South Carolina.**—The Haile Gold Mines. Arthur Lakes. Describes the machinery used for concentrating the ores, and for roasting and treating them by the chlorination process. 2500 w. Mines & Min—Oct., 1900.

The Haile Gold Mines of South Carolina. Arthur Lakes. An illustrated account of some striking peculiarities in regard to the ore bodies as compared with most western deposits. 3000 w. Mines & Min—Sept., 1900.

**Tasmania.**—The Leading Gold Mine of Tasmania. A descriptive account of the Tasmania Mine, Beaconsfield. 4500 w. Aust Min Stand—July 23, 1896.

See also **Mount Lyell.**

**Telluride, Colorado.**—Some High Mines of Telluride, Colorado. Illustrations, with brief account of the mines of Savage Basin and Silver Pick Basin. 500 w. Min & Sci Pr—Jan. 28, 1899.

The Liberty Bell Gold Mine, Telluride, Colorado. Arthur Winslow. Treats of the location, history, geology, ore composition and values, ore treatment, milling and mining methods. Ill. 4800 w. Trans Am Inst of Min Engs—Feb., 1899.

The Smuggler-Union Mines, Telluride, Colo. J. A. Potter. Data relative to this property and the treatment of its ore. Read at Colorado meeting. 2600 w. Min Ind & Rev—Nov. 26, 1896.

The Smuggler-Union Mines, Telluride, Colorado. J. A. Porter. Data relative to this property and the treatment of its ores is given. 2500 w. Trans Am Inst of Min Engs—Sept., 1896.

**Transvaal.**—Balance Sheet of a South African Mine. Itemized official statement. 200 w. Min & Sci Pr—Jan. 11, 1896.

The Economic Value of the Main Reef (Witwatersrand). Fischer Wilkinson. Read before the society. Statistically investigating the value of the Main Reef series, how much is paying now and the future prospects. 2700 w. Chem & Met Soc of S Africa—Oct. 16, 1897.

The Gold Mines of the Witwatersrand, South Africa. John Hays Hammond. The first of an important series of papers upon the development of the gold mines of the Transvaal. This paper deals with the rapid development of the region and with its geological features, including the several theories as to the origin of the formations. 4000 w. Eng Mag—Feb., 1898.

The Gold Mines of the Witwatersrand, South Africa. John Hays Hammond. Mr. Hammond's second paper deals with the methods of working as well as the probable value and approximate duration of the gold supply, together with an account of the mining laws of the region. 2500 w. Eng Mag—March, 1898.

The Gold Mines of the Witwatersrand (Mines d'Or du Witwatersrand). A review of the relation of the variations of the prices of mining shares to the cost of development, based upon data obtained by M. Perrier de la Bathie, from the mines of the Transvaal. 4500 w. Génie Civil—Oct. 23, 1897.

The Rose Deep Gold Mine. Brief account of the methods now in use for the extraction of the metal from the ore, illustrated by photographs of the machinery employed at the mine named, situated near Johannesburg, in the Transvaal. 1500 w. Engr, Lond—June 16, 1899.

The Transvaal Fields. Report of increasing yield, but decreasing prosperity, with extracts from published articles, giving comments on reports, expenses, etc. 1200 w. Aust Min Stand—Sept. 22, 1898.

The Transvaal Mines and the Boer Government. F. H. Hatch. A timely discussion of the relations of the actual conditions on the Rand, with the engineer's interest in reforms. 2500 w. Eng Mag—Aug., 1899.

Transvaal Gold Mines (Mines d'Or du Transvaal). Extracts from the reports of the engineers in charge of some of the mines which are being temporarily worked by the Transvaal government, up to the end of 1899. 1500 w. Moniteur Industriel—March 17, 1900.

**Transvaal Valuation.**—The Valuation of Gold Concessions in the Transvaal (L'Evaluation des Concessions Aurifères au Transvaal). G. Braecke. A description of the methods employed in sampling and assaying the deposits; also of estimating the working expenses, in order to arrive at the commercial value of a claim. 5000 w. Rev Univ des Mines—Dec., 1899.

**Twin Springs, Idaho.**—The Twin Springs Placer Company, Idaho. H. L. J. Warren. Illustrated description of the working of these rich deposits. 1700 w. Eng & Min Jour—Sept. 30, 1899.

**United States, Southern.**—The Southern Gold Belt. William M. Bowron. The gold mining in the South, with description of modern practice at the Royal gold mine, Tallapoosa, Ga. Ill. 4000 w. Tradesman—May 1, 1897.

See also **Georgia; North Carolina; South Carolina.**

**Ural.**—Placer-Mining in the Southern Urals. Charles Tappan. An account of the results of an examination of part of the South Ural Placer District. Serial. Eng & Min Jour—July 14, 1900.

The Gold Placers of the Eastern Oural Mountains, Russia, H. B. C. Nitze. A short outline of the geology, character of the beds and method of working. Ill. 1200 w. Eng & Min Jour—Sept. 10, 1898.

The Kotchkar Gold Mines, Oural Mountains, Russia. H. B. C. Nitze and C. W. Purington. Abstract of paper read at Atlantic City meeting of the Am. Inst. of Min. Engs. Describes these mines of eastern Russia and the manner of working. 2200 w. Eng & Min Jour—Feb. 19, 1898.

The Kotchkar Gold Mines, Ural Mountains, Russia. H. B. C. Nitze, and C. W. Purington. Deals especially with the deposit known as the Ouspensky mine. 2800 w. Trans Am Inst of Min Engs—Feb., 1898.

See also **Russia; MINERAL REGION.**

**Utah.**—The Highland Bay Mine and Mill, Bingham, Utah. Describes this mine which yields two distinct ore bodies, one carrying gold and silver, the other copper, gold and silver. Also illustrated description of mill. 1700 w. Eng & Min Jour—Dec. 4, 1897.

See also **Mercur; GOLD REGION.**

**Victoria.**—Gaffney's Creek (Vic.). Gives views and details of some of the principal mines of this district. 2000 w. Aust Min Stand—June 2, 1898.

**Washington.**—The Deu Pree Lode, Washington. Henry Landes. Some account of mining development in the Cascade Mountains, with description of the property named. 2000 w. Eng & Min Jour—Jan. 8, 1898.

See also **Republic.**

**West Africa.**—The Gold Mines of West Africa. James Irvine. Brief sketch of the history of this coast showing the richness in gold, and giving information concerning the climate, and conditions of the country. Also discussion. 7000 w. Jour Soc of Arts—Feb. 24, 1899.

**Western Australia.**—Notes on Western Australia Mines. Jos. Grus. Information of mining affairs from one recently returned from this region. 2700 w. Min & Sci Pr—Jan. 1, 1898.

The Peculiar Ore Deposit of the East Murchison United Gold Mine, Western Australia. D. P. Mitchell. Describes and illustrates the structural features, mineralization and development. 900 w. Trans Am Inst of Min Engs—Sept., 1899.

See also **GOLD REGION.**

**Witwatersraad.**—See **Transvaal.**

**GOLD MINE ACCIDENT.**

**Cripple Creek.**—See **GOLD GEOLOGY.**

**GOLD MINING.**

See also **GOLD METALLURGY; GOLD MINE; GOLD PLACER; GOLD REGION; MINING; MINTING.**

Gold and Silver Mining. C. C. Goodwin. Describes the finding of some successful mines and their output. 2800 w. Chau—March, 1897.

"That Flood of Gold." Carl Snyder. Popular, interesting description of methods in modern gold mining, with remarks upon probable effect of the great increase in gold production. 4000 w. Rev of Rev—Feb., 1896.

**Alabama Low-Grade.**—Mining Low-Grade Gold Ores in Alabama. William B. Phillips. Information of Clay County, discussing whether there is enough paying ore to warrant extensive gold mining operations. Ill. 1500 w. Eng & Min Jour—Aug. 14, 1897.

**Alaska.**—Mining Conditions in Alaska. "Alex. Quartz." Discussing the seeming decline of the mining industry and explaining some of the causes. Claims that it is not from lack of gold in its mines, but the hard conditions imposed by the government. Gives encouraging reports of some districts recently explored. 2500 w. Min & Sci Pr—Nov. 12, 1898.

**Edmonton, Canada.**—Alluvial Gold Mining at Edmonton, Alberta, Canada. Isaac Cowie. An account of the mineral wealth of this region, the methods of mining employed, and general information of interest. 3400 w. Can Min Rev—May, 1898.

**Ancient.**—Ancient Quartz Mining. I. B. Storch. Description of some ancient (200 B. C.) methods of mining gold. 500 w. Min & Sci Pr—Dec. 21, 1895.

**Appalachian Belt.**—Gold Mining in the Appalachian Belt. W. H. Adams. Reviews the prospects, suggests the dividing of the territory into districts, commends paper on the subject by Messrs. Wilkins and Nitze, and states that the mine future of this belt must rest on ability to work low-grade ores. 2000 w. Eng & Min Jour—July 4, 1896.

**Australasia.**—Australasian Gold Mining. Dr. Karl Schmeisser. From "Die Goldfelder Australasiens." Discusses the present and future outlook, drawing favorable conclusions. 1500 w. Aust Min Stand—July 21, 1898.

**Black Hills, S. D.**—Gold Mining and Milling in the Black Hills (S. Dakota). C. G. Warnford Lock, with discussion. General description, treating of the geological formation, auriferous veins and other deposits, the methods of mining and milling. 17000 w. Inst of Min & Met, Lond—Vol. III., Pt. II.

See also **GOLD GEOLOGY; GOLD METALLURGY; GOLD MILLING; GOLD REGION.**

**Bokhara.**—See **GOLD REGION.**

**Brazil.**—See **DIAMONDS—Brazil.**

**British Columbia.**—The Gold Mining Revival in British Columbia. Editorial review of present prospects in this field. 1700 w. Min Jour—Aug. 29, 1896.

**British Guiana.**—Gold Mining in British Guiana. Concludes that with free milling, gold of a high-grade of value, such as is reported to prevail in the northwest district of British Guiana, and moderate working expenses, the investor may look for success. 2400 w. Min Jour—Nov. 14, 1896.

**Burma.**—Notes Upon Gold Mining in Burma. A. H. Bromly. Abstract from a paper read before the Federated Inst. of Min. Engs. Distribution and mode of occurrence of the metal, with manner of working. 1600 w. Min Jour—Jan. 16, 1897.

**California.**—California Mining. Arthur Lakes. Gives the history of mining in the Nevada City and Grass Valley regions, with description of the geology of the veins. Ill. 3500 w. Mines & Min—Jan., 1900.

Cheap Mining and Milling at the Spanish Mine. Horace F. Brown. An account of a California gold mine and its working of low-grade ore. Ill. 1500 w. Min & Sci Pr—March 24, 1900.

Condition of Gold Mining in California. Charles G. Yale. The change in the character and system of mining, the production, and the value of other minerals mined in this State. 1300 w. Min & Sci Pr—July 10, 1897.

Early Mining and Milling Methods in California. R. B. Noyes. Describes the primitive construction of a mill used in the early '50's. 1200 w. Min & Sci Pr—Jan. 29, 1898.

Gold Mining in California. Aug. J. Bowie. The benefits to the government from the gold mines of the country. Also interesting information on hydraulic mining, legitimate and speculative mining, speculative mines, mining as a business proposition, with an outline of the topography and geology of California, gold quartz veins, depth of mines, etc. Serial. Min & Sci Pr—Sept. 26, 1896.

Mining on the California Gold Belt. W. H. Storms. An account of recent workings by improved methods. Serial. Min & Sci Pr—May 26, 1900.

Recollections of California Mining Life. Reviews what is known of the occurrence of gold in California prior to Jan., 1848, gives interesting account of the finding of the gold as reported by various persons, and the effect of the discovery. Ill. 9800 w. Min & Sci Pr—Jan. 29, 1898.

See also **GOLD MILLING; GOLD REGION.**

**California Drift.**—California Drift Mining. An illustrated detailed account of this industry. 2000 w. Min & Sci Pr—Nov. 25, 1899.

**Canadian Yukon Laws.**—See **MINING LAW—Yukon.**

**Colorado.**—Gold Mining Activity in Colorado. T. A. Rickard. A very entertaining article showing the vicissitudes of Creede and Cripple Creek and the influences upon which the mining activity of the district depended. 3000 w. N Amer Rev—April, 1896.

**Cripple Creek.**—Cripple Creek. Arthur Lakes. The changes and improvements which have taken place within the past year. A description of the building of the new city and the continued remarkable development of the mining industry in the vicinity. 2600 w. Col Eng—Sept., 1896.

Some Cripple Creek Practices. Wascott. Information in reference to the milling capacity, leasing system and tunnel enterprises. 1800 w. Min & Sci Pr—Jan. 2, 1897.

**Darien, S. A.**—Modern Gold Mining in the Darien. Notes on the Re-opening of the Espiritu Santo Mine at Cana. Ernest R. Woakes. An interesting account of the writer's experience at this mine. Ill. 11700 w. Trans Am Inst of Min Engs—Feb., 1899.

Notes on the Espiritu Santo Mine at Cana.; Its Drainage and Recovery. Ernest R. Woakes. Past history of the mine, account of exploration of the mine in 1892, and the more recent work. It is a most interesting mine with an interesting history. 4500 w. Inst of Min & Met, Lond—Vol. III., Pt. II.

See also **GOLD REGION—Colombia.**

**Dutch East Indies.**—The Mining Industry of the Dutch East Indies. A cursory view of the petroleum and gold industries. 800 w. Bd of Tr Jour—Feb., 1896.

**Flour Gold Loss.**—The Loss of Flour Gold in Australian Mines. J. Cosmo Newberry. Discusses the causes of loss in gold mining and what is done to save gold. 2200 w. Aust Min Stand—Oct. 15, 1896.

See also **Losses; GOLD METALLURGY—Fine Gold.**

**French Guiana.**—Gold Mining in French Guiana. E. D. Levat. An account of the prospecting method of working, and peculiarities of the native workers. Serial. Eng & Min Jour—July 8, 1899.

**Future.**—Future of Gold Mining. Editorial review of present conditions and causes which have affected gold mining, calling attention to considerations that demand adjustment. 1000 w. Min Ind & Rev—Feb. 18, 1897.

**Georgia.**—Georgia Gold Mining Developments. Wilber Colvin. Historical review and report of recent work. Ill. 1300 w. Eng & Min Jour—Oct. 6, 1900.

Gold Mining in Georgia. B. M. Hall. This brief paper is intended to call attention to some sources of information, and to point out a few peculiarities of the industry. 1600 w. Eng Assn of the South—April, 1896.

Gold Mining in Georgia. William Tatham. An account of the mines and mining and the opportunities for those possessing capital and experience. 2800 w. Jour Fr Inst—July, 1898.

Gold Mining and Milling in Georgia. H. V. Croll. A brief illustrated description of past methods and remarks on recent advances. 2000 w. Min & Sci Pr—Feb. 3, 1900.

Gold Mining in Georgia. William M. Brewer. Brief description of prospects in this State recently visited. 1400 w. Eng & Min Jour—March 20, 1897.

Gold Mining in Georgia. F. H. Richardson. An account of the extent of the operations in progress and projected. 2000 w. Mfrs Rec—Oct. 15, 1897.

**History.**—The History of Gold Mining. M. C. Ihlsend. An extract from an illustrated lecture delivered before the Engineers' Club, of Scranton, Pa. 2500 w. Mines & Min—July, 1898.

**Hydraulic.**—See **HYDRAULIC MINING.**

**Idaho.**—Gold Mining at Gibbonsville, Idaho. Don Maguire. Facts in regard to the history and prospects of an interesting mining town. 1800 w. Mines & Min—Jan., 1899.

**Improved Processes.**—Improved Processes for Reducing and Saving Precious Metals. Alfred von der Ropp. Shows some of the new ways and means by which gold mining in the present is made profitable. Also calls attention to the superiority of American metallurgists and mining engineers. 1900 w. Min & Sci Pr—Sept. 26, 1896.

**Klondike.**—The Cost of Production of Gold and the Klondike Fields. Discussing whether the cost of obtaining the gold is not greater than the profit. 2300 w. Bankers' Mag, Lond—Nov., 1898.

**Losses, Gippsland, Australia.**—The Losses of Fine Gold in Gippsland. Donald Clark. An interesting description of losses in the mountainous gold field in Victoria. 4000 w. Aust Min Stand—Oct. 29, 1896.

See also Flour Gold Loss; **GOLD METALLURGY —Fine Gold.**

**Machinery.**—See **GOLD MINING MACHINERY.**

**Malay.**—Malay Gold Mining. The extent to which the industry has been carried on under European and Australian auspices. 900 w. Min Jour—Aug. 22, 1896.

**Mercur, Utah.**—Gold Mining in Mercur, Utah. John Dern. Condensation of a paper read at the International Mining convention at Denver, Colo. The history of the camp, its failures and success made possible by the application of cyanide. 2000 w. Min & Sci Pr—July 24, 1897.

See also **CYANIDE PROCESS; GOLD MINE; GOLD REGION—Utah.**

**Modern Practice.**—Modern Practice in Gold Mining. John Hays Hammond. Read before the Engineering Conference of the Inst. of Civ. Engs., England. Classifies and briefly discusses the problems. 1200 w. Col Guard—June 16, 1899.

**New Zealand.**—Gold Mining in New Zealand. C. C. Longridge. Warnings and suggestions, quoting opinions of the Government Inspecting Engineer. Also editorial. 2500 w. Min Jour—Feb. 6, 1897.

Mining in New Zealand. C. C. Longridge. Nature of the gold, power, blasting, crushing and stamping, cyaniding, sluices, labor and cost are briefly noticed. 800 w. Min Jour—Feb. 13, 1897.

New Zealand's First Mining Speculation. Ro. Carrick. Narrates incidents in the discovery and early development of mining in New Zealand. 1400 w. N Z Mines Rec—Jan. 16, 1900.

Quartz Mining in New Zealand. Report concerning the increase in gold returns from this source. 1700 w. N Z Mines Rec—Aug. 16, 1899.

**Nova Scotia.**—Gold Mining in Nova Scotia from 1860 to 1899. Dr. A. R. C. Selwyn. Showing that mining enterprise has been neglected, and discussing the reasons. 1700 w. Can Min Rev—April 29, 1899.

Gold Mining in Nova Scotia. G. W. Stuart. A brief history of the industry, with illustrations. 2800 w. Eng & Min Jour—Sept. 15, 1900.

Notes of the Mining of Low Grade Gold Ore in Nova Scotia. G. F. Andrews. An outline of the writer's personal experience while manager of the Richardson mine at Isaac's Harbor, Nova Scotia. 3000 w. Can Min Rev—Feb., 1897.

Nova Scotia Gold Mines. George W. Stuart. On the changes in the system of mining and milling which have placed the business on a permanent basis. 1000 w. Eng & Min Jour—March 11, 1899.

The Gold Bearing Tailings of Nova Scotia. F. H. Mason. An examination of the value of the tailings in Nova Scotia, with results. 2400 w. Can Min Rev—March, 1897.

**Ontario.**—An Epidemic of Mismanagement. Horace V. Winchell. A discussion of the mistakes made in the management of the Rainy River district in western Ontario. 1600 w. Can Min Rev—Nov., 1897.

**Opening.**—How to Open Up a Gold Mine. S. A. Josephi. Considers the necessary work, how it should be done, and particulars in regard to the probable cost. 1400 w. Mines & Min—Feb., 1900.

**Oregon.**—Gold Mining in Oregon. R. W. Barrell. A description of the development of the mines and the peculiarities of the ores and veins of the eastern mining region of the state, together with an account of climate and topography and the methods of working the mines. 5600 w. Mines & Min—Aug., 1898.

**Oregon Pockets.**—Pocket Mining in Southern Oregon. W. I. Fleck. Describes pocket deposits, especially in this district, with information concerning the prospecting. 1200 w. Eng & Min Jour—July 21, 1900.

**Ore Reserves.**—See **ORE RESERVES.**

**Placer.**—See **GOLD PLACER.**

**Prospecting.**—See **PROSPECTING.**

**Quartz, California.**—Beginning of Quartz Mining in California. Almarin B. Paul. Reviews the history from 1848 to the discovery of the Comstock. Ill. 2300 w. Min & Sci Pr—Jan. 29, 1898.

**Quartz, Canada and Australia.**—Gold Quartz Mining in Canada and Victoria, Australia. Dr. A. R. Selwyn. Facts and comparisons relating to these fields, with discussion. 5500 w. Can Min Rev—Feb., 1897.

**Receptacles.**—Receptacles for Valuable Mineral Deposits. A study of receptacles and the importance to the miner in understanding how to work any deposit. Serial. Aust Min Stand—April 29, 1897.

**Rhodesia, South Africa.**—Gold Mining in Rhodesia. W. T. St. Auburn. An interesting description of methods and conditions in a South African gold district. 2700 w. Min & Sci Pr—March 28, 1896.

On Gold Mining in Rhodesia, British South Africa. William Fischer Wilkinson. Experiences of the writer during a visit of two months duration, at the latter end of 1895. The best way of reaching the country, the geographical position of the gold fields, a list of the principal fields with the names of some of the prominent mines, the geology, mining laws of the country, and evidence of past workings, are some of the subjects receiving attention. 4400 w. Jour Soc of Arts—July 3, 1896.

**River, California.**—River Mining in California. R. Dunn. Considers the appliances for working, and the subjects generally. 4800 w. Min & Sci Pr—March 19, 1898.

**Russian Laws.**—Russian Laws on Gold Mining. Translation and condensation from a recent French publication giving information on this subject. 2200 w. U S Cons Repts, No. 754—June 13, 1900.

See also **MINING LAW.**

**Siberia.**—Gold Gravel Washing in Eastern Siberia. E. D. Levat. Illustrates and describes the sluices in the placers worked by the Zeya Company. 800 w. Eng & Min Jour—April 3, 1897.

Gold Mining in Siberia. Russell L. Dunn. Gives conclusions from a study of Siberian mines and mining conditions on the ground, explaining methods of prospecting, exploration, etc. Ill. 3000 w. Min & Sci Pr—April 3, 1897.

Working Frozen Alluvial Deposits in Siberia. E. D. Levat. Describes the special methods of working where the ground is always frozen. Ill. 900 w. Eng & Min Jour—June 12, 1897.

See also **GOLD REGION.**

**Siberia Gravel Washing.**—Gold Gravel Washing in Eastern Siberia. E. D. Levat. Illustrated description of the sluices in the placers worked by the Zeya Company. 900 w. Aust Min Stand—June 3, 1897.

**Siberian Placer.**—Gold Stealing in the Siberian Placers. E. D. Levat. An account of the habits of theft and the system of work. 700 w. Eng & Min Jour—Feb. 6, 1897.

**Sluicing.**—Hydraulic Sluicing in the Collingwood District. H. F. Logan. Descriptive. 2400 w. N Z Mines Rec—Feb. 16, 1900.

**South Africa.**—The Future of the South African Mining Industry. The editor thinks that though affairs have a gloomy aspect now, the prospects for the future are quite reassuring though not very bright. 1800 w. Min Jour—Feb. 22, 1896.

**Tellurides.**—Concerning Tellurides. What tellurides are, how they are worked and where they occur. 2000 w. Min Jour—Feb. 20, 1897.

**Transvaal.**—Gold Mining in the Transvaal (L'Exploitation Minière de l'Or au Transval). Giving an account of the working of poor ores in situ by the Frasch chlorination process. The solution is circulated through the ore bed by pumping. 2500 w. La Rev Tech—April 25, 1897.

John Hays Hammond on the South African Situation. Chas. B. Going. An interview with the leading authority on the mines of the Rand, containing a fully authorised expression of his views of the present situation and the industrial future of the country. 3500 w. Eng Mag—Jan., 1900.

Mechanical Problems with Special Reference to Gold Mining in the Transvaal. Fearnside Irvine. Read before the Engineering Conference of the Inst. of Civ. Engs., England. Gives the practice in mine pumping, deep-level hoisting, ventilation, milling, treatment, etc. 1500 w. Col Guard—June 16, 1899.

Mining on the Witwatersrand to 12,000 ft. Deep. John Yates. Abstract of a paper recently read before the S. African Assn. of Engs., with editorial. Considers the question of working the banket beds at deeper levels than have been yet attempted. 5000 w. Eng & Min Jour—Sept. 16, 1899.

Some Notes on the Mining Practice of the Witwatersrand Gold Fields, South African Republic. G. A. Denny. Describes the general features of the deposits, the mining methods, etc. 5500 w. Sch of Mines Quar—July, 1899.

The Transvaal Mining Industry for the Second Half of 1899. An account of the conditions and operations of the mines, touching on the political phases only so far as necessary to explain their influence on the industry. Also editorial. Serial. Eng & Min Jour—March 10, 1900.

See also **Witwatersrand; GOLD REGION.**

**U. S. Southern.**—Present Condition of Gold Mining in the Southern Appalachian States. Discussion of the paper by Messrs. Nitze and Wilkens, containing additions and corrections. 4800 w. Trans Am Inst of Min Engs—Feb., 1896.

The Present Condition of Gold Mining in the Southern Appalachian States. H. B. C. Nitze and H. A. J. Wilkens. A monograph, well illustrated, and conveying the latest information regarding these interesting deposits. 40000 w. Trans Am Inst of Min Eng—Nov., 1895.

**Ural.**—The Present Conditions of Gold Mining in the Kochkara Region in the Oural. R. Helmhacker. Part first is mainly descriptive of the geological features. Serial. Min & Sci Pr—Nov. 5, 1898.

**Victoria.**—Revival in Victorian Alluvial Mining. William Bradford. Information concerning the plains south of Ballarat. Ill. 1700 w. Aust Min Stand—April 7, 1898.

Victorian Gold Mining. Thomas Cornish. Misleading statements in prospectuses. 1500 w. Min Jour—Feb. 29, 1896.

Mining in Victoria. An interesting account of this mining region of Australia, illustrating the primitive methods of alluvial gold mining and extraction, and the progress in methods. Serial. Aust Min Stand—Nov. 10, 1898.

**Victorian Deep Leads.**—The Deep Leads of Victoria. E. Lidgey. Giving account of the mining in Victoria, showing how the miner has been gradually sinking deeper shafts, and the great promise of the deep leads. Serial. Aust Min Stand—April 21, 1898.

Victorian Deep Leads. Information of a comprehensive boring scheme, with brief accounts of the districts in which it is proposed to search for deep leads. 2000 w. Aust Min Stand—Nov. 24, 1898.

See also **GOLD REGION—Victoria.**

**West Australia.**—The West Australian Mining Industry. C. C. Londridge, with editorial comments. Discusses and objects to statements made by Mr. Van Oss in his article on the Rand Mining industry, which appeared in the "Nineteenth Century." Tabular statement of crushings is given. 1400 w. Min Jour—Nov. 7, 1896.

West Australian Gold Mining. C. E. Moreing's paper read before the London Inst. of Civ. Engs. A summary of the principal features of the gold fields of this region. 1300 w. Min & Sci Pr—July 3, 1897.

**Witwatersrand, Transvaal.**—Economic Features of Mining on the Witwatersrand Gold Fields. Edgar P. Rathbone. Deals with the mining of gold-bearing conglomerates on the Witwatersrand, Klerksdorp and Heidelberg gold fields collectively, as the geological deposits and conditions are the same. 3800 w. Eng & Min Jour—Feb. 13, 1897.

Mining the Gold Ores of the Witwatersrand. H. H. Webb and Pope Yeatman. A general account of the methods employed in dealing with the mining problems of this field, with many illustrations of the plant at the leading mines, and a description of the machinery used. 4000 w. Eng Mag—April, 1898.

Mining the Gold Ores of the Witwatersrand. H. H. Webb and Pope Yeatman. Especially devoted to the mechanical details of the equipment of the South African mines, with descriptions of buildings, machinery and mining appliances. Many illustrations. 3500 w. Eng Mag—May, 1898.

Railway Rapacity and Rand Mining. Editorial calling attention to the numerous handicaps imposed upon this industry. To import mining machinery, etc., means an outlay of 150 per cent. on prime costs. 1200 w. Min Jour—March 20, 1897.

Some Economic Features in Connection with Mining on the Witwatersrand Gold Fields, South African Republic. Edgar P. Rathbone. Read before the Inst. of Min. & Met. Deals with the mining of gold-bearing conglomerates on the Witwatersrand, Klerksdorp and Heidelberg gold fields collectively. 2800 w. Min Jour—Nov. 21, 1896.

Some Notes on the Mining Practice of the Witwatersrand Gold Fields, South African Republic. G. A. Denny. Calls attention to the features peculiar to this district, and describes the mining methods, which represent the most advanced teaching of modern science and experience. Ill. 20000 w. Trans of Aust Inst of Min Engs—Vol. V.

The Witwatersrand Chamber of Mines. Some particulars of its constitution with facts from its seventh annual report. 1100 w. Commerce—Aug. 19, 1896.

See also **Transvaal.**

**Yukon District.**—Gold Mining in the Yukon District. W. M. Ogilvie. Detailed description of the different methods of gold mining used, with information in regard to the various routes by which one may arrive at these gold fields, and points of interest to miners. 4400 w. Can Min Rev—April, 1897.

**Yukon Royalty.**—See **MINING LAW—Yukon.**

## GOLD MINING LAW.

See **GOLD DREDGING—Law; MINING LAW.**

## GOLD MINING MACHINERY.

See also **ELECTRIC EQUIPMENT—Mines; GOLD METALLURGY; GOLD MILLING; GOLD PLACER—Machinery; MINING MACHINERY.**

Some Modern Forms of Mining Machinery. Frederick T. Snyder. Paper to be discussed at the Montreal meeting of the Federated Canadian Mining Inst. Describes machinery designed to meet specific conditions of the gold ores of the Lake of the Woods, many of which are low in grade, but contain streaks of high values. Ill. 3000 w. Can Min Rev—Feb., 1898.

Machinery for the Coolgardie Gold Fields. Allison D. Smith. Stating the need of machinery and suggesting the list of goods most needed, with editorial urging England to supply the need. 2500 w. Machinery, Lond—Sept. 15, 1896.

**Placer.**—See **GOLD PLACER—Machinery.**

**South Africa.**—Machinery in South Africa. A correspondent's account of what he saw of machinery in various African mines. The Meldrum furnace and other improvements at the Robinson. Progess on the Westleigh Mines. New Machinery at the Ruby and Heriot. 1600 w. Mach, Eng—Nov. 15, 1895.

**Transvaal.**—The Machinery in the Transvaal Gold Mines (Die Maschinen in den Goldgruben Transvaals). Kurt Schweder. An account of the engines, compressors, pumps and other machinery in the Transvaal mining county, showing the very high grade and modern character of the plants. 2500 w. Glückauf—Dec. 16, 1899.

**GOLD NUGGETS.**

See also **GOLD GEOLOGY; MINERAL VEIN.**

World's Big Nuggets. Interesting account of the finding of nuggets in curious places, and under peculiar circumstances. 1500 w. W Min Wld—Nov. 20, 1897.

**Origin.**—The Origin of Nuggets. A. Liversidge. Illustrated description of nuggets from various sections, with account of investigations. Serial. Aust Min Stand—Dec. 30, 1897.

The Origin of Nuggets. A. Liversidge. An illustrated account of investigations, with statement of conclusions. 3000 w. Aust Min Stand (special)—June 1, 1899.

**Structure.**—The Crystalline Structure of Gold and Platinum Nuggets. A. Liversidge. Abstract of a paper read before the Royal Society of N. South Wales. Illustrated description of nuggets from Australia with account of investigations made, showing that gold nuggets have not been built up by successive coatings. 2000 w. Eng & Min Jour—Feb. 19, 1898.

**Victoria.**—Victorian Nuggets. Describes some of the interesting nuggets found, the number being greater than in any other part of the world. 3700 w. Aust Min Stand (special)—June 1, 1899.

**GOLD PLACER.**

See also **GOLD BEACH; GOLD DREDGING; GOLD GEOLOGY; GOLD MINE; GOLD MINING; GOLD REGION.**

A New Method of Placer Mining for Gold. F. B. Knight. A device for excavating and handling large quantities of material at low cost, and means by which a gold-saving flume can be used and the tailings disposed of when the surface has but a moderate degree of fall. Ill. 2900 w. Mines & Min—April, 1898.

Placer Gold and How It Is Secured. John E. Bennett. An explanation of what placers are, how formed, and an illustrated description of the methods of placer mining. 3500 w. Cos —Nov., 1898.

Placer Mining. Arthur Lakes. A general and specific account of placers, their formation, distribution and the construction and development of the different machinery and devices used in working them. Ill. 5800 w. Col Eng—May, 1896.

Placer Mining. Gives calculations made to estimate the plan of working a placer, and the value and future of the same, as an illustration of the correctness. 2200 w. Min Ind & Rev—July 8, 1897.

Pointers on Placer Mining. Discusses the problems presented to the placer miner, and a few of the difficulties. 1400 w. Min Ind & Rev —July 29, 1897.

Prospecting for Gold—Gold Placers; How They are Worked. Arthur Lakes. Theories of the origin of gold sands and the history and distribution of gold placer deposits throughout the world. Illustrated by maps showing locations of gold deposits in Europe, Asia and Africa. Serial. Col Eng—Feb., 1896.

**Alma, Col.**—Prospecting for Placer Gold. Arthur Lakes. A description of Alma Placer, South Park, Colo. The method of economically handling large quantities of gold-bearing soil in this typical placer is treated in a detailed manner and illustrated by sketches. 5000 w. Col Eng—Dec., 1895.

**American Hill, Idaho.**—The American Hill Placer mine, Idaho. Edmund Juessen. Illustration, with description of methods of working. 800 w. Eng & Min Jour—Nov. 27, 1897.

**Arid Regions.**—Dry Gold Placers of the Arid Regions. George H. Stone. The difference in the methods by which they and the wet placers were deposited and the reasons for the failure of so many dry placer machines. 3700 w. Mines & Min—April, 1899.

See also **Machinery.**

**California.**—Forest Hill Placer Mines. Arthur Lakes. How the ancient river beds of Placer County, California, now in the mountain tops, are worked. 1500 w. Mines & Min—May, 1899.

Placer Mining and the Future Possibilities of this Branch of the Mining Industry. John W. Gray. A discussion of the outlook in California, especially, for this system or mining. 2000 w. Min & Sci Pr—May 6, 1899.

Placer Mining in California. Arthur Lakes. The condition of the industry at present and an account of its former greatness. 2800 w. Mines & Min—Feb., 1899.

See also **GOLD MINE; GOLD MINING; GOLD REGION.**

**California, Northern.**—The Gravel Fields of Northern California. C. L. Hall. Information of the placer mining in Trinity and Siskiyou counties. 2000 w. Min & Sci Pr—Feb. 6, 1897.

**Colorado.**—A Mountain Placer. Arthur Lakes. Description of a placer located high in the mountains of Colorado, near Breckenridge. Discusses the points to be considered in making an estimate of a placer's value, the natural features that bear on its value, and veins sometimes discovered in working a placer. Ill. 2000 w. Mines & Min—Dec., 1897.

Exploiting a New Placer Field. Arthur Lakes. Some of the considerations to be taken account of, as illustrated at Fairplay, near Alma, Colorado. Ill. 2200 w. Mines & Min—Oct., 1900.

Origin of Placer Gold in the Drains of the Divide. A. M. Welles. Presents the writer's explanation of the occurrence of gold in Cherry Creek, its tributaries, and other water-ways in Colorado. 2200 w. Min Rept—Dec. 22, 1898.

**Columbia River.**—The Auriferous Gravels of the Upper Columbia River. Frank L. Nason. Describes the actual conditions under which the gold occurs and the method of working the placers and prospecting. 2400 w. Eng & Min Jour—March 21, 1896.

**Ecuador.**—See **GOLD REGION.**

**Glaciated Regions.**—Gold Placers in Glaciated Regions. George H. Stone. Why they present different conditions from those which have not been affected by glaciation. Ill. 2700 w. Mines & Min—June, 1900.

**Idaho.**—Steam Shovel and Derrick Placer Mining in Idaho. John B. Hastings. Illustrated description. 800 w. Eng & Min Jour—Dec. 21, 1895.

**Klondike.**—See **GOLD REGION.**

**Machinery.**—Placer Mining on Wheels. J. M. Sweeney. Illustrated description of a machine to recover gold from placer beds by washing all the gravel. 1800 w. Ry & Engng Rev—Dec. 18, 1897.

A Dry Placer Machine. Illustrated description. 400 w. Min & Sci Pr—March 14, 1896.

Dry Placer Machines. Description of the method of working dry placers in the arid regions of Arizona. Panning is used on a small scale similar to the wet method. The machine used consists of a series of screens arranged so that a blast of air from the fan blows sand and dirt away; it resembles the fanning machine used to clean grain. 1000 w. Aust Min Stand—Oct. 5, 1895.

Placer Mining by Machinery. William M. Johnston. Reviews some of the methods adopted which often have resulted in loss, and endeavors to point out lines which may be safely followed. 3000 w. Min & Sci Pr—Feb. 5, 1898.

The Woods' Dry Placer Miner. The device consists of a disintegrator, resembling an inclosed ore washer, which delivers its pulverized product to an inclined table having riffles at intervals and having a bottom of coarse cloth through which a bellows underneath drives the air in pulsations as in jigging. The gold settles to the surface of the cloth and is there collected. 650 w. Min & Sci Pr—Feb. 8, 1896.

**McDougall Mining Plant.**—See **GOLD DREDGING.**

**Montana.**—A Low-Grade Placer Proposition in Montana. Fred D. Smith. An illustrated account of a placer being worked, which yields less than

2c. to the yard. 800 w. Eng & Min Jour—Nov. 11, 1899.

The Bear Gulch Placers, Montana. Fred D. Smith. Brief account of recent working of this field. Ill. 600 w. Eng & Min Jour—Dec. 23, 1899.

The Cedar Creek Placers, Montana. Fred D. Smith. The location and working of these placers. Ill. 1200 w. Eng & Min Jour—Feb. 4, 1899.

**New Mexico.**—Placer Deposits in New Mexico. Cecil A. Deane. The article describes the way in which the gold occurs in the several districts. 2700 w. Min Ind & Rev—Feb. 13, 1896.

Wonderful Dry Placers. A. W. Gifford. Reports that placers of the Jarilla Mountains, New Mexico, yield coarse gold worth $100 a yard. 1200 w. Ores & Met—Oct., 1899.

**Oregon.**—The Columbia Placer, Oregon. James W. Abbott. Describes the manner of working. 2000 w. Eng & Min Jour—April 9, 1898.

**Origin.**—The Origin of Placer Gold. What placer gold really is, with a sketch of the more modern views of the mode of the deposits. Serial. Min Jour—Aug. 22, 1896.

**Prospecting.**—See also **PROSPECTING.**

**Sampling.**—See **Testing and Sampling; SAMPLING.**

**Siberia.**—See **GOLD MINING; GOLD REGION.**

**Testing.**—The Testing of Flat Placer Deposits. Robert Nye. Discusses usual methods of testing, and the proper use of a well driller. 2400 w. Eng & Min Jour—July 14, 1900.

**Testing and Sampling.**—Methods of Testing and Sampling Placer Deposits. Edmund B. Kirby. Read before the Colorado Scientific Society. Describes the best way of carrying on the work. Serial. Min & Sci Pr—June 17, 1899.

Sampling Placer Deposits. Edmund B. Kirby. Read before the Colorado Scientific Society. On the importance of correct methods of testing their value. 3800 w. Mines & Min—July, 1899.

Testing and Sampling Placer Deposits. Edmund B. Kirby. Abstract of a paper read before the Colorado Scientific Society. Outlines the evidence to be secured by tests, etc., and the methods used in test workings. 2000 w. Eng & Min Jour—July 29, 1899.

**Ural.**—See **GOLD MINE; MINERAL REGION.**

**Wyoming.**—The Douglas Creek Placers, Albany County, Wyoming. E. P. Snow. Description with map and half-tone illustrations. 2000 w. Eng & Min Jour—Dec. 7, 1895.

### GOLD PRODUCTION.

See also **MINTING—Gold and Silver; SILVER PRODUCTION.**

Gold and Silver Production. Reviews the production of the last few years in various parts of the world. 2000 w. Engr, Lond—April 14, 1899.

Gold Production, Present and Future. Statistics show that a point has been reached in excess of any ever before attained. The causes affecting production are considered with especial reference to future probabilities. 2000 w. Eng & Min Jour—Jan. 9, 1897.

The World's Gold Production. From the "New York Journal of Commerce." Calls attention to the discoveries and improved processes of extraction which have given a new impulse to the production, and estimates the probable amount still to be extracted in certain fields. 1000 w. Sci Am Sup—Oct. 2, 1897.

**Australasia.**—The Australian Gold Yield. Reviews the production of the first half of the current year, reporting it as not realizing expectations. 1000 w. Aust Min Stand—July 12, 1900.

**Cost.**—See **GOLD—Cost of Production.**

**Cripple Creek.**—Cripple Creek Gold Production. Edward Skewes. A denial of some published statements, with corrections. 1500 w. Eng & Min Jour—July 4, 1896.

**1850-1897.**—The Production of Gold Since 1850. Edward Sherwood Meade. A discussion of this subject aiming to explain why an increase in value of this commodity is not accompanied by an increasing production. Reviews improvements in mining, considers the future of gold, and its production in various countries. Also appendix. 8000 w. Jour Pol Econ—Dec., 1897.

**1851 to 1898.**—See **SILVER PRODUCTION—1851 to 1898.**

**1871-1897.**—Gold and Silver (Gold und Silber). A review of the relative production of gold and silver from 1871 to 1897, with charts of production by years and countries. 2000 w. Two plates. Glückauf—Dec. 11, 1897.

**1896.**—The Gold Yield of 1896. An American view claiming increase in production and great activity in gold-mining. 1400 w. Aust Min Stand—May 27, 1897.

**1898.**—The Gold Production of the World. Statistics for the year 1898, showing a further increase over the high point attained the previous year. 1200 w. Eng & Min Jour—Sept. 2, 1899.

**1899.**—Gold and Silver in 1899. An estimate of the gold production of the world during this year. 6000 w. Eng & Min Jour—Jan. 6, 1900.

Gold and Silver Production in 1899. Completed tables of production for the year for the United States, and for the world. 2500 w. Eng & Min Jour—June 2, 1900.

**Increase.**—Marvelous Increase in Production of Gold. Alexander E. Outerbridge, Jr. A study of the gold production of the world, the increase due to progress in mining and metallurgical arts, and facts of interest concerning this precious metal. 8200 w. Ap Pop Sci M—March, 1899.

The Increased Production of Gold. Edward Atkinson. Differences in conditions under which our modern supply of gold is obtained as compared with former years are noted, and an effort to present data for a forecast of the effect of the great annual additions to the world's stock of gold is essayed. 5500 w. N Amer Rev—Feb., 1896.

The Increasing Production of Gold. Dr. H. M. Chance. A discussion of the enormous increase in the world's production of gold, and its effect upon prices of general commodities. The writer's prediction of three years ago is shown to be amply fulfilled. 3000 w. Eng Mag—July, 1899.

**Prices.**—Production and Its Cause. An editorial stating that the increased interest in gold mining and in gold production is due to the fall in prices of supplies. Twenty-seven dollars will buy as much now as one hundred dollars would in 1870, though the selling price of gold has remained constant. 600 w. Min Ind & Rev—Nov. 21, 1895.

**Russia.**—Gold and Silver Production in Russia. Figures as reported by the Imperial Mint, with comment. 900 w. Eng & Min Jour—April 3, 1897.

**South Africa.**—More Gold from South Africa. Indications of new prosperity and expansion in the South African gold fields 600 w. Bradstreet's—Aug. 29, 1896.

**Transvaal, 1899.**—Gold Production of Transvaal, 1899. From the London "Economist." Data respecting the production. 500 w. U S Cons Repts, No. 567—Oct. 31, 1899.

**United States, 1896.**—The Production of Gold in the United States in 1896 and the Mint Reports. Explains the discrepancy between the figures as reported by this journal and those of the Director of the Mint. 1800 w. Eng & Min Jour—June 17, 1897.

**United States, 1897.**—United States Gold and Silver Production in 1897. Detailed statement comparing the figures with the two previous years. 2500 w. Eng & Min Jour—May 14, 1898.

**United States, 1898.**—United States Gold and Silver Production in 1898. The corrected estimate, showing a very large gold production and an increase in silver. 1500 w. Eng & Min Jour—June 10, 1899.

### GOLD PROSPECTING.

See **PROSPECTING.**

### GOLD REGION.

See also **GOLD BEACH; GOLD GEOLOGY; GOLD MINE; GOLD MINING; GOLD PLACER; MINERAL REGION; PROSPECTING.**

**Africa.**—See also **Mashonaland; Rhodesia; South Africa; Transvaal; Zambesia.**

**Africa Gold Coast.**—The Gold Mines of the Gold Coast, Africa. Abstract from London "Financial News." Supplement. Brief review of the past history and future prospects of this promising field. 1500 w. Eng & Min Jour—Aug. 5, 1899.

**Alabama.**—Metal Mining in Alabama. William M. Brewer. Information concerning gold and copper mines in this state and their prospects. 1000 w. Eng & Min Jour—March 13, 1897..

Some Auriferous Quartz Bodies in Alabama.

W. M. Brewer. Describes the occurrences of gold-bearing ores in Alabama, with suggestions and general information. 1400 w. Eng & Min Jour—Oct. 16, 1897.

The Gold Regions of Alabama. William M. Brewer. Showing that the gold deposits worked are not beyond the prospecting stage. The ore is quartzose and comparatively free milling. 1000 w. Eng & Min Jour—Dec. 7, 1895.

See also **U. S. Southern.**

**Alabama and Georgia.**—Further Notes on the Alabama and Georgia Gold-Fields. William M. Brewer. Investigations made during the winter and spring of 1896, lead to additional facts and opinions since paper presented in Oct., 1895. 3500 w. Trans Am Inst of Min Engs—Oct., 1896.

Gold Fields of the South. Wm. M. Brewer. The regions of Georgia and Alabama, in which gold deposits are found. The peculiar features of the mines, the geological characteristics of the country, and the forms in which the ore occurs, with some observations in regard to development. 2700 w. Col Eng—March, 1897.

The Gold Mining Industry in Georgia and Alabama. William M. Brewer. A review of the outlook in these fields, and the conditions affecting the industry. 1600 w. Eng & Min Jour—June 27, 1896.

The Gold Regions of Georgia and Alabama. William M. Brewer. Descriptive paper taking up the localities in detail and showing the state of development. 7200 w. Trans Am Inst of Min Engs—Nov., 1895.

**Alaska.**—Alaska and Its Mineral Resources. Arthur Lakes. Abstract from the "Alaska Mining Record." The geographical situation of the mining districts with account of their discovery, the development work, and the conditions under which the work must be done. 2500 w. Mines & Min—March, 1898.

As Seen by an Old Prospector. "Alex. Quartz." An account of the promising fields near St. Michaels, with some reference to the Klondike, and to other districts. 4500 w. Min & Sci Pr—Aug. 13, 1898.

Distribution of Gold in Alaska. R. H. Stretch. Presents views based on work extending over a period of three months. 1400 w. Min Ind & Rev—May 5, 1898.

Gold Deposits, Geology and Geography of Alaska. Information from a U. S. Government pamphlet prepared by W. H. Dall and F. C. Schrader, and edited by S. F. Emmons. Serial. Min & Sci Pr—March 19, 1898.

Gold Fields of Alaska: Rush of Prospectors. Reports the large number of prospectors already on the Pacific coast en route for these gold fields, and comments on the movements of Canada aiming to securing as large benefits as possible from the discovery. 800 w. Cons Repts—March 11, 1898.

The Alaskan Gold Fields and the Opportunities They Offer for Capital and Labor. Samuel C. Dunham. Report of official investigations made under government instructions, giving information of value on all subjects relating to this region. Ills. and maps. 7200 w. Bull of Dept of Labor—May, 1898.

The Alaskan Gold Fields and the Opportunities They Offer for Capital and Labor. Samuel C. Dunham. Report of recent investigations in these mining districts, showing what progress is being made, and the need of taking every precaution in going to this region. 23500 w. Bull of U S Dept of Labor—Nov., 1898.

The Geological Survey's Expedition to the Yukon in 1896. Harold B. Goodrich. An interesting account of the journey from Juneau to the interior 2400 w. Harper's Wk—Aug. 14, 1897.

The Gold Fields of Alaska. Robert Stein. Largely descriptive of the country and means of access to the gold fields. 3000 w. Rev of Rev—June, 1896.

The Yukon and Nome Gold Regions. S. C. Dunham. A full account of these two gold fields and a comparison of the conditions and values. 20400 w. Bull Dept of Labor—July, 1900.

See also **Cape Nome; Klondike; Yukon.**

**Arizona.**—Notes from Mohave County, Arizona. Theo. B. Comstock. Calling attention to this district as favorable for mining investment, and briefly outlining some of the mining enterprises of the region. 2800 w. Eng & Min Jour—Aug. 6, 1898.

The Mines of Yavapai County, Arizona. John P. Blandy. Descriptive account of the mineral wealth of this district. Map. 2600 w. Eng & Min Jour—June 19, 1897.

The Pearce Mining District, Arizona. F. M. Endlich. Describes this rich mine, and the interesting conditions surrounding it. 1100 w. Eng & Min Jour—June 5, 1897.

**Australia.**—A Neglected Gold Field. Reginald H. L. Hobby. Information concerning the Dark River field, about 240 miles from Melbourne. 1100 w. Aust Min Stand—June 20, 1899.

Australian Lodes and Fissures. William Davey. The writer having had large experience in mining, gives some opinions relating to the conditions under which gold may be reasonably expected. Ill. 2 parts. 3500 w. Aust Min Stand—May 19 and 26, 1898.

Exploration in West and South Australia. W. Carr Boyd. Illustrated condensed account of a twelve months' exploring trip for the purpose of discovering auriferous country. Serial. Aust Min Stnd—Nov. 26, 1896.

Neglected Goldfields. William Bradford. Part first gives some information of the Ararat goldfield in Australia. Serial. Aust Min Stand—Nov. 4, 1897.

Northern Goldfields. W. A. S. J. Becher. Part first describes the fields of Pilbarra and West Pilbarra. Ill. Serial. Aust Min Stand—Jan. 20, 1898.

The Northern Territory. F. D. Holland. Illustrated description of the auriferous reefs of the Northern Territory of South Australia. Serial. Aust Min Stand—April 5, 1900.

The Golden Mountain. William Bradford. An account of a great mining boom in the early '90's. Ill. Serial. Aust Min Stand—April 26, 1900.

The World's Greatest Gold Excitement. Describes the scenes on the discovery of the Ballarat and Bendigo gold fields of Australia. 1800 w. Ind & Rev—Sept. 2, 1897.

See also **New South Wales; South Australia; Victoria; Western Australia.**

**Australia, Hodgkinson.**—A Neglected Goldfield. An account of the Hodgkinson gold field by the government geologist. 4000 w. Aust Min Stand—Dec. 31, 1896.

**Black Hills, South Dakota.**—Gold Ores of the Black Hills, South Dakota. H. M. Chance. Describes the silicious gold-belt, the reduction works, and gives an account of the principal Black Hills gold-mining companies. 3000 w. Trans Am Inst of Min Engs—Feb., 1900.

Mineral Wealth of the Black Hills. The geology with brief account of the silicious ore districts. 1400 w. Min Ind Rev—March 4, 1897.

Notes on the Northern Black Hills of South Dakota. Persifor Fraser. An examination of the geology of this region, with microscopical examination of the concentrates, and description of the Coletta group of mines. 8400 w. Trans Am Inst of Min Engs—May, 1897.

See also GOLD GEOLOGY; GOLD METALLURGY; GOLD MILLING; GOLD MINING.

**Bokhara.**—The Gold-Bearing Conglomerates of Bokhara. Information from a lecture delivered before the Royal Geog. Soc. in London, by W. Rickmers. 800 w. Eng & Min Jour—April 21, 1900.

Mining in Bokhara. W. Rickmers. Describes the method of working the gold-bearing conglomerate of Asiatic Russia. 800 w. Aust Min Stand—June 14, 1900.

**Bolivia.**—The Tipuani Gold-Fields of Bolivia. William C. Agle. An account of the mines of this region and the great resources of the country. 1400 w. Eng & Min Jour—May 29, 1897.

**Brazil.**—Notes on Certain Schists of the Gold and Diamond Regions of Eastern Minas Geraes. Brazil. Orville A. Derby. Describes these deposits, giving analyses and discussing their origin. 4500 w. Am Jour of Sci—Sept., 1900.

**British Columbia.**—Notes from the Atlin District, British Columbia. W. M. Brook. An illustrated account of work on this gold field. 1200 w. Eng & Min Jour—Sept. 15, 1900.

The Quartz Lodes of the Atlin District. B. C. R. H. Stretch. A general description, with maps. 8200 w. Eng & Min Jour—Sept. 29, 1900.

The Atlin District. William Baillie. An illustrated account of the discovery, giving the results of work done, and the prospects for the future. 3800 w. B C Min Rec—May, 1900.

The Atlin Gold Fields of British Columbia. J. H. Brownlee. Illustrated description of the conditions and prospects. 2000 w. Min & Sci Pr—May 19, 1900.

A Trip to Rossland, British Columbia. Arthur Lakes. An illustrated account of some of the mines and the peculiarities of the ores. Also a description of the geology of shearage-zone fissure veins and facts regarding extent of development. 4500 w. Mines & Min—July, 1900.

Gold and Silver Ores of the Slocan, B. C. J. C. Gwillam in "Can. Record of Science." Brief account of the geology, with description of the minerals and metals found. 1000 w. Can Min Jour—May, 1896.

The Trail Creek Gold Mining District of British Columbia. J. D. Sword. General description. 4500 w. Can Min Rev—Jan., 1896.

The Trail Creek District, B. C. Full illustrated description of these rich mines. 10000 w. Can Min Rev—July, 1896.

Trail Creek. David B. Bogle. The progress and extensive development of this camp. 1100 w. Eng & Min Jour—July 18, 1896.

Trail Creek Mining District. Notes taken from the report recently made to the Provincial Bureau of Mines, by William A. Carlyle. The history, ore deposits, ores, and their treatment. 2800 w. Min & Sci Pr—Sept. 19, 1896.

Notes on Lardeau and Cariboo Creek Mining Divisions, West Kootenay, B. C. Harry Bush. An account of discoveries made, advantages, and general information of the district. 3000 w. Can Min Rev—Aug., 1898.

Some West Kootenay Ore Bodies. J. C. Gwillin. Read at meeting of Brit. Col. Assn. of Min. Engs. Gives analysis of the country rocks, and observations on the ore bodies of this district. 8000 w. Can Min Rev—Jan., 1898.

Camp McKinney and Its Mines. Donald A. Ross. An illustrated account of the various mines and the development. 4000 w. B C Min Rec—Aug., 1900.

Gold-Bearing Reefs and Placers of Northern British Columbia. William Hamilton Merritt. Notes on the general character of the placers and quartz reefs, and the general character of the ores. Ill. 3800 w. Can Min Rev—March, 1898.

Notes on the Gold-Bearing Lodes of Cayoosh Creek, B. C. G. F. Moncton. The writer thinks there is good cause to believe this will become a famous mining camp, and gives reasons for his opinions. 1600 w. Can Min Rev—Feb., 1897.

The Auriferous Alluvium of the Fraser River and Its Tributaries. J. D. Kendall. Part first gives an outline of the economic history and some hydrographic data. Serial. B C Min Rec—Feb., 1900.

The Big Bend of the Columbia River. W. M. Brewer. Facts relating to the mines of this district. 1200 w. Eng & Min Jour—Dec. 2, 1899.

The Cassiar District, British Columbia. From report on Cassiar Central Railway Mining Land Grant, by Edward D. Self. Describes this region, the geology, the discovery of gold, etc. Maps. 2500 w. Eng & Min Jour—Feb. 18, 1899.

The Mineral Wealth of Cassiar. Report of the Dease Lake country and the probable mineral wealth of the Stikine. 1600 w. Can Min Rev—Aug., 1898.

The Revival of Mining in Cariboo, B. C. Gives past history of this gold region and the arrangements recently made to develop the wealth of this district. 4000 w. Can Min Rev—Feb., 1897.

See also **Vancouver Island.**

**British Columbia and Klondike.**—The Gold-Fields of British Columbia and the Klondike. William Hamilton Merritt. Deals with the immense possibilities of the mountain ranges of Western British America, giving a very interesting report of the region and the mining operations. Discussion. 8000 w. Jour Soc of Arts—June 10, 1898.

**British Guiana.**—See **Guiana.**

**California.**—A Gold-Paved Valley. Dan De Quille. Some thoughts regarding the amount of gold deposited in the valleys of California by the rivers of the Sierras. The indestructibility of gold, and the strange places where it is found. 2000 w. Min & Sci Pr—Aug. 8, 1896.

Angel's Camp, California, and Vicinity. H. L. Tyler. Account of the mines of these districts, with maps. 1400 w. Eng & Min Jour—Aug. 1, 1896.

California Will Be the Leader. A general article descriptive of the gold resources of California. 8000 w. Min & Sci Pr—April 18, 1896.

Gold Bearing Lodes of the Sierra Costa Mountains in California. O. H. Hershey. Describes the general geology of this region and the mining districts, discussing the probability of the deposits proving valuable. 7700 w. Am Geol—Feb., 1900.

The Geology and Archaeology of the California Gold Fields. W. J. McGee and W. H. Holmes. Abstract of a paper read at meeting of the Geol. Soc., of America. Describes the geological changes that appear to have taken place, and the fossils and relics found. 1000 w. Sci Am Sup—Feb. 4, 1899.

The Gold Deposits of Nevada County, California. G. P. Grimsley. An account of this district based on a recent visit. Ill. 1000 w. Eng & Min Jour—Oct. 21, 1899.

The Vanderbilt Mining District, San Bernardino County, Cal. Report of this district and the peculiar vein system. 1700 w. Min & Sci Pr—Nov. 18, 1899.

The World's Greatest Gold Field. Dan de Quille. General review of the California gold fields. 1400 w. Min Ind & Rev—Jan. 16, 1896.

The World's Greatest Gold Lode. Dan de Quille. A discourse upon the bigness of California gold prospects. 3500 w. Min & Sci Pr—March 7, 1896.

See also **GOLD GEOLOGY; GOLD MINE; GOLD MINING.**

**California, El Dorado.**—Characteristics of the Eldorado Gold Belt. A. Thurston Heydon. Some of formation of this rich belt, remarkable for its great extent and the permanent character of its deposits. 1800 w. Min & Sci Pr—March 20, 1897.

**California, Mojave.**—Mining in the Mojave Desert in California. F. M. Endlich. Descriptive account of a new gold region. 1500 w. Eng & Min Jour—Aug. 29, 1896.

The Latest Great Gold Discovery in the United States. The riches of the Mojave Desert in California. 1800 w. Min Jour—Dec. 19, 1896.

**California-Oregon.**—The Great Northern Gold Field. Almarin B. Paul. Information of the mining region of northern California and northern Oregon. 1200 w. Min & Sci Pr—May 1, 1897.

**California, Randsburg.**—The Randsburg Mining District, California. F. M. Endlich. Gives a brief synopsis of the leading properties now in operation, with favorable report of the district. 1900 w. Eng & Min Jour—Feb. 27, 1897.

Randsburg, A Desert Mining Town. Henry G. Tinsley. An account of the wonderful growth of this mining town, its location, prospects, discovery and value. Ill. 2400 w. Harper's Wk—March 6, 1897.

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**Cape Nome.**—Cape Nome, Alaska, Gold Region. Epitome of report by F. C. Schrader and A. H. Brooks, of the U. S. Geol. Surv. Concerning the formation of the country, and where and how the gold is found. Ill. 4300 w. Mines & Min—July, 1900.

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The Gold Deposits of Cape Nome. Charles G. Yale. Information concerning those beach deposits, and their probable origin, means of working, etc. 1700 w. Sci Am Sup—May 12, 1900.

The Gold Sands of Cape Nome. Angelo Heilprin. An interesting account of this mining district, giving its history, and describing the deposits and workings. Ill. 3700 w. Ap Pop Sci M—April, 1900.

The Great Storm at Nome. Winthrop Packard, in the N. Y. "Evening Post." An account of a storm which wrecked a large part of the city. 1700 w. Eng & Min Jour—Oct. 13, 1900.

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**Chile.**—Gold in Chile. B. Becker. Part first briefly reviews its value as a producer in former centuries, and describes the country geographically, geologically and commercially. Serial. Min Jour—Oct. 10, 1896.

**China.**—See **Manchuria.**

**Colombia.**—An Outline of the Gold Fields in Colombia, South America. Francis C. Nicholas. Statements based on extensive explorations of the country giving a general outline of certain conditions relating to the mines of this region. 2500 w. Eng & Min Jour—April 30, 1898.

Explorations in the Gold Fields of Western Colombia. F. C. Nicholas. Read before the N. Y. Academy of Sciences. Investigations of the country leading the writer to believe that the general deposits of gold are not one-tenth part of what might be expected from the reports of certain findings, but due to the gold becoming concentrated in depressions and along zones of drainage. 3300 w. Sch of Mines Quar—April, 1897.

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The Darien Gold Mining Region in Colombia. Eduardo J. Chibas. A fully illustrated account of the re-opening of these ancient Spanish workings, with a description of their modern development. 4000 w. Eng Mag—Oct., 1898.

See also **GOLD MINING—Darien.**

**Colombia, Porce River.**—The Gold Fields of the Porce River, Colombia. J. D. Garrison. Reporting the results of the writer's examination of Colombian mines. Ill. 3100 w. Eng Mag—March, 1897.

**Colorado.**—Geology of the Four-Mile Placer Mining Districts, Colorado. Herbert C. Hoover. The geology, method of deposition, and origin of gravel and the gold are discussed. 1900 w. Eng & Min Jour—May 22, 1897.

Mines of the La Plata Mountains, Colorado. R. W. Petre. Describes the location, geology, and mines. Ill. 1400 w. Eng & Min Jour—Dec. 3, 1898.

Observations on Some Prospects and Mines Around Breckenridge, South Park, Colorado. Arthur Lakes. Notes taken in a trip made to examine a gold placer property. Ill. 1600 w. Mines & Min—May, 1899.

Pine Creek District, Colorado. H. L. McCarn. A descriptive account. 2000 w. Min & Sci Pr—Aug. 29, 1896.

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See also **Cripple Creek.**

**Colorado, Gunnison.**—Sketch of a Portion of the Gunnison Gold Belt, Including the Vulcan and Mammoth Chimney Mines. Arthur Lakes. Describes the area extending from the Cebolla River on the west to the head of Taylor Park and the Sawatch range on the east. 3000 w. Trans Am Inst of Min Engs—Sept., 1896.

The Gold Belt of Gunnison County, Colorado. Thomas Tonge. Information obtained personally by the writer during two visits, examining the mines and prospects of the belts, which is about 65 miles long and 15 miles wide. 1500 w. Min & Sci Pr—July 25, 1896.

The Gold Belt of Pitkin, Gunnison County, Colo. J. R. Holibaugh. Describes the location and formation of the belt and some of the well-developed properties. 900 w. Eng & Min Jour —Dec. 12, 1896.

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**Colorado, Park County.**—The Occurrence and Treatment of Certain Gold Ores of Park County, Colorado. B. Sadtler. The distinctive features of the occurrences of ore, and various methods of treatment. 1600 w. Trans Am Inst of Min Engs—March, 1897.

**Colorado, Rico.**—Rico Mining District. Arthur Lakes. A sketch of the formation and peculiar mode of occurrence of the ores of the region. Ill. 900 w. Col Eng—March, 1897.

**Colorado River.**—The Gold Belt of the Lower Colorado River. Taylor D. MacLeod. A brief review of the conditions of this district and the values in gold as found in the better-known prospects and mines. 2500 w. Min & Sci Pr—May 8, 1897.

**Colorado, San Juan.**—Peculiar Formation in the San Juan Region. Arthur Lakes. The rocks to which nearly all the mines and veins are confined. A description of their appearance and mode of occurrence, together with their characteristics, and the probable method of their deposition. Ill. 1800 w. Col Eng—March, 1897.

The Needles. Arthur Lakes. A report of a recent exploring excursion to the Needles region of the San Juan in Colorado. A description of the peculiar formation and appearance of the country and some suggestions in regard to its possibilities as an ore-producing region. Ill. 2200 w. Col Eng—Oct., 1897.

The San Juan Region. Arthur Lakes. A description of a rich mining field and its developments. The Spanish peaks, the geological history, the ore deposits and mining characteristics are treated in detail. 5400 w. Col Eng—Dec., 1896.

**Colorado, Summit.**—Summit District Gold Regions. An epitome of a description of the ore deposits of Summit District, Rio Grande County, Colorado, by R. C. Hills. Prepared by Prof. Arthur Lakes. Ill. 1800 w. Col Eng—Nov., 1896.

**Colorado, Telluride.**—Telluride, Colorado. T. P. Van Wagenen. The first part consists largely of a description of the country, the formation and location of the mines. 1700 w. Min Jour—July 11, 1896.

See also **GOLD MINE—Telluride.**

**Colorado Twin Lakes.**—Twin Lakes Region. J. J. Guentherodt. Description of a rich placer and gold mining district of Colorado which has been but little developed. 1600 w. Col Eng—Dec., 1896.

**Coolgardie.**—See **Western Australia.**

**Cripple Creek.**—A Trip Around Cripple Creek. Arthur Lakes. Notes on the changes and improvements which have been made there within a short time, with illustrations. 1800 w. Mines & Min—Aug., 1898.

Cripple Creek Gold Mines and the Stock Boom. T. A. Rickard. Describing the geological formation of the Cripple Creek region and the character of the ore, and deploring the reckless speculation to which its richness has given rise. 3500 w. Eng Mag—Jan., 1896.

History of Cripple Creek. Briefly told from the day the first stake was put in the ground. Its early struggles and final success as a great gold camp. Ill. 4200 w. Min Invest—June 20, 1896.

The Cripple Creek Gold Field. Descriptive of the country, and reviewing the changes of the past five years. 2000 w. Aust Min Stand—June 11, 1896.

The Cripple Creek Gold Field. T. A. Rickard. Condensed from a paper read before the Inst. of Min. and Met. Part first describes the physical features of the district, and its geology. Ill. Serial. Min & Sci Pr—Dec. 16, 1899.

The Cripple Creek Volcano. T. A. Rickard. An illustrated explanation of the mining geology of this district and the method of formation. 9600 w. Trans Am Inst of Min Engs—June, 1900.

The Mining Investor's Map of Cripple Creek Mining District. Fremont and El Paso Counties, Colorado. Compiled from records of the U. S. Surveyor General and other authentic sources of information issued by the Colorado Springs Gazette Publishing Co. Min Invest—Feb. 6, 1899.

Cripple Creek Mining District During 1896. Charles J. Moore. Review of the year, showing a steady advance both in the quantity of ore and number of mines opened. 2800 w. Min Ind & Rev—Dec. 31, 1896.

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**Cripple Creek v. Comstock.**—A Colorado Comparison Between Cripple Creek and the Comstock. Reprint of an article from the Denver "Republican," with editorial comment on the impossibility of drawing a fair parallel between the two regions. 3000 w. Min & Sci Pr—Dec. 19, 1896.

**Dakota.**—See **Black Hills.**

**Darien.**—See **Colombia; GOLD MINING.**

**East Indies.**—Gold in the Dutch East Indies. Reinier Verbeek. An interesting letter full of information of the conditions, people, climate, mines, etc. 2400 w. Eng & Min Jour—April 17, 1897.

**Ecuador.**—The Placer Gold Fields of Ecuador. An editorial account of the region with the prediction that the country is destined to add considerably to the world's output of gold. 1200 w. Min Jour—May 16, 1896.

**Georgia.**—The Villa Rica Mining District, Georgia. W. M. Brewer. Report from personal examination of this district, giving the properties purchased since 1895. 1000 w. Eng & Min Jour—May 15, 1897.

See also **Alabama and Georgia; U. S. Southern.**

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**Guiana.**—Future Gold Fields—Guiana. Charles E. Clarke. Considers the territory lying east of the Schomburgh line to be one of the great auriferous fields of the future. 2500 w. Eng & Min Jour—Nov. 7, 1896.

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Quartz and Placer Deposits in British Guiana. Charles E. Clarke. Description of the country generally and of the Barima district in particular. 2400 w. Eng & Min Jour—July 11, 1896.

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See also **GOLD MINING—British Guiana; French Guiana.**

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Buffalo Hump. Don Maguire. Facts about a rich and promising region which has been the scene of great excitement during the past year. 2500 w. Mines & Min—Oct., 1899.

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Mt. Caribou Gold Deposits. Arthur Lakes. A description of the Teton mountain country of Idaho and the formations of the ores found. 1400 w. Mines & Min—Sept., 1898.

Snake River Gold Fields of Idaho. Don Maguire. Describes the river and its tributaries, discusses the sources of the very fine gold and the methods of obtaining it. 4000 w. Mines & Min—Sept., 1899.

The Boise (Idaho) Basin Mining District. Robert Nye. The history of this district, its geology, deposits, and general information. 2800 w. Min & Sci Pr—Oct. 6, 1900.

The Buffalo Hump Mining Camp, Idaho. Charles L. Whittle. Describes the region, the camp, the quartz vein found, and a few claims near. 2000 w. Eng & Min Jour—Aug. 19, 1899.

The Placer Fields of Custer County, Idaho. C. C. Clawson. History of the work in this locality, and the recent revival of mining. 1700 w. Eng & Min Jour—April 14, 1900.

See also **COPPER REGION.**

**Illinois.**—The Gold-Bearing Formation of Stephenson County, Illinois. Oscar H. Hershey. A brief discussion of an isolated deposit in appreciable, but not economical quantities. 1200 w. Am Geol—Oct., 1899.

**India.**—The Gold Resources of India. William King and Theodore Wm. Hughes Hughes. An exhaustive review of the gold regions of India, with especial regard to the Mysore District. 5000 w. Eng Mag—Aug., 1898.

**Kalgoorlie.**—See **Western Australia.**

**Klondike.**—A Journey to the Klondike (Eine Reise nach Klondyke). Zdenko Horovsky. An excellent account of the methods of mining for gold in the Klondike region, being an address by a Bohemian engineer, relating his experiences. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—March 3, 1899.

Alaska and the Kondike. Angelo Heilprin. Part first describes the writer's journey to this region, in by the White Pass and out by the Chilkoot. Ill. Serial. Ap Pop Sci M—May, 1899.

A Winter's Work in the Klondike. Tappan Adney. Letter and illustrations giving an idea of the conditions prevailing in this region. 5500 w. Harper's Wk—Oct. 1, 1898.

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Gold and Other Resources of the Far West. J. A. Latcha. A description of the rich mineral fields of the west, the steps necessary for their development and the changes of recent years. Urging specially the building of railroads through the rich mineral regions. 5000 w. Forum—Sept., 1898.

Gold Fields of Alaska and the Yukon. Cyrus C. Adams. Discusses matters of interest in relation to this region. The routes, desolation, types of mining, and important facts. 2800 w. Chau—Oct., 1897.

Gold Mining in Alasko: Notes from the Klondike. On the promising conditions of these fields, and interesting information relating to their development. 2300 w. U S Cons Repts, No. 447 —June 9, 1899.

How Gold is Mined on the Klondike and the Chances of a Fortune There. A statement of facts showing that the region is not nearly as rich as was California in 1850. 1500 w. Eng & Min Jour —Nov. 27, 1897.

In the Far Northwest. Extracts from report of William Ogilvie, surveyor to the Dominion government, on the extent of the gold-bearing section, its richness, etc. 2000 w. W Min Wld —July 31, 1897.

Life in the Klondike Gold Fields. Personal observations of Joe Ladue, the founder of Dawson, recorded by J. Lincoln Steffens. Ill. 3500 w. McClure's Mag—Sept., 1897.

Mining Conditions in the Klondike. Extracts from a letter published in the "N. Y. Times" of Jan. 23d. Discouraging the going to this new gold field, reporting disappointment and suffering of those there, and the unreliability of the claims for sale. 2500 w. Eng & Min Jour—Jan. 29, 1898.

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The Alaskan Placers. Brief account of the new discoveries, the routes by which to reach the Klondike fields, the mines so far discovered, and the dangers and hardships of the region. 1800 w. Min & Sci Pr—July 24, 1897.

The Alaskan Gold Discoveries. Remarks on the effect of the recent discoveries both on the financial markets and speculation. Mention of the difficulties to be faced in reaching the region is made, and of the severe life due to the climate. 1000 w. Bradstreet's—July 31, 1897.

The Alaska Gold Field. Russell L. Dunn. Discussion of this field with conclusions. The placers are believed to be derived from erosion of gold-bearing lodes, the richness of the Klondike placer is likely to be equalled by other discoveries, and the conditions are different from other mining regions. Also editorial. 4500 w. Min & Sci Pr—Aug. 7, 1897.

The Canadian Yukon Gold Fields. Review of the projected schemes for regulating the mining operations, improvement of the means of transport, etc., with other information of interest. Ill. 2500 w. Can Eng—Sept., 1897.

The Country of the Klondike. Russell L. Dunn. Statements based on observations and information obtained during a recent visit to the basins of the Yukon and Alsek rivers. Serial. Min & Sci Pr—Oct. 22, 1898.

The Economics of the Klondike. Jack London. Considers the profits and losses of the rush to this region, and what the ultimate outcome will be. Ill. 2500 w. Rev of Revs—Jan., 1900.

The Gold Finds of Alaska. Words of caution regarding investments with some information of the country, the deposits, and the products. 2500 w. West Min Wld—July 24, 1897.

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The Gold Region of the Klondike. Describes a new route to be opened by the Canadian government which will remove the great difficulties of transport to the Yukon district. Also briefly comments on the mistake of people going who were physically and intellectually unable to cope with the conditions existing. 900 w. Bd of Trd Jour—May, 1898.

The Klondike Country. Editorial on the richness, character and resources of the country, and the rapid development sure to follow the mining excitement. 900 w. Min Ind & Rev—Sept. 16, 1897.

The Klondike Gold Fever. D. Zahn. Translated from "Ueber Land und Meer." An account of the rush to this field, difficulties of travelling and living, with report of one who made the journey. 1400 w. Chau—Nov., 1898.

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The Klondike Gold Fields. Gives views of two prominent men who have spent some time in this region, and also comments on the preparations being made in Victoria for the coming trade. 1500 w. Cons Repts—Jan., 1898.

The Klondike Gold Fields. Harry de Windt. Comments on the dangers and difficulties of the region, gives a brief outline of the journey, information of the deposits and manner of working, scarcity of food, etc. 2500 w. Contemporary Rev—Sept., 1897.

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The Klondike Mining Camp. Accounts by George Hamlin Fitch and by C. A. Snowden, with illustrations. Gives particulars of the discovery of these rich mines, the processes of mining, etc. 4800 w. Harper's Wk—Aug. 7, 1897.

The Klondike Placers. T. K. Rose. Brief history of the district, with description of the gold fields, and methods of working. 1700 w. Nature—Oct. 28, 1897.

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The Latest News from the Klondike-Yukon Country. John D. McGillivray, in the "New York Herald." Extracts from letters sent from this region reporting the hard conditions of labor, and the doubtful prospects. 2000 w. Eng & Min Jour—Dec. 11, 1897.

The New Arctic El Dorado. Henry Wysham Lanier. An account of the gold-rush to this region, and of the routes, country, prospects, etc. Ill. 3000 w. Chau—May, 1898.

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The Yukon Gold Region. Cyrus C. Adams. Valuable information gained by a Canadian surveyor, relating to important finds in the Klondike and other Yukon regions, routes, etc. Map & Ill. 1600 w. Harper's Wk—Aug. 14, 1897.

The Relief of the Klondike. Perry F. Nursey. Reviews the situation in this district, and explains the works intended to be undertaken by the Northwestern Trust and Development Company of America. 1700 w. Ind & Ir—Nov. 19, 1897.

The River Trip to the Klondike. John Sidney Webb. Interesting account of the country and life of the miners, with some information of method of mining, etc. Ill. 12000 w. Century Mag—March, 1898.

The Rush to the Klondike. Sam Stone Bush. An article on the present output and future promise of Alaska's new gold fields, by an observer. Gives characteristics of the country, methods of mining and living, etc. Ill. 12000 w. Am Rev of Revs—March, 1898.

The Rush to the Klondike over the Mountain

Passes. Edward S. Curtis. Brief account of the difficulties encountered on this route in 1897. Ill. 1400 w. Century Mag—March, 1898.

The Yukon Gold Excitement. Presents facts leading to the belief that the Klondike is a very rich placer gold deposit, also giving information of the country, the climate, cost of transportation, and the attitude of the Canadian government. Short editorial also given. 1800 w. Eng & Min Jour—July 31, 1897.

The Yukon Gold Fields. Considers Vancouver as a base of supplies, the transportation enterprises, and the situation at Dawson City. 1600 w. Cons Repts—Feb. 4, 1898.

See also **Alaska; Yukon; PROSPECTING.**

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**Lake of the Woods.**—See **Ontario.**

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Gold Traffic and Gold Mining in Madagascar. A translation of the law concerning gold export and buying which seems to threaten trouble between local authorities and foreign merchants. 3500 w. Cons Repts—Feb., 1897.

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**Marble Belt.**—The Marble Belt. A. Thurston Heydon. A region of interest to miners because of the large deposits of rich gravel. Reviews the formation, character and past work. 1000 w. Min & Sci Pr—April 10, 1897.

**Mashonaland.**—Notes on the Umtali District (Manica Mashonaland) (Ein Beitrag zur Kenntniss des Umtali Districts) (Manica Mashonaland). Geological notes on the Mashonaland gold district, with map and sections. 2500 w. and map. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 2, 1897.

**Merour.**—See **Utah.**

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The Golden Heart of the Sierra Madre. H. D. Slater. Illustrated description of the new gold fields of the Mexican Sierras, with some account of the country and the way to reach the mines. 2000 w. Am Rev of Revs—April, 1898.

The Gold Resources of Mexico. V. R. de Cornely. Part first describes the auriferous veins and the progress of the gold mining industry. Serial. Eng & Min Jour—March 18, 1899.

The Gold Zone of Copalquin, Durango, Mexico. Frank B. Fowler. An illustrated account of the San Fernando mines is given in part first. Serial. Eng & Min Jour—Feb. 24, 1900.

**Mexico, Altar.**—The Gold Fields of Altar, Mexico. W. George Waring. History of this region and the attempt to open the old mines, with present prospects. 1800 w. Eng & Min Jour—March 13, 1897.

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**Nevada.**—One of the World's Gold Fields—The Silver Peak Mines. S. A. Knapp. An account of these mines in Nevada, whose recent extensive developments have attracted attention. 1500 w. Min & Sci Pr—Nov. 26, 1898.

The Ely Mining District, Nevada. Fred D. Smith. Describes a gold district of much promise. 1000 w. Eng & Min Jour—Aug. 25, 1900.

**New Guinea.**—The Gold Rush to British New Guinea. Theodore F. Bevan. A lecture delivered in Melbourne is reported, with the discussion that followed. 3000 w. Aust Min Stand—Feb. 18, 1897.

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See also **Australia.**

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**New Zealand.**—Gold Mining at Preservation Inlet. Richard Allen. Information of this locality and how it was discovered, and of the mines located and worked. 2000 w. New Zealand Mines Rec—Oct. 16, 1897.

Gold Mining in the Hauraki District, New Zealand. Henry M. Cadell. Abstract of a paper recently read before the Mining Inst. of Scotland. The counties and districts are noticed separately and much valuable information given concerning them. Serial. Min Jour—Feb. 22, 1896.

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Report on the Auriferous Deposits of the Upper Hinemaia River. Alexander McKay. The government geologists' report of the Taupo district, Auckland, N. Z. Did not find a payable prospect. 1600 w. N Z Mines Rec—April 17, 1899.

The Alluvial Gold of Otago, N. Z. From the "New Zealand Mining Journal." An attempt to explain the presence of so much gold in the rich placers, rivers and creeks. 2300 w. Aust Min Stand—Oct. 8, 1896.

The First Discoverer of Gold in New Zealand. An entertaining article from the Auckland "Weekly News" giving a history of the early prospecting in New Zealand. 3300 w. Aust Min Stand—Nov. 16, 1895.

The Gold Fields of the Houraki Peninsula, New Zealand. Joseph Campbell. Describes the characteristics of the gold fields included in each of the counties embraced within the peninsula. Serial. Min Jour—Dec. 12, 1896.

The Gold Mines of New Zealand (Les Mines d'Or de la Nouvelle-Zélande). A general description, with photographic views, and a geological map of the district of Hauraki. 2000 w. Génie Civil—June 11, 1898.

See also **GOLD BEACH; GOLD DREDGING.**

**Nicaragua.**—Gold Deposits in Nicaragua. An account of the explored portion of Nicaragua, with information from Mr. Courtenay De Kalb and O. O. Hill and from official sources. 3800 w. U S Cons Repts—Sept., 1896.

Gold in Nicaragua. C. T. Mixer. Brief account of a region between the 11th and 15th degrees of north latitude, with mention of a few of the properties which have been worked. Ill. 1500 w. Eng & Min Jour—July 30, 1898.

The Segovia Gold Region of Nicaragua. H. H. Miller. Description based on a very hasty visit to the region, calling attention to some of the interesting features. Ill. 2000 w. Eng & Min Jour—Sept. 18, 1897.

**Nome.**—See **Cape Nome.**

**North Carolina.**—North Carolina Gold Fields. J. J. Newman. The communication discusses the need of a central reduction plant and gives a map showing location of gold mines in ten counties, with tabular statement showing character and production. 1200 w. Mfrs Rec—March 6, 1896.

See also **U. S. Southern.**

**Nova Scotia.**—On the Gold Measures of Nova Scotia and Deep Mining. E. R. Faribault. Descriptive account of the geological changes and their results, giving the present features. 4000 w. Can Min Rev—March 31, 1899.

**Ontario.**—Gold in Western Ontario. Editorial review of the diffusion of gold in this province, the amount of development work, value of deposits, etc. 2500 w. Can Min Rev—Sept., 1896.

Notes on the Western Ontario Gold Fields. Dr. Coleman. Briefly refers to the geology, gold-bearing deposits, and veins. 1500 w. Can Min Rev—March, 1897.

Recent Development of Mining in Ontario. Information from the report of Dr. A. P. Coleman to the Bureau of Mines relating to the gold fields of this region. 2000 w. Can Eng—Nov., 1896.

The Gold-Bearing Veins of Bag Bay, Near Lake of the Woods. Peter Mackellar. Describes the peculiar features, the smallness of the quartz-fissures as compared with the size of the ore-bearing lodes, and the operations of the Tycoon, Toronto and Western, and Mikado Co.'s. 4000 w. Trans Am Inst of Min Engs—Feb., 1899.

The Gold Fields of Western Ontario. J. D. Lowry. An account of the deposits, development, advantages, and other information. 1500 w. Eng & Min Jour—Sept. 1, 1900.

The Gold Fields of the Rainy River District. Horace V. Winchell. Comments on the salient features of the Rainy Lake and Seine river portions of this large district in Western Ontario. Map. 2800 w. Eng & Min Jour—Oct. 23, 1897.

The Occurrence of Gold Ores in the Rainy River District, Ontario, Canada. William Hamilton Merritt. Describes the general characteristics of the rocks, veins, etc., with the opinion of the writer that as large a proportion of paying gold mines will be found in this region, as are found on an average in successful mining districts. Ill. 2800 w. Trans Am Inst of Min Engs—May, 1897.

The Western Ontario Gold Fields and Their Genesis. F. Hills. Considers the Bad Vermilion Lake and the Saw Bill Lake deposits, describing the formation and process of deposition. Ill. 5000 w. Can Min Rev—April, 1897.

**Ontario, Deloro.**—The Mispickel Gold Ores of Deloro, Ont. J. Walter Wells. Describes the location briefly, and gives results of experiments in the gold ores of this district. 2200 w. Can Min Rev—March, 1897.

**Ontario, Lake of the Woods.**—The Gold-Bearing Veins of Bag Bay, Near Lake of the Woods. Peter Mackellar. Describes the geological formation, mining developments, vein characteristics and peculiarities. 4200 w. Trans Am Inst of Mon Engs—Feb., 1899.

The Lake of the Woods Gold Field. T. A. Rickard. Discovery, prospecting, history, geology, gold-bearing veins, etc., are described. Ill. 8300 w. Eng & Min Jour—July 3, 1897.

**Ontario, Michipicoton.**—Canada's Newest Gold Field. J. T. McDonald. An account of the discovery of auriferous quartz veins on the north shore of Lake Superior, in the vicinity of the Michipicoton River, with summary of the provisions of the mining act concerning manner in which mining claims may be acquired. 900 w. Eng & Min Jour—Sept. 25, 1897.

Notes on the Michipicoton Gold Field. A. W. Willmott. Read at meeting of the Fed. Can. Min. Inst. Facts gathered from a brief geological examination of this district. 700 w. Can Min Rev—March, 1898.

The Michipicoton Mining District in Ontario. Wilson B. Cue. History of the discovery of this field, with description of the region, and general information. 2000 w. Eng & Min Jour—Dec. 25, 1897.

**Oregon.**—Eastern Oregon Gold Belt. John F. Leland. Brief mention of a few of the active mines of this section showing a bright outlook. 900 w. Min Rept—March 9, 1899.

Eastern Oregon Gold Fields. E. G. Bailey. A statement of the condition of mining in this region. Ill. 1500 w. Min & Sci Pr—Aug. 28, 1897.

Ore Deposits in the Cracker Creek District, Oregon. T. L. Lammers. An account of the development of both placer and quartz mining, and the character of the deposits. 1800 w. Eng & Min Jour—Aug. 11, 1900.

Southern Oregon Placer Conditions. Theo. F. Van Wagenen. Interesting information relating to this region. 1800 w. Min & Sci Pr—April 21, 1900.

See also **California-Oregon.**

**Peru.**—The Gold Fields of Sandia, Peru. H. Tweddle. Illustrated description and historical account, giving the geological formation, deposits, workings, etc. Part first treats of Poto, and San Juan del Oro. Serial. Eng & Min Jour—May 8, 1897.

**Philippines.**—Gold in the Philippines. Ramon Reyes Lala. A brief account of what is thus far known of gold in the Philippines, and the primitive methods used by the natives in its mining and extraction. 2200 w. Am Rev of Revs—July, 1899.

Gold in the Philippines. William Gilbert Irwin. Brief account of such researches as have been made in the Island of Luzon, and the promising outlook. 800 w. Eng & Min Jour—May 19, 1900.

Notes on the Philippine Islands. Extracts from a pamphlet by Frank Karuth, entitled "A New Center of Gold Production," describing conditions in the Philippines. 5800 w. Cons Repts, No. 131—June 3, 1898.

**Prospecting.**—See **PROSPECTING.**

**Quebec.**—The Gold-Bearing Deposits of the Eastern Township of Quebec. Robert Chalmers. The area of this gold-bearing region is estimated at from 3000 to 4000 sq. miles. The writer gives facts and inferences showing the prospects to be rather encouraging, but considers knowledge and skill essential to success. 4200 w. Can Min Rev—Feb., 1897.

**Racing River.**—The Racing River Gold · Region. Describes its location, discovery and value, giving information regarding its prospects. 1600 w. Ir Age—Nov. 5, 1896.

**Rhodesia.**—Gold Mining Prospects in Rhodesia. R. R. Mabson. A very complete account of the ancient workings, existing mines and conditions of present production, with many characteristic illustrations. 4000 w. Eng Mag—March, 1900.

Rhodesia and Its Mines in 1898. William Fischer Wilkinson. An account of the prospects of the gold mines of South Africa, containing much interesting information. Ill. 8500 w. Jour Soc of Arts—Feb. 3, 1899.

**Russia.**—See **GOLD MINE; MINERAL REGION.**

**Siberia.**—Auction of Siberian Mining Land. Details in regard to the leasing by auction of gold mining territory. 2800 w. U S Cons Rept's No. 595—Dec. 5, 1899.

Lease of Gold-Bearing Land in Siberia. A translation of a circular, issued by the Ministry of Agriculture and Domains, in regard to leasing six tracts of land. 700 w. U S Cons Repts, No. 562—Oct. 25, 1899.

The Auriferous Deposits of Siberia. Réné de Batz. Gives some of the reasons for the slow development of these gold fields, describes the general geology of the Siberian placers, the economic conditions, methods of working, etc. Map. 5000 w. Trans Am Inst of Min Engs—Aug., 1898.

The Gold Placers of Siberia. E. D. Levat. The characteristics of the gold formations described, with conjecture as to their probable origin. 1500 w. Eng & Min Jour—Jan. 23, 1897.

The Siberian Railway and the Siberian Gold Districts (Die Sibirische Eisenbahn und die Gold-Vorkommen Sibiriēns). A discussion of the probable effects of the access by railway upon the gold regions of Siberia, with data as to locations and past output. 2000 w. Glückauf—April 30, 1898.

See also **GOLD MINE—Russia; GOLD MINING; MINERAL REGION; RAILWAY PROJECT; SIBERIA.**

**Silesia.**—Gold in Silesia (Gold in Schlesien). A discussion of the geological conditions under which gold is found in Silesia, and a comparison with those of California. 4000 w. Glaser's Annalen—Jan. 15, 1897.

**South Africa.**—Pilgrim's Rest. Malcolm Fergusson. Describes the situation of this rich South African field, its geological formation, and the conditions under which it is worked. Ill. Serial. Mines & Min—June, 1899.

See also **Mashonaland; Rhodesia; Transvaal.**

**South Australia.**—Tarcoola Gold Field. Concerning a recently discovered gold field in South Australia. Maps. 900 w. Aust Mine Stand—April 26, 1900.

Physiography and Geography of the Wadnaminga Gold Fields, South Australia. F. D. Johnson. Paper read before the Australian Inst. of Min. Engs. An extended description. Serial. Aust Min Stand—Dec. 14, 1895.

The Arltunga Gold Field, South Australia. H. T. L. Brown. Extract from a recently issued report of this new field. Map. Serial. Aust Min Stand—March 25, 1897.

See also **Australia.**

**South Dakota.**—See **Black Hills.**

**Tasmania.**—Scamander Mining District, Tasmania. J. Harcourt Smith. Report of the geological surveyor, pronouncing the prospects encouraging. Serial. Aust Min Stand—July 8, 1897.

The Lefroy Gold Fields, Tasmania. Leslie Jolly. A descriptive paper, based on absolute facts that have come within the knowledge of the writer. 2400 w. Aust Min Stand—Sept. 9, 1897.

The Lefroy Gold Fields (Tas.). A. Montgomery. Describes the geology, deposits, etc., in part first. Serial. Aust Min Stand—June 10, 1897.

**Transvaal.**—The Gold Fields of the Transvaal. This article is written in popular style and gives an interesting picture of native miners going to work, a zebra propelled stage coach, and a gold productive diagram from 1887 to 1895. 1400 w. Sci Am Sup—Feb. 22, 1896.

The Rand in 1886. Fred Alexander. Reminiscences of the Early Gold Discoveries in South Africa. 2200 w. Aust Min Stand—Nov. 23, 1895.

The Witwatersrand Gold Field and Its Working. L. de Launay. Part first deals with the geology of the gold field, giving maps and sections. Serial. Eng & Min Jour—June 19, 1897.

**Unexplored.**—Unexplored Gold Regions. Dan De Quille, in "Salt Lake Tribune." The article touches upon the fields of Thibet, Siberia, Mongolia, British Guiana and Venezuela. 2200 w. Min Ind & Rev—March 19, 1896.

**U. S. Southern.**—Gold Mining in the Southern States. H. B. C. Nitze. A statistical geological review of the gold ore deposits in the southern states, and of the methods of working them. 4500 w. Eng Mag—Feb., 1896.

The Southwestern Extremity of the Appalachian Gold Fields. William B. Phillips. Thinks there is but little hope of the placers of this part of the United States and that money spent should be devoted to the quartz seams. 1500 w. Eng & Min Jour—Oct. 2, 1897.

See also **Alabama; Georgia; North Carolina.**

**Utah.**—Camp Floyd District, Utah. James W. Neill. The gold production of the Mercur and adjoining districts is $2750 daily. 2800 w. Eng & Min Jour—Jan. 25, 1896.

The Camp Floyd Mining District and the Mercur Mines, Utah. R. C. Gemmell. Part first gives the history and topography of this district, fifty miles south of Salt Lake City. Ill. Serial. Eng & Min Jour—April 24, 1897.

The Tintic Mining District in Utah. H. L. J. Warren. An outline of a visit among the mines of this district, which is said to be the most prosperous precious metal mining region between the Atlantic and Pacific. 2500 w. Eng & Min Jour—March 6, 1897.

See also **CYANIDE PROCESS; GOLD MINE—Mercur; Utah; GOLD MINING—Mercur.**

**Vancouver Island.**—Vancouver Island—Alberni District. William M. Brewer. An illustrated description of this property, which is the most thoroughly developed on the island, having been opened to a depth of 350 ft. 1900 w. Eng & Min Jour—April 21, 1900.

**Victoria.**—A Neglected Gold Field. An account of the Inglewood reefs, in Victoria, showing that a course of systematic mining would give satisfactory results. Serial. Aust Min Stand—Aug. 18, 1898.

A Victorian Auriferous Zone. Ernest Lidgey. Gives facts relating to the reefs of the western portion of Victoria, with detailed information. 2400 w. Aust Min Stand—Dec. 16, 1897.

A Victorian Mount Morgan. Account of a very rich field recently found in Australia. 1800 w. Min Jour—July 25, 1896.

Benalla Gold Field (Vic.). W. H. Ferguson. Report, with plan, of this field, describing the reefs, alluvial claims, and prospecting. 2000 w. Aust Min Stand—Oct. 21, 1897.

Berringa, Vic. An illustrated account of this field, discussing its prospects. 1600 w. Aust Min Stand—Sept. 15, 1898.

The Alluvial Leads of Victoria. Plan of these leads from the source to the present workings, with tabulated statement giving some idea of the metal won. 500 w. Aust Min Stand—Feb. 25, 1897.

The Victorian Alluvial Gold Field. A map of about thirty miles of alluvial district having the roads, claims, rivers and hills located with explanation in the text. 2400 w. Aust Min Stand—Feb. 6, 1896.

The Ararat District. An illustrated account of its discovery and conformation, mines, etc. 1000 w. Aust Min Stand (special)—June 1, 1899.

The Beechworth District. An illustrated description of this district, its mines and their development, methods, etc. 24500 w. Aust Min Stand (special)—June 1, 1899.

The Berringa Gold Field (V.). William Bradford. An account of the auriferous features and mining efforts. Part first considers the Birthday group. Ill. Serial. Aust Min Stand—July 6, 1899.

The Castlemaine District. Gives an illustrated description, noting its rise and progress, geology, mines, etc. 14200 w. Aust Min Stand (special)—June 1, 1899.

The Deep Leads of Victoria. E. Lidgey. Describes the deposits and the wealth they have been proved to contain. 4200 w. Aust Min Stand (special)—June 1, 1899.

The Loddon Valley Deep Leads. Reginald A. F. Murray. From the report of the government geologist. Descriptive. 2500 w. Aust Min Stand (special)—June 1, 1899.

The Ellesmere Gold Field, Victoria. H. Herman. An account of the geology and gold workings of this region. 2000 w. Aust Min Stand—Feb. 11, 1897.

The Maldon Gold Field. R. A. Moon. Extracts from a special report issued by the Victorian Secretary for Mines. Describes what is claimed to be one of the most flourishing mining centers in Victoria. 3500 w. Aust Min Stand—July 22, 1897.

The Maryborough District. An illustrated description of the gold fields, their value, important reefs, etc. 15300 w. Aust Min Stand (special)—June 1, 1899.

The Mining District. William Bradford. An illustrated account of its geological features, principal mines, systems employed, etc. 17000 w. Aust Min Stand (special)—June 1, 1899.

The Reefs of the Sheep-Station Creek (Vic.). General remarks descriptive of some of the typical mines of this region. 1800 w. Aust Min Stand—March 25, 1897.

The Steiglitz Gold Field, Victoria. William Bradford. Illustrated detailed description. Serial. Aust Min Stand—May 13, 1897.

See also **Australia.**

**Victoria, Ballarat.**—Quartz Lodes in Ballarat West. William Bradford. Illustrated description of the formation of this region. 1200 w. Aust Min Stand—Feb. 11, 1897.

The Ballarat Gold Field. William Bradford. Illustrated description of its main features. 3800 w. Aust Min Stand—Sept., 1896.

The Ballarat Gold Field. Account of the working of the mines, the researches seeming to favor the opinion that gold shoots will be found to have extended to greater depths than humanity will be able to follow. Serial. Aust Min Stand—March 19, 1896.

Famous Mines of Ballarat. Illustrated descriptions are briefly given. 3500 w. Aust Min Stand (special)—June 1, 1899.

**Victoria, Bendigo.**—The Bendigo District. An illustrated account of the city and surroundings, mines, deposits, developments, etc. 50000 w. Aust Min Stand (special)—June 1, 1899.

The Bendigo Gold Field. The first of a series of articles in this field. The present number is confined to the famous Hustle's line. Serial. Min Jour—March 20, 1897.

**Victoria, Creswick.**—Creswick. H. A. Westmoreland. Illustrated description of this valuable quartz gold field. 2500 w. Aust Min Stand (special)—June 1, 1899.

**Victoria, Gippsland.**—An Auriferous Mountain. Description of an extraordinary discovery in the Gippsland district, near Melbourne. 1100 w. Aust Min Stand—July 23, 1896.

Notes on the Auriferous Devonian Formations of Gippsland, Victoria. H. Herman. The writer concludes that there is not yet sufficient reason for altering the opinion that the great mass of the Upper Devonian rocks of Victoria should be considered, in general, non-auriferous. 3500 w. Trans of Aust Inst of Min Engs—Vol. V.

The Gippsland (Vic.) Gold Fields. Donald Clark. Describes the mining prospect and gives the history of the region. It has proved a good field for miners, but is not a field for the capitalist. 2800 w. Aust Min Stand—Sept., 1896.

The Gippsland Gold Fields, Victoria. H. Herman. A brief description of the relations of the silurian and some of the later formations in the lower portion of the Mitchell River Valley, with some probable reasons for the difference in their metalliferous contents. 4200 w. Aust Min Stand—Nov. 3, 1898.

The Golden Mines of Gippsland, Victoria. Describes a new field in the vicinity of the Bemm River, giving plan of mines and illustration of workings. 1300 w. Aust Min Stand—March 18, 1897.

The Gippsland District. An illustrated account of this district, its geological features, mines, etc. 16000 w. Aust Min Stand (special) —June 1, 1899.

The New Discoveries in Gippsland, Victoria. Late discoveries in Eastern Gippsland as reported by Reginald Murray. 1300 w. Aust Min Stand —Nov. 5, 1896.

**Western Australia.**—The Alluvial Deposits of Western Australia. T. A. Rickard. Describes the geology and physiography of these gold fields, distribution, dry blowing machinery, water supply and theories of the origin of the deposits. Ill. 9900 w. Trans of Am Inst of Min Engs—Dec., 1898.

The West Australian Gold Occurrences. C. A. Huessler. Observations and conclusions from notes taken in the various fields while touring per bicycle. Serial. Aust Min Stand—Nov. 19, 1896.

First Impressions of Westralia. T. A. Rickard. Brief description of Western Australia. 1200 w. Eng & Min Jour—Nov. 20, 1897.

Gold in Western Australia. Charles J. Alford. Conditions of deposition, characteristics, process of working, veins, surface deposits, and other related topics are treated briefly. 2500 w. Min Jour—July 18, 1896.

Mining and Milling Gold Ores in Western Australia. H. C. Hoover. A description of this gold field, the mining companies, mines, milling, costs of working, etc. 3300 w. Eng & Min Jour —Dec. 17, 1898.

Phillips River Goldfield (W. Aus.). T. Blatchford. Extracts from the official report to the Mines Dept. on the geology of this district. Serial. Aust Min Stand—Aug. 2, 1900.

The Gold-Fields of Western Australia. Harry C. Rhys Jones. Considers the future of this region one of golden promise. 2200 w. Aust Min Stand—Jan. 14, 1897.

The Land of Gold. Review of book by Julius M. Price on the West Australian gold-field. 2500 w. Trans—June 12, 1896.

The Present Position of Gold Mining in West Australia. Carl Schmeisser. A description of the studies of the writer on these gold fields. The first part deals with their geographical and geological relations and the auriferous deposits. Serial. Min Jour—June 20, 1896.

The Superficial Alteration of Western Australian Ore-Deposits. Herbert C. Hoover. Describes the nature of the deposits and points out the special peculiarities of the phenomena observed in Western Australia. 2500 w. Am Inst of Min Engs—Oct., 1898.

The Yalgoo (Murchison) Gold Field (W. A.). H. P. Woodward. Brief description from the government geologist's report. 1100 w. Aust Min Stand—March 5, 1896.

The Coolgardie Gold Fields. West Australia. A. T. F. A true description of this much talked of Western Australian district, by one who has been there. Map. 2200 w. Ind Engng—Dec. 21, 1895.

The Coolgardie, Australia, District. John Dwyer. Information of some of the mines about Coolgardie. 1800 w. Min & Sci Pr—Aug. 27, 1898.

The Coolgardie Gold Fields. Victor Hansard Yockney. The first number is devoted to a general description of the country and the condition of transportation and living. Serial. Min Jour —Aug. 8, 1896.

The Gold Fields of Coolgardie (Ueber die Gold Lagerstätten von Coolgardie). An account of the new gold fields of Coolgardie, in West Australia, by correspondence from Herr Gmehling. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 31, 1897.

Kalgoorlie, Western Australia, and its Surroundings. George J. Bancroft. Location, manner of reaching and climatic conditions of Kalgoorlie, with information of the deposits and ores. Ill. 8300 w. Trans Am Inst of Min Engs—Feb., 1898.

Kalgoorlie, Western Australia, and its Surroundings. George J. Bancroft. Abstract of paper read at the Atlantic City meeting of the Am. Inst. of Min. Engs. Information of the ores and manner of deposit. 1500 w. Eng & Min Jour —Feb. 19, 1898.

Kalgoorlie, Western Australia, and its Surroundings. Edward S. Simpson's discussion of this paper, with reply by the writer, George J. Bancroft. 1200 w. Am Inst of Min Engs—Oct., 1898.

Kalgoorlie, Western Australia. T. A. Rickard. A general account of this region and the writer's impressions. 1700 w. Eng & Min Jour—April 16, 1898.

Mines of Kalgoorlie, Australia. John Dwyer. A letter descriptive of the various properties, the lodes, yields, and physical and financial condition, very favorable to the region. 2500 w. Min & Sci Pr—Sept. 3, 1898.

The Kalgoorlie District in Western Australia. Facts concerning the output and treatment of the ores. 900 w. Eng & Min Jour—May 27, 1899.

See also Australia; GOLD MINE.

**Witwatersrand.**—See Transvaal; GOLD MINING.

**Wyoming.**—The Bald Mountain District, Wyoming. Fred D. Smith. Describes district and examines statements made by Mr. Tewksbury, manager of the Fortunatus Co. His claims that gold is present in the rocks of this region are not supported by the investigations of the writer. 1600 w. Eng & Min Jour—Dec. 5, 1896.

**Yukon.**—Routes to the Yukon. Discussion of the various possible routes to the gold placers along the Yukon River, showing their relative merits. 1000 w. Min Ind & Rev—Dec. 5, 1895.

The Headwaters of the Lewis River. A. Thurston Heydon. A study of the country made by the writer while prospecting. 1200 w. Min & Sci Pr—Jan. 21, 1899.

The Yukon Country. P. T. Rowe. Abstract of a lecture delivered at Sitka, Alaska. An account of the changes so rapidly wrought, and of the mining conditions and general outlook. 4500 w. Chau—Jan., 1899.

The Yukon District. George M. Dawson. Some account of explorations made in this district, with information of the country and its resources. 1800 w. Can Min Rev—Aug., 1897.

The Yukon Gold Fields. Extracts from Inspector Constantine's report to the government at Ottawa. On the richness of the deposits. 800 w. Aust Min Stand—July 1, 1897.

The Yukon Mining Region. Charles G. Yale. The conditions at present existing, the high price of living and transportation, the severity of the climate, and the expectations are discussed. 2300 w. Min Ind & Rev—March 10, 1898.

See also Alaska; Klondike.

**Zambesia, Africa.**—Ancient Ruins and Gold Mines in Zambesia. From an account sent by Dr. Karl Peters to the London "Times." The article describes the very ancient remains found, and mentions the mountain of Fura, very rich in gold. 1400 w. Eng & Min Jour—Aug. 12, 1899.

Macombe's Country (South of the Zambesi). Its Ancient Goldfields and Industrial Resources. Dr. Carl Peters. Interesting descriptive account, with discussion. 6400 w. Jour Soc of Arts—March 9, 1900.

**GOLD VEIN.**

See GOLD GEOLOGY; GOLD REGION; MINERAL VEIN.

**GONDOLA.**

The Gondola: Its History and Manufacture. Condensed from an account by Horatio F. Brown. Interesting information relating to the changes, use and making of these boats of Venice. 1800 w. Sci Am—Oct. 15, 1898.

**GONIOMETER.**

**Lacroix Axial.**—Lacroix' Axial Goniometer. N. H. Winchell. Illustrated description of an attachment to the microscope, with solution of an example for measuring the optic angle of minerals. 600 w. Am Geol—Feb., 1896.

**GOVERNMENT CONTROL.**

See **MUNICIPAL CONTROL; MUNICIPAL OWNERSHIP; STATE OWNERSHIP.**

**GOVERNOR.**

See also **STEAM ENGINE—Regulation; STEAM ENGINEERING.**

About Engine Governors. Calls attention to some of the causes which impede their action or hinder them from working. 1000 w. Bos Jour of Com—Nov. 14, 1896.

Engine Governors. R. H. Smith. Part first explains the need of varying the design and operation of governors to suit the machine to which they are applied; also considers the whole operation of governing. Serial. Engr, Lond—Nov. 26, 1897.

Steam Engine Governors. Frank H. Ball. An investigation of the governing forces and their relations to each other, with conclusions reached. Ill. 4000 w. Am Soc of Mech Engs—Dec., 1896.

Steam Engine Governors. John Davidson. Read before the Salford Science Students' Assn. Part first discusses the throttle and variable expansion governors, quoting from various writers. Serial. Prac Engr—Jan. 6, 1899.

The Design and Setting of Shaft Governors. J. C. Cornock. Part first discusses the prevention of internal friction, the arrangement of the spring, etc. Ill. Serial. Mech Wld—Aug. 12, 1898.

The Economical Governing of Steam Engines. John S. Raworth. Comparing the relative methods of governing by throttling and by varying cut-off. Willans law is discussed and curves of steam consumption per horse power given for various conditions of load and regulation. 2500 w. Eng Mag—Nov., 1897.

**Corliss.**—Note on Theory of Corliss Governors. C. V. Kerr. Explains a method of reducing the labor of finding the values of certain variables. 500 w. Stevens Ind—Oct., 1900.

**Dow Chronometric.**—The Dow Chronometric Governor. Josiah Dow. Describes and illustrates the invention, explaining its action. 3500 w. Pro of Engs Club of Phila, No. 67—Nov., 1898.

**Dynamics.**—The Dynamics of Direct and Continuous-Acting Governors (Dynamik Direct und Continuirlich-Wirkender Regulatoren). C. Koerner. An elaborate mathematical discussion, giving equations for various conditions, and curves showing the governing action. Three articles. 7500 w. Zeitschr d Oesterr Ind u Arch Ver—June 30, July 7, 14, 1899.

**Electric.**—An Electric Governor (Régulateur Electrique). Ch. Gruet. An illustrated description of a system by which the speed of the steam engine is governed directly from the dynamo instead of using centrifugal force. 1500 w. Rev Tech—May 10, 1899.

Governor with Electric Brake (Régulateur à Frein Electrique). Rieter's improved governor is especially adapted for use with hydraulic motors, and utilizes the retarding action of an electric current upon a revolving mass of iron to assist in the regulation of the speed. 1000 w. Génie Civil—March 19, 1898.

**Electrical Release.**—Speed Regulator with Electrical Release (Geschwindigkeits Regulatoren mit electrischer Auslösung). H. Müller. A centrifugal governor is arranged to throw a switch in and out of gear to operate mechanism for moving the regulating mechanism of steam or hydraulic motors. 1200 w. Elektrotech Zeitschr—Aug. 24, 1899.

**Electrical Work.**—A New Steam Engine Governor for Electrical Work. C. Percy Taylor. Description of a new governor, which claims to fulfill the necessary conditions required in electrical work. 1000 w. Elect'n—Jan. 15, 1897.

**Expansion.**—Combined Engine and Dynamo. An illustrated description of an engine recently erected at the headquarters of the Metropolitan Fire Brigade (London) and forming a part of the electric light plant, especially describing a new form of governor. 1100 w. Engr, Lond—Nov. 4, 1898.

**Fly-Ball.**—The Fly-Ball Governor. H. H. Kelley. An illustrated description of this class of governors and their operation. Serial. Engr, U S A—Dec. 15, 1899.

**Fly-Wheel.**—Behavior of a Fly-Wheel Governor under Sudden Changes of Load. Walter Ferris. Illustrated detailed description of apparatus and method employed in an experimental investigation of this important matter. The article is unusually interesting and instructive. 1800 w. Am Mach—Feb. 13, 1896.

Fly-Wheel Governors. George T. Hanchett. Fly-wheel governors and some of the principles of their design. 1600 w. Elec Wld—April 11, 1896.

**Gas.**—See **GAS DISTRIBUTION—Governor.**

**Hydraulic.**—The Rusch-Sendtner Hydraulic Governor. From "Revue Industrielle." Describes a new resistance or brake governor adapted for maintaining a constant velocity in any sort of a hydraulic motor. Ill. 700 w. Sci Am Sup—Dec. 24, 1898.

See also **Electric; HYDRO-ELECTRIC PLANT; TURBINE; WATER WHEEL—Governing.**

**Inertia.**—The American Inertia Governor (Die Amerikanischen "Inertie" Regulatoren). A. Stodola. A general discussion of shaft governors of the inertia type, with illustrations from recent American practice. 2000 w. Schweizer Bauzeit—May 20, 1899.

The Siemens' Regulating Principle and the American Inertia Governors (Das Siemenssche Regulirprinzip und die Amerikanischen "Inertie-Regulatoren"). A. Stodola. An exhaustive examination of the inertia principle as applied to steam engine governors, showing the anticipation of the modern governors by the Siemens' governor of 1845. Serial. Zeitschr d Ver Deutscher Ing—May 6, 1899.

**Marine Engine.**—Marine-Engine Governors (Schiffsmaschinenregler). A paper by Hr. Dubbel showing the importance of governors for marine engines, with descriptions of some of the more recent forms and discussing the conditions of governing for multiple-expansion engines. 2000 w. Zeitschr d Ver Deutscher Ing—July 23, 1898.

**Measure of Quality.**—A New Measure of Good Quality in Governors. R. H. Smith. An explanation of measures of governor good quality based on geometric sensitiveness, force-power, energy-power and stability. 2800 w. Engr, Lond—May 25, 1900.

**Power.**—The Controlling Power of Governors. Translated from "Zeitschrift des Vereines Deutscher Ingenieure." Remarks explanatory of the forces in the governor, and their action. Mathematical determination of the power available. 3500 w. Mech Wld—May 12, 1899.

The Controlling Power of Governors (Die Verstellkraft von Regulatoren). F. J. Weiss. A mathematical examination of the relations of the forces in centrifugal governors, with especial regard to the power available for the regulating mechanism. 3000 w. Zeitschr d Ver Deutscher Ing—Jan. 21, 1899.

**Power Machinery.**—The Regulation of Power Machinery (Das Reguliren von Kraftmaschinen). J. Isaachsen. A general discussion of the fundamental principles of the regulation of motors, including steam and hydraulic machinery, in connection with a consideration of the inertia of the moving masses. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 5, 1899.

**Shaft.**—Designing an Engine Shaft Governor. Theo. F. Scheffler, Jr. General description of the governor and the mechanical theory, showing how it controls the steam valve; followed by details. Serial. Mach—Jan., 1897.

Good Regulation and the Shaft Governor. E. T. Adams. Suggestions toward securing better regulation, with practical hints as to the best method of working, and need of observing certain precautions. 3300 w. Sib Jour of Engng—Dec., 1895.

Good Regulation and the Shaft Governor. E. T. Adams. A consideration of the problem of securing good regulation from a shaft governor. The directions are written especially for the men actually in charge of a plant. Ill. 4200 w. Elec Wld—Nov. 23, 1895.

Mechanics of the Shaft Governor. John H. Barr. A consideration of the principal points necessary to be observed in the successful design of any of this class of governors. 6000 w. Sib Jour of Engng—Feb., 1896.

Notes on Shaft Governors. W. B. M'Lean. Deals with practical points in the design of these appliances, noticed by the writer during work connected with high-speed engines which were thus governed. Ill. 2500 w. Can Engr—April, 1899.

Shaft Governors. J. C. Cornock. Illustrates and describes various forms, and explains the method of control in part first. Serial. Prac Engr—May 4, 1900.

Shaft Governor with Relieved Connections (Achsenregler mit Enlasteten Gelenken). O. Franiek. An improved shaft governor in which knife-edge bearings are used, in order to avoid the disturbing influence of friction in the pin connections. 1200 w. Zeitschr d Ver Deutscher Ing—March 19, 1898.

Steam Engines with Shaft Governors (Dampfmaschinen mit Flachreglern). Hugo Seidler. An illustrated discussion showing forms of shaft governor used in Germany, with diagrams showing the closeness of regulation. 4000 w. Zeitschr d Ver Deutscher Ing—May 14, 1898.

The History of the Shaft Governor. Investigation of the subject, with illustrations. 2000 w. Eng News—March 17, 1898.

The Shaft Governor. R. C. Carpenter. Discusses the forms of shaft governors with an explanation of the theory. Ill. 3800 w. Power—May, 1898.

The Shaft Governor. Thomas Hall. Considers some of the problems presenting themselves in the endeavor to secure good regulation. Ill. 3500 w. Elec Wld—June 4, 1898.

The Shaft Governor. Henry E. Longwell. A discussion of Prof. Carpenter's article with notes from the writer's experience. 2200 w. Power—June, 1898.

**Testing.**—Experiments Upon the Action of Engine Governors. William George Hibbins. Read at Inst. of Civ. Engs., England. An account of experiments upon nine types of governors, made at Mason College, Birmingham, Eng. Ill. Serial. Am Mfr & Ir Wld—Oct. 12, 1899.

On Methods of Testing Engine Governing. F. W. Roller. Explanation of the methods of testing how well the governors of steam engines for electric work fulfill their purpose. Ill. 2400 w. Am Elect'n—Dec., 1897.

**Thunderbolt.**—The Thunderbolt Governor. Illustrated description of a most ingenious system of governing. 1100 w. Elec Rev, Lond—Oct. 29, 1897.

**Water Wheels.**—See also **Electric; Hydraulic; HYDRO-ELECTRIC PLANT; TURBINE; WATER WHEEL—Governing.**

## GRADE CROSSING.

See also **INTERLOCKING; RAILWAY ACCIDENT; RAILWAY SIGNAL; TRACK DEPRESSION; TRACK ELEVATION.**

Grade Crossings. Augustus Mordecai. Brief discussion of the rights of parties interested and the justice each should be awarded. 2700 w. Jour Assn of Engng Socs—Dec., 1899.

**Alarms.**—Highway Crossing Alarms. J. S. Evans. Read at Detroit, before the Assn. of the Ry. Tel. Supts. Discusses automatic alarms, and the requirements for protection of crossings. 1200 w. R R Gaz—July 20, 1900.

Highway Grade Crossing Alarms. J. S. Evans. Read before the Assn. of R. R. Tel. Supts. Discusses the protection by automatic alarms, the reliability, cost, etc. 1200 w. Eng News—Aug. 30, 1900.

**Automatic Signaling and Stopping.**—Automatic Signaling and Stopping of Trains at Grade Crossings. Illustrated description of an interlocking plant with automatic signals, supplemented on one line by the Rowell-Potter safety stop for automatically applying the brakes should a train try to run past a signal. 1000 w. Engs News—Nov. 16, 1899.

**Automatic Signals.**—Why Automatic Road-Crossing Signaling Apparatus Fails. V. K. Spicer. Considers the various devices for protecting road crossings, and calls attention to the care and watchfulness necessary. 1000 w. Am Eng & R R Jour—Sept., 1897.

**Electric and Steam.**—Crossing Protection Between Electric and Steam Railways. Extract from advance sheet of report of the Railroad Commissioners of Massachusetts. A statement of dangerous conditions, with suggested remedies. 1000 w. Ry Rev—March 27, 1897.

Steam and Electric Railway Crossings. An editorial based upon the accident at Cohoes, N. Y., showing the importance of adequate mechanical protection, and suggesting an interlocking system, with derailing device for the electric line. 800 w. Ry & Eng Rev—Sept. 24, 1898.

**Electric Controller.**—Electric Controller for Grade Crossing Alarm Signals. Illustrated description of a new device. 500 w. Eng News—May 21, 1896.

**Electric Railways.**—The Protection of Grade Crossings. Concerning laws of various states, and the interlocking plants of numerous electric roads and their operation. Ill. 2400 w. St Ry Rev—April 15, 1898.

**Electric Signals.**—Electric Warning Signals for Unguarded Railway Crossings (Elektrische Warnungsläutewerke für Unbewachte Bahnüberwege). L. Kohlfürst. Describing and illustrating several systems for giving an audible warning signal at grade crossings when a train is approaching; avoiding the necessity for an attendant. 2500 w. Elektrotech Zeitschr—May 12, 1898.

**Europe and America.**—Railway Crossings in Europe and America. Franklin B. Locke. An interesting illustrated account of recent improvements and of the service in Europe and America, with comparisons and important information. 9000 w. Century Mag—May, 1898.

**Gates.**—Highway Crossing Gates. Report of the committee of the Assn. of Ry. Supts. of Bridgs. and Bldgs. The merits and disadvantages of the types in common use are discussed. 2000 w. Ry Age—Nov. 4, 1898.

Railway Crossing Gates with Pipe Connections. Illustrates and describes a gate operated by pipe connections and levers similar to those of an interlocking plant. 450 w. Eng News—Aug. 23, 1900.

**Illinois Law.**—Railroad Grade Crossings Under the Illinois Law. The practical working of various Illinois laws. 2500 w. R R Gaz—Jan. 10, 1895.

Statutory Regulation of Interlocking Signals for Railway Grade Crossings. Historical summary of the statutory regulation of grade crossings in Illinois from the various reports of the Railroad and Warehouse Commission of the State, and from the report of the present consulting engineer, Mr. Dwight C. Morgan, for the year 1895. 2800 w. Eng News—Feb. 6, 1896.

**Indiana Law.**—Indiana State Law Regulating the Interlocking of Railway Grade Crossings. Abstract of the main provisions of a law just passed. 1000 w. Eng News—April 29, 1897.

**Interlocking.**—Interlocking Protection for Grade Crossings. J. I. Vernon. Read before the Ry. Sig. Club. Illustrates and describes the general method in use at the present time, also a crossing protected by detector bars and signals. 1800 w. Ry & Engng Rev—May 5, 1900.

See also **INTERLOCKING.**

**Kingston, N. Y.**—Subway at Kingston, N. Y. Illustrated description of an interesting piece of construction work, by which a five-track grade crossing with a steam railroad is avoided. 1300 w. St Ry Jour—Dec., 1899.

**Newark, N. J.**—Plan for Removing Grade Crossings in Newark, N. J. A descriptive account, with plan and profile. 900 w. R R Gaz—May 29, 1896.

**Newton, Mass.**—Abolition of the Grade Crossings on the Main Line of the Boston and Albany Railroad in Newton, Mass. I. History of the improvement, and an account of the street and drainage work connected therewith. Irving T. Farnham. II. The depression of the railroad tracks. William Parker. III. Bridges over the railroad tracks. W. G. S. Chamberlin. Ill. 11800 w. Jour Assn of Engng Soc—Aug., 1896.

**Ohio Law.**—Ohio State Law Regulating the Interlocking of Railway Grade Crossings. Text of the bill just passed, with editorial. 900 w. Eng News—July 2, 1896.

**Protection.**—The Protection of Level Crossings. Notes on the minimising of danger when a railway crosses a road or footpath. Confined to the practice in England. 3500 w. Engng—Feb. 5, 1897.

**Syracuse, N. Y.**—Proposed Abolition of Grade Crossings at Syracuse. An abstract of the report of

Henry B. Seaman to the city government giving plans for a comprehensive treatment of the problem. 1600 w. R R Gaz—April 21, 1899.

**Train Signals.**—Signal Rules for Trains Approaching Crossings. A comparison of English and American practice, with exposition and discussion, especially of the English system. 2200 w. R R Gaz—Oct. 9, 1896.

### GRADUATION.

See **DIVIDING ENGINE; INDEX PLATE.**

### GRAFTING.

**Cast Iron.**—Cast Iron Grafting. W. L. Hayden. How wobblers may be grafted on to 8-in. rolls and be made to endure all the wear and strains required. Interesting and instructive description with illustrations. 500 w. Foundry—July, 1896.

### GRAIN ELEVATOR.

See also **MECHANICAL HANDLING.**

**Buffalo.**—The Great Northern Elevator. Albert Vickers. Illustrated description of a fine, large grain elevator in Buffalo, N. Y., operated by electric power. 2500 w. Elec Wld—Feb. 12, 1898.

The Great Northern Electric Grain Elevator at Buffalo, N. Y. O. E. Dunlap. Illustrated detailed description of one of the largest structures of its kind. 1500 w. Elec Eng, N. Y.—Jan. 27, 1898.

**Copenhagen.**—Grain Elevator and Warehouse at Copenhagen (Silo-und Bodenspeicher der Freihafen-Gesellschaft in Kopenhagen). Description of this important structure with elevation and section. 1200 w. Oesterr Monatschr f d Oeffent Baudienst —Oct., 1897.

Grain Elevator in Copenhagen. Translated from "Oesterreichische Monatsschrift für den Oeffentlichen Baudienst." Illustrated description. 1000 w. Sci Am Sup—Dec. 4, 1897.

**Fireproof.**—A Fireproof Grain Elevator. Description of an interesting structure in Buffalo, N. Y. Ill. 1800 w. Eng Rec—Nov. 27, 1897.

**Louisville, Ky.**—Large Grain Elevator, Louisville, Ky. Illustrates and describes a 400,000 bushel steel elevator. 800 w. Eng Rec—Dec. 17, 1898.

**Manchester Canal.**—American Grain Elevator on the Manchester Ship Canal. Illustrated detailed description of the construction of the buildings and their equipment. 3500 w. Engr, Lond—Oct. 7, 1898.

**New Orleans.**—Elevator System of the Illinois Central R. R. at New Orleans. Illustrates and describes the grain handling facilities, and the recent improvements. 1500 w. Ry & Engng Rev —July 23, 1898.

**Pneumatic.**—Pneumatic Grain Elevators (Ueber Pneumatische Getreideförderung). M. Buhle. An illustrated description of the Duckham pneumatic system of handling grain as installed in various ports in England and on the continent. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 20, 27, 1898.

See also **MECHANICAL HANDLING—Grain Suction Pipe.**

**Steel Tank.**—Steel Tank Grain Elevators "Electric" and "Fort William." Illustrates and describes the two most recent structures of this class, one at Buffalo, N. Y., the other at Fort William, Ont. 1200 w. Eng News—March 17, 1898.

The Steel Tank Grain Elevator "Great Northern" at Buffalo, N. Y. Illustrated description of the structural features, storage bins, operating machinery, etc. 3800 w. Eng News—April 7, 1898.

### GRAIN HANDLING.

See also **MECHANICAL HANDLING.**

**New York Harbor.**—Handling the Grain Crop at the Port of New York. Interesting description of the facilities for transporting and handling the immense grain crops of the western states. Ill. 2800 w. Sci Am—Nov. 20, 1897.

### GRAIN TRAFFIC.

**Gulf Ports.**—Grain Going to Gulf Ports. Reviews the complaint of New York interests that this is due to enforcement of the Joint Traffic Association rates. The opinion is hazarded that some of the changes in currents of traffic are more likely to be permanent than in former years. 900 w. Bradstreet's—Feb. 29, 1896.

### GRAMOPHONE.

**Technical Notes.**—Technical Notes on the Gramophone. Emile Berliner. This paper is an elaboration of the system of gramophony, as described by Mr. Berliner, in a previous paper read by him before the Franklin Institute, and published in the "Journal." It is illustrated by diagrams. 5000 w. Jour Fr Inst—Dec., 1895.

See also **GRAPHOPHONE; PHONOGRAPH.**

### GRAND STAND.

**Steel, Yonkers.**—A Large Steel Grand Stand. Illustrated description of a structure at Yonkers, N. Y., which is 400 ft. long, 62 ft. wide, and seats 7700 spectators. The structural details of the column and roof connections, and other special features, are explained in detail. 1900 w. Eng Rec—Feb. 10, 1900.

### GRANITE.

See also **BUILDING MATERIAL; QUARRY; STONE.**

Granite and Granite Quarrying. F. T. Mallon. Concerning the selection of a site and related matters affecting success. 3300 w. Stone—June, 1900.

**Barre Quarries.**—Barre, Vermont, Granite Quarries. From the Burlington, Vt., "Free Press." Interesting account of the granite industry and the social conditions affecting it. 3300 w. Stone —Nov., 1896.

**England.**—The West of England Granite Country. Arthur Lee. Illustrated description of these quarries and their beautiful surroundings. Serial. Stone—Jan., 1897.

**Georgia Quarries.**—The Granite Quarries of Stone Mountain, Georgia. Illustrated description. The mountain is a solid mass of granite rising to 700 feet above the level of the plain. Quarrying is done by blasting and breaking to size by the plug and feather method. 600 w. Eng News—Nov 21, 1895.

**Maryland.**—Central Maryland Granites. Charles Rollin Keyes. Condensed from the fifteenth annual report U. S. Geological Survey. Some of the problems encountered in the study of these rocks, their classification, types and components. Ill. Serial. Stone—Oct., 1896.

**Missouri.**—Missouri Granites. Charles R. Keyes. Abstract of article in "Stone." Describes the occurrence, varieties and characteristics. 3300 w. Eng & Min Jour—Aug. 29, 1896.

**Sweden and Norway.**—The Granites of Sweden. From "The Stonemason." Information concerning the granite of Norway and Sweden. 800 w. Stone—June, 1900.

**Tests.**—Experimental Investigations Upon Granite (Untersuchungen von Granit). C. Bach. A most valuable series of experiments upon the strength and elasticity of granite, with tabulated and graphical records; also an extension of the principles developed to other materials of construction. 10000 w. Zeitschr d Ver Deutscher Ing—Feb. 27, 1897.

### GRAPHICS.

Graphical Methods for the Reduction of Experimental Observations. W. F. Durand. Brief discussion of some of the ways in which results may be treated, calling attention to the methods most readily applicable. 1800 w. Sib Jour of Engng—Nov., 1898.

Graphical Solutions of Certain Problems in Engineering. F. H. Hummel. Abstract of a paper read at the meeting of the Soc. of Civ. and Mech. Engs. Deals with problems where the reasoning may be assisted and the results obtained by graphic constructions. 2200 w. Prac Engr—April 20, 1900.

**Bridge Design.**—See **BRIDGE DESIGN.**

**Diagrams.**—Graphic Diagrams and Glyptic Models. R. H. Thurston. Discussing the value of graphic and glyptic methods, giving examples for illustration, showing how readily they permit the solution of important problems and other results of the applications of this system. Ill. 1000 w. Am Soc of Mech Engs, No. 777—June, 1898.

**Electric.**—See **ELECTRIC GRAPHICS.**

**Experimental Science.**—The Use of the Graphical Method of Experimental Science (La Methode Graphique et les Sciences Expérimentales). Portion of an address by M. Marey upon the value of mechanically recording devices in experimental investigations. 1500 w. Le Génie Moderne—Sept. 15, 1897.

**Framework.**—See **FRAMEWORK—Graphic Methods.**

**Hydraulics.**—See **HYDRAULICS—Graphics.**

**Tri-Axial Diagram.**—Note on the Use of the Tri-Axial Diagram and Triangular Pyramid for Graphical Illustration. Henry M. Howe. Calls attention to the tri-axial diagram as a convenient means of illustrating the properties of slags, and commends it to those inclined to graphical studies, having other possible applications. 2200 w. Am Inst of Min Engs—Oct., 1898.

### GRAPHITE.

See also **CARBON; PLUMBAGO.**

Graphite: Its Formation and Manufacture. E. G. Acheson. Gives the early history, distribution, uses, manufacture, theory of formation, etc. 4500 w. Jour Fr Inst—June, 1899.

Graphite. J. Ohly. A description of its occurrence and properties. Serial. Min Rept—Nov. 2, 1899.

The Occurrence, Treatment and Application of Graphite. W. F. Downs. Part first is introductory to a series of articles which will treat of the occurrence, gradation, preparation and application. Serial. Ir Age—April 19, 1900.

**Bavaria.**—The Graphite Deposits of Passau (Ueber die Graphitlagerstätten der Umgebung von Passau). E. Weinschenk. An illustrated account of the important Bavarian graphite deposits near Passau and Silberberg. 2000 w. 1 plate. Glückauf—Nov. 5, 1898.

**Cranston, R. I.**—A Graphite Mine. R. H. Palmer. Describes the deposit in the town of Cranston, R. I., and its working. 900 w. Eng & Min Jour—Dec. 9, 1899.

**Electric Furnace.**—Graphite from the Electric Furnace. Investigations of E. G. Acheson of the conditions under which graphite is formed in the carborundum furnace. Diagram is given with explanation. 1200 w. Elec Eng—Oct. 14, 1896.

**Lubrication.**—Graphite and Its Application as a Lubricating Material (Graflt und seine Verwendung als Schmiermittel). F. Wagner. A paper giving data concerning the use of graphite in steam cylinders and valve chests of steam engines, showing its value for lubrication. 2500 w. Zeitschr d Ver Deutscher Ing—Sept. 2, 1899.

**Siberia.**—Graphite in Siberia. R. Helmbacker. Information of the discovery and working of these valuable deposits of graphite, which rank among the richest and most promising in the world. 1500 w. Eng & Min Jour—Dec. 25, 1897.

### GRAPHOPHONE.

The Graphophone Grand. Report of committee of the Franklin Inst. on the invention of Thos. H. Macdonald, and embracing a general history of sound-recording and reproducing devices, with a supplement by Philip Mauro. Ill. 6900 w. Jour Fr Inst—July, 1900.

See also **GRAMOPHONE; PHONOGRAPH.**

### GRAPNELS.

**Submarine Cable.**—Submarine Cable Grapnels. Charles Bright. A statement of the requirements, with illustrated description of a grapnel apparatus. Serial. Engng—Nov. 4, 1898.

See also **CABLE SHIP; SUBMARINE CABLE LAYING.**

### GRATE.

See also **BOILER; COMBUSTION; FIRING; FURNACE; MECHANICAL STOKING.**

**Air Space.**—The Relation of Air Space in Grates to Boiler Economy. Editorial discussion of influence of variations in air space as shown by tests. 800 w. Eng Rec—July 30, 1898.

**Coke.**—The Incandescent Fire Frame. How to Burn Coke. Describes the "incandescent fire frame," whereby it is claimed much more satisfactory results are obtained than by the more ordinary grates, etc. 800 w. Am Gas Lgt Jour—Feb. 3, 1896.

**Domestic.**—The Incandescent Fire-Mantel. T. E. Pye. Read before the Midland Assn. of Gas Managers, Eng. Describes an appliance designed to facilitate the combustion of non-bituminous fuel in the ordinary domestic fire grate. It claims to give a smokeless fire at about half the expense usual, and while it can be used with all fuel, it is especially adapted to gas works coke. Also discussion. 2800 w. Jour of Gas Lgt—Nov. 3, 1896.

**Efficiency.**—Efficiency of the Boiler Grate. William Wallace Christie. Data collected from 108 boiler tests, paying particular attention to the pounds of coal burned per square foot of grate. 1200 w. Am Soc of Mech Engs—Dec., 1896.

**English.**—English Fire Grates. Frederick Dye. Information upon the English methods of construction. Ill. Serial. Heat & Ven—June 15, 1898.

**Kudlicz.**—See **GAS ENGINEER—French Convention.**

**Locomotive.**—See **LOCOMOTIVE GRATE.**

### GRAVING DOCK.

See **DRY DOCK.**

### GREAT BRITAIN.

See also **ENGLAND; UNITED KINGDOM.**

### GREAT LAKES.

See also **CANAL—Great Lakes-Atlantic; WATERWAY.**

On the Great Lakes. F. W. Fitzpatrick. Illustrated presentation of the magnitude of the Great Lakes and their commerce. 3700 w. Cos—May, 1898.

Reservoir System of the Great Lakes of the St. Lawrence Basin. Hiram M. Chittenden. Its relation to the problem of improving the navigation of these bodies of water and of their connecting channels. With a mathematical analysis of the influence of reservoirs on stream flow, by James A. Seddon. Diagrams. 17500 w. Pro Am Soc of Civ Engs—June, 1898.

The Great Lakes and the Modern Navy. J. H. Gibbons. Shows that the development of the iron and steel industry of this region of the United States has an important effect on shipbuilding; discusses the projects to connect the lakes with sea by improvements in canals, and the result this would have on our merchant marine, etc. 4000 w. N Am Rev—April, 1898.

**Engineering Works.**—Engineering as Exhibited on the Great Lakes. John Birkinbine. General review of engineering progress in all departments in the lake region. Serial. Jour Fr Inst—June, 1896.

Notable Engineering Achievements in the Great Lake Region. John Birkinbine. Among other notable features described are the 800 by 100 ft. Sault Ste. Marie Lock, the ore docks, the Chicago drainage canal, and the 3000-ft. Marquette Breakwater. 5000 w. Pro of Eng's Club of Phila—Jan., 1896.

The Great Lakes. John Birkinbine. An account of the magnitude and diversity of the engineering work in this region. 5400 w. Jour of Worcester Poly Inst—Nov., 1899.

How the Great Lakes Were Built. J. W. Spencer. A geological study. 4800 w. Pop Sci M—June, 1896.

**Geology and Hydrology.**—Notes about the Geology and Hydrology of the Great Lakes. P. Vedel. A summary of what is known of the nature and origin of the great American Lakes, with geological and hydrographical maps and charts. 11000 w. Jour of West Soc Engs—June, 1896.

**Levels.**—Lake Levels—Proposed Dam in the Niagara. George G. Wisner. Discusses the advantage and the methods. 3400 w. Marine Rev—Oct. 19, 1899.

Proposed Plans for Regulating Works for Controlling the Level of Lake Erie. An illustrated description of the proposed design for the regulating works, with editorial discussion of the effect upon the levels of the St. Lawrence River. 4200 w. Eng News—March 22, 1900.

Report of the Deep Waterways Board on the Regulation of the Great Lakes. An abstract of the conclusions of the Board of Engineers appointed by Congress, as given in the preliminary report. Also editorial comment on this stupendous project for improving lake navigation. 4200 w. Eng News—Jan. 4, 1900.

The Changes of the Great Lake Levels. From "Chicago Inter-Ocean." Comments on the changes in level and the effect of the drainage canal on Lake Michigan. 1400 w. Am Archt—Aug. 4, 1900.

The Control of the Levels of the Great Lakes. W. A. Jones. Showing that it is possible, by a system of dams at the outlets of the Great Lakes, to maintain their surfaces at a constant level, and thereby facilitate navigation and commerce. 2900 w. Eng Mag—May, 1897.

The Lake Erie Regulating Weir. A description of the barrage which it is proposed to build across the foot of Lake Erie to maintain a fairly uniform depth of water in the Great Lakes. 1200 w. Eng Rec—Jan. 6, 1900.

**Shipbuilding.**—See **SHIPBUILDING—Great Lakes.**

**Shipping.**—Wonders of Lake Shipping. Remarks on the enormous traffic of the Sault canal, the big vessels and despatch in loading. 1200 w. Bos Jour of Com—June 19, 1897.

**Transportation.**—Commerce of the Great Lakes. The development of trade on the great American lakes, the works of improvement in facilities for travel, and the immense traffic. 1800 w. Sci Am—Feb. 19, 1898.

Statistics of Commerce on the Great Lakes. Statements from an interesting report issued by the Bureau of Statistics of the U. S. Treasury Dept. upon the growth of the traffic, and the reasons for it. 2800 w. Eng New—Aug. 11, 1898.

The Carrying Trade of the Great Lakes. Allan Hendricks. Considers the great importance of the commerce of these lakes, the modern type of freight carriers, the projects for enabling the lake steamers to reach the ocean, passenger boats and other craft, and related matters of interest. 4400 w. N Am Rev—June, 1898.

The Commerce of the American Great Lakes. Charles E. Wheeler. Read at New York meeting of the Society of Naval Architects and Marine Engineers. The effects of cheap transportation by water and its future possibilities. 2800 w. Ir Age—Nov. 18, 1897.

The Great Lakes and Our Commercial Supremacy. John Foord. An interesting account of the improvements that have made the transportation of ore through the Great Lakes so cheap as to make the primacy of the United States in the production of iron and steel secure, and the increase in trade due to the development of the trade of Lake Superior. 4500 w. N Am Rev—Aug., 1898.

See also **DOCK; HARBOR—Great Lakes; IRON ORE; IRON ORE HANDLING; IRON ORE TRANSPORTATION.**

**GREENHOUSE.**

**Auteuil, Paris.**—The New Horticultural Garden of the City of Paris (Le Nouveau Jardin Fleuriste de la Ville de Paris). M. Seruat. A general view of the grounds at Auteuil, with details of the structural work of the conservatory buildings and of the heating apparatus. 2500 w. 1 plate. Génie Civil—Aug. 13, 1898.

**Construction.**—Building a Glass-House. On the construction of greenhouses of various kinds, and the points to be especially considered. Ill. 2000 w. Car & Build—Feb. 3, 1899.

Building a Greenhouse. Discusses their need of paint, material for roofs, the roof plate, and the ridge pole. 1800 w. Ill Car & Build—July 24, 1896.

**Heating.**—See **HEATING—Greenhouse.**

**GRINDER.**

**Drill.**—A Constantly Adjusted Twist Drill Grinder. Illustrated detailed description. 700 w. Am Mach—March 1, 1900.

A New Drill Grinder. Illustrated description of an improved machine invented by O. S. Walker. 1800 w. Am Mach—Oct. 28, 1897.

**Wax Holder.**—Wax for Holding Work on Grinder—A Milling Machine Difficulty. Theo. This paper illustrates and describes some very useful shop "wrinkles." 700 w. Am Mach—April 30, 1896.

**GRINDING.**

**Bicycle Cup and Cone.**—Bicycle Cup and Cone Grinding Machines. Illustrates and describes some novel machines recently developed by the Pratt & Whitney Co., of Hartford, Conn. 1600 w. Am Mach—Jan. 12, 1899.

**Cards.**—See **CARDING MACHINERY—Grinding.**

**Fixture.**—See **Profile Cutter.**

**Machine.**—Machine Grinding. C. H. Norton. The article is written to help clear away misunderstandings, and open the way to the more profitable use of grinding. Part first gives suggestions for using the grinding machine successfully. Serial. Am Mach—May 6, 1897.

Machine Grinding. C. H. Norton. The care needed in the handling of these machines. 1600 w. Am Mach—March 10, 1898.

The Use of the Grinding Machine. John Randol. Some ideas and occurrences from the writer's observation and experience, and also information from the Brown & Sharpe Mfg. Co. Ill. 4000 w. Am Mach—Feb. 25, 1897.

See also **MACHINE TOOL.**

**Profile Cutters.**—A Fixture for Grinding Profile Cutters. A. L. de Leeuw. Illustrated description. 1200 w. Am Mach—May 21, 1896.

Fixture for Grinding Profile Cutters and Laying-Off Cams. A. L. de Leeuw. Description with sketch illustrating the principle of the device. 7000 w. Am Mach—Dec. 29, 1898.

**Schweitzer Mill.**—See **MILL—Schweitzer.**

**Tool.**—Systematic Tool-Grinding. Illustrated description of method observed in a shop in Leipsig, Germany. 1000 w. Am Mach—Oct. 28, 1897.

**GRINDSTONE.**

**Experiments.**—Experiments Upon the Strength of Grindstones (Versuche über die Festigkeit von Schleifsteinen). M. Grübler. Especially investigating the resistance of grindstones and emery wheels to the stresses due to centrifugal force, with description of the apparatus and results of tests. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 21, 1899.

**Strains.**—The Strains in Grindstones and Emery Wheels (Der Spannungszustand in Schleifsteinen und Schmirgelscheiben). A mathematical discussion of the conditions in rapidly revolving grinding wheels by Prof. Grübler of Charlottenburg, as a result of investigations into a recent disaster at Spandau. 4500 w. Zeitschr d Ver Deutscher Ing—July 24, 1897.

**GROINED ARCH.**

Diagram for Determining the Volume of Semi-Elliptical Groined Arch Vaulting. John H. Gregory. Gives a diagram for simplifying the mathematical work, with explanation. 350 w. Eng News—Aug. 23, 1900.

**Reservoir.**—The Groined Arch as a Covering for Reservoirs and Sand Filters: Its Strength and Volume. Leonard Metcalf. The formulas given were deduced in connection with work at Somersworth, N. H. A sketch of the development of the groined arch is also given and a description of a method for comparing the strength. Ill. 6500 w. Pro Am Soc of Civ Engs—May, 1899.

The Groined Arch as a Covering for Reservoirs and Sand Filters: Its Strength and Volume. Discussion of paper by Leonard W. Metcalf. 600 w. Pro Am Soc of Civ Engs—Sept., 1899.

The Groined Arch as a Covering for Reservoirs and Sand Filters: Its Strength and Volume. Continued discussion of paper by Leonard Metcalf. 2000 w. Pro Am Soc of Civ Engs—Oct., 1899.

The Groined Arch as a Covering for Reservoirs and Sand Filters: Its Strength and Volume. Continued discussion of paper by Leonard Metcalf. 800 w. Pro Am Soc of Civ Engs—Jan., 1900.

**Steel-Concrete.**—Groined Steel Roof Arches. Illustrated description of gothic arches made of steel shapes bent by special machines, which are explained, and covered with concrete to give the effect of solid masonry. 600 w. Eng Rec—July 8, 1899.

**GROUND WATER.**

See also **ARTESIAN WELL; WATER SUPPLY; WELL.**

Principles and Conditions of the Movements of Ground Water. Extract from 19th Annual Report of the U. S. Geol. Surv. Investigations made by F. H. King and C. S. Slichter. 2800 w. Eng News—Dec. 28, 1899.

The Collection of Ground Water (Ueber Grundwasserfassungen). An investigation of the conditions which govern the accumulation of ground water and the formation of subterranean streams and pools, with special view to the use of such sources of water supply. 6000 w. Gesundheits Ingenieur—Oct. 31, 1897.

The Investigation of Subterranean Water Sources (Recherche des Eaux Souterraines). Discussing the geological conditions which govern the flow of waters within the earth and of the external indications by means of which they may be discovered. Serial. La Rev Tech—Jan. 25, 1898.

**Bacteria.**—On the Bacterial Contents of Certain Ground Waters Including Deep Wells, Boston. W. T. Sedgwick. Describes experimental investigations of numerous springs, wells and deep wells, with reference to their containing germs of bacteria. Results show the water from wells and springs may contain more bacteria than water from lakes. 2200 w. San Rec—Jan. 17, 1896.

**Beaver Falls, Pa.**—Test of Water-Bearing Gravel at Beaver Falls, Pa. Illustrated description of an interesting experimental investigation. 2400 w. Eng News—Aug. 20, 1896.

**English Law.**—The Law in Regard to Underground Water. J. Shiress Will. Read at meeting of the Surveyors' Inst., London. Reviews the English law with regard to the ownership of underground water, discussing cases, and among them the Jordeson Gasholder Case. 10500 w. Jour Gas Lgt—March 20, 1900.

The Law Relating to Underground Water. Lecture by Robert Cecil. Explains the historical development of the English law relating to percolating water. 6000 w. Jour Gas Lgt—Nov. 7, 1899.

Underground Water. An interesting case recently decided in the Court of Appeal, England. 2500 w. Col Guard—May 26, 1899.

**Level.**—The Level of Ground Water in Wells Grundwasserspiegel bei Brunnenanlagen. Dr. P. Forchheimer. An examination of the effect of wells upon the level of subterranean water strata, especially in connection with the use of wells for extensive water supply. 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 25, 1899.

The Level of Ground Water Supply (Grundwasserspiegel bei Brunnenanlagen). Dr. P. Forchheimer. An elaborate mathematical discussion of the variations in the level of ground water, when the source is drawn from wells for water supply. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 4, 11, 1898.

**Movements.**—Movements of Ground Water. Benjamin Smith Lyman. Reviews the reports of F. H. King and C. S. Slichter, as given in Part II. of the nineteenth annual report of the U. S. Geol. Survey. 6000 w. Jour Fr Inst—Oct., 1900.

**Munich, Germany.**—See **WATER WORKS—Munich, Germany.**

**New York.**—The Ownership of Underground Water in New York. Gives the legal views held by the New York courts on the ownership of ground water, and explains the reason for giving an injunction to a farmer to restrain pumping such a supply for municipal use, when refusing an injunction to a rival water works for the same purpose. 800 w. Eng Rec—April 15, 1899.

**Reservoir.**—See **RESERVOIR—Ground Water.**

**Sanitation.**—The Influence of Subsoil Water on Health. S. Monckton Copeman. Brief running review of the various theories, facts and fancies, which have been advanced by observers, and pointing out things that have not yet received merited attention, or concerning which no satisfactory conclusions have yet been reached. 1500 w. San Rec—Feb. 21, 1896.

**South Atlantic Piedmont Plateau.**—Notes on the Underground Supplies of Potable Waters in the South Atlantic Piedmont Plateau. J. A. Holmes. The topic of the relative purity of surface water and that from deep wells is first discussed and the limited availability of deep artesian wells is then presented, and the tube well system is commended as adapted to the plateau in question. 2800 w. Trans Am Inst of Min Engs—Feb., 1896.

**Temperature and Flow.**—Influence of Rain and Air-Temperature upon the Temperature and Flow of Ground Water (Abflussmengen und Temperaturschwankungen des Grundwassers in ihren Beziehungen zur Regenhöhe und Lufttemperatur). Adolph Friedrich. Tabulated deductions, with diagrams, from data obtained from many observations in Austria. 3000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—April, 1899.

**Tropics.**—The Danger of Ground Water Supplies in the Tropics. Eug. Ackermann. A letter from the chief sanitary engineer of Para on the well water of Brazil and its pollution. 800 w. Eng Rec—March 3, 1900.

**U. S. Western.**—The Flow of Ground Water. A statement of the sub-surface flow of water in the semi-arid regions. 700 w. Eng Rec—Dec. 24, 1898.

**Utah Law.**—The Ownership of Underground Water. Reviews a decision of the Utah Supreme Court, on the law of underground water. 1200 w. Eng Rec—Oct. 22, 1898.

**GROYNE.**

See **SHORE PROTECTION.**

**GUARD WIRE.**

See **ELECTRIC TRAMWAY—Overhead Construction.**

**GUIDES.**

**Lining.**—Lining Guides. Ira A. Moore. Describes how the work should be done. Ill. 1600 w. Loc Engng—Aug., 1898.

**GUN.**

See also **ARMAMENT; ARMOR PLATE; ARTILLERY; BALLISTICS; GUN CARRIAGE; RIFLE; WAR—Spanish-American.**

**Automatic.**—Automatic Firing Guns. Hiram Stevens Maxim. The first part is devoted entirely to the history of revolving fire arms. Serial. Ind & Ir—March 20, 1896.

Vickers' Automatic 14-Pounder Gun. Illustrated description of a gun built for the United States Government. 1100 w. Engng—Feb. 9, 1900.

**Automatic Sight.**—An Automatic Sight with a Maximum and Minimum Height Cam. H. C. Dunlop. Gives directions for cutting a cam that shall give the proper angles of elevation to the gun at all heigths of tide. Ill. 1000 w. Jour U S Art—July-Aug., 1899.

**Automatic Sighting.**—Automatic Sighting. H. S. S. Watkin. Reprinted from Pro. Royal Art. Inst. Discusses the theory and practice. Ill. 2400 w. Jour U S Art—1899.

**Bore Erosion.**—The Erosion of the Bore of Artillery (L'Erosion de l'Interieur des Canons). A discussion of the probable causes of bore-erosion, taking into account the physical constitution of the steel as revealed by metallography. 1200 w. Rev Tech—April 10, 1899.

**Breech Mechanism.**—Automatic Breech Mechanism for Quick-Firing Guns. Illustrated detailed description of a very ingenious device. 1400 w. Engng—May 1, 1896.

**Breech Mechanism, Canet.**—Schneider-Canet Quick-Firing Breech Mechanism. Illustrated description of the 15 cm. (5.9 in.) breech gear. 1200 w. Engr, Lond—Feb. 11, 1898.

**Breech Mechanism, Dashiell.**—The Dashiell Breech Mechanism. An illustrated description of this mechanism as applied to a 4-inch breech-loading rifle. 900 w. Sci Am—April 30, 1898.

**Breech Mechanism, Krupp.**—Krupp Breech Blocks (Kruppsche Geschützverschlüsse). J. Castner. An illustrated description of various kinds of breech mechanism. Serial. 2 parts. 8000 w. Stahl und Eisen—June 1, 15, 1900.

**British.**—Our Guns and Their Uses in War. A discussion of British guns and their fittings. 3000 w. Engr, Lond—Feb. 2, 1900.

**Brown Segmental.**—The Brown Segmental Tube Wire Gun. Edward A. Gage. Briefly reviews the history of wire-bound guns, and describes the invention of J. H. Brown, and its construction. 4000 w. Jour Worcester Poly Inst—July, 1899.

See also **Wire.**

**Carriage.**—See **ARTILLERY; GUN CARRIAGE.**

**Dismountable, Congo.**—The Dismountable Gun of the State of Congo. Illustrates and describes a gun made dismountable, that it may be easily carried by men or animals. 800 w. Sci Am Sup—June 9, 1900.

**1898.**—See **WARSHIP.**

**Explosion.**—See **GUN EXPLOSION.**

**Explosives Action.**—On the Action of the Projectile and of the Explosives on the Tubes of Steel Guns. W. C. Roberts-Austen. Read before the Iron and Steel Inst., at Stockholm. A thorough examination shows that the action of the explosive upon the mass of the tube is purely mechanical, but at the extreme edge there is an altered layer. 1200 w. Ir & St Trds Jour—Sept. 17, 1898.

**Factory.**—See **GUN MANUFACTURE.**

**Gatling 8-Inch.**—The Test of the Gatling Cast Steel 8-Inch Gun. Report of Dr. John N. Stockwell of an investigation of the effects of cooling on the strains of the different parts of the gun. 1400 w. Sci Am Sup—Jan. 21, 1899.

**Heavy.**—Evolution of the Modern Heavy Gun. W. LeConte Stevens. Historical review of the progress in the construction of materials used in warfare; confined principally to the evolution of the cannon. Ill. 5800 w. Pop Sci M—June, 1877.

Heavy Ordnance. Osborne Atwater Day. Reviews the progress made, especially since the Civil War. 1800 w. Yale Sci M—March, 1898.

**High-Angle.**—Our Own Latest Marvel at Gunnery. Relates to the new "high-angle firing" weapon soon to be introduced into the American navy. It is capable of being elevated so as to stand almost vertical with the deck, if necessary. 1100 w. Engng Mech—Oct., 1898.

**Hydraulic Brake.**—The Design of Hydraulic Brakes (Sur le Tracé des Freins Hydrauliques). M. Vallier. A discussion of the proper proportions of hydraulic buffing cylinders for the absorption of the recoil force of artillery. 1800 w. Comptes Rendus—Nov. 6, 1899.

**Iron.**—See **IRON—Gun.**

**Large Calibre.**—Cannon of Large Calibre (Canons de Gros Calibre). A discussion of the value of guns of various calibre as shown in the recent Spanish-American naval engagement at Manila. 1800 w. Le Rev Tech—June 10, 1898.

**"Long Cecil," Kimberley.**—Notes on the Construction of "Long Cecil," a 4.1-Inch Rifled Breech-loading Gun, in Kimberley During the Siege 1899-1900. Edward Goffe. Describes the construction. 4 plates. 5500 w. Inst of Mech Engs—1900.

**Machine.**—Machine Guns of Calibre. An explanation and discussion of armaments used in the South African war. 2300 w. Engr, Lond—May 11, 1900.

**Manufacture.**—See **GUN MANUFACTURE.**

**Maxim.**—The Maxim Gun. It is proposed to give a somewhat full description of the gun as it now exists. Part first considers the origin of the gun and some of the steps by which it has been brought to its present development. Ill. Serial. Engng—Feb. 11, 1898.

The Tactical Applicability of the Maxim Machine Gun. A. v. Boguslawski, in "Kriegstechnische Zeitschrift." Concludes the guns adapted to the uses of cavalry but of doubtful effect when employed by infantry. 2500 w. Sci Am Sup—Jan. 14, 1899.

See also **Vickers-Maxim; AERONAUTICS.**

**Naval.**—Rifled Naval Artillery. Andrew Noble. Abstract of a paper read at meeting of the Inst. of Naval Archts., England. Reviews progress since 1850 in the armament of battleships. 2700 w. Ind & Ir—July 21, 1899.

See also **U. S. Naval.**

**Rapid-Fire.**—Guns of Position and Siege Guns for the War. Illustrated description of two 4.7-in. quick-firing guns, and remarks on the conditions in South Africa. 1000 w. Engr, Lond—Jan. 5, 1900.

The Rapid-Fire Guns of the "New Orleans." Illustrated description of the guns and their operation. 1500 w. Sci Am—May 21, 1898.

**Siege.**—Siege Guns at the Washington Arsenal. Illustrations of two types of siege guns, with particulars. 800 w. Sci Am—Jan. 21, 1898.

**Sims-Dudley Pneumatic.**—The Sims-Dudley Powder Pneumatic Gun. Illustrated description of a gun, known as a dynamite gun, though really charged with Nobel's gelatine. 1000 w. Am Mach—July 28, 1898.

**Sixteen-Inch.**—The New Army 16-Inch Gun. An illustrated account of this great cannon and its manufacture at Watervliet Arsenal, New York. 1800 w. Sci Am—Sept. 29, 1900.

**Thirteen-Inch.**—Our New Thirteen-Inch Guns. Illustrates and describes this gun, twenty-eight being in use in the U. S. navy. 1200 w. Sci Am—June 11, 1898.

Working a Big Gun. Brief account of how the 13-inch destroyer is operated in a battle. 600 w. Bos Jour of Com—July 2, 1898.

**U. S. Coast-Defence.**—A Great Coast-Defence Gun. G. L. Carden. Illustrated account of the largest gun ever constructed in the United States, now being made at the Bethlehem Iron Works. 3000 w. Harper's Wk—Dec. 11, 1897.

**U. S. Naval.**—American Naval Ordnance and Armor in the Late War. The report of Capt. Charles O'Neill shows the number of vessels supplied with munitions of war, and that most of the material came from the United States. Other related matters are noted. 900 w. Eng News—Nov. 10, 1898.

Forthcoming Improvements in United States Naval Ordnance. G. L. Carden. Discusses changes to be made in guns and mounts and in the make up of the ships' batteries. 2000 w. Sci Am—Dec. 17, 1898.

Naval Ordnance. Extract of the more important features of the annual report of the Bureau of Naval Ordnance of the United States, dealing with guns and mounts, small guns, efficiency, smokeless powder, and armor. 2400 w. Ir Age—Oct. 27, 1898.

The Armament of Our Latest Warships. Illustrations showing the remarkable changes in navy guns during the last fifteen years, with a table showing the ballistics of the 1899 model. 1700 w. Sci Am—Jan. 20, 1900.

The Guns of Our Navy. Henry Hess. Information of interest. 800 w. Mach, N. Y.—Aug., 1898.

See also **BATTLESHIP—"Georgia" Class.**

**Vickers' at Paris.**—Vickers' Ordnance at the Paris Exposition. Illustrated description of the fine exhibit of modern ordnance. 2500 w. Engng—June 8, 1900.

**Vickers-Maxim.**—The New High Powered Guns of the Vickers, Sons & Maxim Company. An illustrated description of the gun, giving an explanation of the device for preventing erosion and stating the advantages of the new mechanism. 1800 w. Sci Am—Nov. 5, 1898.

Vickers' Guns. Illustrated description of the breech mechanism of guns manufactured by Messrs. Vickers, Sons & Maxim, Limited, England. 2500 w. Engng—May 20, 1898.

**Wire.**—New Type Wire Guns. Part first gives illustrated description of the service wire guns as given by the Royal Gun Factory. Serial. Engr, Lond—Feb. 24, 1899.

The Construction of Modern Wire-Wound Ordnance. Part first describes the preparation of the wire used. Serial. Engr, Lond—Jan. 7, 1898.

See also **Brown Segmental.**

**GUNBOAT.**

See also **WARSHIP.**

**"Annapolis" Trial.**—The Contract Trial of the U. S. Gunboat "Annapolis." C. H. Mathews. Illustrated detailed description with data of trial. 2500 w. Jour Am Soc of Nav Engs—Aug., 1897.

The Official Trial Trip of the U. S. Gunboat "Annapolis." This is the first U. S. Government vessel of large size to be fitted with boilers of the water-tube type exclusively. Description and dimensions, with brief report of trial. 500 w. Eng News—May 13, 1897.

**"Dwarf" and "Thistle."**—New British Gunboats "Dwarf" and "Thistle." Describes boats of an interesting type, designed with special reference to the requirements on river service in distant British possessions. 1000 w. Engng—Oct. 28, 1898.

**Egypt.**—A River Gunboat. Illustrated description of the "Melik," a twin-screw, shallow-draught gunboat built for the Egyptian government. 1500 w. Engng—Oct. 22, 1897.

Gunboats and Railways in the Soudan Campaign. Illustrates and describes these gunboats and the method of conveying them by rail around impassable rapids. 1200 w. Sci Am—Jan. 14, 1899.

Light-Draught Gunboats for the Nile Expedition. Description with illustrations of one of the new boats built in England for service above the cataracts. 1500 w. Sci Am—Nov. 20, 1897.

Light-Draught Gunboat. Illustrated description of one of the gunboats built for the Egyptian Government. 1900 w. Engng—Oct. 8, 1897.

**"Helena" and "Wilmington" Trials.**—The Contract Trials of the U. S. Gunboats "Helena" and "Wilmington." W. S. Smith. Detailed descriptions with account of trials, giving data. Ill. 4000 w. Jour Am Soc of Nav Engs—May, 1897.

**Light-Draught.**—See **Egypt; "Helena"; "Nashville"; United States.**

**"Nashville" Trial.**—Contract Trial of the U. S. S. "Nashville." W. Strother Smith and C. B. Price. Illustrated description of vessel, furnishings and equipment, with data of trial. 4300 w. Jour Am Soc of Nav Engs—Aug., 1897.

**Soudan Campaign.**—See **Egypt.**

**United States.**—Light-Draught Gunboats for the United States Navy. Description of the "Nashville," "Wilmington" and "Helena" as representing a class intended for special duty in shallow bays and rivers. Ill. 2500 w. Engr, Lond—Dec. 3, 1897.

**U. S. Composite.**—Construction of the New U. S. Composite Gunboats with a Comparison of Their Performances. Illustrations, dimensions, particulars, and trials. 1500 w. Marine Engng—Nov., 1898.

**"Vicksburg" and Newport" Trials.**—The Contract Trials of the U. S. Gunboats "Vicksburg" and "Newport." H. N. Stevenson. Description, with principal dimensions of engine and account of trials. Ill. 2500 w. Jour Am Soc of Nav Engs—Aug., 1897.

**"Wheeling" and "Marietta" Trials.**—The Contract Trials of the U. S. Gunboats "Wheeling" and "Marietta." F. C. Bieg. Dimensions with description of vessels and equipment, and report of trials. Ill. 8000 w. Jour Am Soc of Nav Engs—Nov., 1897.

### GUN CARRIAGE.

See also **ARTILLERY.**

**Disappearing.**—See **ARTILLERY; MACHINE WORK—War Material.**

**German.**—The 15 Cm. Marine Carriage and the Krupp Tilting Carriage (Die 15 Cm. Schiffslaffeten und die Kruppsche Wiegenlaffete). J. Castner. Illustrated description of recent German gun carriages, with especial reference to wide range of movement, and recoil bearings for rapid-fire. 3000 w. Stahl und Eisen—Nov. 1, 1899.

**Howell Disappearing.**—The Howell Disappearing Carriage. Illustrated detailed description of the machine and its operation, giving brief report of tests. 800 w. Sci Am—Aug. 25, 1900.

**Naval, Elswick.**—Elswick Naval Mountings. Illustrations and descriptions of mountings for quick-fire guns dealt with in Sir Andrew Noble's paper before the Inst. of Naval Architects. Serial. Engr, Lond—Jan. 19, 1900.

**Naval, Krupp.**—Krupp Central Pivot Gravity and Spring-Return Carriages for Naval Ordnance. Illustrates and describes these two ways of mounting guns. 1000 w. Sci Am Sup—March 31, 1900.

**Rapid-Fire.**—Quick-Firing Field Gun Carriage. Illustrates and describes a field carriage, the characteristic feature consisting in the method of taking up the recoil. 900 w. Engr, Lond—March 10, 1899.

The Development of Carriages for Rapid-Fire Guns (Die Entwickelung der Schnellfeuer-Feldlaffeten). J. Castner. With details of carriages, and reproductions of photographs of some of the latest forms of German field artillery. 3500 w. Stahl und Eisen—Dec. 1, 1898.

**U. S. 10-Inch.**—Barbette Carriage for the U. S. 10-Inch Breech-loading Rifle. With detailed illustrations and description, showing the general construction and the arrangement of the recoil mechanism. 1000 w. Engng—Sept. 2, 1898.

### GUN EXPLOSION.

**Sandy Hook.**—Cause of the Recent Explosion of the Ten-Inch Gun at Sandy Hook Explained. Hudson Maxim. An explanation by one of the inventors of the smokeless powder used. Ill. 2000 w. Sci Am—April 8, 1899.

Explosion of a Gun at Sandy Hook, New York Harbor. Discusses the cause of the accident. 1500 w. Engng—April 14, 1899.

High Explosives and Big Guns. Editorial on the explosion at the Sandy Hook testing grounds and the behavior of smokeless powder. 1900 w. Ind & Ir—April 28, 1899.

### GUN FIRE.

See also **NAVAL BATTLE; WAR.**

**Manila.**—Effect of the Gun Fire of the United States Vessels in the Battle of Manila Bay. John M. Ellicott. Report by the Intelligence Officer of the U. S. S. "Baltimore," which took part in the action. Ill. 4200 w. Naut Gaz—April 27, 1899.

**Santiago Naval Battle.**—Gun Fire Analysis of the Santiago Sea Fight. The gun fire analyzed for the Santiago sea fight by Lieut. B. W. Wells, with some of the causes to which the victory was due. 600 w. Eng News—Aug. 18, 1898.

### GUN MANUFACTURE.

**Bethlehem Works.**—Manufacture of Guns and Armor at the Bethlehem Steel Works. An illustrated description of the open hearth process. 2000 w. Sci Am—May 19, 1900.

**Boring.**—Boring a Thirteen-Inch Naval Gun. E. J. Prindle. Illustrates and describes the boring of this tube of a thirteen-inch breech-loading rifle at the Naval Gun Factory at Washington, D. C. 1000 w. Am Mach—Jan. 26, 1899.

**Factory Management.**—The Management of Ordnance Factories. Editorial discussion of the question of civil as against military control. 2200 w. Engng—Dec. 30, 1898.

**Lathe.**—See **LATHE—Gun.**

**Measuring Instruments.**—Measuring and Testing Instruments Used in the Manufacture of Naval Ordnance. E. J. Prindle. Illustrates and describes the instruments, the use of which makes possible the high degree of precision required. 3500 w. Sci Am—Feb. 25, 1899.

**Rifling.**—Rifling a Big Navy Gun. Edwin J. Prindle. Illustrates and describes the manner in which it is performed at the Naval Gun Factory at Washington, D. C. 900 w. Am Mach—Feb. 16, 1899.

**Treadwell Construction.**—On Certain Physical Difficulties in the Construction of Large Guns. W. Le Conte Stevens. Describes the Treadwell plan for gun construction, which has been universally adopted, and the difficulties met with in shrinking the jacket and adjusting it to the cold tube. 2800 w. Science—Nov. 27, 1896.

**Washington.**—Big Gun Manufacture. Henry A. Wiley. Describes the work as carried on at the United States naval gun factory at Washington, D. C. 2800 w. Age of St—July 3, 1897.

Mechanical Operations in the Manufacture of a Great Naval Gun. Edwin J. Prindle. A richly illustrated article describing the work at the Washington Gun Factory, with especial reference to the construction of the 13-inch naval guns used on the U. S. battleships. 4000 w. Eng Mag—June, 1898.

The Gun Factory at the United States, Washington, D. C. Navy Yard. Illustrated description of the work as carried on at this shop. 1500 w. Sci Am—Feb. 26, 1898.

United States Ordnance Factory, from Data Furnished by the Bureau of Ordnance. Illustrated description of the manufacture of big guns. 2000 w. Marine Rev—Sept. 28, 1899.

### GUNNERY.

See also **BALLISTICS; POSITION FINDER; RANGE FINDER.**

**Terms.**—Terms Used in Modern Gunnery. F. Maurice. An explanation of such terms as "Creusot," "Krupp," "Shrapnel," "Common-Shell," "94-Pounders," "4.7-inch guns," "Mausers," "Lee-Enfield," etc. 4800 w. Nineteenth Cent—Dec., 1899.

### GUNPOWDER.

See **EXPLOSIVE.**

### GUTTA-PERCHA.

See also **BALATA; INSULATION; RUBBER—Electrical Engineering; SUBMARINE CABLE.**

Gutta Percha. Eugene F. A. Obach. A series of lectures before the Society of Arts. History, general properties, geographical distribution, cultivation, analysis, exports, imports, prices, treatment, etc. Ill. Serial. 4 parts. 44000 w. Jour Soc of Arts—Dec. 24 & 31, 1897; Jan. 7 & 14, 1898.

Gutta Percha (Die Guttapercha). E. Veyeraband. A general account of the production and properties of gutta percha, with especial reference to its applications in electrical work. 4500 w. Elektrotech Zeitschr—Feb. 15, 1900.

**Electric Cables.**—Increase in the Use of Gutta-Percha in Electric Cable Building. Hawthorne Hill. Discusses the demand for new cables and the supply of gutta-percha. 1800 w. Elec Rev, N. Y.—Sept. 12, 1900.

**Supply.**—The Future Supply of Gutta-Percha. Editorial on the increasing rise in the price of this product and its cause. 2800 w. Engng—June 8, 1900.

The Supply of Gutta-Percha. Hawthorne Hill. On the sources of supply, and the demand, with related information. 1200 w. Elec Rev, N. Y.—March 7, 1900.

**Trade, 1895-6.**—See **RUBBER TRADE—1895-6.**

**United States.**—The Use of Gutta-Percha in the United States. John M. Armstrong. The history of gutta-percha, its discovery, uses, etc., and its importance. Comparison is made with india-rubber, showing the radical difference between the two gums. 2500 w. Ind Rub Wld—March 10, 1896.

### GYMNASIUM.

**Boston.**—See **BATH.**

**Podgórze, Cracow.**—Gymnasium at Podgórze, near Cracow (Turnhalle des Turnvereines "Sokol" in Podgórze bei Krakau). Plate and brief description of a fine gymnasium hall, also arranged for theatrical performances, etc. 800 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1897.

### GYPSUM.

**Analysis.**—On the Chemical Composition of Some Kansas Gypsum Rocks. E. H. S. Bailey and W. M. Whitten. The results of analysis of average samples of the rock or dirt used at the mill. 1500 w. Kansas Univ Quar—Jan., 1897.

**Colorado.**—Gypsum and Clay. Arthur Lakes. The geological structure and economic values contained in the foothills of the Rockies near Loveland, Colorado. Ill. 2800 w. Mines & Min—Dec., 1899.

**Kansas.**—Gypsum in Kansas. G. P. Grimsley. Early account of this mineral, and the location, geology, topography, etc., of the areas in this state. Ill. 4500 w. Kansas Univ Quar—Jan., 1897.

**Nova Scotia.**—Nova Scotia Gypsum. The industry is briefly described in a general way, and the shipments given in quantity and value from 1890 to 1895; when 133,300 tons were sent out. 800 w. Can Min Rev—March, 1896.

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**HALL.**

**Philadelphia.**—Sanger Hall, Philadelphia. Illustrated description of the design and construction of a large temporary auditorium. 800 w. Eng Rec—Jan. 9, 1897.

**HAMMER.**

Notes on the Hammer. Herbert Aughtie. Enumerates and explains the principles of its action. 1800 w. Prac Eng—Jan. 15, 1897.

**Drop.**—See **DROP HAMMER.**

**Helve.**—The Helve Hammer in a Railroad Shop. O. H. R. An excellent practical article in which the dies for a great variety of work done with this class of hammers are described and illustrated. 1800 w. Loc Engng—Feb., 1896.

**Power.**—See **POWER HAMMER.**

**Steam.**—See **STEAM HAMMER.**

**HARBOR.**—See also **BREAKWATER; BULKHEAD; CANAL; DOCK; JETTY; MARINE CONGRESS; PIER; RIVER REGULATION; SHORE PROTECTION; WATERWAY.**

**Antwerp.**—The Extension of the Port of Antwerp. Part first gives a statement of the conditions and discusses some of the plans submitted for the extension of the port. Serial. Engr, Lono—March 11, 1898.

The Port of Antwerp (Le Port d'Anvers). A. Dumas. With map and plan of the city, and numerous illustrations of the quays, docks, and landing stage. An account of the new quay wall, now in course of construction is also given. 8000 w. 1 plate. Génie Civil—Aug. 20, 1898

The Quay Wall at Antwerp. Illustrated description of a very heavy wall of concrete blocks each having a pneumatic foundation. 1000 w. Eng Rec—Nov. 26, 1898.

**Belfast.**—Belfast and Its Industries. Illustrated description of the port of Belfast and the shipbuilding works of Messrs. Harland & Wolff, Limited. 6000 w. Engr., Lond—July 10, 1896.

**Bombay.**—Bombay Port Trust.—A short description of the development of the property vested in the Trustees of the Port of Bombay. Gives the principal works and conveniences for shipping and traffic. Serial. Engng—Nov. 21, 1896.

**Boston.**—Boston's Harbor Defects. From the N. Y. "Times." Development of the ocean trade of that port retarded by shoal water. 1100 w. Sea—June 8, 1897.

The Port of Boston. Some facts concerning New England's metropolis, its harbor, exports and imports, etc. Ill. 1600 w. Sea—May 20, 1897.

**Boulogne, France.**—Boulogne Harbor. Describes the improvements carried out since 1876, the cost, the machinery and working conditions of the port, navigating conditions, towing service, pilots, etc. Ill. 3000 w. Engr, Lond—July 22, 1898.

**Buffalo Breakwater.**—The Breakwater Extension at Buffalo, N. Y. Illustrations taken from the Government specifications, showing the general construction of both the rubble and timber work, are given. 800 w. Eng News—Oct. 29, 1896.

**Bremen.**—Free Port of Bremen. Complete historical and statistical account with regulations, bylaws, etc. 4800 w. U. S. Cons Repts—Feb., 1896.

The New Harbor Works at Bremen and Bremerhaven (Die Neuen Hafenanlagen in Bremen und Bremerhaven). The official report of Herr Herbst, the chief engineer of the Austrian Department of the Interior, with plans of the docks and river improvements. 4000 w. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1897.

**Breslau.**—The Opening of the New Ship Canal at Breslau (Zu der Eröffnung des Grosschiffahrtsweges in Breslau). Brief description with photographs of the docks, bridges and locks. 800 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 18, 1898.

**British Coal.**—Coal Ports of Great Britain. An illustrated description of Newport, Monmouthshire. 2800 w. Ir & Coal Trds Rev—Nov. 12, 1897.

**Bruges, Belgium.**—The Harbor and Maritime Canal of Bruges (Les Ports et le Canal Maritime de Bruges). An account of the extensive harbor improvements recently commenced, and to be completed in 1902, at a cost of nearly 40,000,000 francs. 1200 w. La Revue Technique—Sept. 25, 1898.

The New Harbor Work at Bruges (Nouveaux Ports de Bruges). J. Nyssens-Hart. An account of the conduct of the improvement works, with especial reference to the machinery and methods employed in connection with the heavy masonry construction. 3000 w. 1 plate. Rev Univ des Mines—Jan., 1900.

**Buenos Ayres.**—See **Monte Video.**

**Calais.**—The Port of Calais. An illustrated account of the improvements and extension of this port, the plant and machinery. 2000 w. Engr, Lond—July 22, 1898.

**Calcutta.**—The Port of Calcutta. Charles Cecil Stevens. Descriptive, with an account of the harbor improvements and topics relevant to the subject. Discussion. 17200 w. Jour Soc of Arts —June 16, 1899.

**Cardiff.**—Cardiff as a Port. Considers the causes which have led to the phenomenal development during the last fifty years—the population increasing from 10,000 to 176,000. 3000 w. Col Guard—Sept. 16, 1898.

The Coal Ports of the United Kingdom. Cardiff. Illustrated article. The shipments from this South Wales port increased in the past 56 years from 4000 to 12,000,000 tons annually. The necessary Improvement at Chicago. A consideration of the article. Serial. Ir & Coal Trs Rev—Jan. 31, 1896.

**Cherbourg Dike.**—The Reinforcement Works of the Forts of the Dike of Cherbourg (Travaux de Renforcement des Forts de la Digue de Cherbourg). An illustrated account of this important piece of masonry construction. 2000 w. Génie Civil—May 22, 1897.

**Chicago.**—The Needs and Possibilities of Harbor Improvement at Chicago. A consideration of the more important engineering and commercial questions involved. Editorial. 4000 w. Eng News—July 16, 1896.

See also **CANAL—Chicago Drainage.**

**Chinese Treaty.**—The Four New Treaty Ports of China. The ports described are Chungking, Hangchow, Soochow, and Sha-tsze. Brief mention is also made of the Yangtze Gorges, 60 miles above Sha-tsse. 2600 w. U S Cons Repts—Jan., 1896.

**Cocanada, India.**—Cocanada Harbor. Jas. R. Bell. Letter with notes on condition, value, and a description of Cocanada Bay. Serial. Ind Engng —Oct. 2, 1897.

**Colombo, Ceylon.**—Colombo Harbor. Editorial discussion of the advantages of this harbor, and of the railway scheme to connect the railway system of Ceylon with that of India. 1200 w. Eng, Lond—Aug. 20, 1897.

The Colombo Harbor Works. History of the various improvements made, especially the recent work which has made this one of the finest artificial harbors in the world. Map. 2800 w. Ind Engng—Sept. 4, 1897.

**Constanza, Roumania.**—The Corner-Stone Laying of the New Harbor of Constanza (Die Grundsteinlegung im neuen Hafen von Constanza). Friedrich Bömches. Plan and description of the new docks and breakwater of which the corner-stone was laid last October, and which form part of the plan to facilitate the handling of the grain product of Western Europe to better advantages. 2500 w. Zeitschr d Oesterr Ing u Arch Vereines —Nov. 20, 1896.

**Copenhagen.**—Free Port of Copenhagen. Circular issued by the Copenhagen Free Port Co. at the opening of the port in Nov., 1894, setting forth its purpose, commercial advantages, accommodations for vessels, regulations, by-laws, schedule of taxes, etc., with supplementary report dealing with the effect of the free port on trade. 9400 w. U S Cons Repts—Feb., 1896.

The Free Port of Copenhagen. P. Vedel. Describing the engineering work that has been done to preserve Copenhagen's position as the distributing center of the Baltic. 2500 w. Eng Mag—Feb., 1896.

**Cosel on Oder.**—The Harbor of Cosel on the Oder, and its Present Commerce (Der Oder-Hafen zu Cosel und sein Bisheriger Verkehr). J. Riedel. An account of the important internal commerce centering at Cosel on the canalized Oder, near Breslau. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 10, 1899.

**Creusot Exhibit, Paris.**—See **ARTILLERY.**

**Dortmund Canal.**—See **DOCK—Coal.**

**Dortmund, Germany.**—The Harbor of Dortmund and its Traffic (Der Hafen von Dortmund und sein Bisheriger Verkehr). J. Riedel. A note concerning the traffic and handling facilities of the port of Dortmund considered in connection with the opening of the Dortmund-Ems Canal. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 29, 1899.

**Duluth, Minn.**—New Ship Canal Entrance to the Harbor of Duluth, Minn. Improvements demanded by increased size of lake vessels and growth of lake commerce are now in progress. Illutsrated description showing location and general dimensions of the old and new piers. 1800 w. Eng News—July 28, 1898.

Improving the Harbor of Duluth. The reconstruction of the entrance piers for this harbor, and other improvements on the Great Lakes are discussed. 1000 w. Ir Age—June 9, 1898.

See also **Great Lakes.**

**Dunkirk, France.**—The Port of Dunkirk (Le Port de Dunkerque). A description of the new channel and docks, and the effect of improved facilities upon traffic. 3000 w. 1 plate. Rev Univ des Mines—Jan., 1900.

**East London, South Africa.**—Harbor Development in South Africa. General plan of East London Harbor, with account of improvements. 2200 w. Trans—Oct. 2, 1896.

**Fraserburgh, Scotland.**—The Harbor Works at Fraserburgh. Describes a scheme of harbor development and extension now in progress at this point. Ill. 3000 w. Transport—Jan. 21, 1898.

**Fremantle, Australia.**—Harbor Improvements in Western Australia. The first part relates to the harbor of Fremantle mainly. The need of a harbor at this point is shown and the two schemes proposed for the improvement of the harbor are presented. Serial. Engng—Oct. 2, 1896.

The Port of Fremantle. Report of the rapid advance in the work being carried out at this port in West Australia. 2000 w. Trans—Oct. 22, 1897.

**Galveston.**—The Galveston Harbor Works. W. J. Sherman. Illustrated historical account of the work of harbor improvement at this point. 3000 w. Jour Assn of Engng Socs—Dec., 1896.

The Jetties at Galveston Harbor. Walfred Wilson. Illustrated description. 1000 w. Sci Am—May 23, 1896.

See also **New Orleans.**

**Germany.**—The Means and Aim of Marine Construction in Germany at the Beginning of the Twentieth Century (Ueber Mittel und Ziele des Deutschen Wasserbaues am Beginn des XX Jahrhundert). J. F. Bubendy. A review of marine construction up to the present time, including harbors, channels, docks, canals, etc., and a discussion of future needs in view of the increasing size of vessels. Three articles. 6000 w. Deutsche Bauzeitung—March 25, 31, April 5, 1899.

**Ghent.**—The Maritime Installation of the Port of Ghent (Les Installations Maritimes du Port de Gand). G. Leugny. A detailed account of the Terneuzen Canal, by which communication is to be made between Ghent and the North Sea by way of the Scheldt. 2000 w. Revue Technique—Feb. 10, 1900.

**Gibralter.**—See **COAST DEFENCE.**

**Gray's Harbor, Washington.**—Improving the Entrance to a Bar Harbor by a Single Jetty. T. W. Simons. The writer, convinced that there are places where a single jetty will, if properly placed, accomplish all that could be expected of two jetties, decided that Gray's Harbor in the State of Washington was such a place. The improvement of the harbor was so planned, and a description is presented with facts and reason which led to the adoption. 4800 w. Am Soc of Civ Engs—May, 1896.

**Great Lakes.**—The New Era on the Lakes. The improvement of lake ports, and the increase of the size of lake vessels have inaugurated the era discussed, in which Duluth, it is anticipated, will rival Chicago in the lake commerce. From the "Duluth News Tribune." 1100 w. Sea—Oct. 1, 1896.

See also **Duluth; GREAT LAKES.**

**Hamburg.**—Free Port of Hamburg. Historical and statistical article, giving voluminous statistics of trade at this port. Also fully dealing with the regulations of trade at the port. 27000 w. U S Consular Reports—Feb., 1896.

The Maritime Position and the Principal Features of the Port of Hamburg. Franz Andreas Meyer. Read at the meeting of Inst. of Naval Architects. An eloquent and interesting description of this important port. 4000 w. Eng, Lond—June 12, 1896.

The Recent Development of the Harbor of Hamburg (Die Neuere Ausgestaltung der Hamburger Hafenanlagen). A review of the growth of the commerce of the port of Hamburg from 1882 to 1895, showing the development due to improved facilities. 4000 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1899.

See also **CANAL—Kiel.**

**Harwich.**—The Growth of the Port of Harwich. William Birt. A paper read before the British Assn. at Ipswich. Historical account of a port that has become important only during the last thirty years, but from which now sail steamers to various parts of the continent. 4500 w. Eng —Nov. 15, 1895.

**Havre.**—The Improvement Works at the Port of Havre (Les Travaux d'Amelioration du Port du Havre). G. Leugny. With a hydrographic plan of the harbor, and a description of the new dykes and dock basins. 3000 w. Revue Technique—March 25, 1899.

See also **Seine Mouth.**

**Licata, Sicily.**—Proposed Harbor at Licata, Sicily. A. E. Carey. Gives a sketch of a scheme of importance both commercially and scientifically, with plan of the work and statement of existing conditions. Ill. 1300 w. Eng, Lond—July 9, 1897.

**Loire Mouth.**—Cutting a Channel through the Charpentier Bar (Le Creusement d'un Chenal à travers la Barre des Charpentiers). M. de Joly. The official account of the works at the mouth of the Loire; with hydrographic charts, details of dredging machinery, etc. 17500 w. Two plates. Ann des Ponts et Chaussées—Pt. I, 1897.

**Madras, India.**—Advance Madras! An account of harbor improvements in this part of India which have been carried out in the face of great natural difficulties. 1000 w. Ind Engng—April 2, 1898.

Changes in Madras Harbor and Roadstead. A recent survey has been made of this harbor, and reported information is given, with discussion of causes, comparison with previous reports, etc. Serial. Ind Engng—July 23, 1898.

Madras Harbor. Discussion of the improvement in harbor facilities. Part first considers the boat basin project. Serial. Ind Engng—April 16, 1898.

Madras Harbor. W. B. de Winton. A review of F. J. Wilson's boat basin project, stating objections to the proposals and offering his own views on the subject. 2000 w. Ind Engng—May 14, 1898.

Plan of the Madras Harbor. Full-page drawing, with explanatory note. 300 w. Ind Engng —Nov. 9, 1895.

See also **CAISSON.**

**Mallaig, Scotland.**—See **RAILWAY.**

**Marseilles.**—Enlargement of the Port of Marseilles, France. From "La Nature." Explains the reasons that prompted the work, and the conditions under which it is being executed. Ill. 1600 w. Sci Am Sup—Dec. 25, 1897.

Enlargement of the Port of Marseilles (Agrandissement du Port de Marseille). With plan of the present condition of the harbor, and an account of the proposed docks, with section of the new breakwater. 1200 w. Génie Civil—Nov. 20, 1897.

**Monte Video and Buenos Ayres.**—The Rival Ports of Monte Video and Buenos Ayres. Deals mainly with Monte Video, the position of the port and the new works. Discusses also the competition of foreign nations with British trade. Report of the British Consul. 1700 w. Trans—Sept. 10, 1897.

**Nantes.**—The Port of Nantes. General description and statistics. 2500 w. Cons Repts—March, 1896.

See also **Loire Mouth.**

**New Orleans and Galveston.**—New Orleans and Galveston. Considers the improvements, and their growing importance in the export business. 1500 w. Transport—April 1, 1898.

**New York.**—Improve New York Harbor. Suggestions for needed improvements from a pamphlet published by John W. Ambrose. 1000 w. Fire & Water—March 5, 1898.

New York Harbor. Some account of the marked features of the harbor, the amount of trade and the great number of vessels, both for marine and inland navigation, which visit the wharves. 1500 w. Sea—Feb. 18, 1897.

New York Harbor. The necessity for a 35-foot channel from the Narrows to the sea. Report of Col. G. L. Gillespie. 800 w. Sea—March 11, 1897.

New York Harbor and Trade. Editorial comment on the improvements needed in the harbor and the amount of trade passing this port, with the need of effort to keep it from drifting to other seaports. 1600 w. Trans—Nov. 13, 1896.

The Commerce of the Port of New York. A statement of the fluctuations in the percentage of the foreign commerce of the United States passing through the port, and a review of measures proposed to increase its facilities. 1600 w. Eng Rec—Dec. 17, 1898.

See also **DOCK; GRAIN HANDLING.**

**Ostend.**—Maritime Installation of the Port of Ostend (Installations Maritimes du Port d'Ostende). O. Watrin. A general description of the improved harbor works, with plates showing the construction of the docks and quay walls. 4000 w. 3 plates. Rev Univ des Mines—Jan., 1900.

**Otaru, Japan.**—Notes from Japan. Gives illustrations and descriptions of the Otaru harbor works. 2800 w. Engng—Dec. 15, 1899.

**Philadelphia.**—See **RIVER REGULATION—Delaware and Schuylkill.**

**Plymouth, Eng.**—Development of the Port of Plymouth, Eng. An explanation of the two projects before the local authorities for the improvement and extension of the port and harbor. 1600 w. Engr, Lond—Feb. 18, 1898.

Harbor Extension at Plymouth. Recommendations from the report of J. Wolfe Barry and Cuthbert Brereton to the Corporation of Plymouth, in reply to the points submitted for their consideration relative to advisability of making this extension. 1800 w. Transport—Nov. 26, 1897.

The Improvement of Plymouth Harbor. Plan showing the position of the proposed works and describing the arrangements. 1300 w. Engr, Lond—Feb. 25, 1898.

**Portsmouth, Eng.**—Harbor Improvement and Water Service at Portsmouth, Eng. The proposed improvement of the harbor railway terminus and the establishment of a better service by water between Portsmouth and Gosport. 1800 w. Transport—Feb. 4, 1898.

**Riesa, Elbe River.**—The Commercial and Winter Harbor on the Elbe at Riesa (Der Verkehrs und Winter Hafen an der Elbe). Description and plan of this important basin and quay wall. 1200 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1897.

**Rio Grande do Sul, Brazil.**—The Bar at Rio Grande do Sul (La Barra de Rio Grande do Sul). L. L. Vauthier. An account of the works for the maintenance of a permanent channel at the mouth of the canal connecting the port of San Pedro, Brazil, with the ocean. 8000 w. Ann des Ponts et Chaussées—2 Trimestre, 1899.

**San Francisco.**—Removal of Rocks in San Francisco Harbor. Illustrated description of one of the largest enterprises of this kind on record. 1100 w.. Min & Sci Pr—May 12, 1900.

Removing Submerged Rock in San Francisco Harbor. Illustrated description of a drilling platform, hung like a derrick arm from a gin post erected on top of the rocks to be blasted; the drills were of the oil-well type. 600 w. Eng Rec—May 26, 1900.

**San Juan.**—Port of San Juan and the San Juan River. Translation of a communication published in "El Ferrocarril," April 18, 1896. 1700 w. U S Cons Repts—July, 1896.

**Savannah, Ga.**—The Story of the Savannah Harbor Work. Editorial review of the work on which Capt. Carter was engaged, and the evidence upon which he was pronounced guilty. 4800 w. Eng News—May 10, 1900.

**Seaham, Eng.**—Proposed New Docks and Collieries at Seaham Harbor. An account of the proposed works and favorable prospects of this port. 1100 w. Col Guard—Sept. 1, 1899.

**Seattle.**—The New Waterways and Land Reclamation at Seattle, Wash. Extracts from a letter of Mr. Eugene Semple, giving interesting information, with editorial comment, calling attention to necessary precautions in this class of work. 2300 w. Eng News—May 27, 1897.

**Seine Mouth.**—Dangers to Navigation at the Mouth of the Seine (Les Dangers de la Navigation à l'Embouchure de la Seine). Describing the shifting of the bar, and the variations in the channel, with suggestions as to the remedy; with hydrographic charts. 1 plate. 3000 w. La Revue Technique—May 10, 1897.

**Sfax, Tunis.**—The Port of Sfax, Tunis (Port de Sfax). M. Bezault. Describing the dredging of the channel and the construction of the docks and quays of this port of Tunis, under the direction of the French protectorate. 4500 w. 1 plate. Ann des Ponts et Chaussées—4 Trimestre, 1897.

**Shanghai.**—The Port of Shanghai and China's Trade Details the companies and vessels which trade at this important port and predicts that the future route to China, either with or without the Nicaranga Canal, will be across the Pacific. 2200 w. U S Cons Repts—Jan., 1896.

**Stettin.**—The Harbor of Stettin and its Water Communication with the Sea and the Interior (Ueber die Hafenanlagen Stettins und dessen Wasserverbindungen mit dem Meere und dem Binnenlande). An account of the important harbor improvements of Stettin, by means of which it is expected to compete with Hamburg and Bremen. Three articles. 4500 w. Deutsche Bauzeitung—April 24, May 1 & 8, 1897.

The New Harbor Works at Stettin (Die Neuen Hafenanlagen in Stettin). W. Zimmermann. A description of the important dock and canal construction works recently completed at Stettin, costing more than 12 million marks. 3000 w. 1 plate. Glaser's Annalen—March 15, 1899.

**Tampico, Mexico.**—The Harbor Works at Tampico. From a paper read at a meeting of the Institution of Civil Engineers. This Mexican port, on the gulf coast, is interesting. Since the harbor improvements the trade has doubled in value, making it probably the second port in Mexico. Interesting also on account of the peculiar engineering difficulties. 1000 w. Trans—April 3, 1896.

**Tunis.**—Harbors of Tunis (Les Ports Tunisiens). G. Leugny. A well illustrated account of harbor improvements at Tunis and Sousse, in Tunis, with tables showing amount of traffic and port charges. 3000 w. Revue Technique—July 25, 1900.

**United Kingdom, 1896.**—Harbors and Waterways. Editorial review of changes and improvements during the past year. 2000 w. Engr, Lond—Jan. 1, 1897.

**United Kingdom, 1897.**—Harbors and Waterways. Editorial discussion of improvements made and planned, made necessary by the constantly increasing size of vessels; also inland navigation and related matters. 4300 w. Engr, Lond—Jan. 7, 1898.

**United Kingdom, 1898.**—Harbor and Waterway Engineering for 1898. A summary of the events of the past year in the United Kingdom showing great activity in this field. 4400 w. Engr, Lond—Jan. 6, 1899.

**United States.**—Great Harbors on Our Seaboard. Cyrus C. Adams. Describes some of the harbors of the United States, and their commercial importance. 2500 w. Chau—April, 1898.

Our Future Seaports. Archibald A. Schenck.

Some information regarding important ports of the United States, and the concessions being made by railroads to reach these ports directly at the coast. 600 w. R R Gaz—Jan. 21, 1898.

**Vera Cruz.**—See **RAILWAY—Tehuantepec.**

**Victoria, B. C.**—Harbor Improvements at Victoria. Extracts from the "Victoria Colonist" giving an outline of the scheme. The estimated outlay is about $5,290,000. 1000 w. U S Cons Repts, No. 476—July 14, 1899.

Proposed Harbor Improvements at Victoria, B. C. Map with explanation of proposed improvements with cost and particulars. 1400 w. Can Arch—Oct., 1899.

**Vienna.**—The Conversion of the Danube Canal at Vienna into a Dock and Winter Harbor (Ueber die Arbeiten zur Umwandlung des Wiener Donaucanals in einen Handels- und Winterhafen). An elaborately illustrated account of these very important harbor improvements. Two plates of details and numerous illustrations. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—April 2 and 9, 1897.

**Vladivostock.**—Merchant Shipping in the Harbor of Vladivostock (Die Handelsschiffahrt im Hafen von Wladiwostok). F. Theiss. With map and photographs of the terminal of the Siberian railway, and an account of the business now handled at the port. 1800 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1900.

See also **RAILWAY—Siberia.**

**Wellington, New Zealand.**—Harbor Development in New Zealand. The Port of Wellington is the business center of the colony. A map is given of the berthage accommodations and the town, with description. 3000 w. Trans—April 10, 1896.

**Western Australia.**—See **Fremantle, Australia.**

**Windau, Baltic.**—Windau, as the European Export Harbor of the Siberian Railway (Windau, der Europäische Exporthafen der Grossen Sibirischen Bahn). A discussion of the advantages of this Baltic seaport as a terminus from which the exports from Siberia may be handled. 2000 w. Glaser's Annalen—July 15, 1897.

**HARBOR IMPROVEMENT.**

See **HARBOR.**

**HARBOR RAILWAY.** See **RAILWAY—Bristol Harbor, Eng.**

**HARDENING.**

See also **ANNEALING; IRON MANUFACTURE; STEEL MANUFACTURE; TEMPERING.**

**Heating Machine.**—Continuous Heating Machine for Hardening Small Articles. Illustrated description of a machine designed for hardening quantities of bicycle balls, but also useful in hardening other work not exceeding 2½ in any dimension. 700 w. Ir Age—Sept. 29, 1898.

**HARDNESS.**

**Metals.**—A New Indentation Test for Determining the Hardness of Metals. William Cawthorne Mervin. Reviews the methods previously used for determining hardness, and describes the author's method. Ill. Serial. Prac Engs—Oct. 29, 1897.

**HARLAND.**

Sir Edward J. Harland. Obituary. Gives an account of the life and work of one of the most famous of English naval architects. 6700 w. Engng—Jan. 3, 1896.

**HAULAGE.**

**Canal.**—See **CANAL HAULAGE.**

**Coke Ovens.**—Endless Rope Haulage at the Coke Ovens of the Röchling Works. Herr Weihe. Translated from "Glückauf." Illustrates and describes the arrangement of the haulage plane. 2200 w. Ir & Coal Trds Rev—Feb. 9, 1900.

The Rope Haulage Plant of the Coke Ovens at the Röchling Steel Works at Völklingen, in Altenwald (Die Maschinelle Seilförderung auf dereim Besitz der Röchlingschen Eisen und Stahlwerke zu Völklingen a. d. Saar Befindlichen Koksofen-Anlage in Altenwald). H. Weihe. With numerous views showing the arrangement of cables and trackways. 2600 w. Glückauf—Oct. 14, 1899.

**Dinnendahl System.**—An Overland Cable Haulage Installation at the Monceau-Fontaine Collieries. Translated from the "Annales des Mines de Belgique." Describes the Dinnendahl system of haulage, giving cost of installation. Ill. 900 w. Ir & Coal Trds Rev—June 3, 1898.

**Electric vs. Compressed Air.**—Electric Haulage at Port Chalmette. G. F. P. Account of the adoption of electricity in the place of compressed air, and claiming greater economy. Also editorial objection to conclusions and defending compressed air. 2000 w. R R Gaz—July 9, 1897.

**Mine.**—See **COAL HANDLING; MINE HAULAGE.**

**HAWAII.**

Engineering Work in the Hawaiian Islands. Describes the construction of the Nuuanu Pali road, up a steep mountain side, and mentions other engineering work. Ill. 900 w. Eng News—June 30, 1898.

**HEAD FRAME.**

See **MINE—Head Frame.**

**HEADLIGHT.**

Eyes and Headlights. On the value of strong headlights, with arguments for and against their use. 1500 w. R R Gaz—Oct. 12, 1900.

**Acetylene.**—Acetylene Gas for Locomotive Headlights. Illustrated description of an acetylene gas generator as applied to locomotives. The device was invented by A. M. Holland, of Ottawa, Canada. 1000 w. Ry and Engng Rev—March 4, 1899.

**Arc Lamp.**—Electric Arc Lamp for Locomotive Head-Light (Elektrische Bogenlichstirnlampe für den Fahrdienst auf Eisenbahnen). Max Schiemann. A description of the Wagenhals lamp and an account of its performance, with data as to cost of maintenance. 2600 w. Elektrotech Zeitschr—Jan. 19, 1899.

**Electric.**—Electrical Headlights for Locomotives. Discussing the advantages and the objections. 1600 w. R R Gaz—March 11, 1898.

Electric Headlights for Locomotives. States the advantages of electric headlights, and gives report of a test made on the C. C. C. & St. L. Ry. and describes an apparatus designed by George C. Pyle. Ill. 1400 w. Eng News—June 16, 1898.

The Pyle National Electric Headlight. Illustrated description of the essential features. 1000 w. R R Gaz—March 12, 1897.

**Searchlight Attachment.**—Seachlight Attachment for Headlights. Brief illustrated description of a simple arrangement, devised by John S. Thurman, for enabling the engineer to adjust his headlight on the searchlight principle. 300 w. Ry Age—Sept. 16, 1898.

**HEAT.**

See also **HEAT CONDUCTIVITY; HEAT RADIATION; HEAT TRANSMISSION; HEAT UTILIZATION; STEAM ENGINEERING; THERMODYNAMICS; THERMOMETRY.**

**Absorption Power of Water.**—See **WATER-TUBE BOILER—Circulation.**

**Latent.**—Latent Heat. Editorial. Starting with the assertion that the term "latent heat" is very inadequately comprehended, this article, in the form of a reply to a correspondent, gives an explanation of the term, and the relation of latent heat to sensible heat. 1600 w. Am Mach—April 2, 1896.

See also **EVAPORATION; GASES—Vaporization; LIQUID AIR; MELTING POINT; STEAM; THERMODYNAMICS.**

**Mechanical Equivalent.**—A New Method for the Determination of the Mechanical Equivalent of Heat (Methode Nouvelle pour Determiner l'Equivalent Mécanique de la Chaleur). A method by MM. Baille and Féry, in which the elevation in temperature is measured of a metallic mass fixed in an alternating electrical field. 1000 w. Comptes Rendus—May 23, 1898.

The Bakerian Lecture.—On the Mechanical Equivalent of Heat. Osborne Reynolds. Abstract of lecture before the Royal Society. Research to determine the mechanical equivalent of the total heat necessary to raise the temperature of water over the standard interval of temperature, and thus to obtain directly the equivalent of the mean specific heat between the freezing and boiling points. 1500 w. Nature—June 3, 1897.

**Mixing Liquids.**—On the Heat Effect of Mixing Liquids. C. E. Linebarger. An experimental research. Details of experiments are presented, and the results are given in tabulated form. 5000 w. Phys Rev—May-June, 1896.

**Vibrations.**—Mechanical-Technical Recreations (Mechanish-Technische Plauderein). Dr. Holzmüller. A popular examination of the phenomena of vibration in connection with heat, illustrated with diagrams and formulas. 6000 w. Zeitschr d Ver Deutscher Ing—Aug. 18, 1900.

**HEAT CONDUCTIVITY.**

See also **CYLINDER CONDENSATION; HEAT TRANSMISSION.**

**Marble and Slate.**—The Temperature Variation of the Thermal Conductivities of Marble and Slate. B. O. Peirce and R. W. Willson. Account of an investigation, conducted in the Jefferson physical laboratory, at Cambridge, with refined apparatus and methods, which are described and illustrated with diagrams. 1900 w. Am Jour of Sci—Dec., 1895.

**HEAT ENGINE.**

See **GAS ENGINE; GASOLINE ENGINE; OIL ENGINE; STEAM ENGINE; STEAM ENGINEERING; THERMODYNAMICS.**

**HEATING.**

See also **CAR HEATING; ELECTRIC HEATING; FURNACE; GAS HEATING; HEATING AND VENTILATION; PLUMBING; STEAM HEATING.**

Artificial Heating. W. M. Watson. The subject is viewed from the standpoint of the fitter, and discusses various systems. Ill. Serial. Can Engr—Aug., 1900.

Heating and Plumbing a House. Describes the heating system and plumbing system of the residence of A. C. Cobnrn, at New Britain, Conn., giving plans. 2000 w. Met Work—Dec. 10, 1898.

Practice in Warming (Aus der Heizungspraxis). F. Halbig. Discussing especially the most desirable features of boilers for steam heating. 2000 w. Gesundheits Ingenieur—Oct. 15, 1899.

The Combination Heating and Sanitary Plumbing of a Residence. Illustrates and describes the heating and plumbing systems of a commodious residence. 2300 w. Met Work—Oct. 15, 1898.

The Heating of Buildings. George Hill. A general essay on the subject of warming buildings, covering the principal classes of buildings and their special requirements, and also the principal varieties of apparatus and appliances used for the purpose, with some practical suggestions relating to their successful installation and operation. 5000 w. Arch Rec—Oct.-Dec., 1895.

**Armour Buildings, Chicago.**—Heating of the Armour Buildings at Chicago, Ill. Illustrated description of central installment for heating twenty-nine buildings, comprising the Armour flats and Armour Mission, Chicago. Ill. 1200 w. Eng Rec—March 21, 1896.

**Aspirating Furnace.**—An Aspirating Furnace Heating System. Explains the nature of the ground, and the arrangements of the buildings of the First Universalist Society, of Buffalo, N. Y., with the interesting features of the heating system. 1800 w. Met Works—Sept. 18, 1897.

**Bank Building.**—See **BANK BUILDING—Buffalo.**

**Blast.**—A New System. Leicester Allen. To compete with steam or hot water by forced circulation of hot air. 1600 w. Dom Engng—Jan., 1896.

Blast Heating. George D. Hoffman. Application of the new system. Illustrated detailed description. 900 w. Dom Eugng—Jan., 1896.

Concentrated Heating Surface for Hot Blast Systems. J. H. Kinealy. Describes the two general systems of arranging the heating surface of hot blast apparatus, and comments on cost and advantages. 1000 w. Heat & Ven—Nov. 15, 1898.

Automatic Regulation of the Hot Blast System of Heating in the Racine High School. Illustrated detailed description. 1500 w. Heat & Ven—July 15, 1897.

Forced Blast Warming With Furnaces. George W. Kramer. Read at the second annual meeting of the Am. Soc. of Heat. and Vent. Engs. Mr. Kramer is the architect to whom the recent impulse in this system of warming buildings is chiefly due, and his paper is full of valuable practical information upon the subject. 4400 w. Mas St Fit—Feb., 1896.

Forced Blast Warming with Furnaces. George W. Kramer. Read before the Am. Soc. of Heat. & Vent. Engs. An illustrated paper dealing with both the theoretical and practical principles involved in this system of heating, with examples of its successful application. Discussion. 5000 w. Heat & Ven—Feb., 1896.

Hot Blast-Heating System in a Boston Church. Illustrated description of an interesting installation. A good study in this system of heating. The air is taken in at an altitude of fifty feet to avoid the introduction of dust. 800 w. Eng Rec—Feb. 8, 1896.

See also **Regulations; HEATING AND VENTILATION.**

**Blower System.**—Condensation of Steam in Blower Systems of Heating. Reviews experiments by R. C. Carpenter with a 48-in. blower, heater coils and engine. 2500 w. Eng Rec—Jan. 27, 1900.

**Boilers.**—Boilers for Low Pressure Hot Water Heating. Samuel Naylor. Read at meeting of the Inst. of Heat. and Ven. Engs., London. Discusses the important features necessary in the selection of boilers, giving results obtained with different kinds. 3400 w. Plumb & Dec—March 1, 1900.

Church Heated with Battery of Boilers. Describes the heating arrangements in use at St. Patrick's Church at Utica, N. Y. 1000 w. Mas St Fit—March, 1897.

House-Heating Boiler Capacities. Opinions of experts as to desirable commercial ratio between steam and hot-water boilers. 9000 w. Heat & Ven—Dec., 1899.

See also **HOT WATER; STEAM HEATING.**

**Boiler Construction.**—Progress in Heating Boiler Construction. Hugh J. Barron. A study of the boiler problem with sketches of work done by the writer. Serial. Heat and Ven—March 15, 1897.

**Boiler Rating.**—The Rating of Boilers for Heating Purposes. Describes experiments by John Mackay and gives two tables from which the sizes of boilers can be determined having given the amount of radiation to be supplied and the rate of coal consumption. 1400 w. Eng Rec—Jan. 27, 1900.

**Boiler Shop.**—Heating a Locomotive Boiler Shop. Tells of the successful application of a heating system and gives diagram showing effect of velocity in increasing relative condensation in heater. 600 w. Loc Engng—Feb., 1900.

**British vs. American.**—A Comparison of British and American Heating Practice. D. M. Nesbit. Compares the hot-water methods and the steam as practiced in Great Britain and in the United States. 4200 w. Dom Engng—Jan., 1899.

European Systems of House Heating. J. L. Saunders. Comparing British and American methods, and noting differences due to climatic conditions. The British house-heating practice is growing more and more like American. 2500 w. Eng Mag—Jan., 1898.

**Car.**—See **CAR HEATING.**

**Central Station.**—See **Hot Water Central Station; STEAM HEATING.**

**Church.**—On Church Heating. H. B. Prather. By the combination of steam indirect and blowers. Illustrated detailed description of an elaborate system. A good article. 2500 w. Dom Engng—April, 1896.

The Heating of Churches, Especially the Heating of the Cathedral of Ulm (Ueber Beheizung von Kirchen, insbesondere über die Beheizung des Ulmer Münsters). Prof. Rietschel. A very complete account of the introduction of low-pressure steam heating into a mediaeval cathedral. Two articles. 6000 w. Gesundheits Ingenieur—Sept. 15, 30, 1899.

See also **Boiler.**

**Combination System.**—A Combination Heater. "Knight." A practical dissertation on combination systems of warming. 1900 w. Heat & Ven—Feb. 15, 1896.

Combination Systems of Heating. E. C. Moses. Gives the advantages obtainable and discusses circumstances which render the use of such combinations desirable. 1200 w. Heat & Ven—Dec. 15, 1895.

Combined Hot Water and Low Pressure Steam Heating System (Kombinierte Warmwasser und Niederdruckdamf-Heizung). F. Eclbo. Radiators in the basement are supplied with hot water from below the water line, those in upper floors by steam. 1200 w. Gesundheits Ingenieur—May 31, 1898.

Combination Heating System in a Philadelphia Residence. Illustrated description of successful installation at the residence of T. Henry Asbury, Oak Lane. 500 w. Heat & Ven—Aug. 15, 1897.

An Entirely New System of Heating. A combination of steam and hot-water systems is described, with plans of the building in which it was installed. The advantages claimed are perfect regulation of heat and ventilation, with minimum attention. Plans of the apparatus showing details are also furnished. 2500 w. Dom Engng—Dec., 1895.

Hot Water and Hot Air Heating Combined. From a pamphlet issued by Isaac A. Shepard & Co., Phila., called "Hints About Heating." Calls attention to things to be considered, and ways of overcoming difficulties. Serial. Met Work—Dec. 24, 1898.

**Cooling Combination.**—Combination Heating and Cooling Systems. Suggestions for a combination system to be used for cooling in the summer and heating in the winter. 2000 w. Heat & Ven—Sept. 15, 1897.

**Cotton Mill.**—Mill Heating. Facts taken from paper of Geo. W. Weeks, which was read before the New England Cotton Manufacturers' Assn. Illustrated description of a novel arrangement. 2000 w. Heat & Ven—May 15, 1896.

**Country Residence.**—Heating System in an Extensive Country Residence. Illustrated detailed description. 2000 w. Eng Rec—Aug. 1, 1896.

Heating Residence of Thomas M. Turner, Esq. Illustrated description of a type of rural-residence heating quite prevalent in many parts of the United States. 700 w. Heat & Ven—Nov. 15, 1897.

**Direct Radiation.**—Methods of Proportioning Direct Radiation. R. C. Carpenter. Read at meeting of Am. Soc. of Heat and Ven. Engs. Calls attention to the methods which have been proposed in the past and to a modified method resulting from experiment, which the writer believes to be at least worthy the trial of all heating engineers. 2500 w. Met Work—Jan. 30, 1897.

**Draft Flues.**—See Furnace Flue; **CHIMNEY.**

**Economizer.**—Heating a Mill from an Economizer. Describes the system, showing the method diagrammatically. 800 w. Eng Rec—April 3, 1897.

**Efficiency.**—Efficiency of Heating Systems as Affected by the Removal of Air from the Radiators and Consequent Reduction of Pressure. H. A. Joslin. Read at semi-annual meeting of Am. Soc. of Heating and Ventilating Engs. Data obtained from tests made upon plants. Also discussion. 2800 w. Heat & Ven—June 15, 1897.

**Electric.**—See **ELECTRIC HEATING.**

**Electric Station.**—See Hot Water Electric Station; **STEAM HEATING.**

**Exhaust Steam.**—See Economizer; **STEAM HEATING.**

**Expansion Tank.**—An Unusual Position for an Expansion Tank. Illustrated explanation of a hot-water heating system with a novel expansion tank in the cellar of the building below all the radiators. 1000 w. Eng Rec—March 17, 1900.

**Fire-Place.**—See also **THERMOPHORE**—Pillet.

**Foundry.**—Heating the Foundry of the General Electric Co. An illustrated account of the plant for heating this new building. 1400 w. Ir Age—April 27, 1899.

**Fuel Consumption.**—Fuel Necessary to Heat Small Buildings (Combustile Nécessaire pour le Chauffage d'un Local). Short article by J. Orpiszewski in the "Revue Technique de Varsovie," abstracted in the "Bulletin de la Société Vaudoise des Ingenieurs et des Architects," showing how to determine the amount of fuel necessary to keep a room at a given temperature. 400 w. Moniteur Industriel—March 31, 1900.

**Fuel Value.**—See **FUEL**—Working Value.

**Furnace.**—A Departure in Furnace Heating. Illustrated description of a system employing round pipes of unusually large area throughout. 1600 w. Met Work—Sept. 10, 1898.

An Efficient Furnace System. Illustrates an arrangement of a few risers to heat a number of rooms. 400 w. Eng Rec—May 21, 1898.

A Study in Warming-Furnaces (Eine Ofenstudie). An account of experiments made in Norway by Dr. Henrichsen, upon the value of different fuels for house warming. 3500 w. Gesundheits-Ingenieur—Feb. 28, 1897.

Furnace Heating. The causes why they sometimes fail to heat. Discusses location of registers, location of furnace, sizes of hot air pipes and defects in buildings. 1200 w. Dom Engng—April, 1897.

Furnace Heating. Examines the causes why they sometimes fail to heat. 1200 w. Dom Engng—Jan., 1897.

Furnace Heating. William G. Snow. Illustrated description. Serial. Met Work—Oct. 7, 1899.

Rules for Proportioning Furnace Systems. J. H. Kinealy. A study of the problem. Part first states the things necessary to determine and examines some of them. 1800 w. Met Work—March 13, 1897.

See also Hot Air; Hot Water.

**Furnace Flue.**—Draft Flues for Furnaces. E. C. Moses. Observations on the character of chimney flues, with general conclusions. Serial. Heat & Ven—Dec. 15, 1897.

**Furnace Work.**—Furnace Work. An argument favoring placing registers near inner walls. 800 w. Dom Engng—May, 1896.

**Gas.**—See **GAS HEATING.**

**Gas or Steam.**—Gas or Steam Heating. Comments on the labor-saving possible by the use of gas and steam for heating, quoting from articles describing their use in America. 1800 w. Jour Gas Lgt—July 25, 1899.

**German Methods.**—German Heating. An interesting exposition of the methods employed in heating German houses. Ill. Serial. Dom Engng—June, 1896.

**Government Building, Norfolk, Va.**—Heating of a Norfolk, Va., Government Building. Describes and illustrates the hot-water system recently installed. 1000 w. Eng Rec—Sept. 24, 1898.

**Great Britain.**—Heating in Great Britain. J. L. Saunders. Comment on the different conditions in the United States and Great Britain, with short account of systems most used. 1400 w. Heat & Ven—Dec. 15, 1897.

See also British vs. American.

**Greenhouse.**—A Modern Greenhouse Heating Plant. From "The Florists' Exchange." Illustrates and describes the plant in a mammoth greenhouse establishment at Cromwell, Conn. 2000 w. Met Work—Aug. 18, 1900.

Application of Heat to Greenhouse Structures. W. R. Beattie, in the "Columbus Horticultural Journal." Describes a combination of steam and hot-water heating that the writer has found advantageous. 1800 w. Met Work—May 14, 1898.

Greenhouse Heating. Thomas N. Thomson in the "Home Study Magazine." Brief description of a small greenhouse and the means of heating it, that may be built by any man handy with tools. Ill. 1500 w. Sci Am Sup—Oct. 8, 1898.

Heating a Greenhouse. Illustrated detailed description of an unusual method of warming a greenhouse, now attached to a residence in West Superior, Wis., which was also one of the exhibits at the World's Fair, in Chicago. 200 w. Eng Rec—Nov. 23, 1895.

Heating Horticultural Glasshouses. Frederick Dye. Illustrates and describes methods in use in England. 1700 w. Heat & Ven—March, 1899.

Heating Greenhouses. L. R. Taft, in the "Florists' Exchange." Extracts from article. Discusses boilers, grate and heating surface, radiation, piping, heating by steam and by steam and hot water combined. 4000 w. Met Work—July 24, 1897.

Heating the Greenhouse. On the hot-water system and its adaptability to plant growth. 1000 w. Ill Car & Build—Feb. 3, 1899.

Hot-water Heating for Greenhouses. J. D. Eisele. Condensed from a paper read before the Philadelphia Florists' Club. Discusses the selection of boilers, the elevated boiler system and the economy. 2000 w. San Plumb—July 15, 1897.

See also Lily Pond; **GREENHOUSE; HEATING AND VENTILATION.**

**Heating Surface.**—Heating Surface: Its Best Form and Relation to Radiating Surface. John Kitchen. Read before the British Inst. of Heat. and Ven. Engs. The necessity of understanding the conditions to be fulfilled, in order to reach correct conclusions. Discusses different systems and experiments. 3500 w. Plumb & Dec—Nov. 1, 1899.

See also Radiators.

**History.**—Methods of Heating in Olden Time. Sidney Perley. Historical account of early fireplaces and stoves used in various places. 2800 w. Dom Engng—Jan., 1898.

Prehistoric and Modern Heating Appliances. Robert Grimshaw. Part first traces the progress of heating appliances from the earliest times, giving illustrations of advancing stages. 1800 w. Dom Engng—April, 1897.

**Hospital.**—A Hospital Central Heating Plant. Illustrated description of a central power house and heating plant for the Bellevue Hospital, New York. 1300 w. Eng Rec—July 22, 1899.

See also **HEATING AND VENTILATION; HOSPITAL.**

**Hot Air.**—A Hot-Air Furnace Heating System. Illustrated description of a plant in a 60x43 ft. frame house, where provision is made for positive ventilation by special flues and dampers. 1000 w. Eng Rec—Feb. 10, 1900.

An Interesting Furnace Heating System. Describes a system which successfully overcomes serious difficulties, designed by William G. Barrows, of Utica, N. Y. Ill. 1000 w. Met Work—July 16, 1898.

Determining the Volume of Air Passing Through a Register per Minute. J. H. Kinealy. Read at meeting of the Am. Soc. of Heat. & Ven. Engs. Gives methods for determining the velocity of the air, tests and results of experiments. 2400 w. Met Work—Jan. 30, 1897.

Furnace Heating. Advocates the hot-air furnace for heating church buildings. 1200 w. Dom Engng—June, 1897.

Heating a Private Residence with a Warm-Air Furnace. B. Harold Carpenter. Condensed from a paper presented at the New York meeting of the Am. Soc. of Heat & Ven. Engs. Illustrates and describes arrangements for overcoming the weak points in warm-air furnaces. Discussion. 1100 w. Eng News—Jan. 26, 1899.

Heating a Private Residence with a Warm-Air Furnace. B. Harold Carpenter. Illustrates and describes the arrangement adopted in city residences, which has given satisfactory results. 1000 w. Dom Engng—Feb., 1899.

Heating Buildings by the Warm-Air System. J. J. Blackmore. Describing the conditions and methods of the most advanced practice in warm air heating, both for residence and public buildings, with numerous illustrations. 3000 w. Eng Mag—June, 1898.

Heating by Warm Air (Ueber Luftheizung). Especially discussing indirect systems of steam and hot water heating, and opposing the use of direct radiators in rooms. 5000 w. Gesundheits Ingenieur—March 15, 1897.

The Fall of Temperature of Warm Air in Metal Ducts. J. H. Kinealy. Discusses how the fall of temperature of air passing through a duct, under stated conditions, may be determined. 1500 w. Heat & Ven—Dec. 15, 1898.

Warm Air Heating. S. Hampton Ripon. The subject will be discussed under five divisions. The first part is introductory and consists of general remarks. 1000 w. Heat & Ven—Oct. 15, 1896.

**Hot Air and Water.**—Heating a Residence. Describes and illustrates a combination system, providing for simultaneous heating by warm air and hot water circulation. 1800 w. Met Work—Jan. 21, 1899.

**Hot Air Furnace.**—Hot Air Furnace. Martin L. Kaiser. Special prize essay. Illustrated description of method of school house heating under conditions specified in a competition. 3500 w. Met Work—April 29, 1899.

The Metal Worker Hot Air Furnace Competition. Albert N. Parker. The first prize essay of a competition for heating a school building with hot air furnaces. Ill. 2500 w. Met Work—April 1, 1899.

See also **FURNACE.**

**Hot Blast.**—See **Blast.**

**Hot Springs.**—Hot Water Heating Without Fuel. Describes a system found possible in the vicinity of Boise, Idaho, where thermal waters were discovered at a depth of nearly 400 feet, and the water gushed to a height of 40 feet above the ground. 1000 w. Met Work—March 20, 1897.

**Hot Water.**—A Combined Direct and Indirect Hot Water System. Plans of the building are given with description of a successful heating plant. Two other plants proved unsuccessful. 800 w. Met Work—July 15, 1899.

A Good Job of Hot Water Heating. Illustrated description. 900 w. Dom Engng—Sept., 1896.

A Hospital Hot Water Heating Plant. Illustrated description of an unusually large plant with direct hot water radiation and a plenum ventilation system. 1700 w. Eng Rec—Aug. 26, 1899.

A Hot Water Heating Plant in St. Louis. Illustrated detailed description of hot water plant in residence of Byron Nugent. 2400 w. Eng Rec—July 10, 1897.

A Hot Water Heating System for Single Floors (Beschreibung einer Etagen Warm-Wasser Heizung). Describing a system for warming apartments by water heated from the kitchen range; as applied in Italy. 2500 w. Gesundheits Ingenieur—July 31, 1897.

A Large Residence Heating Apparatus. Illustrated description of the plant for heating a 62-room house by hot water; the front portion chiefly by indirect radiation and the back portion by direct radiation. 1300 w. Eng Rec—Oct. 13, 1900.

An Extensive Single Circuit Hot Water System. Illustrated detailed description of plant for heating five buildings belonging to the Craig Colony for Epileptics at Sonyea, N. Y. 900 w. Eng Rec—Aug. 15, 1896.

An Original System of Hot Water Heating. Detailed illustrated description of a plant wherein the owner insisted that the radiation should conform essentially to the simple pipe coil system used in greenhouse work. 800 w. Eng Rec—Dec. 21, 1895.

A Recent Hot Water Plant near Philadelphia. Illustrated description of the plant in residence of Mr. Cyrus H. K. Curtis, at Wyncote, Pa. 600 w. Eng Rec—Jan. 9, 1897.

Arrangement of Mains in Hot Water Heating Apparatus. W. M. Mackay. Read at meeting of Am. Soc. of Heat. & Ven. Engs. Describes earlier systems and gives information from the writer's experience and observation. 2200 w. Met Work—Jan. 30, 1897.

English Views on Hot Water Heating. W. J. Maguire. Brief explanation of the writer's methods and the reasons. 1600 w. San Plumb—March 1, 1898.

Fundamental Principles of Hot Water Circulation, on Which the Various Water Heating Systems Depend for Success. James J. Lawler. The special object is to show these fundamental principles of circulation in a plain, simple way, and lead step by step to the most complicated systems. Illustrated article. 1600 w. San Plumb—Jan. 15, 1897.

Heating Buildings by Hot Water. F. Dye. It is proposed to give a complete account of the hot water engineer's work in heating buildings, and this will include a full description of the newest English and American methods and systems. Part first explains action of heat and cause of circulating movement. 2000 w. Plumb & Dec—Feb. 1, 1897.

High Pressure Hot Water Heating. Frederick R. Farrow. Review of a paper describing characteristic British practice. 800 w. Eng Rec—June 18, 1898.

Hot Water Circulation. Robert W. King. Read before the Toronto Engs'. Club. Illustrates and describes points to be met in designing an efficient hot water heating apparatus. 4200 w. Can Archt—June, 1900.

Hot Water Heating in a Baltimore Building. Illustrated description with plans of the heating in Notre Dame Institute. 700 w. Eng Rec—July 4, 1896.

Hot Water Heating in a Country Residence. Illustrated description of a plant in the residence of Mr. John Jacob Astor, at Rhinecliff, N. Y. The house is 84x88 ft. in plan and is in an exposed situation. 1800 w. Eng Rec—Nov. 9, 1895.

Hot Water Heating in a New York Residence. Illustrated description of a plant with an unusual amount of indirect heating installed under difficult conditions. 1300 w. Eng Rec—Aug. 20, 1898.

Hot Water Heating in a St. Louis Residence. Detailed illustrated description of hot water heating plant—closed system. 2800 w. Eng Rec—Jan. 25, 1896.

Hot Water Heating of a Danbury, Conn., Business Block. Describes the heating of the Nichols Block. The overhead system of supply is employed, and the heater is placed on the first floor, there being no basement. Ill. 600 w. Eng Rec—Nov. 13, 1897.

Hot Water Heating of a Residence. Illustrated detailed description giving plans of floors, and particulars of a design in hot water heating apparatus containing some unusual features. 450 w. Eng Rec—Nov. 23, 1895.

Hot Water Heating of a Residence. Illustrated description of a heating system with new features in the connections. 400 w. Eng Rec—Dec. 17, 1898.

Low Pressure Hot Water as a Heating Medium. Louis F. Pearson. Read at a meeting of the Inst. of Heat. and Ven. Engs., at Stourbridge. Compares low pressure hot water with other forms of heating apparatus, discussing the necessary qualifications of a desirable heating installation. 1500 w. Plumb & Dec—Aug. 1, 1899.

Low Pressure Hot Water Heating. J. Nelson Russell. Read at meeting of Inst. of Heat. and Ven. Engs., London. Considers this system efficient, easily attended to and economical. 2100 w. Met Work—Aug. 11, 1900.

Novel Residence Hot Water Heating Plant. Illustrated detailed description of a plant quite out of the common run, designed especially to meet unusual requirements. 1400 w. Heat & Ven—March 15, 1896.

Overhead Hot Water Heating System in Masonic Temple Building. Illustrated description of the system adopted at this large building in Staunton, Va., 1200 w. Met Work—Dec. 16, 1899.

The Dangers of Hot Water Heating Apparatus. Gives especial attention to dangers arising from frost, illustrating by examples. 3300 w. Builder—Oct. 29, 1898.

The Hot Water System for the Heating of Buildings. J. J. Blackmore. Illustrating and describing various systems of piping, boilers and radiators, with regard to the various adaptations to house heating, with data about proportions and performance. 4000 w. Eng Mag—Feb., 1898.

The Warming of Buildings by Hot Water. Ernest King. Read before Inst. of Junior Engs. Part first considers the low pressure system, in which the water in the apparatus is at one or more points open to the atmosphere. Serial. Prac Eng—Dec. 25, 1896.

**Hot Water and Steam.**—Manual of Steam and Hot Water Heating. Thomas E. McNeill. A detailed study of these systems. Ill. Serial. Met Work—March 17, 1900.

**Hot Water Central Station.**—Hot Water Heating from a Central Station. H. T. Yaryan. Illustrated description of the system of the Toledo Heating and Lighting Co. 3300 w. Trans Am Soc of Mech Engs, No. 852—May, 1900.

**Hot Water Electric Station.**—Central Station Heating in Connection with Electric Lighting Plants. W. H. Schott. Read before the Northwestern Elec. Assn. Advocates the installation of a hot water system. 700 w. Elec Rev, N. Y.—Jan. 24, 1900.

Utilizing Waste Heat from Electric Light Plants for House Heating. Considers in detail the requirements of the system. 5800 w. Dom Engng—Sept. 15, 1900.

**Hot Water Exhaust.**—An Exhaust Hot Water Heating Plant. Illustrated description of the heating plant of a school building on Staten Island. 1500 w. Eng Rec—Sept. 23, 1899.

**Hot Water Explosion.**—Explosions in a Hot Water Heater. William J. Baldwin. A statement of their cause. 700 w. Eng Rec—June 2, 1900.

**Hot Water Friction.**—Friction of Water in Hot Water Heating Pipes. J. H. Kinealy. Investigations which the writer has made in order to fix upon the proper formulae to be used in determining the friction in the pipes of hot water heating systems. 700 w. Heat & Ven—Nov. 15, 1896.

**Hot Water Furnace.**—A Hot Water Furnace for Heating a Residence. Illustrated description of a furnace which supplies both hot water and warm air. 900 w. Eng Rec—Oct. 28, 1899.

**Hot Water Pipes.**—The Calculations for Pipes for Hot Water Heating (Berechnung von Rohrleitungen für Warmwasserheizungen). H. Weiprecht. Deriving a formula for use in practice, and giving examples of computations. 1800 w. Gesundheits Ingenieur—Nov. 30, 1899.

**Hot Water Single Pipe.**—A Single Pipe System of Hot Water Heating. Illustrated description of heating system in the residence of H. E. Baumann, of Charlotte, Mich., which is said to be unusually effective and economical. 700 w. Met Work—Sept. 18, 1897.

See also **One Pipe System.**

**Hot Water-Steam.**—A Novel Steam Hot Water Heating Apparatus. The novelty of the system consists in the entire omission of air valves and air valve piping and also the possibility of controlling the temperature of the coils to suit the weather. Illustrated article. 900 w. Eng Rec—Jan. 23, 1897.

**Hot Water Supply.**—See **HOT WATER.**

**House Fires.**—See **COMBUSTION—House Fires; THERMOPHORE—Pillet.**

**Indirect.**—Indirect Heating in a New Haven Residence. Illustrated detailed description. 700 w. Eng Rec—Oct. 24, 1896.

Size of Registers and Flues for Indirect Heating. J. S. Bixby, Jr. Chart from which the size of flues for indirect heating may be taken off without any computation, and description of method for using the chart. 350 w. Met Work—Aug. 29, 1896.

**Indirect Hot-Water.**—Indirect Hot-Water Heating in a Rochester Residence. Illustrated description. 500 w. Eng Rec—March 28, 1896.

Indirect Hot Water Heating in a New York Residence. Illustrated description of a very extensive indirect system in which fans are provided for moving the air when the wind conditions are unfavorable. 1800 w. Eng Rec—June 23, 1900.

**Installations.**—Installation of Successful Heating Systems. Reviews the information necessary to decide upon the best system; discusses various systems and matters relating to their installation. 2000 w. Dom Engng—Dec., 1897.

**Intermittent.**—Heating Places of Worship and Other Buildings Not Having Regular Daily Use. Frederick Dye. Calls attention to heating by low-pressure steam, which the writer thinks especially adapted to the purpose, fulfilling every special requirement, and possessing no disadvantages. 1900 w. Dom Engng—April, 1897.

**Large Heaters.**—Economical Heating. Claims that large heaters will alleviate many of the ills complained of, and prove economical in consumption. 1200 w. Dom Engng—July, 1897.

**Library.**—See **LIBRARY—Providence, R. I.**

**Lily Pond.**—Heating the Lily Pond in Prospect Park. Describes the arrangements used in the Brooklyn park, making it possible to grow the tropical flowers. Ill. 800 w. Met Work—July 31, 1897.

**Lloyds Bank, London.**—Heating the Law Courts Branch of Lloyds Bank, Limited, London, England. Illustrated description of building and plant. 1700 w. Heat & Ven—May 15, 1896.

**Masonic Temple.**—Heating of the Utica Masonic Temple. Illustrated description of a direct and indirect system in a 8-story and basement building. 1000 w. Eng Rec—May 21, 1898.

**Medical Baths, Bellevue Hospital.**—Heating of the Medical Baths at Bellevue Hospital, New York City. Illustrated description of apparatus recently erected in this institution. 700 w. Eng Rec—June 20, 1896.

**Mineral Oils.**—Heating and Lighting with Mineral Oils. Dr. Stevenson Macadam. Abstract of paper read at the Royal Scottish Soc. of Arts. Discusses the dangerous character of oils, to what due, and the requirements for safety. 1800 w. Arch, Lond—Dec. 18, 1896.

**Office Building, N. Y.**—Heating of the Bowling Green Office Building, New York City. Illustrated description of a large plant requiring 23500 lineal feet, or 4½ miles of steam and return piping. 1500 w. Heat & Ven—April 15, 1897.

The Heating and Lighting of the American Surety Building. Illustrated description with plans of one of the most complete heating-plants, comprising the most advanced methods, that has yet been placed in a tall office building; with a description of the electric lighting installation, also comprising the latest improvements in the art. 3000 w. Eng Rec—March 7, 1896

See also **ELECTRIC PLANT; HEATING AND VENTILATION; MECHANICAL PLANT; STEAM PLANT; TALL BUILDING.**

**One-Pipe System.**—A One-Pipe System in a New York Building. Illustrated detailed description of installation in University Building, eleven stories high, and covers an area of 100x177 feet. All floors above the seventh are heated by the one-pipe system. 1400 w. Eng Rec—Sept. 19, 1896.

See also **Hot Water Single Pipe.**

**Philadelphia Bourse.**—The Heating and Lighting of the Philadelphia Bourse. Illustrated detailed description. 3000 w. Eng Rec—Feb. 1, 1896.

**Pipes.**—Proportioning of Circulating Pipes for Steam and Hot-Water Heating Systems. J. J. Blackmore. Examines the rules formulated by different engineers, showing their discrepancies and presents rules which the writer believes will establish safe ratios for all sizes of plants. 2400 w. Trans Am Soc of Heat & Ven Engs—Jan., 1898.

**Public Buildings.**—Heating of County Buildings, Mason City, Iowa. Illustrated description of a plant for independent buildings exposed to very cold weather. 800 w. Eng Rec—Feb. 4, 1899.

The Warming of Public Buildings. Frederic R. Farrow. A lecture delivered before the Sheffield Society of Architects and Surveyors. Considers hot air heating, hot water, low and high pressures, steam, etc. 8000 w. Jour of Roy Inst of Brit Archts—May 7, 1898.

**Radiating Surface.**—A Chart for Determining Radiating Surface. Gives a diagram for reading off readily the radiating surface of any room with either steam or hot-water heating. 700 w. Eng Rec—March 5, 1898.

The Utilization of Radiating Surface. A. J. Kingsley. A study of the subject with the view of finding means of discriminating as to the relative value of the different styles of radiators on the market. 1700 w. San Plumb—April 15, 1897.

Radiating Surface. Earnest T. Child. A comparison of the methods of determining the proper amount of radiating surface. 2200 w. Met Work—Nov. 11, 1899.

See also **Heating Surface.**

**Radiation.**—Estimates of Radiation. Knight. A simple, concise and reliable method for most cases is given, whereby the extent of heating surface for rooms differently located may be computed. 1800 w. Met Work—May 2, 1896.

Heat Imparted from Surfaces with Various Temperature Differences. Leicester Allen. Reply to a correspondent desiring to know the number of British thermal units given off per square foot of direct-radiating surface per hour in a hot-water system and by steam radiation, under stated conditions, with information on the computation of heating effect. 1200 w. Heat & Ven—Oct. 15, 1897.

**Radiators.**—Air in Radiators. J. H. Kinealy. Explains why air gives trouble and the devices used to free the radiator but gives no solution of the problem. 1800 w. Heat & Ven—June, 1899.

A Suggestion for Determining the Heating Surface of Indirect Radiators. H. Eisert. Read at Atlantic City meeting of the Am. Soc. of Heat & Ven. Engs. Showing that the relative value of a heating surface depends mainly on the arrangement of the surface and its condition, and gives the results obtained by careful study. 2200 w. Heat & Ven—July 15, 1898.

Some Relations Between the Arrangement of Heating Surfaces in Radiators, the Velocity of the Air Passing Over Such Surfaces, and Their Efficiency. H. Eisert. An analysis of the results from tests and a study under stated conditions. Serial. Heat & Ven—March 15, 1897.

The Manufacture of Radiators. H. Hansen. Illustrated detailed description. Serial. Heat & Ven—Sept. 15, 1896.

See also **Heating Surface.**

**Railway Station.**—Method of Heating Buildings where Three or More Stoves are Now Used. Report of committee as to best substitute for stoves in warming railway stations. 2500 w. Am Assn of Ry Supts of Bridges and Buildings.

See also **MECHANICAL PLANT.**

**Reflection System.**—A New System of Heating. Illustrated detailed description of a system in which reflection of heat is the underlying principle. 1400 w. Heat & Ven—Sept. 15, 1896.

**Regulation.**—Heat Regulation. Fred W. Powers. In a blast apparatus applied to a hot-air furnace. 600 w. Dom Engng—Jan., 1896.

**Ribbed Radiators.**—Concerning Ribbed Heating Tubes (Ueber Rippenheizkörper). A discussion of the best proportions for ribbed or "extended" radiating surfaces to obtain the greatest amount of heat from the steam or hot water within. 1200 w. Gesundheits Ingenieur—March 31, 1898.

**School.**—Heating of a Medford, Mass., School. Illustrated description. 1200 w. Eng Rec—Jan. 2, 1897.

Heating of the Malden (Mass.) High School. Illustrated detailed description. 1000 w. Eng Rec—Nov. 7, 1896.

Heating the School at Pocantico Hills, N. Y. Illustrated description of the heating arrangements in a building consisting of one story and basement. 1100 w. Met Work—Nov. 12, 1898.

Heating the West Hoboken School Building. Illustrated detailed description. 2000 w. Met Work—Oct. 13, 1900.

Hot-Air Furnaces for Small School-Houses. A statement of the opinions held in Boston, New York, Chicago, and Philadelphia, all being in favor of hot-water or steam heating. 1000 w. Eng Rec—Jan 20, 1900.

Notes on Heating of Schools (Einiges über Schulheizung). Discussing the various methods employed in Germany, including stoves, steam, hot water and hot air. Three articles. 10000 w. Gesundheits Ingenieur—April 15, 30, May 15, 1897.

See also **Hot Air Furnace; HEATING AND VENTILATION.**

**Sing Sing Prison.**—Heating of a Prison Mess Hall and Hospital. Brief illustrated description of building added at Sing Sing prison. 800 w. Eng Rec—Dec. 5, 1896.

**Steam.**—See **Hot-Water and Steam; STEAM HEATING.**

**Theatre.**—Heating a Theatre Plant in the Pabst Theatre, Milwaukee, Wis. Illustrated detailed description. 800 w. Dom Engng—Feb., 1896.

**Thermophore.**—See **THERMOPHORE.**

**Ulm Cathedral.**—See **Church.**

**Verity Plow Co.**—The Heating Plant of the Verity Plow Company, Brantford, Ont. Description and drawings of the heating and power plant being installed in the new works of this company. 1700 w. Ir Age—June 16, 1898.

**Wall and Ceiling Construction.**—The Construction of Walls and Ceilings with Regard to Their Influence on Warming (Die Bauart der Wände und Decken in ihrem Einfluss auf die Heizung). H. C. Nussbaum. Showing the influence of walls upon the efficiency of heating apparatus. 2500 w. Gesundheits Ingenieur—Oct. 15, 1899.

**Warehouse.** See **STEAM HEATING—Appraisers' Stores, N. Y.**

**Warm Air.**—See **Hot Air.**

## HEATING AND VENTILATION.

See also **HEATING; MECHANICAL PLANT; POWER PLANT; SANITATION; STEAM HEATING; VENTILATION.**

Heating and Ventilating Residences. James R. Willett. A series of office rules for architects' use in estimating the sizes of furnaces, etc., required to heat buildings. Serial. Dom Engng—Sept., 1896.

Heating and Ventilation. Warren C. Weatherly. General discussion of subject. 2000 w. San Plumb—Nov. 15, 1896.

New Method of Heating and Ventilation. Charles Carroll Gilman read at meeting of Am. Soc. of Civ. Engs. Describes experiments based on the fact that air rarified by heating will cause a circulation in the rooms of a building. 1100 w. Arch & Build—March 27, 1897.

Ventilation in Its Relation to Heating, etc. W. R. Maguire. Read before the British Inst. of Heat and Ven. Engs. Discusses some of the systems in use, and points worthy of attention. 5000 w. Plumb & Dec—Nov. 1, 1899.

Warming and Ventilation. T. Wilson Aldwinckle. Read before the London Arct't Assn. Discusses this subject in general, also mechanical and natural ventilation, and special ventilation and warming as applied to various classes of buildings. 5000 w. Builder—April 21, 1900.

**Armory, Cleveland, O.**—See **BUILDING CONSTRUCTION.**

**Auditoriums.**—Warming Auditoriums. Illustrated description of a method whereby, it is claimed, the engineer may control temperature without interfering with the ventilation of an auditorium. 900 w. Dom Engng—Sept., 1896.

See also **St. Louis Coliseum.**

**Bank.**—A Hot-Blast Gravity Steam-Heating Apparatus. Illustrated description of a sytem of heating and ventilation installed in a Utica bank building, an unusual feature of the work being the provision for the ventilation of many of the offices leased to tenants. 1500 w. Eng Rec—Nov. 4, 1899.

Heating and Ventilating of a Bank Building. Illustrated description. Indirect hot-water heating. Forced circulation of air. 1100 w. Eng Rec—July 11, 1896.

Ventilation and Heating of a Syracuse Bank Building. Illustrated description of the combined direct and indirect heating plant in a 10-story building with special ventilation for the banking rooms. 1500 w. Eng Rec—Nov. 5, 1898.

Ventilation and Heating of the Detroit State Savings Bank. Illustrated description of special plant for heating by direct radiation and ventilation by the downward system of air distribution. Both the plenum and exhaust system of ventilation are used. 1600 w. Eng Rec—Sept. 29, 1900.

**Blast.**—Forced Blast Warming with Furnaces. George W. Kramer. An able discussion of a method of warming and ventilating which appears to be coming into favor. It is a combination of forced circulation with warm air furnace heating. 4000 w. Met Work—Jan. 25, 1896.

Forced Draft System of Heating and Ventilation. R. C. Carpenter. A very elaborate article on an important subject. It discusses, and gives in tabulated form, data upon volume of air discharged at various pressures and many other quantities. 2400 w. Heat & Ven—Dec. 15, 1895.

Heating and Ventilation by the Hot Blast System. F. H. Green and T. Weinshenk. Experiments with plant at the High School building at Champaign, Ill., with illustrated description of the heating and ventilating apparatus. 1400 w. Tech—May, 1896.

The Fan and Furnace System of Heating and Ventilation. Walter B. Snow. The system is claimed not to be new, as some have supposed. An instance of a successfully working apparatus of this kind, as erected in the mansion and greenhouses of Baron Hugel, at Schönbrunn, Germany, 45 years ago is given, and it is also stated to have been used for heating large factories in England about the same time. The introduction of small cheap motors now promises to greatly extend the use of the system. 1000 w. Met Work—Feb. 1, 1896.

See also **HEATING.**

**Blower System.**—A Blower System of Furnace Heating. Illustrated description of the system of heating and ventilation used in school No. 2, East Albany, N. Y. 1300 w. Met Work—July 31, 1897.

Ventilation and Heating. W. .. Snow. Read before the Applied Science Soc. of McGill Univ. Illustrates and describes the hot-blast apparatus for combined heating and ventilating, and discusses other systems. Serial. Can Engr—July, 1900.

See also **Fan System.**

**Boston Library.**—See **STEAM PLANT.**

**Calculations.**—An Attempt to Systematise Calculations Where Heating is to be Accomplished Entirely or Partly by Air Introduced for Ventilation. H. Eisert. The object of the paper is to define the relations to each other of those conditions which must be considered wherever heating is to be accomplished by this method. Serial. Heat & Ven—Nov. 15, 1897.

**Capitol, Harrisburg, Pa.**—Heating and Ventilation of the Pennsylvania State Capitol. Brief description, with engravings. The building has been destroyed by fire. 400 w. Heat & Ven—March 15, 1897.

**Capitol, Washington.**—Proposed Changes in the Hall of the House of Representatives. A review of the official reports on ventilation and heating of the hall. 1800 w. Eng Rec—March 25, 1899.

**Central Plant, Vienna.**—Examples of Small Central Heating and Ventilating Plants (Beispiele Kleinerer Centralheizungs-und Ventilationsanlagen). Showing large hot air furnace system for warming and ventilation, as applied to a theatre and a charitable institution near Vienna. 2500 w. Wiener Bauindustrie Zeitung—Dec. 28, 1897.

**Church.**—Heating and Ventilating of Large Churches. H. B. Prather. Abstract from paper read at the meeting of the Am. Soc. of Heat. and Vent. Engs. The exact requirements of each particular case carefully ascertained, should be the basis of the whole procedure in the design of the plant, in which co-operation of the architect and engineer are considered as essential to high success. 2600 w. Mas St Fit—Feb., 1896.

Heating and Ventilating Churches. An instructive chapter, reprinted from book by George W. Kramer, touching on the essential features. 6000 w. Met Work—Aug. 21, 1897.

Heating and Ventilating of Large Churches. Henry B. Prather. Paper read before the Am. Soc. of Heat. & Ven. Engs. How to proceed from beginning to end—architect and heating engineer co-operating—in order to achieve marked success in heating and ventilating churches. Causes of failure are stated, and remedies for them suggested. A good paper, with discussion. 3500 w. Heat & Ven—Feb., 1896.

**Church, Brooklyn.**—Heating and Ventilating a Brooklyn Church and Chapel. Illustrated detailed description of a church heated chiefly by indirect radiation, with some supplementary direct radiation, and in which the ventilation is effected, both winter and summer, by a fan blower driven by a gas engine. 1100 w. Eng Rec—May 9, 1896.

Heating and Ventilating the First Baptist Temple, Brooklyn, N. Y. Illustrated detailed description. 1800 w. Eng Rec—Aug. 29, 1896.

**Church, Chicago.**—A Church Heating and Ventilating System. Illustrates and describes the system adopted for the Presbyterian Church at Sixty-second street and Woodlawn avenue, Chicago, Ill. A special feature is the free circulation of warmed air by means of specially constructed and arranged ventilators, with the aid of small gas heaters placed at the bottom of the ventilating shafts. 1800 w. Met Work—June 25, 1898.

**Church, Erie, Pa.**—The Heating and Ventilation of Central Presbyterian Church and Sunday School, Erie, Pa. Illustrates and describes the installation of a fan system in a building provided only for a system of direct heating. 1200 w. Heat & Ven—Feb. 15, 1898.

**Church, Montclair, N. J.**—Ventilation and Heating of a Montclair, N. J., Church. Illustrated description of the arrangement of a church with unusually complete appointments, using both direct and indirect systems of steam heating. The method followed in computing the heating apparatus is explained in some detail. 1500 w. Eng Rec—July 14, 1900.

**Church, Newark, N. J.**—Ventilating and Heating of a Newark church. Illustrates and describes a system with some direct radiation, supplemented by a heated fresh air supply intended to furnish one-third the total heat. Circulation of air in the church is obtained in an unusual manner. 1400 w. Eng Rec—Dec. 31, 1898.

**Church, Philadelphia.**—Heating and Ventilation in the George W. South Memorial Church of the Advocate, Philadelphia, Pa. Brief description of one of the most magnificent churches in the United States, with detail drawings of heating and ventilating plant. The installation is a system of indirect radiation, supplemented by a blower with tempering coils. 1500 w. Heat & Ven—June 15, 1898.

**Clinic.**—See also **CLINIC BUILDING—Philadelphia.**

**Club House.**—Lighting, Heating and Ventilating a Club House. Illustrated description of changes made at the Whist Club of New York. 2000 w. Met Work—Sept. 8, 1900.

**Columbia University.**—The Heating and Ventilating of Columbia University. G. A. Suter. An explanation of the theory of the heating and ventilating apparatus, describing the details necessary to a proper understanding of the subject. 6000 w. Sch of Mines Quar—July, 1898.

**Convention, Berlin, 1896.**—The First Convention of Warming and Ventilating Engineers, Berlin, 1896 (Die I. Versammlung von Heizungs-und Lüftungs-Fachmännern in Berlin, 1896). Containing a general report of the progress and present state of the art of warming and ventilation in Germany. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—March 5, 1897.

**Corcoran Gallery, Washington.**—Heating and Ventilation Apparatus of the Corcoran Gallery of Art, Washington, D. C. Illustrated detailed description. 1600 w. Eng Rec—Sept. 5, 1896.

**Cornell Test.**—A Test of the Heating and Ventilating Plant, New York State Veterinary College, Cornell University, Ithaca, N. Y. R. C. Carpenter. Gives description of buildings and plant, with report of investigations made and results. The fan system is used controlled by thermostats. Ill. 11500 w. Trans Am Soc of Heat & Ven Engs—Jan., 1898.

**Court House, Louisville, Ky.**—Heating and Ventilation of the Jefferson County Court House, Louisville, Ky. Illustrated description of building heated by the fan system. 800 w. Heat & Ven—Aug. 15, 1897.

**Court House, Munich.**—The Heating and Ventilating of the New Court House at Munich (Die Heizung und Lüftung im Neuen Justiz-Gebäude in München). A general description of this important work, presented before the Munich convention of the Society of Heating and Ventilating Engineers. 3500 w. Gesundheits Ingenieur—Nov. 15, 1898.

**Court House, New York.**—Ventilation and Heating, Appellate Court House, New York. Illustrated description of a dual plant, one for operation during the hours when many parts of the building are liable to be crowded, and the other for the period from 5 p. m. to 6 a. m. 2700 w. Eng Rec—May 12, 1900.

**Custom House.**—Heating and Ventilating of a U. S. Custom House. Illustrated detailed description. Low pressure exhaust steam is used, and a combination of direct, direct-indirect and indirect radiators is employed, the indirect radiators being supplied with air by fans, etc. 1000 w. Eng Rec—April 4, 1896.

**Dormitories.**—Ventilation and Heating of the University of Pennsylvania Dormitories. Illustrated description of the methods of heating a large number of small rooms and ventilating them by the plenum system. 1800 w. Eng Rec—Sept. 8, 1900.

**Engineering.**—Heating and Ventilating Engineering. Calls attention to the demands made on architects, and the growth of these two allied branches, demanding expert service. Also discusses the commissions paid architects and their need of being increased. 2200 w. Am Arch—March 20, 1897.

**English Practice.**—English Practice in the Warming and Ventilation of Technical and Art Schools. Paper prepared by Frank Ashwell and revised and edited by D. M. Nesbitt. Describes a mechanical system which is a combination of the plenum and vacuum systems, and discusses briefly the theory of the methods adopted. 7000 w. Trans Am Soc of Heat & Ven Engs—Jan., 1898.

**Exchange, Buffalo.**—Heating and Ventilation of the Buffalo Real Estate Exchange. Illustrated description of apparatus designed in connection with the designing of the building, and which is a decidedly great improvement on the usual custom. 2500 w. Heat & Ven—Nov. 15, 1896.

**Factory.**—Heating and Ventilating a Five-Story Factory. Illustrated detailed description of the system used in the White Dental Factory, Philadelphia, Pa. 1800 w. Eng Rec—June 19, 1897.

**Fan Furnace System.**—Fan Furnace System of Heating and Ventilation. George W. Kramer. Essentials to good results in this system are definitely stated and the article is of general practical value. 2000 w. Heat & Ven—March 15, 1896.

**Fan System.**—Fan System of Heating and Ventilating the Central Telephone Building, Paris, France. Brief illustrated description of the apparatus and novel features, with an account of an unusual method of procuring fuel and attendance. 1000 w. Heat & Ven—Dec. 15, 1898.

Heating and Ventilating. Illustrated description of a fan system as applied in the Jackson school, in St. Louis. 1600 w. Dom Engng—Oct. 15, 1900.

Heating and Ventilation of the Infirmary of the Indiana Reformatory, Jeffersonville, Ind. Illustrated description of a first-class fan system of heating and ventilation, which can be installed at small expense. Plans and data of the plant in the building named are given. 1100 w. Heat & Ven—May 15, 1898.

The Fan System of Heating and Ventilating as Applied to Court Houses. Describes the system, giving illustration. 1700 w. Dom Engng—Oct., 1898.

See also **Blast; Blower System.**

**Forced Circulation.**—Mechanical Ventilation and Heating by a Forced Circulation of Warm Air. Walter B. Snow. Lecture delivered before the Engs'. Club of Yale University. A description of this system, with information concerning methods, costs, etc. Ill. 3500 w. Yale Sci M—Jan., 1900.

Mechanical Ventilation and Heating. Illustrated abstract of lecture by Walter B. Snow on the financial advantages of mechanical draft and ventilation. 2200 w. Eng Rec—April 21, 1900.

Heating and Ventilating Church and Parish Buildings by Forced Draft. B. H. Carpenter. States the conditions to be met and method of obtaining the required results. 1100 w. Trans Am Soc Heat & Ven Engs—Jan., 1898.

**Formulas.**—German Formulas and Tables for Heating and Ventilating Work. J. H. Kinealy. The first of a series of articles containing information translated from the German, principally relating to the determination of the radiation surface required by different systems of heating to supply the heat lost through walls of different kinds. 1100 w. Met Work—June 18, 1898.

**Foundry.**—Heating and Ventilating Plant in the McCormick Harvesting Machine Company's Foundry. J. I. Lyle. Illustrated description of the fan system installed in a Chicago foundry. 1700 w. Foundry—Feb., 1900.

**French.**—French Methods of Heating and Ventilating. G. Debesson. Principal French methods will be described. Part first deals with the possibilities of the introduction of American goods and methods. 1300 w. Heat & Ven—Oct. 15, 1896.

**Furnace.**—A Ventilating System in Connection with a Furnace. Detailed description of a system in operation during last winter in the residence of J. P. Watson, Flatbush, N. Y., used in connection with a Thatcher furnace. 2000 w. Met Work—Dec. 18, 1897.

**Furnace, Schools.**—Ventilation and Heating of School Buildings with Furnaces. J. L. Bixby, Jr. A practical essay profusely illustrated in which the subject is ably treated. 2000 w. Met Work—June 20, 1896.

See also **School.**

**Gas.**—The Heating and Ventilating of the School House at Neuhausen by Use of Gas (Gasofenheizungs und Lüftungsanlage im Schulhause zu Neuhausen). A paper before the Munich convention of Heating and Ventilating Engineers. Fuel gas, generated from coke, is used. 5000 w. Gesundheits Ingenieur—Nov. 30, 1898.

See also **GAS HEATING.**

**Greenhouses.**—Heating and Ventilation with Regard to Greenhouses. Robert W. King. Read before the Can. Hort. Assn., at Montreal. Conclusions from experience as to the best means of securing economic and efficient heating. 6300 w. Can Archt—Sept., 1900.

See also **Horticultural Buildings; GREENHOUSE; HEATING.**

**Home for Aged.**—Ventilation and Heating of the Methodist Episcopal Home for the Aged, Philadelphia. Illustrated description of a plenum system in a building having an unusual amount of exterior wall surface in proportion to its floor area, and a more exposed location than structures usually heated in this way. 2500 w. Eng Rec—April 28, 1900.

**Horticultural Buildings.**—The Warming and Ventilating of the Horticultural Buildings at the Hamburg Exposition (Heis und Luftwesen auf der Gartenbauausstellung in Hamburg). With full details of the hot water system of these important buildings especially intended as a model plant. 3500 w. Zeitschr d Ver Deutscher Ing—Nov. 27, 1897.

**Horticultural Hall.**—The Mechanical Plant, Horticultural Hall, Philadelphia. A description, with floor plans, giving special attention to the heating, ventilation and lighting arrangements. 2800 w. Eng Rec—Nov. 28, 1896.

**Hospitals.**—A Model Hospital. Frederick Baumann. Discusses the principles that should govern hospital erection, with special reference to the heating and ventilation. 2600 w. In Arch't—May, 1899.

An English System of Hospital Warming and Ventilation. Review of statement of present practice made by T. Wilson Aldwinckle before the Arch. Assn. of London. 800 w. Eng Rec—June 2, 1900.

See also **HEATING—Hospital; Hot Water; HOSPITAL—Brook, Kent.**

**Hospital, Albany.**—Ventilating and Heating the City Hospital, Albany. Illustrated account of the special features of a large one-pipe system of heating by direct-indirect radiation, with a natural system of ventilation. 1800 w. Eng Rec—May 26, 1900.

**Hospital, Detroit**—Ventilation of a Detroit Hospital. Illustrated description of a heating and ventilating plant designed and installed by the Am. Blower Co., of Detroit. 1300 w. Eng Rec—Feb. 20, 1897.

**Hospital, Kalamazoo.**—Heating and Ventilating Fletcher Hospital, Kalamazoo, Mich. Illustrates and describes a fine installation. 1500 w. Heat & Ven—April, 1899.

**Hospital, New York.**—Ventilating and Heating a New York Hospital. Illustrated description of an interesting application of the indirect hot-blast system in the Hospital for the Ruptured and Crippled. The ventilation is effected by the use of exhaust fans placed on the roof. 1300 w. Eng Rec—Aug. 6, 1898.

**Hospital, Railway.**—Heating and Ventilation of the Atchison, Topeka and Santa Fé Railway Hospital. Illustrated description of the building and its fan system of heating. 900 w. Heat & Ven—Dec. 15, 1896.

**Hospital, Rome.**—Engineering in Italy. Ettore de Castro. General remarks with an illustrated description of the heating and ventilating plant in the largest hospital in the world—the Policlinic Umberto I degree, in Rome. 2500 w. Power—July, 1898.

**Hotel Waldorf-Astoria.**—Ventilation of the Astoria Hotel, New York City. A general description of the hotel and the ventilating plant, which has a capacity of 15,000,000 cu. ft. of air per hour. The air is moderately warmed and the heating of the rooms is by direct radiation. Ill. Serial. Eng Rec—March 19, 1898.

**House.**—See also **SANITATION—House.**

**Lewis Institute, Chicago.**—Heating and Ventilating of the Lewis Institute, Chicago, Ill. Illustrated detailed description. 2200 w. Heat & Ven—Sept. 15, 1896.

**Library, Boston.**—See **STEAM PLANT.**

**Library, Congressional.**—Heating and Ventilation of the Congressional Library. Part first gives an illustrated general description, floor plans, and distribution of flow and return pipes. 2400 w. Eng Rec—May 1, 1897.

**Library, Illinois University.**—The Heating and Ventilating of the Library of the University of Illinois. James M. White. The system adopted is the "plenum" or fan system. The conditions to be complied with are given, with illustrated detailed description of work. 1800 w. Heat & Ven—Nov. 15, 1897.

**Masonic Temple, Albany, N. Y.**—Heating and Ventilating of the New Masonic Temple at Albany, N. Y. Illustrated description. 800 w. Eng Rec—July 18, 1896.

**Mechanical Systems.**—Recent Systems of Heating and Ventilation. R. C. Carpenter. Presents the advantages of the mechanical system. Part first is introductory to a study of the different forms of fans and of the experiments which have been made relating to their use. Serial. Heat & Ven—Oct. 15, 1898.

**Metropolitan Museum.**—Ventilation and Heating in the Metropolitan Museum of Art, New York. Illustrated description of a plant designed to show no source or method of heating to the observer. Fresh tempered air is forced through hidden direct radiators. 2200 w. Eng Rec—Aug. 18, 1900.

**Mill.**—A Mill Ventilating and Heating Plant. Illustrated description of a hot-blast plant for a large paper mill. 1000 w. Eng Rec—Aug. 12, 1899.

Warming and Ventilation of Mills. A summary of the advice given by S. Horner Woodbridge for work of this sort. 2600 w. Eng Rec—May 5, 1900.

**Mills Hotel, N. Y.**—Heating, Ventilating and Sanitary Equipment of a Modern Hotel. C. Wadsworth, Jr. Read at Atlantic City meeting of the Am. Soc. of Heat. & Ven. Engs. Illustrated description of this New York hotel, designed for the accommodation of men who receive low wages. 6000 w. Engr, N. Y.—July 15, 1898.

The New Mills Hotel, New York City. Describes briefly the plan of Mills House. No. 2, giving illustrated description of the ventilation and heating plant. 2000 w. Eng Rec—Oct. 8, 1898.

**Modern Practice.**—Modern Practice in Steam Heating and Ventilation. William S. Monroe. Chapter first describes the methods used in heating buildings of different classes and is introductory to more detailed information. Serial. Eng Rec—April 15, 1899.

**Office Building.**—Heating and Ventilating Large Office Buildings. Thomas Barwick. Discusses the different systems employed giving the writer's preference, and reasons. 2000 w. Heat & Ven—April 15, 1897.

See also Tall Buildings; **ELECTRIC PLANT; HEATING; MECHANICAL PLANT; STEAM PLANT; TALL BUILDING.**

**Office Building, Minneapolis.**—Heating and Ventilation of the Wyman-Partridge Building, Minneapolis, Minn. Illustrated detailed description. 1200 w. Heat & Ven—April 15, 1898.

**Office Building, New York.**—Ventilating and Heating of the Singer Building, New York City. Illustrated description of a plant which supplies fresh air to every room of a ten-story building. The direct-indirect system is employed. 2000 w. Eng Rec—Sept. 3, 1898.

**Opera House, Cazenovia, N. Y.**—Heating Installation in Cazenovia Opera House. Illustrated description of heating and ventilating plant. Direct-indirect radiators. 500 w. Heat & Ven—Dec. 15, 1897.

**Paris Exposition.**—Description of Arrangement for Heating and Ventilating Exhibit at Paris Exposition, 1900. W. F. Wolfe. Read at the Saratoga meeting of the Am. Soc. of Heat. & Ven. Engs. Information regarding space, classification, attendance, etc. 2000 w. Heat & Ven—July, 1899.

**Parliament, London.**—Ventilation and Warming. W. T. Sugg. General consideration of the subject, with special reference to the work of warming and ventilating the Houses of Parliament. 4400 w. Arch, Lond—Dec. 6, 1895.

**Penitentiary.**—Heating and Ventilation of the Tennessee State Penitentiary. Illustrated detailed description of plant furnished by the American Blower Co. 1000 w. Eng Rec—Oct. 9, 1897.

**Philadelphia Protectory.**—The Roman Catholic Protectory of Philadelphia, Pa. Illustration of the building and the mechanical plant for heating and ventilating. 2500 w. Eng Rec—Dec. 18, 1897.

**Planning.**—Planning the Work. This article is an able argument for careful planning of heating and ventilating installations, with examples of practice. 1200 w. Mas St Fit—Feb., 1896.

**Post-Office.**—The Heating of a Small Post-Office Building. Describes and illustrates an unusual, though simple, system of ventilation and heating. 600 w. Eng Rec—July 16, 1898.

**Post-Office, Amsterdam.**—Ventilation and Heating of Post-Office, Amsterdam, Holland. Illustrated description of the heating of a new Dutch public building by direct hot-blast, except during the coldest weather, when direct steam radiation is used. 900 w. Eng Rec—March 11, 1899.

**Post-Office, Detroit.**—Heating and Ventilation of the Detroit Post-Office. Illustrated description of a plant planned with more than ordinary care. Serial. Eng Rec—July 31, 1897.

**Post-Office, Lowell, Mass.**—Hot-Water Heating and Ventilating of the U. S. Post-Office Building at Lowell, Mass. Illustrated detailed description. 1400 w. Eng Rec—May 16, 1896.

**Post-Office, Omaha.**—Ventilation and Heating of the Omaha Post-Office. Illustrates the plant in a four-story public building covering 167x188 feet. Low-pressure exhaust steam is used, and a modified double-duct system is employed, with supplementary direct and direct-indirect radiation on the different floors. 1200 w. Eng Rec—May 7, 1898.

**Pottery.**—Ventilation and Heating of the Rookwood Pottery, Cincinnati. Illustrated description of the mechanical plant which is relied on for the entire heating of a pottery devoted exclusively to the highest branches of ceramics. 1300 w. Eng Rec—Jan. 13, 1900.

**Public Buildings.**—Combined Heating and Ventilation of Public Buildings. J. D. Sutcliffe. Read before the Manchester Soc. of Architects. Part first discusses warming by direct and indirect radiation and gives reasons for adopting the warm air system. Serial. Heat & Ven—Jan. 15, 1897.

Combined Warming and Ventilation of Public Buildings. J. D. Sutcliffe. Read before the Manchester Society of Architects. Consists of an introduction and discussion of warming by direct and indirect radiation; three systems of central heating; reasons for adopting the warm air system; warming and ventilation without mechanical power; mechanical ventilation; with description of some installments and practical hints. 4800 w. Arch & Build—Aug. 1, 1896.

Ventilation and Heating of Public Buildings,

P. H. Bryce. Read before the Engng. Soc. of the Sch. of Prac. Science, Toronto. Discusses the house air, and means whereby it may serve the requirements of health. 5400 w. Can Archt—July, 1900.

**Public Buildings, Boston.**—A Study of the Heating and Ventilating Plants in the Suffolk County Court House and the Massachussetts State House, Boston. Percy N. Kenway. A comparison of results in two buildings very nearly alike in size, exposure, and conditions of use, but supplied with radically different heating plants. A very interesting and instructive study in the art of heating and ventilation. Ill. 5300 w. Jour of Assn of Engng Soc—Oct., 1895.

Study of the Heating and Ventilating Plants in the Suffolk County Court House, and the Massachusetts State House, Boston. Percy N. Kenway. Read before the Boston Society of Civil Engineers. Very full illustrated detailed description. 5600 w. Heat & Ven—April 15, 1896.

**Railway Shop.**—Ventilation and Heating of a Railroad Shop. Illustrated description of the plant by which a number of large detached shops are heated by an air supply from a single source. 1400 w. Eng Rec—Feb. 18, 1899.

**Railway Station.**—Ventilation and Heating of the Nashville Union Station. Illustrated description of an unusual plant in a 145x149 ft. building, 5 stories high. 3000 w. Eng Rec—Feb. 24, 1900.

**Registers and Flues.**—Dimensions of Registers and Ventilating Flues. R. C. Carpenter. From "Heating and Ventilating Buildings." Presented largely in tabular form. 1800 w. Heat & Ven—May 15, 1896.

**Reichstag, Berlin.**—The Warming and Ventilating of the Reichstags Building in Berlin (Die Heizungs-und Lüftungsanlage des Deutschen Reichstagshauses in Berlin). Karl Schmidt. A very fully illustrated description of this large plant, recently installed in the buildings of the German Capital, at a cost of $200,000. Two articles, 1 plate. 7500 w. Gesundheits Ingenieur—June 15 and 30, 1897.

Heating and Ventilation in the New Reichstag Building at Berlin (Die Heizung und Lüftung im neuen Reichstagsgebäude). Statement of the requirements, and details of the final installation. 1800 w. Wiener Bauindustrie Zeitung—Oct. 29, 1800.

**Residence.**—See also **PLUMBING.**

**School.**—Heating and Ventilating of School-houses. R. C. Carpenter. A description of some of the methods employed, with suggestions for proportioning and constructing such systems. Ill. 6600 w. Br Build—March, 1900.

School House Warming and Ventilation. S. H. Woodbridge. Discusses the peculiar conditions of the problems and their solution. Serial. Eng Rec—Oct. 22, 1898.

School Ventilating and Heating Apparatus. Review of a report by Alfred R. Wolff, describing the bad features in a high-school he examined, and giving his recommendations for their removal. 1500 w. Eng Rec—March 24, 1900.

Ventilation Practically Considered. An extract on the heating of school buildings from a work published by Rufus R. Wade. 3800 w. Met Work—Dec. 12, 1896.

See also **English Practice; Furnace, Schools; SCHOOL—Vermont.**

**School, Baltimore.**—Ventilation and Heating of a Baltimore School House. Illustrated account of the system of mechanical draft heating, which can be adopted where the climate is temperate. 1200 w. Eng Rec—Jan. 6, 1900.

**School, Bayonne, N. J.**—Heating and Ventilating a Bayonne (N. J.) School. Illustrated description of a low-pressure steam heating and ventilating system. 1200 w. Met Work—March 12, 1898.

**School, Boston.**—Some Engineering Features of a Boston School. Illustrated description of the plant in the Mayhew High School, which is noteworthy for the method of spraying water into the heated air. 1800 w. Eng Rec—March 25, 1899.

**School, Detroit.**—Heating and Ventilation of the Central High Schood, Detroit, Michigan. Illustrated description. 1800 w. Eng Rec—Dec. 19, 1896.

**School, Duluth.**—Heating and Ventilating the Adams School, Duluth, Minn. A full description of the installation, with plans. The building having been recently enlarged, a remodelling of the heating and ventilating plant became necessary. 1000 w. Eng Rec—Dec. 14, 1895.

**School, Erie, Pa.**—Heating and Ventilating of Public School No. 14, Erie, Pa. Floor plans and description clearly shows the arrangement of the system. 600 w. Heat & Ven—May 15, 1897.

**School, Fitchburg.**—Heating and Ventilation of the Fitchburg (Mass.) High School. Illustrated detailed description. 1800 w. Heat & Ven—June 15, 1896.

**School, Freehold.**—Heating and Ventilation of the Freehold High School. Illustrated detailed description with plans. 1600 w. Heat & Ven—Feb. 15, 1896.

**School, Illinois.**—Heating the Eastern Illinois State Normal School. Illustrated description of a building heated and ventilated by what is known as the double type of the plenum system. 1000 w. Met Work—Aug. 13, 1898.

**School, Johnstown, Pa.**—Heating and Ventilation of the Union Street School Building, Johnstown, Pa. Illustrated detailed description. 500 w. Heat & Ven—Sept. 15, 1896.

**School, London.**—Ventilation and Warming. Extracts from a report by W. Napier Shaw, on the ventilation and warming in certain of the Metropolitan Poor Law Schools, giving the writer's views on ventilation. Serial. Arch, Lond—Sept. 23, 1898.

**School, Melrose, Mass.**—Ventilation and Heating of the Melrose, Mass., High School. Illustrated description of a hot-blast system with the engine using steam at the same pressure (15 lbs.) employed in the coils. 2000 w. Eng Rec—Jan. 7, 1899.

**School, Milwaukee.**—A Model Heating and Ventilating System and Down Draft Forge Shop. An illustrated description of the apparatus used and plan of installation in the West Side High School Building of Milwaukee, and the down draft method of removing smoke in the forge shop of the same school. 1100 w. Heat & Ven—Aug., 1899.

**School, New Brunswick.**—Ventilation and Heating of a New Brunswick School. Describes and illustrates a small school ventilated and heated on the indirect blower system, with double ducts and air mixing at the base of the flues. 900 w. Eng Rec—Dec. 10, 1898.

**School, New Haven, Conn.**—Heating of a New Haven School. Illustrated description of the heating and ventilating plant of the Northern school building. 1300 w. Eng Rec—April 17, 1897.

**School, N. Y.**—Heating and Ventilating Apparatus for Public School Building No. 122, Northeast Corner First Ave. and Ninth St., New York. Illustrated detailed description. 8500 w. Heat & Ven—Aug. 15, 1898.

Heating and Ventilation of the Twenty-third Ward Grammar School, New York City. Illustrated detailed description. 1300 w. Heat & Ven—Sept. 15, 1897.

Ventilation and Heating of a New York School. Illustrates and describes an interesting plant in a New York City School. The building is heated by direct radiation. 2000 w. Eng Rec—May 27, 1899.

**School, Pittsburg.**—Automatic Heat Control in School House Ventilation. Illustrated description of an interesting arrangement used in the school building, corner of Carson and Tenth streets, in Pittsburg, Pa. 3000 w. Eng Rec—Dec. 4, 1897.

**School, Salem, Mass.**—Warming and Ventilation of the State Normal School Building, Salem, Mass. Illustrated description. The specially interesting features are in the compactness of the systems of air ways, and in the resulting economy of floor and room space; in the reduced cost and methods for the economising of heat. 2300 w. Eng Rec—Aug. 21, 1897.

**School, Saugus, Mass.**—Heating, Ventilating and Plumbing the Grammar School at Saugus, Mass. Illustrated detailed description. 2300 w. Met Work—May 8, 1897.

**St. Joseph's Home, Troy, N. Y.**—Heating and Ventilating St. Joseph's Home, Troy, N. Y. Describes a combination system of direct and indirect hot water radiation with some use of direct-indirect. Ill. 1500 w. Heat & Ven—Oct., 1899.

**St. Louis Coliseum.**—Heating and Ventilation of the St. Louis, Missouri, Coliseum. Illustrated description of the plant installed in a very large building. 1200 w. Heat & Ven—Oct. 15, 1897.

**Siegel-Cooper Store.**—Heating and Ventilation of the Siegel-Cooper Co.'s "Big Store." Illustrated description. 1100 w. Heat & Ven—June 15, 1897.

**Sloane Mansion, N. Y.**—Ventilation and Heating of a Large New York Residence. Illustrated description of the plant in the W. D. Sloane mansion, which includes both indirect heating and a modified hot blast system. 3300 w. Eng Rec—Dec. 23, 1899.

**Society Meeting.**—Semi-Annual Meeting of the American Society of Heating and Ventilating Engineers. An account of the first semi-annual meeting with president's address, abstracts of papers read, business, etc. 9000 w. Met Work—June 26, 1897.

**Spreckles Mansion.**—See **PLUMBING.**

**Stables.**—Ventilating and Warming Stables. Considers the proper area of floor space for stables and also the cubic space, and the quantity of fresh air required both summer and winter. 1800 w. Heat & Ven—Dec. 15, 1896.

Ventilating and Warming Stables. A dissertation upon the essentials of warmth and ventilation necessary to maintain the health of horses kept in stables; the amount of cubic space required per horse and the proper size of stalls. 2000 w. Can Arch—Oct., 1896.

See also **STABLE.**

**Tall Buildings.**—Some Points Regarding the Ventilation and Heating of Tall Buildings. Henry C. Meyer, Jr. Discusses various types of apparatus used. 2500 w. Dom Engng—July, 1899.

See also **Office Buildings.**

**Telephone Building, Paris.**—See **Fan System.**

**Theatre.**—Heating and Ventilation of the Montauk Theatre. Illustrated detailed description. The ventilation apparatus is designed for cooling the building in summer, by the use of ice. 1500 w. Heat & Ven—Dec. 15, 1895.

The Heating and Ventilation of the German Theatre, Chicago. Illustrated detailed description with plans of basement and each story. A good study in heating. 2300 w. Eng Rec—Dec. 7, 1895.

**United States.**—Modern Methods of Heating and Ventilating Buildings as Practiced in the United States. James J. Lawler. Discusses methods in the use of steam and hot water. Ill. 3000 w. Cal Arch't—Feb., 1900.

**University of Pennsylvania.**—Ventilation and Heating of the Law School Building, University of Pennsylvania. Illustrated description of a system of warming by a heated supply of fresh air and ventilation on the plenum system, with numerous special details of construction. 3300 w. Eng Rec—June 16, 1900.

**Workmen's Dwellings.**—See **WORKMEN'S DWELLING—Internal Arrangement.**

**Y. M. C. A. Building.**—Heating and Ventilation of the West Side Branch Y. M. C. A. F. R. Harris. Illustrated description. 1500 w. Heat & Ven—Jan. 15, 1897.

## HEATING POWER.

See **CALORIFIC VALUE.**

## HEAT RADIATION.—See also MECHANICS; PHYSICS.

Certain Optical and Electro-Magnetic Properties of Heat-Waves of Great Wave-Length. H. Rubens and E. F. Nichols. Describes apparatus used, gives results obtained, and describes experiments. Serial. Phys Rev—Aug., 1897.

**Photographing.**—A Photographic Method of Recording Emissions of Heat (Sur un Mode d'Euregistrement Photographique des Effluves Thermiques). A memorandum by M. Guébhard, presented to the French Academy by M. Lippmann. By the use of a bath of diamido-phénol the heat radiation may be photographed in a manner similar to magnetic lines of force with iron filings. 1000 w. Comptes Rendus—Nov. 22, 1897.

## HEAT TRANSMISSION.

See also **BOILER; CYLINDER CONDENSATION; HEAT CONDUCTIVITY; STEAM ENGINEERING.**

The Transmission of Heat and Accompanying Phenomena (Ueber Wärme Durchgang, und die darauf bezüglichen Versuchsergebnisse). Dr. Richard Mollier. Experimental and mathematical investigation of the transmission of heat through various materials and under various conditions. Two valuable papers. 12000 w. Zeitschr d Ver Deutscher Ing—Feb. 6 & 13, 1897.

The Transmission of Heat Through Metals from Steam to Water. A. W. Richter. Illustrated description of tests made to furnish formulas for estimating the transmission of heat in boilers, feed water heaters, etc. 4000 w. Eng Rec—Nov. 11, 1899.

**Copper Coils.**—Transmission of Heat Through Copper Coils. Discusses many experimental results and shows the need of more data. 1000 w. Eng Rec—March 5, 1898.

**Locomotive Boiler.**—See **LOCOMOTIVE BOILER.**

**Metal Plates.**—The Transmission of Heat Through Plates from Hot Gases to Water. George Halliday. A paper read at the Sheffield, Eng., meeting of the Institution of Engs. and Shipbuilders in Scotland. Presents the leading known facts on this question. Serial. Ind & Ir—June 24, 1898.

Transmission of Heat Through Metal Plates (Ueber den Wärmedurchgang durch Metallplatten). Report upon experimental determination of transmission of heat through plates of steel of various thickness for various differences of temperature. 1500 w. Zeitschr d Oesterr Ing u Arch Vereines—Jan. 29, 1897.

**Walls.**—The Effect of the Heights of Walls on the Amounts of Heat Transmitted Through Them. J. H. Kinealy. Reviews the experiments made by other investigators and holds that the heat loss of a high wall is greater than that of a lower one of the same kind, area and thickness. 1800 w. Trans Am Soc of Heat & Ven Engs—Jan., 1898.

## HEAT UTILIZATION.

A Theoretical and Practical Study of the Utilisation of Heat (Etude Theorique et Pratique de l'Utilisation de la Chaleur). A valuable series of papers by MM. Damour and Watson treating of the calorific value of combustibles and the best methods of utilising it. Serial. Part 1 and 2. 10000 w. Génie Civil—May 29 & June 19, 1897.

## HELIUM.

Helium. Its Identification and Properties. C. A. Young. Account of the discovery and identification, with what has thus far been ascertained as to its properties. 2400 w. Pop Sci M—Jan., 1896.

**Electric Discharge.**—See **ARGON.**

**Liquefaction.**—A Research on the Liquefaction of Helium. Translated from the original paper by Prof. K. Olszewski, in the "Bulletin de l'Académie des Sciences des Cracovie" for June, 1896, "Ein Versuch, das Helium zu verflüssigen," by Morris Travers. Description of apparatus, method and results. 1800 w. Nature—Aug. 20, 1896.

See also **LIQUEFACTION—Gases.**

**Helmholtz.**—Helmholtz. T. C. Mendenhall. Account of his life and scientific labors. An interesting account of the rise and final triumph of the doctrine of the conservation of energy is comprised in this article. 3900 w. Science—Feb. 7, 1896.

## HERO OF ALEXANDRIA.

The First Engineer. W. A. Truesdell. An interesting account of Hero of Alexandria his labors and their results. 6500 w. Jour Assn of Engng Soc—July, 1897.

## HIGH BUILDING.

See **TALL BUILDING.**

## HIGH TEMPERATURES.

See also **ALUMINOTHERMY; PYROMETRY.**

**Gas Apparatus.**—Some Modern Devices for Securing High Temperatures. W. H. Birchmore. A résumé of the variety of appliances used for this purpose, as seen and studied by the writer. 5000 w. Am Gas Light Jour—Oct. 4, 1897.

## HIGHWAY.

See **ROAD.**

## HIGHWAY BRIDGE.

See also **BRIDGE—Highway.**

**Cantilever, Allegheny City, Pa.**—The Davis Avenue Cantilever Highway Bridge, Allegheny City, Pa. Illustrates the strain sheet and some of the more important details of a cantilever highway bridge now being built to span a deep ravine. 700 w. Eng News—Sept. 1, 1898.

**Pittsburg.**—The West Braddock Bridge. Illustrated description of the design and erection of a bridge, near Pittsburg, with about 900 feet of plate girder spans, and river spans of 515, 489 and 252 feet. The expansion pockets and several other details are novel. 1700 w. Eng Rec—Aug. 13, 1898.

**HIGHWAY TRAFFIC.**

See **ROAD TRAFFIC.**

**HILKOFF.**

**Prince Michael.**—See **RAILWAY—Russia.**

**HIPPODROME.**

**Paris.**—The New Hippodrome at Paris (Le Nouvel Hippodrome). G. Leugny. A well-illustrated account of the construction of this building, particularly of the roof trusses. 1800 w. Rev Tech—April 25, 1900.

**HITTORF.**

Wilhelm Hittorf. A biographical notice of Dr. Hittorf and a review of his career, upon the fiftieth anniversary of his reception of his doctor's degree. Portrait. 1000 w. Zeitschr für Elektrochemie—Oct. 20, 1896.

**HOIST.**

See also **AIR HOIST; ELECTRIC HOISTING; HOISTING; HOISTING ENGINE.**

**Tomson Water.**—See **WATER RAISING—Mines.**

**HOISTING.**

See also **COAL HANDLING; HOISTING CAGE; HOISTING DRUM; HOISTING ENGINE; MINE HAULAGE; MINE SHAFT.**

Hoisting Machinery (Les Appareils de Levage). Including jacks, chain blocks, link belt elevators, conveyors, etc. Three articles. 12000 w. Rev de Mécan—Feb., April, Aug., 1897.

Improvements in Winding Appliances. E. M. Hann. Read before the South Wales Inst. of Engs. Illustrated description of some practical improvements made in existing plants, with some suggestions for further improvements. 2200 w. Col Guard—June 17, 1898.

Winding. W. Galloway. A lecture before the South Wales Inst. of Engs. Considers a complete winding outfit for a vertical shaft. Ill. Serial. Can Min Rev—July 31, 1899.

**Air Shaft.**—Adaptation of an Air Shaft for Winding. M. Prosper Vanhassel. From a communication to the Société de l'Industrie Minerale, Saint Etienne. Illustrated description of methods. 4300 w. Col Guard—Nov. 27, 1896.

**Anaconda Mine.**—See **Butte, Mont.; HOISTING ENGINE.**

**Balanced Ropes.**—Winding from Great Depths with Constantly Balanced Ropes. André Després. Describes the means for practically carrying out this system, giving illustrations. 2800 w. Col Guard—Sept. 24, 1897.

**Belt Ropes.**—The Use of Slow Moving Belt Ropes in Shafts. Harry Rhodes. Part first considers the advantages of this form of power transmission, and some of the details in the installation of such a plant. Ill. Serial. Prac Engr—Jan. 19, 1900.

**Brake.**—Experiments with a New Checking Brake (Versuche mit einer Neuen Bremsend Wirkenden Fangvorrichtung). Giving the data of tests of a safety check for mine hoists. Teeth on eccentric sheaves engage with shaft timbers. 1600 w. 1 plate. Glückauf—Sept. 4, 1897.

**Butte, Mont.**—Hoisting Machinery. Charles S. Herzig. The methods of hoisting employed at Butte, Mont. An exposition of the inapplicability of the Koepe system to the conditions at Butte. 2800 w. Col Eng—Aug., 1896.

**Cage.**—See **HOISTING CAGE.**

**Coal Mines.**—Modern Improvements in Coal Mining: Winding from Deep Mines. Henry William Martin. Read at the Engineering conference of the Inst. of Civ. Engr., England. Describes the main features of the winding machinery at a new colliery in South Wales. 2000 w. Engr, Lond—June 16, 1899.

**Constant Resistance.**—New Winding Arrangement with Constant Resistance. André Després. Describes a new method whose object is to afford an absolutely constant movement with a single chain, to permit of employing the lightest possible chain, to afford a high degree of safety, etc. 2400 w. Col Guard—April 9, 1897.

**Counterpoise.**—Winding Rope Counterpoise at a Prussian Colliery. Oberbergrath Leybold, in "Zeitschrift für Berg-Hütten-und Salinenwesen." Illustrates and describes an appliance which has been in use for some years and is considered satisfactory. 1800 w. Col Guard—April 28, 1899.

The Hoist Equalizer of the Camphausen Mine near Saarbrück (Die Seilgewichts-Ausgleichung der Grube Camphausen bei Saarbrücken). Describing the ingenious method of counterbalancing the variable weight of the cable in the hoisting machinery. 2000 w. Glückauf—June 3, 1899.

**Deep Mines.**—Hoisting Plant for Deep Mines (Förderanlagen für Grosse Tiefen). E. Tomson. A very full account of the plant at the Preussen mine at Dortmund, with detail drawings, computations and much valuable information. Four articles. 12000 w. 20 plates. Glückauf—June 4, 11, 18, 25, 1898.

Steam Raising, Motive Power, and Accessory Winding Engines at a Westphalian Colliery. E. Tomson. From a communication to the jubilee meeting of the Liége Engs.' Assn. Describes an installation of the Preussen Colliery, No. 1 pit. Ill. 2000 w. Col Guard—July 8, 1898.

Winding from Deep Mines. Illustrates and describes the system introduced at Dolcoath mine by its inventor, William Morgans. Serial. Engr, Lond—March 16, 1900.

Winding from Great Depths. Léon Poussigue. From a paper for the International Congress at Paris. Discusses various systems for deep winding, and the most practical solution of the problem. Ill. 5500 w. Col Guard—July 6, 1900.

See also **COAL MINING—Deep; MINE; MINE SHAFT; MINING.**

**Driving Wheel.**—Hoisting with a Driving Wheel (Die Förderung mit Treibscheibe). A. Ehrlich. A well illustrated description of the machinery used in hoisting the cages in shafts by an endless rope driven by a large wheel. 3000 w. Zeitschr d Ver Deutscher Ing—May 26, 1900.

**Drum and Pulley.**—On the Relative Positions of Drums and Pulleys in Winding Arrangements. George W. Westgarth. Read before the South Wales Inst. of Engs. Gives information to determine the most economic lines, from a rope point of view, for the relative positions of the drum and pulley for pits from 100 to 1200 yards winding depth. 2700 w. Ir & Coal Trds Rev—Dec. 15, 1899.

**Electric.**—Arrangement of a Mine Hoisting Plant (Zusammenstellung der bei Anlage von Streckenförderanlagen zu Berücksichtigenden Punkte). A very full discussion of the most economical arrangement for certain given conditions, including the use of an electric motor winding engine. 5000 w. 2 plates. Glückauf—May 21, 1898.

Experimental Trials with an Electrically-Driven Winding Engine. Ingenieur C. Köttgen. A technical paper, from "Gluckauf," giving the results of experiments made by Siemens and Halske, showing that equal ease in handling and safety can be obtained, as with steam or compressed air. The motors were direct gear connected. 2500 w. Col Guard—April 10, 1896.

The Electric Hoisting Plant of the Thiederhall Company at Thiede, near Brunswick (Die Elektrische Förderanlage der Aktien-Gesellschaft Thiederhall in Thiede bei Braunschweig). Prof. O. Hoppe. The current is generated above ground and an electric motor 300 meters underground drives the rope hoist from the 500 meter level. Illustrated. 4000 w. Glückauf—June 9, 1900.

See also **ELECTRIC HOISTING.**

**Endless Chain.**—An Endless Chain Winding Plant. T. A. O'Donahue. Read before the South Wales Inst. of Engs. Describes the method of winding at Rowley Colliery, and discusses the advantages. Ill. 1700 w. Col Guard—June 30, 1899.

**Equalizer.**—See **Counterpoise.**

**Gas Engine.**—See **GAS ENGINE—Hoisting.**

**Girder.**—See **GIRDER—Lifting Four Stories.**

**Head Gears.**—Colliery Head Gears—Past and Present. Illustrates and describes the radical changes in this feature of colliery equipment, beginning with the simple device used in early days of coal mining. Serial. Ir & Coal Trds Rev—April 21, 1899.

See also **MINE—Head Frame.**

**Koepe.**—Hoisting Machinery. William M. Morris. Illustrated description of a proposed modification of the Koepe system. 1700 w. Col Eng—July, 1896.

The Koepe System of Winding. John Georgory and John T. Stobbs. Abstract of a paper read before the Inst. of Min. Engs. Illustrates and describes this system at the Sneyd Colliery, Burslem, giving data relating. 800 w. Col Guard—Oct. 5, 1900.

See also **Butte, Mont.**

**Mähnert Hydraulic.**—Method for the Supersession of Winding in Shafts. E. Mähnert, in "Glückauf." Gives a diagrammatic vertical section showing the arrangement, and states the advantages of the method. 1500 w. Col Guard—Aug. 4, 1899.

The Mähnert Hoisting Apparatus (E. Mähnert's Auftrieb-Förderverfahren). An illustrated description of an improved device for elevating materials by utilizing their buoyancy in a column of water. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 14, 1899.

**Guides.**—Installation of a New Metal Guiding Apparatus (Briart System). Marc Warolus. Translated from "Revue Universelle des Mines," etc. Description of apparatus which was installed in No. 4 pit of the Monceau Fontaine and Martinet collieries. Serial. Col Guard—Oct. 16, 1896.

See also **HOISTING CAGE—Safety Catch.**

**Preliminary Plant.**—Preliminary Hoisting Plant for Mines. Robert Peele. An account of the hoisting appliances appropriate to the temporary work generally preceding serious mining operations, and sometimes also employed in connection with the development of mines. Ill. 2400 w. Sch of Mines Quar—Jan., 1897.

**Rope.**—Hoisting Ropes. Robert Peele. Considers the various kinds in use and the properties which influence their strength and life. 4200 w. Mines & Min—March, 1900.

Statistics of Rope Haulage in Shafts (Statistik der Schachtförderseile). Tables showing the life, efficiency, breakages, etc., of wire, hemp and other kinds of rope. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 12, 1900.

See also **Balanced Ropes; Belt Ropes; Wire Rope; MINE HAULAGE; ROPE.**

**Safety Appliances.**—Arrangements for Preventing Shaft Accidents. M. Thiriart, in "Annales des Mines de Belgique." Description of arrangements applied, and discussion of objections. Ill. 1700 w. Col Guard—Jan. 19, 1900.

Means for Preventing Shaft Accidents. Leon Thiriart. From a communication to the "Annales des Mines de Belgique." Illustrated description of arrangements for enclosing cages during the travelling of workmen, and for weekly inspections, etc. 3000 w. Col Guard—Dec. 29, 1899.

Means for Preventing Accident in Mine Shafts. Victor Watteyne. From a communication to the "Annales des Mines de Belgique." Deals with accidents in connection with winding, and with air and pumping shafts, also at landings. Serial. Col Guard—March 24, 1899.

Safety Appliances for Hoisting Machines (Sicherheitsvorrichtung für Fördermaschinen). C. Budil. A description of the Wodrada apparatus, recently installed in Moravia, by which any excess in speed of the cage gives an alarm in the engine room. 1000 w. Zeitschr d Ver Deutscher Ing—Sept. 9, 1899.

Safety Appliances in Winding Shafts. Victor Watteyne and Armond Halleux. From a report on the plant and methods of mine working at the Brussels International Exhibition of 1897. Illustrated description of apparatus for the protection of shafts at landings, for preventing the cage being drawn up to the pulleys, or attaining excessive speed, etc. 4000 w. Col Guard—May 13, 1898.

Safety in Colliery Winding. C. M. Percy. Read at the meeting of the Manchester Geological Society. The writer presents, what in his opinion is a really good equipment, thus making accidents in mines, with colliery winding appliances, very nearly impossible. 3000 w. Col Guard—May 15, 1896.

See also **HOISTING CAGE.**

**Safety Appliance, Romer.**—Romer's Automatic Apparatus for Insuring Safety in Winding. Describes an apparatus which prevents the rising cage from coming to bank at too great a speed, and, to a certain extent, a too sharp setting down at the landing of the descending cage. 3000 w. Col Guard—Nov. 13, 1896.

**Safety-Door.**—An Improved Safety Door for Mine Shafts (Ueber Einen Neuen Sicherheits-Schachtsverschluss). The sliding door is operated automatically by levers actuated by the wheels of the car. 800 w. 1 plate. Glückauf—Feb. 24, 1900.

A Simple Form of Brake Safety Door (Einfach Konstruierter Bremsschacht Verschluss). A brake mechanism is connected with the door opening device so that the hoisting gear cannot be operated until the door is closed. 1000 w. 1 plate. Glückauf—March 12, 1898.

Automatic Apparatus for Closing Levels in Mine Shafts (Appareils Automatiques de Fermeture des Recettes dans le Puits de Mines). H. Schmerber. Illustrated description of automatic doors operated by the passage of the cage, avoiding the danger of men or tram-cars falling down the shaft. 1500 w. Génie Civil—Dec. 24, 1898.

Automatic Shaft-Closing Arrangement at a Westphalian Colliery. From "Glückauf." Illustrates a simple and original design which has proved satisfactory. 400 w. Col Guard—Sept. 1, 1899.

New Arrangements for Closing Mine Shafts. From communication to "Glückauf" of Essen-an der-Ruhr, Westphalia. Illustrates and describes several automatic devices, which satisfy the conditions required. 2500 w. Col Guard—Jan. 20, 1899.

See also **HOISTING CAGE.**

**12-Decked Cages.**—Upcast Air Shaft Fitted for Winding with 12-Decked Cages. M. Ghysen. From a communication to the Liége Engs'. Assn. Describes the conditions which led to the use of 12-decked cages, and their use and movement. Ill. 2600 w. Col Guard—April 14, 1899.

**Water.**—See **MINE DRAINAGE; WATER RAISING.**

**Westphalia Coal Mine.**—Improvements in Mine Plant, Westphalia. M. Robiaud. From a communication to the Société de l'Industrie Minérale, Saint-Etienne. Observations on ropes and winding engines, with illustrations. 3800 w. Col Guard—Dec. 3, 1897.

**Whiting.**—Hoisting from Deep Shafts. Walter McDermott. Read before the Inst. of Mining and Metallurgy. An illustration of a system of winding known as the Whiting hoist. 900 w. Col Guard—Sept. 18, 1896.

**Wire Rope.**—Wire Rope Conductors for Pit Cages. John Vaughan. Read before the South Wales Inst. of Engs. Considers that type of conductor exclusively, the difficulties and disturbing elements to be avoided in laying down the plant, manner of putting the ropes into position, etc. Ill. 3000 w. Col Guard—June 30, 1899.

## HOISTING CAGE.

**Commentry.**—Mechanical Caging at the Commentry Colliery. Illustrated description of the arrangement. 1100 w. Col Guard—May 11, 1900.

**Falling Stop.**—Falling Stop Arrangement for Winding Cages with Movable Floor. Illustrated description, with explanation of method of working. 2000 w. Col Guard—Jan. 1, 1897.

**Hydraulic Decking.**—Fowler's Hydraulic Decking Arrangement. Illustrates and describes the arrangement in use at Cinder Hill Colliery, Nottingham. It was invented to save the time taken up in changing the decks of the winding cages. 1600 w. Ir & Coal Trds Rev—March 23, 1900.

**Hydraulic Loading.**—Hydraulic Cage-Loading and Unloading Apparatus. G. B. Stones. Abstract of a paper read before the Inst. of Engs. Illustrated description of the surface and underground arrangements. 1200 w. Col Guard—Oct. 12, 1900.

**Interlocking.**—Interlocking Mine Cages with Anti-overwinding Apparatus. Illustrated description. 2500 w. Eng, Lond—Aug. 28, 1896.

**Moustier Safety.**—Moustier Safety Cage. M. Vallat. From a communication to the Société de l'Industrie Minérale, Saint-Etienne. Brief illustrated description. 700 w. Col Guard—Jan. 28, 1898.

**Safety Catch.**—Automatic Safety Catch and Brake for Hoists (Bremsend Wirkende Sicherheits Fang- und Aufsets-Vorrichtung für Förderkörbe). An improved and simple form of safety stop for the cages of mine hoists as used in several mines in Saxony. A table is given of the efficient manner in which the device has operated in numerous cases. 2500 w. 1 plate. Glückauf—March 19, 1898.

Bley Safety Arrangements for Mine Cages. Illustrates and describes the safety apparatus adopted at the collieries of Florentin, Kaestner & Co., Reinsdorf, near Zwickau, Saxony, giving tabulated results of five trials carried out in the testing frame, or tower. 1800 w. Col Guard—Nov. 4, 1898.

New Safety Catch for Mine Cages. From a communication by E. Flemming to "Glückauf," of Essen-an-der-Ruhr. Illustrated description of the brake-action safety catch brought out by Gerlach and Bömcke, of the Dortmund Iron Works, Westphalia, with report of trials. 1500 w. Col Guard—Oct. 8, 1897.

The Oberegger Safety Catch for Mine Cages. Translated from "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrates and describes the catch and its operation. 800 w. Ir & Coal Trds Rev—Jan. 27, 1899.

Combined Safety Clutch and Stopping Device for Winding Cages. O. Schenck, in "Allgemeine Bergmännische Zeitschrift." Illustrated detailed description. 800 w. Col Guard—April 12, 1900.

Safety Stop for the Briart Guide (Parachute pour Guidonnage Briart). Ch. Marbais. Illustrated description of a simple safety stop for mine cages or other hoistways where the Briart rail guides are used. 1000 w. Rev Universelle des Mines—Sept., 1898.

See also **HOISTING—Safety Appliances; Safety Door.**

**Sliding Doors.**—Sliding Doors for Mine Cages. From "Zeitschrift für Berg, Hütten-und Salinenwesen." Illustrated description. 750 w. Col Guard—Sept. 15, 1899.

**Wilmotte Stops.**—Wilmotte Stops for Mine Cages. From a communication to the Liège Engineers' Association by M. Louis Eloy, engineer at the Kessales Colliery, Jemeppe, Belgium. Illustrated description, with a consideration of the conditions to be fulfilled by a good set of stops. 3000 w. Col Guard—June 19, 1896.

### HOISTING DRUM.

**Blanzy, France.**—Winding Drum with Tangential Arms at the Blanzy Colliery. Paul Perroy. From a communication to the Société de l'Industrie Minérale, Saint Etienne. Illustrated description of a new type of winding drum suggested by a bicycle wheel. 2700 w. Col Guard —Jan. 26, 1900.

**Strength.**—Strength of Hoisting Drums. Charles Lewis. Analysis of the strains. 800 w. Am Mach—Feb. 11, 1897.

**Torque.**—Design of Hoisting Drums for Uniform Torque. John H. Barr. Considers method of determining the curve of a uniform torque drum, discussing other types in use. 1600 w. Sib Jour of Engng—June, 1899.

See also **HOISTING ENGINE.**

### HOISTING ENGINE.

See also **HOISTING.**

**Anaconda Mine.**—A Remarkable Hoisting Engine. Geo. S. Binckley. Describes an engine at the Bell mine, one of the properties of the Anaconda Copper Co., and its operation. 2500 w. Min & Sci Pr—Feb. 25, 1899.

Hoisting Engines for the Anaconda Mine. Illustrated description of the compound hoisting engines—high-pressure cylinder 26 inches diameter, low-pressure cylinders 46 inches diameter, stroke 72 inches. 700 w. Sci Am—Jan. 9, 1897.

The Great Hoisting Engines for the Anaconda Mining Co. Illustrated description. 800 w. Eng News—Sept. 3, 1896.

**Compound.**—Experiments with Compound Winding Engines. J. Davis. "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Report of tests made to gain information of the relative superiority of compound versus non-compound engines for winding in mines. 1000 w. Col Guard —Dec. 22, 1899.

The Compound Winding Engine, Its Operation and Steam Consumption (Ueber Compound Fördermaschinen, deren Betriebs-und Dampfconsumverhältnisse). Julius Divis. A general review of the advantages of the compound engine for mine hoists, giving methods of computing cylinder ratios, and general proportions for this especial service. Serial. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 4, 1899.

The Operation and Economy of Compound Hoisting Engines (Ueber Compound Fördermaschinen, deren Betriebs und Dampfkonsumverhältnisse). A general discussion of the applicability of compound engines for winding mine hoists, giving data and results of tests of a number of engines in service. 4000 w. Glückauf—Jan. 27, 1900.

**Compound, Great Western.**—The Compound Winding Engine at the Great Western Colliery Company's Pit, with Notes on Its Comparative Steam Economy. Hugh Bramwell. Illustrated description of the engines, with numerous indicator diagrams and tabulated data. 1800 w. Ind & Ir—Oct. 9, 1896.

**Compound, Llanbradach.**—A Compound Winding Engine. W. Galloway. The substance of a paper read before the North of England Inst. of Min. & Mech. Engs. Describes an engine recently erected at Llanbradach colliery, near Cardiff. 1800 w. Col Guard—Sept. 25, 1896.

**Crank Action.**—The Motion of Winding Engines for Various Crank Positions (Das Anlaufen der Fördermaschinen aus jeder Kurbelstellung). A graphical investigation of the crank action on double cylinder engines, showing the causes for irregularity of motion. 1200 w. Zeitschr d Ver Deutscher Ing—Aug. 21, 1897.

**Expansion.**—See **STEAM ENGINEERING.**

**Gas vs. Steam.**—See **GAS ENGINE—Hoisting.**

**Safety Appliance.**—Safety Appliances for Winding Engines. States the requirements common to all safety appliances and describes the chief appliances in use, including the Römer, Baumann, Müller, Hahn (Münzner), and Jetschim apparatus, comparing the systems and giving conclusions. Ill. 5000 w. Col Guard—Nov. 11, 1898.

Safety Apparatus for Winding Engines. From a communication by Herr Baumann to the upper Silesian Assn. of German Engs., published by "Glückauf." Illustrated description. 1200 w. Col Guard—Nov. 20, 1896.

**Spring Coupling.**—A Spring Coupling for Winding or Hauling Engines. Description with drawing of the invention of H. W. Hollis. 500 w. Col Guard—Feb. 12, 1897.

**Tamarack Copper Mine.**—The Tamarack Mining Company's New Hoisting Engine. An illustrated detailed description, with editorial on hoisting engine development. 2500 w. Am Mach—Sept. 7, 1899.

**Torque.**—The Torque of Hoisting Engines. D. S. Kimball. Discusses the operations of hoisting engines in mining, and the means of determining the torque. 1300 w. Sib Jour of Engng—Feb., 1899.

See also **HOISTING DRUM.**

**Twin Tandem.**—Twin Tandem Hoisting Engine at the Scharnhorst Mine (Zwillings-Tandem-Fördermaschine der Zeche Scharnhorst). F. Schulte. An illustrated description, with diagrams and indicator cards. 2 plates. 1700 w. Glückauf—July 1, 1900.

**Westphalia Coal Mine.**—Powerful Winding Engines at the Preussen Colliery, Westphalia. E. Tomson. From a communication to the jubilee meeting of the Liége Engs'. Assn. Side elevation, plan and dimensions, with description of the arrangement adopted and statement of its advantages. 8200 w. Col Guard—July 22, 1898.

### HOLLOW BRICK.

See **BUILDING MATERIAL; FIREPROOF CONSTRUCTION; TERRA COTTA.**

### HOLOPHANE GLOBES.

Lighting by Holophane Globes. F. Guilbert. Translated from "L'Eclairage Electrique." An able and exhaustive scientific analysis and explanation of the action of these globes with numerous diagrams, by which the action is shown to approach very nearly the ideal photometric curve in the distribution of light. Serial. Pro Age—March 1, 1896.

The Holophane Globes, for Effecting the Better Diffusion and Distribution of Artificial Light. Report of the Franklin Inst., through its committee on Science and Arts, on the invention of Messrs. Blondel and Psaroudaki, of Paris, France. Ill. 3000 w. Jour Fr Inst—April, 1898.

### HONGKONG.

Economic Conditions in Hongkong. A brief review of the industrial and commercial situation of the colony during the past year. 1500 w. Cons Repts—March 12, 1898.

### HORSE-POWER.

On the Value of a Horse-Power. George I. Rockwood. Reports the discussion on the question at Worcester, Mass., in settling questions of water privileges. 4800 w. Trans Am Soc of Mech Engs, No. 850—Dec., 1899.

The Measure of Horse-Power. Considers various arithmetical equivalents of the unit of measure known as a horse-power. 2200 w. Engr, Lond—March 10, 1899.

### HORTICULTURAL PALACE.

See also **GREENHOUSE; HEATING.**

**Paris Exposition.**—The Palaces of Horticulture at the Paris Exposition (Exposition de 1900. Les Palais de l'Horticulture). M. Adémar. A well illustrated description of the Horticultural buildings at the Exposition. 1 plate. 1500 w. Génie Civil—June 23, 1900.

**HOSE.**

**Air Brake.**—See **AIR BRAKE—Hose.**

**Car Heating.**—Tests of Rubber Hose for Steam Connections on Railway Cars (Prüfung von Gummischläuchen für Dampfheizungs Kupplungen). M. Rudeloff. A valuable report upon tests made for the German State Railway, with full table of results. 3000 w. Mitt aus den Kgl Tech Versuchsanstalt—Part III., 1899.

**Fire.**—Fire Hose Requirements in New York City. Specifications for hose required by the city, with information regarding kind of hose used in different cities, and cost. 1300 w. Ind Rub Wld—June 10, 1896.

The Evolution of Fire Hose and Circular Hose Weaving. Gives the historical account of the hose manufacture in the United States. 1500 w. Ind Rub Wld—May 1, 1899.

**Fittings.**—Hose Couplings, Hose Bands and Hose Menders. Gustav Heinsohn. Illustrated description of the principal features of each of several designs offered by the trade. 2000 w. Ind Rub Wld—March 10, 1897.

**HOSPITAL.**

See also **ASYLUM; HEATING; HEATING AND VENTILATION; INFIRMARY.**

Axioms and Principles of Modern Hospital Construction. Max Junghaendel. Read before the Technical Soc. of the Pacific Coast. A discussion of hospital construction and sanitation. 6200 w. Am Arch—March 10, 1900.

The Construction of Hospitals. William Henman. Read before the Liverpool Archt. Soc. Deals principally with the design of large town hospitals, discussing all important details. Ill. 5800 w. Jour Roy Inst of Brit Archts—May 6, 1897.

The Requirements of Modern Hospitals (Ueber Bedürfnisse Moderner Krankenanstalten). Frans Berger. A general discussion of hospital construction and sanitation, with plans. 7000 w. Zeitschr d Oest Ing u Arch Ver—May 11, 1900.

**Baden, Austria.**—The Alland Hospital near Baden, Austria (Die Heilanstalt Alland bei Baden). Elevation and plans of this fine new hospital especially intended for patients affected with pulmonary diseases. The sanitary and disinfecting arrangements are fully described. 4000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—March 18, 1898.

**Brook, Kent.**—The Brook Hospital, Shooter's Hill. Interesting illustrated general description. 4500 w. Arch, Lond—Aug. 7, 1896.

The Heating and Sanitation of Public Institutions. W. N. Twelvetrees. A very completely illustrated account of the heating and household arrangements at Brook Hospital, near London. 4500 w. Eng Mag—Aug., 1898.

**Buffalo.**—The Buffalo General Hospital. Illustrates and describes the structural and hygienic features of a large hospital building recently opened. 2000 w. Eng Rec—April 8, 1899.

**Calcutta.**—South Calcutta Hospital, Bhowanipore. Detailed description of a suburban hospital, with elevation and sections. 2000 w. Ind Engng—May 2, 1896.

The Lady Dufferin Victoria Zenana Hospital, Calcutta. Plans and drawings with description. 1000 w. Ind Engng—Dec. 17, 1898.

**Chicago.**—Engineering Features in the Alexian Brothers' Hospital, Chicago. Description with illustrations, of a hospital where all the arrangements are on sanitary principles. 1800 w. Eng News—July 20, 1899.

**Children's Summer.**—A Children's Summer Hospital. Illustrated description of the arrangement of the Lewis Memorial Cottage, New Dorp, N. Y., for the treatment of children during the summer months. 800 w. Eng Rec—Oct. 6, 1900.

**Cottage.**—Cottage Hospitals. Thomas W. Aldwinckle. History of this movement as given in a book by Henry C. Burdette, dealing also with the architecture. 4700 w. Jour Roy Inst of Brit Arch—July 29, 1897.

**Davos, Switzerland.**—Hospital for Chest Diseases at Davos (Die Basler Heilstätte für Brustkranke in Davos). Plans, elevation and description of special cantonal hospital of 70 beds, Switzerland. 3000 w. Schweizerische Bauzeitung—Jan. 30, 1897.

**Edinburgh.**—The New Edinburgh Fever Hospital. Brief description of some of the principal buildings of a new hospital for the treatment of infectious diseases. 2000 w. Arch, Lond—Nov. 20, 1896.

**Europe.**—Modern Hospitals in Europe. Alphonse de Calonne. Interesting illustrated description of the architecture, or system of arrangement, in European hospitals, with the improvements introduced in the modern buildings. 8000 w. Arch Rec—July-Sept., 1896.

**Heating.**—See **Sanitation; HEATING; HEATING AND VENTILATION; STEAM HEATING.**

**Isolation.**—Sanitary Principles in the Construction of Isolation Hospitals. G. A. T. Middleton. With ground plans of numerous accepted arrangements, viewed especially from the architect's standpoint, and emphasizing the importance of cleanliness and ample ventilation. 2500 w. Eng Mag—Nov., 1898.

**London.**—The Park Hospital, Hither Green, S. E. Illustrated description of a new fever hospital in England. 2500 w. Eng, Lond—July 16, 1897.

**Loomis Sanitarium.**—The Loomis Sanitarium. Illustrated description of a hospital for consumptives. 600 w. Eng Rec—Jan. 14, 1899.

**Massillon, O.**—Massillon State Hospital. Illustrated description of the grounds, buildings, heating, ventilation, plumbing, water supply and sewage disposal of a large Ohio institution for the insane. 2000 w. Eng Rec—April 15, 1899.

**Military.**—See **BARRACKS—Teschen, Austria.**

**Münsingen, Switzerland.**—The New Insane Hospital at Münsingen, Canton of Bern (Der Neubau der Kantonalen Irrenanstalt zu Münsingen, Kanton Bern). A description with many illustrations, of one of the finest hospitals of the sort in Europe. 10000 w. Schweizerische Bauzeitung—Jan. 2, 9 & 16, 1897.

**Philadelphia Clinic.**—See **CLINIC BUILDING.**

**Sanitation.**—The Ventilation, Heating, Water Supply and Drainage of Infectious Diseases Hospitals. E. R. Matthews. Read at meeting of Inst. of San. Engs. (England). Reviews the origin of these hospitals in England, mentioning important points in selecting a site, describing general structural arrangements, and precautions necessary in the lines mentioned. Serial. San Rec—Nov. 4, 1898.

**Shooter's Hill.**—See **Brook, Kent.**

**Styria.**—The Public Hospitals of Styria (Die Oeffentliche Krankenpflege in Steiermark). Dr. E. Kleinsasser. With plans and details of arrangement of a number of modern hospital buildings in the province of Styria, in Austria. 10000 w. 8 plates. Oesterr Monatschr f d Oeffent Baudienst—June, 1899.

**Ventilation.**—See **Sanitation; HEATING AND VENTILATION; VENTILATION.**

**Vienna.**—The Bettina Pavilion in the Elizabeth Hospital at Vienna (Der Bettina-Stiftungs Pavillon im k. k. Elisabeth-Spital in Wien). Plans, elevations and description of the handsome hospital pavilion founded by Baron Rothschild in memory of his deceased wife. 4500 w. 8 plates. Oesterr Monatschr f d Oeffent Baudienst—June, 1898.

**Wall Construction.**—Hospital Wall Construction. Illustrated description of special details arranged to prevent any accumulation of dust about the heating coils in wards. 600 w. Eng Rec—June 9, 1900.

**HOSPITAL SHIP.**

**U. S. Navy.**—Our Ambulance Ships. Illustrates and describes the "Solace" and "Relief," of the U. S. navy, and their equipment for hospital service. 2000 w. Marine Rev—Aug. 11, 1898.

**HOSPITAL TRAIN.**

**South Africa.**—The Princess Christian Hospital Train for South Africa. H. J. Shepstone. Illustrated description of an efficient train built in quick time. 1200 w. Sci Am—March 24, 1900.

**HOT BLAST.**

See also **BLAST FURNACE; CUPOLA.**

The Equalization of the Temperature of Heated Gases (Verfahren Zum Ausgleichen der Temperatur Heisser Gase). An illustrated description of the Gjers and Harrison arrangement of hot-blast stoves by which the fluctuations in temperature are avoided. 1200 w. Stahl und Eisen—March 15, 1899.

The Heating of the Blast for Blast-Furnaces (Die Winderwärmung an den Hochöfen). F. Braune. A discussion of the advantages of heating the blast, with illustrations and descriptions of the more recent hot-blast stoves. 3500 w. Zeitschr d Ver Deutscher Ing—Sept. 10, 1898.

**Coils.**—Design of Hot Blast Coils. Explains the methods of figuring coils for any given amount of work. 400 w. Eng Rec—June 3, 1899.

**Ford and Moncur Stoves.**—Hot-Blast Stoves for Pig-Iron Works. Joseph H. Harrison. Abstract of paper read at meeting of the Cleveland Inst. of Engs. On the merits of the Ford and Moncur hot-blast stoves. Also discussion. 3300 w. Col Guard—Dec. 23, 1898.

### HOT BOX.

See also **CAR BEARINGS—Hot; LUBRICATION—Car.**

About Hot Boxes. Attributes the trouble generally to rough and inferior construction. 600 w. Loc Engng—July, 1896.

Hot Boxes and Their Cause. Causes of hot boxes discussed, experiences compared and remedies proposed. 5000 w. Pro Cent Ry Club—March, 1896.

Hot Boxes—Their Causes. M. P. Cook. From a paper presented at the May meeting of the St. Louis Railway Club. Reviews the conditions that cause hot boxes, the injury, and the writer's opinion as to the best way of cooling. 2500 w. R R Gaz—July 16, 1897.

Hot Journals. Translation of a review by Josef Grossmann, discussing the subject from the standpoint of oil pressures between bearing surfaces. Ill. 2400 w. Am Engr & R R Jour—Oct., 1900.

### HOTEL.

See also **HEATING; HEATING AND VENTILATION; PLUMBING.**

Hotel Design. T. Raffles Davison. Part first illustrates a New Forest hotel—the Crown Hotel of Lyndhurst. Serial. Brit Arch—Jan. 6, 1899.

**Budapest.**—The Grand Hotel Royal at Budapest (Grand Hotel Royal am Elizabethring in Budapest). An illustrated description of the largest and handsomest hotel in Budapest, with floor plans, elevation and section. 1000 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—April, 1898.

**Cecil, London.**—Hotel Cecil. A brief description of some features of this fine hotel, being built on the Thames embankment. 1700 w. Plumb & Dec—April 1, 1896.

Hotel Cecil, London, England. Arthur Lee. Illustrated description of a fine hotel recently built upon the Thames embankment. 400 w. Stone—March, 1896.

**Chicago.**—See also **THEATRE.**

**Mills.**—Model Lodging-Houses for New York. Brief description of great improvements in this class of buildings in Glasgow, Manchester, London and other European cities, and now being made in New York. Illustrations of designs of Mr. Ernest Flagg now being built by Mr. D. O. Mills. 1500 w. Rev of Revs—Jan., 1897.

**Rothenburg, Bavaria.**—Plans for Altering the Inn "zum Weissen Hirschen" in Rothenburg, Bavaria (Entwürfe zur Umgestaltung des Gasthofes zum Weissen Hirschen in Rothenburg O. T.). Illustrated description of plans for bringing this inn into harmony with its mediaeval surroundings. 400 w. Deutsche Bauzeitung—March 28, 1900.

**Waldorf-Astoria.**—The Astoria Hotel, New York City. Illustrated description of the Waldorf-Astoria hotel, as the completed structure will be called. 3000 w. Sci Am—Oct. 30, 1897.

The Hotel Waldorf-Astoria, New York. W. G. Mitchell. A criticism of the design, with plans and illustrations of one bedroom. 1700 w. Am Arch—April 2, 1898.

The New Astoria Hotel. Illustrated description of this fine hotel in New York City. 4 plates. 2000 w. Arch & Build—Feb. 5, 1898.

### HOT WATER.

See also **HEATING; HEATING AND VENTILATION; PLUMBING.**

Domestic Hot Water Supply. Frederick Dye. Read at London meeting of the Inst. of Heat. and Ven. Engs. An illustrated account of what happens when a tap is opened, and allied phenomena. 2500 w. Plumb & Dec—Aug. 1, 1900.

The Heating of Water (Warmwasserbereitung). M. Grellert. An illustrated account of a system of heating water for various purposes in a house by means of the kitchen fire, with calculations of the efficiency of the system. Two articles. 3600 w. Gesundheits Ing—March 15, 31, 1900.

**American Practice.**—An English Criticism on American Practices in Erecting Domestic Hot Water Supply Apparatus. Frederick Dye. The object of the article is to point out faults with the view of showing how the work may be improved. Ill. 1800 w. Heat & Ven—Feb. 15, 1898.

**Boiler Connections.**—English Boiler Connections. Frederick Dye. Illustrated description and differences between English and American practice. 2400 w. Heat & Ven—Oct. 15, 1896.

**Faults.**—Faults and Causes of Failure in Domestic Hot Water Supply. Frederick Dye. Part first considers boilers and their effectiveness, and the position of the pipes in the common type of apparatus on the tank system. Ill. Serial. Plumb & Dec—Feb. 1, 1899.

Mistakes Made in the Erection of Domestic Hot Water Supply Apparatus. Frederick Dye. Part first discusses English practice, giving instances of bad results due to details of construction. Ill. Serial. Heat & Ven—Dec. 15, 1897.

**German Baths.**—German Bath Heaters. Robert Grimshaw. Illustrates and describes water heaters in use in Germany. 3000 w. Dom Engng—Sept., 1898.

**Junker Heater.**—The Junker Water Heater (Junker's Schnell-Flüssigkeitserhitzer). A modification of the Junker gas calorimeter for the heating of water for household purposes. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 7, 1897.

**Leaks.**—See also **PLUMBING.**

**Multiple.**—A Multiple Hot Water Supply. Illustrated description of an unusually complex system of plumbing for water supply in a large New York residence. 1500 w. Eng Rec—Aug. 11, 1900.

**Noises in Pipe.**—English Views on the Cause of Noises in Hot Water Pipe. Refers to hot water apparatus which supplies baths and taps from a boiler in a kitchen range. 2800 w. San Plumb—Nov. 1, 1898.

**Plainfield, N. J.**—Hot Water Plumbing System in a Plainfield Residence. An unusual distribution required to supply four bathrooms on opposite sides of the house in the upper stories, beside toilet room and the usual kitchen and laundry fixtures. Ill. 700 w. Eng Rec—Sept. 11, 1897.

**Stand Pipes.**—Stand Pipes for Low Pressure Heating Boilers (Die Standrohre der Niederdruck-Dampfkessel). A résumé of the statutes in force in various parts of Germany relating to the use of open stand pipes for the regulation of pressure on boilers used for cooking, evaporating and similar purposes. Illustrations of various approved methods are given. Two articles. 5000 w. Gesundheits Ingenieur—July 15, 31, 1899.

See also **PLUMBING.**

**Steam.**—On Heating Water by Steam. Discusses the best means of heating water for use in industrial establishments, and gives rule for finding the weight of steam required to heat a given body of water to the boiling point. 1500 w. Prac Eng—Dec. 31, 1897.

**Steam Injection.**—Heating Water by the Direct Injection of steam. An article in partial answer to queries received concerning the amount of coil surface, the best size of pipe, and time required to heat a given number of gallons of water through a given range of temperature. 1500 w. Locomotive—Jan., 1898.

**Street Lamps.**—Waste Heat Used. Describes an invention for heating water for public consumption. Utilizes the heat of street gas-lamps. Ill. 1800 w. Dom Engng—Nov., 1897.

### HOUSE.

See also **ARCHITECTURE; COTTAGE; COUNTRY ESTATE; VILLA.**

Houses for Homes. Considers how best to house the happy home. Makes suggestions for the planning of a city house. 1800 w. Nat Build—May, 1897.

**Am. Soc. Civil Engineers.**—The New House for the American Society of Civil Engineers. Brief illus-

[illegible] Eng [illegible] 2.

**England.** [illegible] Houses [illegible] [illegible] buildings.

**Brick.** [illegible] Houses built of Brick. [illegible] [illegible] Walls [illegible] [illegible]

[illegible] Houses built of Brick. [illegible] [illegible] [illegible] [illegible]

[illegible] Houses built of Brick. [illegible] [illegible] [illegible]

[illegible] Houses built of Brick. Walter [illegible] [illegible] [illegible]

See also BRICK BUILDING; BRICKWORK.

**City.** [illegible] [illegible] [illegible] [illegible]

**Corfu.** [illegible] Houses in the Island of Corfu [illegible] [illegible] [illegible] [illegible] [illegible] Nov 1896.

**England.** The English House. A review of the [illegible] [illegible] July 17, 1896.

The [illegible] Houses of the English Suburbs and [illegible] [illegible] [illegible] [illegible] Arch Rec [illegible]

**French Society of Civil Eng.**—The New House of the Society of Civil Engineers of France (Das [illegible] [illegible] der Ingenieurs [illegible] in Paris. Illustrated description of the new building of the French Civil Engineers. 1600 w. Schweizerische Bauzeitung—[illegible] 21, 1896.

**London.**—North London House Property. Illustrated [illegible] of the class of modern houses built in this district, with some particulars and [illegible] 2000 w. Ill Car & Build—Apr. 2, 1896.

The Modern Town House. A criticism of the houses of London in general, with brief description of the house built by Mr. [illegible] 1000 w. Ill Car & Build—Sept. 8, 1897.

**Mountain Station, N. J.** A Typical American Dwelling. Illustrated description of the residence and [illegible] of Mrs. Kathleen Martin, at Mountain Station, N. J. 700 w. Ill Car & Build—April 24, 1896.

**Roman Country.** The Roman Country House. A. D. Smith. The first part is a review of the [illegible] of life which made the architecture and [illegible] of the Roman of more importance than the interiors, with illustrations and interesting information connected with the subject. Serial. Arch Rec—Vol. IV., No. II., 1896.

**Twentieth Century.** The House of the Twentieth Century (La Maison du XXe Siècle). A somewhat fanciful theoretical discussion of a house with all modern improvements, built on scientific and hygienic principles. Serial. 2 parts. 7000 w. Revue Technique—May 25, June 25, 1896.

**Washington.**—Domestic Architecture in Washington City. Glenn Brown. Showing a century's architectural development in the nation's capital as expressed in the private residences. Ill. 3600 w. Eng Mag—June, 1896.

**Wooden, Switzerland.** Wooden Houses in Switzerland. Jean Schopfer. An interesting illustrated description of the exhibition of Swiss chalets of various epochs, at the Geneva National Exposition of 1896. The "Swiss Village" was arranged on historical lines, each house exists, or did exist, in reality. 3000 w. Arch Rec—April-June, 1897.

**HOUSE-PLANNING.**

See also ARCHITECTURE.

House-Planning from the Aesthetic Point of View. [illegible] Read at meeting of the [illegible] [illegible] on the importance of [illegible] [illegible] in securing effect. A [illegible] [illegible] 1200 w. [illegible]—Jan. [illegible]

Suggestions on House Planning. Oscar Hall. [illegible] before the Toronto Chapter of Architects. Gives analysis of a plan in its general [illegible] and in the details of separate rooms [illegible] 3000 w. [illegible]

**HUB.**

See also WHEEL.

**Rubber Cushioned.**—A Rubber Cushioned Hub. Illustrated description of an invention for reducing the vibration of vehicles, adapted for motor vehicles and cycles. 600 w. Eng. Lond—April 2, 1897.

**HUEBNERITE.**

**Arizona.**—Hübnerite in Arizona. William P. Blake. Describes the occurrence in this new locality. [illegible] 1000 w. Trans of Am Inst of Min Eng—[illegible] 1896.

**HUMIDITY.**

See also DRYING; HEATING AND VENTILATION; METEOROLOGY; VENTILATION.

The Humidity of the Air (Der Feuchtigkeitsgehalt der Luft). Bruno Wernig. Discusses the question in connection with house heating, and maintains that for health the humidity should be maintained the same as exists with the corresponding temperature in summer. 2000 w. Gesundheits Ingenieur—Nov. 15, 1897.

**Drosophore.**—The Drosophore, for the Humidification of the Air (Humidification de l'Air. Le Drosophore). An apparatus for maintaining the proper degree of humidity in spinning and weaving mills by a combination of atomizers and air currents. 1500 w. La Revue Technique—March 25, 1897.

**Drying Plants.**—The Determination of Atmospheric Humidity in Drying Plants (Beiträge zur Bestimmung der Atmosphärischen Feuchtigkeit in Trockenanlagen). Paul Fuchs. A study of hygrometry from the technological standpoint, giving practical methods of determining the moisture in connection with drying apparatus. 2000 w. Gesundheits Ingenieur—Oct. 31, 1896.

**Iron Making.**—See CUPOLA—Humidity.

**New England.**—The Relative Humidity of Southern New England and Other Localities. Report of Alfred J. Henry, Chief of Div. of Weather Bureau, U. S. Dept. of Agriculture. Results in tabulated form of extensive observations in various localities, with explanatory remarks upon the methods and their accuracy, and comparisons of humidity of different regions. Also diagrams showing curves of relative humidity, and statement of the relation of atmospheric humidity to kinds and quantities of useful crops. 5000 w. Bos Jour of Com—July 25, 1896.

**Reducing.**—Reducing Atmospheric Humidity. Frank Richards. A correspondence giving information on this subject. 1700 w. Am Mach—Sept. 23, 1896.

**Regulating Apparatus.**—Humidifiers and Ventilators. Illustrated description of a new apparatus for regulating the hygrometric condition of the atmosphere of manufacturing establishments, more particularly those producing textile fabrics, whereby much more uniform results are attainable than heretofore. 600 w. Ind & East Eng—Jan. 18, 1896.

**Textile Factories.**—The Moistening of the Air in Spinning and Weaving (Die Anfeuchtung von Luft in Spinnereien und Webereien). J. Körting. A paper showing the importance of maintaining the proper degree of moisture in the air of spinning and weaving factories, with microphotographs of the fibers. 4000 w. Zeitschr d Ver Deutscher Ing—Aug. 27, 1896.

**Weaving Shed.**—See VENTILATION.

**HYDRANT.**

See also FIRE PROTECTION; WATER SUPPLY.

**Rentals.**—New Judical Light on Hydrant Rentals. A Michigan decision, holding that in the absence of a contract, 8 per cent. on the cost of the necessary plant is the proper charge. 600 w. Eng Rec—May 20, 1899.

### HYDRAULIC ELEVATOR.

See **ELEVATOR.**

### HYDRAULIC ENGINE.

An Hydraulic Engine. Arthur Rigg. Reviews various makes of hydraulic engines, and notes the wasteful manner in which the pressure water is applied, when operating under partial loads, and gives illustrated description of invention of the writer. 3000 w. Engr, Lond—Jan. 14, 1898.

**Pope Tube Works.**—The Hydraulic Service Engine of the Pope Tube Company. Illustrates and describes a crank machine operating under pressure of 1200 pounds and over per square inch, and running with complete absence of shock at sixty turns per minute. Serial. Am Mach—Oct. 20, 1898.

**Rotative.**—Hydraulic Rotative Engines. Arthur Rigg. Paper read before the Soc. of Engs. The development of the modern rotative hydraulic engine is traced from the time of Bramah, up to date. Serial. Ind & Ir—May 8, 1896.

### HYDRAULIC ENGINEERING.

**Massachusetts, 1895.**—See **SANITARY ENGINEERING.**

**Metropolitan Power House, N. Y.**—Hydraulic Engineering in the Metropolitan Power House. Illustrated detailed description of the water supply, fittings, plumbing and fire protection. 1800 w. Ir Age—Aug. 23, 1900.

### HYDRAULIC INTENSIFIER.

**Frictional Losses.**—Frictional Losses in a Hydraulic Intensifier. Walter Ferris. Gives experiments made at the Pencoyd Iron Works, with the idea of obtaining information as to the frictional losses in hydraulic machinery and to see to what extent the formulas given by engineering authorities correspond with practice. 1400 w. Am Mach—Feb. 3, 1898.

### HYDRAULIC JACK.

Theory of the Hydraulic Jack. George F. Hodgins. Explanatory. 1500 w. R R Car Jour—Aug., 1900.

**Bridge Lifting.**—Hydraulic Jacks for Lifting Iron Bridges (Hydraulische Vorrichtungen zum Heben von Eisernen Eisenbahnbrücken). With illustrations of the powerful hydraulic jacks used in lifting the iron bridge near Dordrecht in Holland. 1800 w. Glaser's Annalen—Feb. 1, 1899.

### HYDRAULIC JET.

See **INDUCTION JET.**

### HYDRAULIC JOINTING.

**Tubes.**—Hydraulic Jointing of Tubular Structures. Illustrated description of process invented by Charles T. Crowden. 2500 w. Ind & Ir—Feb. 4, 1898.

### HYDRAULIC LABORATORY.

**Cornell.**—The Hydraulic Experiment Station of Cornell University. Information concerning the plant for making hydraulic experiments. Ill. 4800 w. Eng News—March 2, 1899.

The Cornell Hydraulic Laboratory. J. H. Massie. Illustrated description of the reservoir, canal, penstock and laboratory proper, and a review of the proposed work to be done there. 8600 w. Eng Rec—March 4, 1899.

The Great Hydraulic Laboratory at Cornell. Harley S. Gibbs. The important features of its construction, its purposes, and aims. Ill. 2300 w. Trans of Assn of Civ Engs of Cornell Univ—1898.

The Hydraulic Laboratory of Cornell University. E. A. Fuertes. A brief history of this laboratory, built for the purpose of advancing hydraulic science. Ill. 5000 w. Jour N E Water Wks Assn—March, 1900.

**Lafayette.**—The Hydraulic Laboratory of Lafayette College. Illustrated description of a new laboratory for the demonstration of hydraulics before classes, and for experiments by students. 3000 w. Eng Rec—Dec. 30, 1899.

**Worcester Poly. Inst.**—Worcester Polytechnic Institute. Hydraulic Laboratory. Illustrated description. 1200 w. Eng Rec—Nov. 21, 1896.

### HYDRAULIC MACHINERY.

**Gate Operating.**—A Device for Operating a Gate from a Distance by Hydraulic Power. A. L. Adams. Illustrated description. 700 w. Eng News—Aug. 27, 1896.

**Machine Tool.**—See **MACHINE TOOL—Hydraulic.**

**Watson-Stillman, New York.**—Some Notes on the Manufacture of Hydraulic Machinery, Gathered in the Shops of the Watson-Stillman Co. Illustrated description. 2000 w. Mach, N. Y.—Oct., 1899.

### HYDRAULIC MINING.

See also **GOLD DREDGING; GOLD MINING; GOLD PLACER; GOLD REGION.**

Defining Hydraulic Mining. Extracts from a letter by T. L. Ford, of San Francisco, to an inquiry as to what constituted hydraulic mining. 1700 w. Min & Sci Pr—April 23, 1898.

Practical Notes on Hydraulic Mining. George H. Evans. Part first names points on which a mine manager should be thoroughly posted, and considers water facilities, and nature of the country for grades, etc., as the first two. Serial. Min & Sci Pr—April 10, 1897.

Some Notes on Hydraulic Mining. Augustus J. Bowie. Some of the difficulties encountered are mentioned showing how hazardous anticipated estimates of yield are. 2500 w. Eng & Min Jour—Oct. 30, 1897.

**California.**—Amount of Loss to California Due to Closure of Hydraulic Mines. Considers the loss under three headings: 1st, direct loss of the gold formerly produced by the mines; 2d, depreciation in value of the property and equipment; 3d, the loss to sympathetic industries. 1300 w. Min & Sci Rev—Jan. 16, 1897.

California Hydraulic Mining Under the Caminatti Act. Explains the manner of occurrence and gives illustrated description of methods of hydraulic mining used. The difficulties which led to the passage of this act are also explained. 3400 w. Sci Am Sup—July 21, 1900.

**Debris.**—Responsibility for Debris. Data aiming to prove that hydraulic mining was not the chief cause of the evils complained of, but that the Sacramento River has been raising its channel and increasing the swamps for centuries. 1100 w. Min & Sci Pr—Jan. 9, 1897.

**Elevator.**—See **ELEVATOR—Gravel.**

### HYDRAULIC PIPING.

A Proposed Improved System of Hydraulic Piping. Walter Ferris. Illustrates and describes the writer's plan. Part first gives an outline of the scheme. Serial. Am Mach—Nov. 2, 1899.

### HYDRAULIC POWER.

**Mines.**—The Brown Hydraulic System for Underground Pumping and Haulage. William F. Lang. Read before the Mining Inst. of Scotland. A description of the adaptation of this system to mining purposes. 1800 w. Col Guard—Dec. 31, 1897.

**Transmission and Distribution.**—Hydraulic Transmission and Distribution of Power. E. B. Ellington. The first portion of a presentation of the claims of high-pressure hydraulic transmission to consideration, being devoted to questions of the cost of generation and transmission, and to be followed by details of application. 3000 w. Engineering Magazine—May, 1899.

Hydraulic Transmission and Distribution of Power. E. B. Ellington. The concluding paper is devoted to the practical questions connected with the delivery and utilisation of hydraulic power, including motors and tools operated directly by hydraulic pressure. 3500 w. Engineering Magazine—June, 1899.

See also **POWER TRANSMISSION—Hydraulic.**

### HYDRAULIC PRESS.

See also **FORGING PRESS—Hydraulic.**

Hydraulic Press of 350 Tons Capacity (Presse Hydraulique de 350,000 Kilogrammes). A powerful press for hydraulic forging, on the Tenner system, with steam accumulator. 1500 w. La Revue Technique—Sept. 10, 1897.

The Steam Hydraulic Press as a Substitute for the Blooming Hammer (Ersatz der Luppenhämmer durch dampf-hydraulische Pressen). Description and illustration of combined steam and hydraulic press for handling blooms, instead of the steam hammer. 2500 w. Stahl und Eisen—April 1, 1897.

### HYDRAULIC PRESSURE.

High Hydrostatic Pressures and Their Application to Compressing Liquids; a New Form of Pressure Gauge. Francis H. Stillman. Describes methods and apparatus used. Ill. 2000 w. Trans Am Soc of Mech Engs, No. 848—Dec., 1899.

**Engine Erection.**—Use of Hydraulic Pressure in Engine Erection. Illustrates and describes its use at the 96th street power house, New York. 700 w. Power—Aug., 1899.

### HYDRAULIC RAM.

See also **SIPHON; WATER HAMMER.**

Hydraulic Rams. J. Richards. A study of the efficiency and defects of rams, giving experiments and illustrations. 2400 w. Eng & Min Jour—April 25, 1896.

Hydraulic Rams. Carl Pixis. Illustrated description of three varieties of a new kind of hydraulic ram, recently exhibited at the Paris Agricultural Exhibition. 1000 w. Eng & Min Jour—June 20, 1896.

Hydraulic Rams. J. Richards. Illustrates and describes the work of the writer in this field, showing the improvements made and yet to be desired, and giving much information of value. Also discussion. 8000 w. Jour Assn of Engng Socs—Jan., 1898.

The Durability of Cast-Iron Rams for Hydraulic Presses. "Uni." The durability of rams and the causes of their becoming rough, with means of preventing the trouble. Ill. 1800 w. Prac Engr—Nov. 25, 1898.

**Rife.**—Tests of a Rife Hydraulic Ram. I. Efficiency and Capacity Test and Comparison of the Effect of "Statical" and "Sliding" Head in Driving the Ram. Theo. W. Johnson and Arthur J. Wood. II. Efficiency Test Under High Driving Heads and the Determination of the Lowest Ratio between the Driving and Pumping Heads. A. Beutler, Jr., P. J. Brune and Thomas J. Main. Illustrated detailed description of tests made. 5000 w. Stevens Ind—April, 1898.

**Water-Works.**—A Hydraulic Ram Plant for a Public Water Supply. Illustrated description of the Rife engine and account of the installation at West Reading, Pa. 1500 w. Eng News—Dec. 31, 1896.

The Hydraulic Ram for Use in Public Water Works Systems. Daniel W. Mead. This paper is an explanation of its principle and action and illustrates and describes existing forms. Discussion. 4500 w. Ill Soc of Engs & Surv—11 An Rept., 1896.

### HYDRAULICS.

See also **HYDROGRAPHY; RIVER DISCHARGE; WATER FLOW.**

**Alluvial River.**—Hydraulics of Rivers Having Alluvial Beds. Abstract of paper by George Y. Wisner. A study of the movement of water and sedimentary material in rivers. 2000 w. Eng Rec—Sept. 5, 1896.

**Approximate Formulae.**—Approximate Formulae and their Application in Technical Calculations (Ueber Näherungsgleichungen und deren Anwendung bei Technischen Rechnungen). Dr. J. B. Goebel. Some approximate equations with their applications to hydraulics and safety valves. 800 w. Gesundheits Ing—March 31, 1900.

**Graphics.**—Two Graphic Methods Applied to Hydraulic Calculations. Ponsonby Moore Crosthwaite. A comparison of the two methods of plotting diagrams, with an explanation of the principle and the advantages. 1400 w. Engng—July 15, 1898.

**Index.**—The Colton Index to Hydraulics. Describes a card index of literature on the whole field of hydraulic engineering, now preserved at Yale University. It illustrates the usefulness of this system when applied to one subject. 1200 w. Eng Rec—June 17, 1899.

**New.**—The New Hydraulics: An Essay for Advanced Students in the Art, and for Those who Look Beneath the Surface. Clemens Herschel. Reviews important experiments, and urges the collection of new coefficients derived from experiment. 1300 w. Eng News—Nov. 10, 1898.

**Theory.**—The Theory of Energy in Hydraulics. L. M. Hoskins. The author attempts to supplement what he thinks to be an inadequate treatment of this subject. 1200 w. Am Gas Lgt Jour—Oct. 12, 1896.

### HYDRAULIC TOOL.

See **MACHINE TOOL—Hydraulic.**

### HYDROCARBONS.

See also **OZOKERITE; PETROLEUM.**

**Utah.**—The Hydrocarbons of Eastern Utah. Don Maguire. With special reference to the deposits of ozokerite, gilsonite, and elaterite. Their properties, and the uses to which they are adapted. The forms of the deposits, their situation, and the extent to which they have been prospected and developed. 2800 w. Mines & Min—April, 1900.

### HYDRODYNAMICS.

See **SHIP RESISTANCE; WATER FLOW.**

### HYDRO-ELECTRIC MACHINERY.

See also **HYDRO-ELECTRIC PLANT.**

Direct-Connected Waterwheels and Generators. Frank C. Perkins. Illustrates and describes examples of the use of impulse-wheels, and pressure turbines for direct-connection with electrical generators, with remarks on efficiency. 1300 w. W Elect'n—April 14, 1900.

### HYDRO-ELECTRIC PLANT.

See also **ELECTRIC TRANSMISSION; TURBINE; WATER POWER.**

Electricity and Water Power. Mark A. Replogle. The writer aims to put into plain language the fundamental principles governing the application of water power to the generation of electricity. Serial. Elec Rev—April 15, 1896.

Electric Utilization of Water Powers. L. D. W. Magie. Abstract of a paper read before the Canadian Elec. Assn., at Montreal, Que. Discusses questions requiring study in the harnessing of water powers; also the cost. 1500 w. Elec Wld—July 9, 1898.

Hydraulic Problems. W. Stuart Smith. Read before the Sacramento convention of the Pacific Coast Electric Transmission Assn. The difficulties that arise in the development of a water power. 3800 w. Jour of Elec—Nov., 1897.

The Utilization of Water Power. Alph. Steiger. Abstract of paper read before the Inst. of Elec. Engrs. The great service water powers are capable of rendering in the cheap production of electrical energy, with description of a few turbine plants under low falls. Serial. Prac Eng—Aug. 21, 1896.

The Utilization of Water Power, Especially with a Small Fall, with Some Examples of Plants for the Generation of Electrical Energy. Alph. Steiger. Read before the Inst. of Elec. Engs. Showing that water-powers if judiciously utilized are capable of rendering great service. Serial. Elect'n—May 29, 1896.

Water Driven Plants. John Murphy. Read before the Can. Elec. Assn. Deals in a general manner with the operation of water driven lighting and power plants. 1100 w. Can Elec News—June, 1897.

**Adige River, Austria.**—The Power Plant on the Adige to Supply Botzen, Meran and Vicinity with Electricity (Die Etschwerke zur Versorgung der Städte Botzen, Meran, und Nachbarorte mit Elektricität). O. von Miller. A fully illustrated description of the plant by which a fall of 66 meters is used to generate 6000 h. p. for lighting, power, and carbide manufacture. 2500 w. Elektrotech Zeitschr—Aug. 31, 1899.

**Alpine for Railways.**—The Utilization of Water Power in the Alpine Countries for Railway Purposes (Ueber die Ausnützung der Wasserkräfte in den Alpenländern zum Betriebe von Local- und Gebirgsbahnen). An address by Adolph Prasch giving a general account of the utilization of Alpine water powers, with data as to cost and performance. 7500 w. Mitt d Ver f d Förd des Local- und Strassenbahnwesens—April, 1898.

**Amparo, Brazil.**—Electric Station at Amparo, Brazil (Station d'Electricité du Amparo, Brésil). Illustrated account of the hydraulic-power electric-lighting station for the city of Amparo, with views of the power plant and diagram of the distribution. 1200 w. Génie Civil—May 28, 1898.

**Arc River, France.**—The Motive Power of the Arc (Les Forces Motrices de l'Arc). Giving an illustrated description of the various power stations which utilize the force of this mountain torrent of upper Savoy between Modena and Saint-Michel. 3500 w. La Rev Tech—Nov. 25, 1897.

See also **La Praz, Savoy.**

**Arosa, Switzerland.**—The Electric Plant at Arosa (Das Elektricitätswerk Arosa). An excellently illustrated account of the hydraulic electric plant at this popular Swiss resort. Over 300 h. p. are developed from a small mountain stream. Two articles. 2500 w. Schweizerische Bauzeitung—Dec. 3, 10, 1898.

**Artesian Well.**—See **Chamberlain, S. D.**

**Athens, Ga.**—A Water Power Developed for Electric Railway. Albert Phenis. A description of the plant at Athens, Ga. 1300 w. Mfrs Rec—Feb. 12, 1897.

See also **ELECTRIC TRAMWAY.**

**Auburn, California.**—The Auburn Station of the Central California Electric Company. Illustrates and describes an auxiliary hydraulic station running in parallel with another five miles away, giving particulars of the buildings and construction. 1000 w. Am Elect'n—Sept., 1899.

**Azusa, Cal.**—See **WATER WHEEL—Tutthill Impulse.**

**Baden, Switzerland.**—See **Europe.**

**Bakersfield, Cal.**—The Bakersfield Power Plant. Jas. D. Schuyler. Illustrated description of a hydro-electric power plant for lighting this city and supplying electricity for power as well as light. 2500 w. Eng News—Sept. 2, 1897.

**Bex, Switzerland.**—The Electric Plant of the Société des Forces Motrices l'Avançon in Bex, Canton Waadt (Das Elektricitätswerk der Société des Forces Motrices de l'Avançon in Bex, Waadt). K. A. Breüer. A well illustrated account of this plant, which gets power from the Avançon River, and distributes light and power, and operates a tramway. Serial. Schweiz Bauzeitung—April 14, 1900.

**Big Cottonwood, Utah.**—See **ELECTRIC TRANSMISSION—Big Cottonwood, Utah.**

**Big Hole River, Mont.**—A Polyphase Power Plant. Frank C. Perkins. Brief illustrated description of the Montana Power Company's station on Big Hole River. 700 w. Elec Rev, N. Y.—April 18, 1900.

**Bodie, Calif.**—See **DAM.**

**Bourgogne Canal.**—The Electric Plant of the Bourgogne Canal (Installation Electrique au Canal de Bourgogne). M. Galliot. A general description of the hydraulic electric power plant utilizing the power of the Saone to supply the Bourgogne canal with water. 4000 w. 4 plates. Ann des Ponts et Chaussées—4 Trimestre 1898.

**Brown, Boveri & Co.**—See **Europe.**

**Butte, Mont.**—The Butte, Montana, Power Plant. Illustrated description of a 6000 H. P. hydro-electric plant with steam relay and a 66-ft. timber dam. 900 w. Eng Rec—March 5, 1898.

The Montana Power Company. L. D. Tandy. Illustrated detailed description of a plant that will rank among the finest in the United States, from both an engineering and from a financial standpoint. 2000 w. St Ry Jour—Feb., 1898.

**California.**—California Water Power in Electrical Harness. H. G. T. Abstract from correspondence in the N. Y. "Evening Post." Brief review of the work already done and in prospect in this line. 1800 w. Elec Eng—April 22, 1896.

A California Electric Mining Plant. A 300 h. p. 30-inch Girard water wheel is coupled direct to a 1000-volt direct-current electric generator. Current is transmitted to a motor driving a pump which supplies water to the gold sluices. 800 w. Min & Sci Pr—April 18, 1896.

The Electric Development of Hydraulic Power. F. C. Finkle. With especial reference to the development of water powers in southern California, giving many illustrations of power locations. 4000 w. Eng Mag—March, 1898.

Water-Power Plants with Long-Distance Electric Transmission in Southern California. C. E. Fowler. Introductory remarks on the extent of these plants, with illustrated description of that recently completed by the Southern California Power Co. Serial. Eng News—March 9, 1899.

**Chamberlain, S. D.**—Electric Light Plant at Chamberlain, S. D., Operated by Artesian Well Power. Illustrated description. 1800 w. W Elec—March 7, 1896.

**Chèvres, Geneva.**—The Electricity Works of Chèvres (Geneva). An illustrated account of some of the difficulties overcome and successes achieved in this hydraulic undertaking. Serial. Elec Rev, Lond—Oct. 12, 1900.

**Chicago Drainage Canal.**—Power Development of the Drainage Canal at Joliet. An illustrated description of an 8000 horse-power water and electric power plant at a dam in the Chicago Drainage Canal. 2500 w. W Elect'n—Sept. 22, 1900.

**Columbia, S. C.**—A Large Hydraulic Plant at Columbia, S. C. Illustrated description of a plant for generating electricity for street railway, lighting, or industrial purposes. 1400 w. Eng Rec—Jan. 1, 1898.

Power Plant of the Columbia Water Power Company. Describes the installation of this company, which utilizes the water of the Broad River, and includes a development of 3000 h. p., which is to be increased to 10,000 h. p. 1500 w. Elec Wld—June 11, 1898.

**Dalmatia.**—The Utilization of the Falls of Kerka, in Dalmatia (Project zur Verwerthung der Wasserkraft der Kerkafälle in Dalmatien). G. Sartori. A detailed description of the hydraulic and electric plant designed to utilize over 7000 h. p. from the river Kerka, near Sebenico, in Dalmatia. Two articles. 3000 w. Elec Tech—May 31, June 15, 1898.

**Delta, Pa.**—Delta Light and Power Plant. Illustrated description of the water-power electrical generating plant of Delta, York Co., Pa. 1500 w. Am Elect'n—March, 1898.

Power Plant with Electric Transmission at Delta, Pa. S. R. Stubbs. A short description of a small but interesting plant. 900 w. Eng News—April 21, 1898.

**Dolgeville, N. Y.**—The Dolgeville, N. Y., Electric Light and Power Plant. Data and illustrations of a plant for the generation of electricity for lighting, heating, etc. 1800 w. Elec Eng, N. Y.—March 17, 1898.

The Dolgeville (N. Y.) Water-Power Electric Light and Power Plant. E. A. Grissinger. Deals with the organization and the technical details relating to the installation. Ill. 3400 w. Am Elect'n—April, 1898.

**Efficiency.**—The Determination of the Efficiency of a 220 Kilowatt Generator and Turbine with Vertical Connecting Shaft (Bestimmung der Elektrischen Verluste Eines mit einer Turbine Gekuppleten 220 Kilowatt Drehstromgenerators mit Vertikaler Welle). K. P. Täuber. Details of the test are given, the total loss being about 5 per cent. 2000 w. Elek Zeitschr—Sept. 1, 1898.

**Europe.**—On Hydro-Electric Installations. S. Du Riche Preller. The first part contains an introduction which makes a classification of the applications of single-phase, two-phase and three-phase alternate current. This is followed by an illustrated description of the two-phase installation at Baden,—the first of a series of descriptions of a number of notable installations carried out by Messrs. Brown, Boveri & Co. of Baden, in various parts of Europe which are to be presented. Serial. Engng—Nov. 1, 1895.

**Germany-Switzerland.**—Electrotechnics (Elektrotechnik). F. Uppenborn. A valuable paper describing and illustrating some of the more recent hydraulic electric power stations of Germany and Switzerland. 6000 w. Zeitschr d Ver Deutscher Ing—Aug. 14, 1897.

**Granada.**—The Hydro-Electric Power Plant of Granada, Spain (Usine Hydro-Electrique de Grenade). R. B. Ritter. An extended account of this important plant. A fall of 100 meters is utilized to obtain 1750 h. p. from the Rio Genil. 3500 w. 1 plate. Génie Civil—April 2, 1898.

**Hamilton, Can.**—The Hamilton, Can., Cataract Power Co.'s Plant at De Cew Falls. George W. Bowie. Illustrated detailed description of a long distance transmission plant with many novel features. 3000 w. Elec Eng, N. Y.—Dec. 8, 1898.

**Hartford, Conn.**—See **Tariffville, Conn.**

**Helena, Mont.**—The Harnessing of the Missouri River Near Helena, Montana. Illustrated description of the latest installation in the Rocky Mountain region. 700 w. Elec Eng, N. Y.—March 31, 1898.

The Helena Power Development. Illustrates plant on the Missouri River for developing 10,000 h. p. 1200 w. Eng Rec—April 16, 1898.

**Ingleton, Yorkshire.**—Ingleton Water-Power Electric Supply Works. Illustrated description of a British plant for village electric lighting. 1200 w. Elect'n, Lond—Feb. 16, 1900.

**Isle of Man.**—A Water Power Tramway Plant in the Isle of Man. Illustrated description of a line 18 miles long worked solely by water power. 2000 w. Tram & Ry Wld—Feb. 8, 1900.

Isle of Man Electric Tramways: Water Power Utilization Plant. Illustrated description of the new turbine plant which has enabled the company to shut down their steam plant entirely and work their line solely by water power. 1200 w. Elect'n, Lond—Jan. 26, 1900.

**Italy.**—Concessions for Hydraulic Power (Le Concessioni di Forze Idrauliche). A discussion of the quantity of hydraulic power available in Italy, and the probable cost of its electrical transmission to points of application; in view of the granting of concessions to undertakers for its development.

Two articles. 3500 w. Rivista Gen d Ferrovie —Jan. 8, 15, 1899.

Industrial Electro-Hydraulic Installations (Impianti Industriali Elettro-Idraulichi). Carlo Gabussi. An argument for the electrical exploitation of the numerous small water-powers in Italy, containing some data of streams, etc. 1500 w. Giorn del Lav Pubb e delle Str Ferr—Nov. 16, 1898.

The Utilization of the Water Powers of Italy. Enrico Bignami. A review of the possibilities which the innumerable water powers of Italy offer for the industrial salvation of the country. 4500 w. Eng Mag—Aug., 1899.

See also **Lake Garda; Paderno; Ticino.**

**Jamaica.**—See **ELECTRIC TRAMWAY—Kingston, Jamaica.**

**James River, Va.**—The James River, Va., Water-Power Development. William Todd. Illustrates and describes the plans of a work now in progress. 1800 w. Elec Wld & Elec Eng—May 6, 1899.

**Joliet, Ill.**—See **Chicago Drainage Canal.**

**Kalamazoo, Mich.**—The Kalamazoo Valley Electric Company's Plant. W. G. Fargo and J. B. Foote. Illustrated description of the framed dam, generating station and transmission lines of a plant of 2000 H. P., serving a district 46 miles long. 2200 w. Eng Rec—Jan. 13, 1900.

**Lachine, Montreal.**—Lachine Rapids Plant and the Cost of Producing Power for Generating Electricity Therefrom. W. M'Lea Walbank. A detailed statement of costs, with editorial comment. 2500 w. Elect'n, Lond—July 8, 1898.

The Electric Light and Power Plant of the Lachine Rapids Hydraulic & Land Company. Charles T. Child. Illustrated description of a twelve-thousand horse power hydraulic and electric station that lights Montreal and furnishes power to its industries. 8500 w. Elec Rev, N. Y.—Sept. 12, 1900.

The Lachine Rapids Power Plant, Montreal, P. Q. Wm. L. Bishop. Illustrated detailed description of a plan for power development. 4500 w. Eng News—Feb. 18, 1897.

See also **ELECTRIC TRANSMISSION.**

**Lake Garda, Italy.**—The Electric Plant at Salo, on Lake Garda (Impianto Elettrico della Societa Salo Gardone). Illustrated description of an interesting small plant. A head of 127 metres is utilized to drive Pelton wheels operating direct-connected dynamos. 2500 w. L'Industria—Nov. 12, 1899.

**La Praz, Savoy.**—Hydro-Electric Power Plant at La Praz, Savoy (Usine Hydro-Electrique de la Praz, Savoie). A. Lapouche. An illustrated description of this plant, whose current is used to produce aluminum. An arched steel water pipe serves as a foot-bridge of 50 meters span. 1500 w. Génie Civil—June 23, 1900.

See also **Arc River, France.**

**Les Clées-Yverdon, Switzerland.**—The Transmission Plant Les Clées-Yverdon. J. Laffargue, in "L'Industrie Electrique." Translated description with comments from an American point of view. Ill. 1500 w. Elec Wld—Nov. 26, 1898.

**Lyons.**—The Rhône Hydro-Electric Installation. Illustrated description of an undertaking on a large and very comprehensive scale, the object of which is to convert the water power of the Rhone into electric energy, to be distributed throughout the city of Lyons, and adjacent districts. 3500 w. Engng—April 17, 1896.

The Utilization of the Power of the Rhone at Lyons (Ausnützung der Wasserkraft des Rhôneflusses bei Lyon). Anton Klir. An illustrated description of the canal de Jonage which cuts across a loop of the Rhone and enables 12,000 h. p. to be utilized at Lyons. 4000 w. 3 plates. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1899.

**Marbach, Stuttgart.**—The New Hydraulic Electric Power Plant of Stuttgart at Marbach on the Neckar (Die Neue Wasserkraft Anlage des Elektrizitätswerkes Stuttgart zu Marbach a. N.). Describing the plant by which 2,000 h. p. is generated at Marbach and transmitted about 12 miles to Stuttgart. 1000 w. Deutsche Bauzeitung —Sept. 29, 1900.

**Massena, N. Y.**—Electric Power from the St. Lawrence River. Details concerning an important project near Massena, N. Y. Ill. 3000 w. Elec Rev—Aug. 4, 1897.

The Electric and Hydraulic Power Plant of the Saint Lawrence Power Company, Massena, N. Y. Charles T. Child. Illustrates and describes the engineering and construction features of this enormous development of hydraulic power for electric transmission and utilization. 2200 w. Elec Rev, N. Y.—Oct. 24, 1900.

The Massena Water-Power Electrical Generating Plant. Brief illustrated description of some of the important features. 500 w. Am Elect'n—Sept., 1897.

The Power House of the St. Lawrence Power Company, Massena. Illustrated description of the station on the Grasse River, which is designed for an ultimate capacity of 150,000 h. p., half again as much as the capacity of the Niagara Plant at present. The switchboard details are particularly novel. 1800 w. Eng Rec—Feb. 10, 1900.

The St. Lawrence Power-Transmission Scheme. Brief description of the project to utilize the waters of the St. Lawrence in the neighborhood of the township of Massena. 1800 w. Elec Engr, Lond—May 21, 1897.

See also **WATER POWER.**

**Mechanicsville, N. Y.**—The Development of the Hydraulic Power of the Hudson River at Mechanicsville. Fully illustrated article describing the development of 7000 h. p. and its electrical transmission to Schenectady. 3000 w. Am Elect'n —Sept., 1898.

The Generation of Electricity by Water Power at Mechanicsville, New York. An illustrated detailed description of a Hudson River power-plant which will supply Schenectady and other places in the vicinity. 3200 w. Power—Oct., 1898.

The Mechanicsville Transmission Plant. Illustrated description of a Hudson River water-power which will supply current to Schenectady and other nearby places. 1300 w. Elec Rev, N. Y. —Aug. 31, 1898.

**Mexico.**—Notes on Mexico (Notes sur le Mexique). Ramon Fernandez de Arteaga. Especially describing the development of hydraulic power in the numerous mountain streams including the hydraulic electric power station at Régla, near Pachuca. 2500 w. Génie Civil—Feb. 19, 1898.

**Montmorency Falls.**—Development of the Montmorency Falls. E. M. Archibald. Illustrates and describes the power plant and system of distribution. 4800 w. Elec Wld & Elec Engr—June 17, 1899.

**Mt. Whitney, Cal.**—The Mount Whitney Water Power Electric Plant and Light Regulating Device. Describes the plant and its device for preventing consumers from burning too many lights. 1800 w. Eng News—Sept. 7, 1899.

**Moutier-Grandval, Switzerland.**—Hydraulic Electric Power at Moutier-Grandval, Switzerland (Installation Hydro-Electrique de Moutier-Grandval, Suisse). An interesting power plant near Basle. The flow of the river Birse is only about 21 cu. ft. per second, but a head of over 300 feet enables 500 h. p. to be developed and applied in this industrial community for lighting and power. 5000 w. 1 plate. Génie Civil—Jan. 1, 1898.

**Neuchatel, Switzerland.**—Electricity at Neuchatel, Switzerland. Illustrated description of plant. 1800 w. W Elec—Sept. 12, 1896.
See also **Val de Travers.**

**Nevada Co., Cal.**—See **DAM—South Yuba River.**

**Niagara.**—The Falls Harnessed. Historical account of the two power companies at the Falls of Niagara, with many illustrations. 5000 w. St Ry Rev—Oct. 15, 1897.

Nikola Tesla at Niagara Falls. Orrin E. Dunlap. Account of Tesla's first visit to the plant of Niagara Falls Power Co., with his impressions. 1300 w. W Elec—Aug. 1, 1896.

A Great Power House at Niagara. An illustrated description of the recent developments of the water power of Niagara Falls. 1700 w. Sci Am—June 18, 1898.

Electrical Development at Niagara Falls. The demands for power and the arrangements being made to supply it; a brief description of the new wheel pit, etc. Ill. 600 w. Elec Rev—April 14, 1897.

Electricity at Niagara Falls. A brief and concise review of the present situation with respect to electrical development, with particular reference to the newest applications and to details of operation. Ill. 5700 w. Am Elect'n—June, 1897.

Electric Power Transmission of Niagara. Orrin E. Dunlap. An account of the rapid progress in the power development. 1800 w. Ill. W Elec—Feb. 8, 1896.

Extension of the Niagara Power House. Orrin E. Dunlap. Views and drawings illustrate the scene of the wheel-pit and power house extension, and make clear the changes to be made. 1100 w. Elec Eng—Sept. 16, 1896.

New Wheel Pit of the Niagara Falls Power Co.'s Power Plant at Niagara Falls, N. Y. O. E. Dunlap. Information concerning this work, which when completed will give this company a total of 105,000 h. p. Ill. 1200 w. Eng News—April 5, 1900.

Lessons from the Niagara Power Plant. Reviews the statements of Dr. Coleman Sellers concerning the changes considered necessary by experience in operating the plant. 1200 w. Eng Rec—Jan. 14, 1899.

Niagara on Tap. T. Commerford Martin. Illustrated description and general remarks upon the utilization of the power of Niagara Falls by the conversion of the energy of its fall into electricity. 4500 w. Jour Fr Inst—Oct., 1896.

Professor Forbes on "Harnessing Niagara." Ernest A. Le Sueur. A severe criticism of Prof. Forbes' recent article in "Blackwood's Magazine." 2700 w. Pop Sci M—Dec., 1895.

The Accomplished Utilization of Niagara. W. B. Rankine. Data as to the result of the enterprise, with a list of contracts for power to Nov., 1896. 600 w. Elec Eng—Jan. 6, 1897.

The Niagara Falls Power Plant. J. E. Woodbridge. The subject is treated from an engineering standpoint, giving reasons for adopting some of the features and details in the design, the additions just completed, and the conclusions which may be drawn. Fully illustrated. 9500 w. Elec Wld—Jan. 7, 1899.

The Development and Extension of the Niagara Power System Up to Date. J. E. Woodbridge. Illustrations and information on the most advanced developments of polyphase work. 18000 w. Am Elect'n—Jan., 1900.

The Extension of the Power Plant of the Niagara Falls Power Co. Orrin E. Dunlap. Description, with illustrations, of the extension of the power-house and wheel-pit, and other changes. 1100 w. Eng News—Oct. 14, 1897.

The Installation of the Niagara Falls Power Company. Charles F. Scott. Shows something of the means which have been taken, within the last few years, for the utilization of this power, and explains the most interesting features. Ill. 6500 w. Pro Engs Club of Phila—July-Sept., 1897.

The Utilization of Niagara Falls (Utilisation des Chutes du Niagara). Georges Henry. A description of the extension of the Niagara power plant, with numerous illustrations and a plate of details of the turbines. 8500 w. 1 plate. Génie Civil—June 17, 1899.

Electricity at Niagara Falls. W. E. Tuttle. A description of the plant, in process of construction, of the Niagara Falls Hydraulic Power and Manufacturing Company which it is thought will produce the cheapest power for the money invested of any in this country. 1800 w. Elec Wld—March 7, 1896.

New Work at Niagara Falls by the Hydraulic Company. Orrin E. Dunlap. Illustrates and describes the recent extension of the company's plant. 2000 w. Elec Eng, N. Y.—July 28, 1898.

Niagara Falls Hydraulic Power Plant. Interesting illustrated description. 1600 w. Sci Am—April 4, 1896.

Old Hydraulic Canal Plant at Niagara Falls Transformed for Electrical Transmission. Orrin E. Dunlap. Illustrated description of the changes made. 2000 w. W Elec—Dec. 5, 1896.

Power Plant of the Niagara Falls Hydraulic Power and Manufacturing Company. From "Canadian Journal of Commerce." Descriptive. 800 w. Power—Dec., 1895.

Recent Additions in the Power House of the Niagara Falls Hydraulic Power and Manufacturing Company. Illustrated description of special machines for the generation of direct currents for electro-chemical purposes from hydraulic power 2700 w. Am Elect'n—Dec., 1899.

The Niagara Falls Hydraulic Power and Manufacturing Company. A. Scheufelen. A well illustrated description of the canal and the power-house below the Falls, with remarks on the industries to which the power is applied. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—March 17, 1900.

The Niagara Falls Hydraulic Power and Manufacturing Co.'s New Work. Orrin E. Dunlap. Illustrated description. 1600 w. Elec Eng—Dec. 4, 1895.

The Niagara Falls Hydraulic Power & Manufacturing Company's Plant. Illustrated description of a plant in which the water is received through large penstocks running down the face of Niagara Gorge; the last of these penstocks is 200 ft. high, 11 ft. in diameter and entirely free from supports between its top and bottom. 3000 w. Eng Rec—Jan. 20, 1900.

The Power Plant of the Niagara Falls Hydraulic Power and Manufacturing Company. Illustrates and describes the plant, and the uses to which the power is applied. 4500 w. Elec Wld—Jan. 14, 1899.

See also **ELECTRIC TRAMWAY—Buffalo; ELECTRIC TRANSMISSION; NIAGARA; WATER POWER.**

**Niagara Gorge.**—See **WATER POWER.**

**Niagara Rapids.**—Developing Power of Lower Niagara. Orrin E. Dunlap. Concerning the development of the rapids of the lower Niagara. Map. 1600 w. W Elect'n—June 18, 1898.

**Ogden, Utah.**—The Power Plant, Pipe Line and Dam of the Pioneer Electric-Power Company of Ogden, Utah. Henry Goldmark. Describes in detail these works recently built in the cañon of the Ogden River, which constitute the most important hydraulic-power plant of Utah, and one of the largest works of the kind in the country. 20500 w. Pro Am Soc of Civ Engs—May, 1897.

**Oregon City.**—The Electric Development of the Falls of the Willamette. An illustrated description of a long distance transmission plant at Oregon City, for supplying Portland and suburbs, twelve miles away. The total power of the fall is estimated at 50,000 horse-power. The completed plant will develop 12,500 horse-power. 1400 w. Elec Ind—Nov., 1895.

**Paderno, Italy.**—European Transmission Practice and the Water Power and Electric Plant at the Adda Rapids, near Paderno, Italy. Illustrates and describes an interesting hydraulic plant, where 13,000 h. p. is transmitted a distance of 20 miles. Serial. Elec Eng, N. Y.—Feb. 9, 1899.

The Electric Power Plant at Paderno, on the Adda (Die Elektrische Kraftübertragungs-Anlage Paderno d'Adda-Mailand). An illustrated account of the Paderno power plant by which 13,000 h. p. is taken from the Adda for transmission to Milan, 21 miles distant. Serial. Schweizer Bauzeit—May 13, 1899.

The Electric Station of Paderno on the Adda (Das Elektricitätswerk in Paderno d'Adda). E. Vannotti. An illustrated account of the hydraulic plant at Paderno, Italy; where 13,000 h. p. is developed and transmitted electrically over 19 miles. 3000 w. Elektrotech Zeitschr—Jan. 5, 1899.

The Water Power Installation at Paderno. G. Semenza. Lecture given before the Milan section of the Associazione Elettrotecnica Italiana. An illustrated detailed description of an interesting power transmission scheme. Serial. Elect'n, Lond—Dec. 16, 1898.

Water Power and Electric Plant at the Adda Rapids, Near Paderno, Italy. Illustrated detailed description. 2200 w. Elec Eng, N. Y.—Dec. 9, 1897.

See also **ELECTRIC TRANSMISSION.**

**Pelzer, S. C.**—The Power Plant at Pelzer, S. C. Illustrated detailed description of one of the most interesting and important water power developments in the South. 2200 w. Eng Rec—May 2, 1896.

See also **ELECTRIC DRIVING—Cotton Mill.**

**Penig, Saxony.**—The Municipal Electrical Works at Penig (Das Städtische Elektrizitätswerk in Penig). Dr. R. Rühlmann. A general description of the plant by which the power of the river Mulde is utilized for light and power supply of the city of Penig. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 28, 1899.

**Pike's Peak, Colo.**—Pike's Peak Company's Power Plant. J. W. Dickerson. Illustrated description of construction, pipe line, and equipment. 2400 w. Mod Mach—June, 1900.

**Rathausen, Lucerne.**—The Electric Plant at Rathausen, near Lucerne (Das Elektricitätswerk Rathausen bei Luzern). An extensive illustrated description of the new hydraulic electric plant near Lucerne—900 h. p. now in use, and at present being increased to 1500 h. p. 7500 w. Elektrotech Zeitschr—March 4, 1897.

**Rheinfelden.**—The Great Electrical Power Plant at Rheinfelden on the Rhine. Illustrated detailed description. 1300 w. Sci Am—Nov. 20, 1897.

The Hydro-Electric Plant at Rheinfelden. Detailed description. 3400 w. Engng—Nov. 10, 1899.

The Rheinfelden Power Transmission. The history of the scheme, with description of the power house, turbines, plant and distribution. Ill. 3500 w. Elect'n—March 26, 1897.

The Utilization of the Power of the Rhine at Rheinfelden (Utilization des Forces Motrices du Rhin à Rheinfelden). A description of the important hydraulic and electric plant under construction on the Rhine above Basle, with photograph and drawings of the turbines and generators. Two articles. 7000 w. Génie Civil—July 3, 17, 1897.

Transmission of Rheinfelden. E. Rathnan. Abstract of a paper read before the Verband. Deutsch. Elektrotechn. Illustrated description. 900 w. Elec Eng—Aug. 12, 1896.

See also **TURBINE.**

**Riverhead, Long Island.**—See **ELECTRIC STATION.**

**St. Anthony's Falls.**—Power House and Shops of Twin City Rapid Transit Company. Illustrated description of the water power plant at St. Anthony's Falls, method of distributing current, stations, shops, cars, etc. 5400 w. St Ry Rev—Feb. 15, 1899.

St. Anthony's Falls Water Power Plant. Illustrated full description of plant constructed to furnish power to all the street railway systems of Minneapolis and St. Paul. 2800 w. St Ry Jour—May, 1898.

St. Anthony Falls Water Power Plant. Illustrated description of the large plant for furnishing power to the electric railways of St. Paul and Minneapolis. 3500 w. Am Elect'n—May, 1898.

The St. Anthony Falls Electric Transmission Plant. Illustrated description of the plant that operates all the street railways of Minneapolis and St. Paul. 2000 w. St Ry Jour—June, 1897.

The St. Anthony Falls Power Plant. Edward N. Saunders, Jr. Brief account of this plant built to furnish power for the street railways of St. Paul and Minneapolis. Ill. 1800 w. Yale Sci M—Feb., 1898.

See also **United States.**

**St. Cloud, Minn.**—St. Cloud, Minn., Water Power Plant. F. W. Springer. Illustrated description. Gives an ingenious means of maintaining constant voltage. 1600 w. Elec Wld & Engr—Sept. 30, 1899.

**St. Helens, Eng.**—Turbo-Electric Generators for Alkali Works. Illustration and description of one of two large generators constructed for the Electric Chemical Works of St. Helens, for the generation of electric current for the decomposition of salt into chlorine and caustic soda. 500 w. Engng—Oct. 16, 1896.

**St. Gabriel, Canada.**—Jacques-Cartier Water Power Plant. Describes an interesting Canadian plant which utilizes a fall of 30 feet. Ill. 900 w. W Elect'n—Dec. 9, 1899.

**St. Lawrence.**—See **Lachine; Massena.**

**Sao Paulo, Brazil.**—The Sao Paulo Power Plant, Brazil. Illustrated description of an 8000 h. p. hydaulic plant for a Brazilian city where coal sells at $10 a ton, making an elaborate station financially advisable. 2300 w. Eng Rec—July 21, 1900.

**Sarajevo, Bosnia.**—The Electric Station at Sarajevo (Das Elektricitätswerk in Sarajevo). Ludwig Spängler. An illustrated account of this important hydraulic power electric station, and description of the applications of current for lighting and tramways. 7500 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—Oct. 21, 1898.

**Sault Ste. Marie.**—See **ELECTRIC INDUSTRY; WATER POWER.**

**Schaffhausen.**—Switzerland. An illustrated description of the hydro-electric station at Schaffhausen. 1700 w. Elec Eng, Lond—Jan. 5, 1900.

The Electric Plant of the City of Schaffhausen (Das Elektrizitätswerk der Stadt Schaffhausen). K. P. Täuber. A very complete and fully illustrated account of the hydraulic power and electric plant above the Falls of the Rhine. Three articles. 5000 w. Schweiser Bauzeit—June 4, 11, 18, 1898.

**Schwyz.**—The Distribution of Electric Energy at Schwyz, Switzerland (Distribution d'Energie Electrique de Schwyz). An excellent account of this new power plant on the lake of Lucerne. Over 3000 h. p. are taken from the river Muotta and distributed both for lighting and power. 1 plate. 5000 w. Génie Civil—Feb. 5, 1898.

The Utilization of the Water Power of the Muotta, near Schwyz (Die Ausnützung der Wasserkräfte der Muotta oberhalb Schwyz). A. Forti. With views of the weir, and plans of the tunnel and power house, and a topographical map. 1200 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—June 3, 1898.

**Sherbrooke, Quebec.**—Two-Phase Water Power Development at Sherbrooke, Quebec. A brief illustrated description of the electric light and power plant, its power development, its equipment and distribution. 2700 w. Can Elec News—Nov., 1899.

**Sihl River, Zürich.**—The Electrical Plant on the Sihl (Das Elektricitätswerk an der Sihl). Prof. Wyssling. A very full account of the hydraulic and electric plant near Zürich. Serial. Schweiz Bauzeit—June 12, 1897.

The Hydro-Electric Station on the Sihl, Switzerland (Station Hydro-Electrique de la Sihl, Suisse). A description of the hydraulic plant recently completed, by which about 2000 h. p. of the Sihl above Zürich are utilized for lighting and power. A fall of over 200 feet is obtained by running a channel across a loop formed by the river. Details of the turbines and generators are given. 3000 w. 1 plate. Génie Civil—Oct. 8, 1898.

**Snoqualmie Falls, Wash.**—Snoqualmie Falls Transmission. Illustrated description of plant to utilize the power of these falls and transmit it to Seattle and Tacoma, Washington. 2000 w. W Elect'n—Aug. 20, 1898.

Snoqualmie Falls Power Plant. Illustrated description of a 10000 h. p. hydraulic plant with novel features. 2000 w. Power—Oct., 1899.

Snoqualmie Falls Power Transmission. Charles H. Baker. History of the enterprise, with an illustrated detailed description of the plant. 8000 w. Trans of Assn of Civ Engs of Cornell Univ—1900.

The Snoqualmie Falls Transmission Plant: An illustrated detailed description. 2500 w. Elec Wld & Engr—Oct. 21, 1899.

**Speed Regulation.**—Elements of Design Favorable to Speed Regulation in Plants Driven by Water Power. Allan V. Garratt. Describes those peculiarities of design which have a special bearing on speed regulation. Also discussion. 16700 w. Trans Am Inst of Elec Engs—Aug. and Sept., 1899.

**Switzerland-Germany.**—See **Germany-Switzerland.**

**Tariffville, Conn.**—The New Water Power of the Hartford Electric Light Company. W. L. Robb. Illustrated detailed description. 1500 w. Am Elect'n—March, 1900.

The Tariffville Plant of the Hartford Electric Light Company. Illustrated description of the construction of a concrete dam and power station for a 1250 h. p. plant, with notes on the electrical features. 2300 w. Eng Rec—March 24, 1900.

See also **ELECTRIC TRANSMISSION—Hartford.**

**Ticino, Italy.**—The Hydro-Electric Plant of the Ticino at Vizzola (L'Impianto Idroelettrico di Vizsola Ticino). An illustrated description of the dam, canal, and power house. A fall of 28 metres is obtained and it is expected that 19000 h. p. will be developed. Two articles. 2500 w. L'Elettricità—Nov. 4, 11, 1899.

**Toledo & Maumee Ry., Ohio.**—A Water Power Railway Plant. W. N. Zurfluh. Illustrates and describes the power house of the Toledo & Maumee Valley Traction Company. 1300 w. Am Elect'n—Oct., 1900.

**Tyrol.**—The Electric Plants in the Tyrol, the Voralberg and Trent (Le Officine Elettriche nel Tirolo e Voralberge nel Trentino). E. Lanzerotti. A general review of the development of the water power of the Tyrolese Alps and its electrical distribution. 2000 w. L'Elettricita—March 4, 1899.

**United States.**—Hydro-Electric Power Stations in the United States. Part first gives information of the plant at St. Anthony's Falls. Serial. Elec Rev, Lond—Aug. 6, 1897.

Water Power Electrical Plants in the United States. B. C. Washington, Jr. On the great importance of the development, with description of a few important plants, and statistics of interest. 7000 w. Jour Fr Inst—Sept., 1899.

Water Power Electric Plants in the United States. Bushrod C. Washington, Jr. An extensive illustrated article which will be of interest to the general electrical reader as well as to the engineer. 8000 w. Elec Wld—March 7, 1896.

**Val de Travers, Switzerland.**—Electrical Works in Switzerland—The Val de Travers Station. J. E. Petavel. Illustrated description. 800 w. Elect'n—Sept. 11, 1896.

The Utilization of Water Power at Val de Travers (Wasserkraftausnutzung in Val de Travers). Describing the manner in which over 5000 h. p. is taken from the Reuse by four successive power plants, before it flows into the Lake of Neuchatel. 1200 w. Zeitschr d Ver Deutscher Ing—April 23, 1898.

See also **Neuchatel.**

**Yadkin River, N. C.**—Power Plant on the Yadkin River, North Carolina. Illustrated description of plant being built by the Fries Manufacturing and Power Company, of Salem, N. C. 900 w. Fire & Water—Nov. 27, 1897.

**Zufikon-Bremgarten, Switzerland.**—Zufikon-Bremgarten Three Phase Power Transmission in Switzerland. Illustrated description of hydraulic and electrical plant. 800 w. W Elec—Aug. 8, 1896.

**Zürich.**—The Proposed Power Plants in the Wäggithal and on the Etzel (Die Projektierten Kraftanlagen im Wäggithal und am Etzel). With a map and description of these proposed plants near Zürich, by which more than 80000 h. p. will be secured. 2000 w. Schweizer Bauzeit—April 22, 1899.

See also **Sihl River, Zürich.**

### HYDRO-ELECTRICITY.

The Production and Utilization of Electricity from Steam (De la Production et dé l'Utilisation de l'Electricité Tirée de la Vapeur d'Eau). E. E. Stahl. Showing the conditions under which a current may be developed from a steam jet. Possible applications are given. Serial. Rev Tech—Aug. 10, 1900.

### HYDROGEN.

**Liquified.**—See **LIQUEFACTION.**

### HYDROGRAPHIC SURVEY.

See also **HYDRAULICS; HYDROGRAPHY; RIVER DISCHARGE; SURVEYING.**

Hydrographic Surveying—How the Maps and Charts of our Coast and Harbors are Made. Thomas C. Harris. A brief explanation of the work done in American waterways, by the government engineers, to insure a safe passage through harbors. Ill. 2000 w. Sci Am—Jan. 1, 1898.

Some Methods of Making Hydrographic Surveys. Charles T. Dixon. Describes methods used on the Detroit and St. Mary's rivers for determining the contour of the bottom of a stream or channel, enabling the amounts of material above any required depth to be computed. 4000 w. Technic—1897.

**British Admiralty.**—Recent Hydrographical Surveys. On recent work of the hydrographical department of the British Admiralty, and the great benefit accruing from this work. 2500 w. Engr, Lond—Aug. 11, 1899.

**Danube.**—Soundings in the Danube (Sondierverfahren an der Donau). An account of the soundings made near Kritzendorf, to determine the volume of discharge. The so-called "cross" method was used, with diagonal intersecting lines, the distances being determined by the Reichenbach telemeter. 3000 w. Oesterr Monatschr f d Oeffent Baudienst—May, 1897.

**Mining.**—See **MINING—U. S. Geological Survey.**

**Montana.**—Hydrographic Surveys in Montana. A. M. Ryan. A review of the work done and the methods employed in the measurement of the flow of rivers and streams in Montana. 2200 w. Sch of Mines Quar—Nov., 1896.

**Nicaragua.**—Hydrographic Surveying in Nicaragua. Francis W. Belknap. A description of the methods employed by the Walker Board on the interoceanic-canal investigation. 4000 w. Eng Rec—Nov. 19, 1898.

See also **CANAL.**

**Ohio River.**—Government Surveys on the Ohio River. Describes methods employed in hydrographic surveys for river improvements costing $20,000,000. 2100 w. Eng Rec—June 30, 1900.

**Yukon Delta.**—The Survey of the Mouths of the Yukon River, Alaska. G. R. Putnam. An interesting illustrated account of the methods and of the information gained. 4500 w. Eng News—June 7, 1900.

### HYDROGRAPHY.

See also **HYDRAULICS; HYDROGRAPHIC SURVEY; RIVER DISCHARGE; WATER FLOW.**

**Austria, 1896.**—Hydrographic Service of Austria in 1896 (Der Hydrographische Dienst Oesterreichs im Jahre 1896). Report of the Austrian hydrographic bureau, with illustrated description of tank for testing current meters. 4 plates. 4000 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1897.

**Vienna Bureau.**—The Information Service of the Vienna Hydrographic Bureau (Der Wasserstands-Nachrichtdienst der K. K. Hydrographischen Landesabtheilung in Wien). A full account of the observations of the level of the Danube at various points, and the system of sending out information of floods. 4500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—April, 1899.

**Würtemberg.**—Hydrographic Observations and Measurements in Württemberg (Die Hydrologischen Beobachtungen und Messungen in Württemberg). H. Gugenhan. An account of the surveys and river measurements made in Württemberg for a number of years past, with interesting data as to methods of observing and recording. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 2, 1899.

### HYDROMETERS.

Experiments on Hydrometers and Anemometers. Prof. Rateau. From "Annales des Mines." Experiments with instruments of the Woltmann Mill type to determine the degree of approximation obtainable, and the causes which affect it. Serial. Col Guard—July 8, 1898.

See also **AIR VELOCITY; ANEMOMETER; WATER FLOW.**

### HYDROPLANE.

The Hydroplane. Harvey D. Williams. An illustrated article describing an experiment demonstrating the possibility of a craft that will propel itself on the surface of water after the manner of a skipping stone. 1200 w. Sib Jour of Engng—Nov., 1895.

### HYDROSTATICS.

See **HYDRAULICS.**

### HYGROMETRY.

See **HUMIDITY; METEOROLOGY.**

### HYSTERESIS.

See also **ELECTRO-PHYSICS; MAGNETIC INDUCTION; MAGNETIC TESTING; MAGNETISM; TRANSFORMER.**

Magnetic Hysteresis and Eddy Currents (Magnetische Hysteresis und Wirbelströme). F. Niethammer. A discussion of the methods of determining the magnetic coefficients for various kinds of magnetization; with curves plotted from the results. Two articles. 6000 w. Elektrotech Zeitschr—Oct. 6, 13, 1898.

Magnetic Hysteresis. Ernest J. Berg. Explains the terms and discusses the causes and effects. 1200 w. Am Elect'n—Dec., 1896.

The Magnetization and Hysteresis of Certain Kinds of Iron and Steel. H. Du Bois and E. Taylor Jones. Results of investigations, with explanation of process for the construction of permanent magnets. 2800 w. Elect'n—Sept. 4, 1896.

The Hysteresis of Iron in an Alternating Magnetic Field. Francis G. Baily. Experiments undertaken to prove whether the same law of hysteresis holds in a rapidly alternating field as in one of very slow change. 2500 w. Elect'n—Nov. 22, 1895.

**Alternators.**—Calculation of Loss from Hysteresis (Zur Berechnung der Eisenverluste in Alternatoren der sogenannten Induktortype). A mathematical treatment of the subject by Dr. Behm-Eschenberg. 1000 w. Elektrotech Zeitschr—Jan. 14, 1897.

**Armature.**—Hysteresis Loss in Armatures. Ernest

Kilburn Scott. Brings up a number of interesting points, which are commented upon editorially. 1800 w. Elect'n, Lond—Dec. 8, 1899.

**Armature Cores.**—The Testing of Hysteresis in Armature Cores. Francis G. Baily. An account of experiments made and results obtained. 1500 w. Elect'n, Lond—Dec. 29, 1899.

**Armatures, Grooved.**—Calculation of Loss from Hysteresis in Grooved Armatures (Zur Berechnung von Eisenverlusten in Nuthenankern). Treated analytically and graphically by Dr. Max Breslauer, of Frankfurt a. M. 1500 w. Elektrotech Zeitschr—Feb. 11, 1897.

**Cathode-Ray Method.**—A New Method for Studying Hysteresis Curves in Samples of Iron and Steel. Knut Angström. Abstract translation of paper read before the Konglish Vetenskaps-Akademiens Forhandlingar, in Copenhagen. Describes a method of using cathode rays for experimental research. Ill. 700 w. Elec Rev, N. Y.—Jan. 10, 1900.

**Curve Apparatus.**—An Apparatus for Determining Induction and Hysteresis Curves. Frank Holden. Illustrated description of an instrument built by the writer over a year ago, with description also of method of getting the hysteresis curve. 1000 w. Elec Wld—June 27, 1896.

**Electric Meters.**—See **ELECTRIC METER—Hysteresis.**

**Low Temperatures.**—The Hysteresis of Iron and Steel at Ordinary Temperatures and at the Temperature of Solid Carbon Dioxide. A. H. Thiessen. Investigations of the hysteresis of iron, steel and nickel-steel, giving diagrams and tables. 1600 w. Phys Rev—Feb., 1899.

**Measurement.**—A Method of Measuring the Loss of Energy in Hysteresis. G. F. Searle. Paper read before the Cambridge Philosophical Society. A method for determining the hysteresis loss by a single observation of a galvanometer. 1200 w. Elect'n—April 19, 1896.

On a New Method of Measuring Hysteresis in Iron. J. L. W. Gill. Describes instrument based upon the principle that the hysteresis loss is, by the law of the conservation of energy, numerically equal to the resultant mechanical work expended. 1000 w. Elec Wld—Sept. 4, 1897.

**Meter.**—The Blondel-Carpentier Hysteresis Meter (Der Hysteresismesser Blondel-Carpentier). A brief description, with illustrations. The principle is the same as that of the Ewing rotary hysteresis meter. 800 w. Elektrotech Zeitschr—March 2, 1899.

The Blondel & Carpentier Hysteresis Meter (Sur l'Hystérésimétre Construit par MM. Blondel et Carpentier). Marcel Deprez. A communication to the French Academy in which M. Deprez shows the identity of the Blondel & Carpentier hysteresis meter with one devised by himself several years before. 1000 w. Comptes Rendus—Jan. 9, 1899.

The Blondel-Carpentier Hysteresis Meter (L'Hystérésimétre Blondel-Carpentier). A. Blondel. Illustrated description of an ingenious instrument for measuring hysteresis in a sample of metal. 1200 w. L'Electricien—Jan. 7, 1898.

**Molecular Magnet Experiments.**—The Hysteretic Qualities of Iron Viewed from the Molecular Magnet Standpoint. Dr. Samuel Sheldon. An interesting account of experiments with watch-charm compass magnets. 1100 w. Elec Wld & Engr—Feb. 10, 1900.

**Polar Diagrams.**—Effect of Hysteresis and Foucault Currents on Polar Diagrams. Frederick Bedell and James E. Boyd. Notes some of the effects produced by hysteresis upon polar diagrams. Serial. Elec Wld—July 18, 1896.

**Sheet Iron.**—Hysteresis in Sheet Iron and Steel. Arthur Hillyer Ford. An account of researches on commercial transformers, undertaken with the object of showing the conditions met in practice. Also on small specimens of iron obtained from various makers and users. 1800 w. Trans Am Inst of Elec Engs—March, 1900.

**Steinmetz Coefficients.**—The Magnetic Properties of Modern Irons (Ueber die Magnetischen Eigenschaften der Neueren Eisensorten). Discussing the applicability of the Steinmetz coefficients to various commercial brands of iron. 3500 w. Stahl und Eisen—June 1, 1897.

The Steinmetz Coefficients of Magnetic Hysteresis (Ueber den Steinmetz'schen Koefficienten der Magnetischen Hysteresis). Applying the Steinmetz coefficients to a variety of modern irons. 3500 w. Elektrotech Zeitschr—May 13, 1897.

**Straight Strips.**—A Method of Determining Magnetic Hysteresis Loss in Straight Iron Strips. J. A. Fleming. Read before the Physical Society. A description of a process based upon the use of the bifilar reflecting wattmeter and which operates upon samples of iron, large or small, in the form of straight strips which are simply slipped into a long magnetized coil. Serial. Elec Eng, Lond—Sept. 17, 1897.

A Method of Determining Magnetic Hysteresis Loss in Straight Iron Strips. J. A. Fleming. Read before the Physical Society. Description of a process which is based upon the use of the bifilar reflecting wattmeter, and operates on samples of iron large or small, in the form of straight strips which are simply slipped into a long magnetising coil. Ill. Serial. Elect'n,

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## ICE.

**Artificial.**—See **REFRIGERATION.**

**Sanitary Inspection.**—The Inspection and Sanitary Analysis of Ice. Charles L. Kennicott. Method and apparatus described and illustrated. 2800 w. Sci Am Sup—Sept. 19, 1896.

**Strength.**—Strength of Ice. C. W. Beech, A. M. Munn, and H. E. Reeves. Extracts from "The Technograph," No. 9. The device used to prevent unequal pressure on the faces of the ice cubes while crushing, is illustrated and the data is given in full for 55 specimens of ice tested, averaging 1451 lbs. per sq. in. compressive strength, and 19 slabs, averaging 718 lbs. per sq. in. The average tensile strength per sq. in. on 34 specimens was 165 lbs. 2000 w. Digest of Phys Tests—April, 1896.

## ICE-BREAKER.

See also **FERRY BOAT.**

**American.**—Northern Harbors Kept Open. Robert Runneberg. On the American system of building ice-breaking boats, and their use in keeping harbors open. 800 w. Am Mfr & Ir Wld—Feb. 22, 1900.

**Danish.**—Danish Steam Railway Ferries and Ice-Breaking Steamers. I. C. Tuxen. Illustrated description of boats constructed to continue the traffic during the entire year, between the islands and through the drifting ice. 2000 w. Marine Engng—Sept., 1897.

Danish Steam Railway Ferries and Ice-Breaking Steamers. I. C. Tuxen. Read at the International Congress of Naval Architects and Marine Engineers. Illustrated description of the special features of these vessels. 2800 w. Engng—July 16, 1897.

**Danzenbaker.**—The Danzenbaker Ice Boat. Illustrated description of a boat designed for breaking up ice obstructions to navigation on the Delaware River. The design contemplates the breaking up of the ice by a beak in the nature of a double mold-board plow, the point of which passes under the ice and whose inclined sides throw the broken ice away laterally in both directions. 900 w. Shipbuilder—March 26, 1896.

**"Ermack."**—An Ice-Breaking Steamer for Russia. A description of the powerful quadruple screw steamer "Ermack," especially designed for the purpose of breaking the ice and keeping open the Northern ports of Russia. Engng—Feb. 24, 1899.

Ice Breaking Vessels (Les Navires Brise-Glace). M. Hachebet. A description of the Russian ice-breaking vessel "Ermack," with photographs of the boat in service, breaking a channel through heavy ice. 2500 w. Génie Civil—Feb. 24, 1900.

New Ice-Breaking Steamer for Russia. From the "Newcastle Daily Chronicle." Describes the launch of an ice-breaking vessel, larger, heavier and more powerful than any yet built. Gives particulars and dimensions. 900 w. U S Cons Repts, Vol. LIX—Jan., 1899.

The Ice-Breaking Boat "Ermack" (Le Vapeur Brise-Glace "Ermack"). A general description of the new Russian ice breaker, with plan and sections, and an account of the successful opening of the harbor of Cronstadt. 2000 w. Le Yacht—April 15, 1899.

The Ice-Breaking Steamer "Ermack." Information respecting this interesting vessel built for the Russian government. Ill. 4200 w. Engng—March 31, 1899.

See also "Sampo."

**"Haidamak."**—The Ice-Breaking Pilot Steamer "Haidamak" (Der Eisbrecher, Bergungs-und Lootsendampfer "Haidamak"). A very well illustrated description of the hull, engines, etc., of this Russian pilot boat, 187 feet in length, built at Kiel. 800 w. 1 plate. Zeitschr d Ver Deutscher Ingenieure—May 12, 1900.

**Kertch, Crimea.**—Shipbuilding in Germany. George Crouse Cook. Illustrates and describes an ice-breaking pilot steamer building at Kiel for service at the Kertch, which connects the Black Sea with the Azof. 1800 w. Marine Rev—Sept. 27, 1900.

**Mackinac Straits.**—Ice Crushing and Ferry Steamers at the Straits of Mackinac. W. D. Hulbert. Illustrated description of vessels built by the Detroit Dry Dock Co. for winter navigation through fields of heavy ice. 1800 w. Marine Engng—April, 1898.

See also FERRYBOAT.

**Polar Exploration.**—Ice Breakers in Polar Exploration. Edwin Swift Balch. An account of the "Ermack" and her voyages, and the value of this means of penetrating the polar regions. 1000 w. Jour Fr Inst—Feb., 1900.

**"Sampo" and "Ermack."**—Ice-Breakers. H. F. Swan. Read at meeting of the Inst. of Naval Archts. Gives particulars of two vessels of this class embodying the latest practice; the "Sampo," built for the Finnish Government, and the "Ermack," built for the Imperial Russian Government. 2300 w. Engr, Lond—July 21, 1899.

**ICE ELEVATOR.**

**Lawrence Filter Beds.**—Ice Elevator at the Lawrence Filter Beds. Illustrated description of the elevating machine, something like a ladder dredge, used to take the ice from the open sand filters. 500 w. Eng Rec—Dec. 9, 1899.

**ICE HOUSE.**

Construction of Small Ice Houses. Recommendations from the report of committee appointed by the Assn. of Ry. Supts. of Bridges and Buildings of the United States. 1000 w. Ice & Refrig—Aug., 1898.

Designs for Ice Houses. Report of committee, discussing the quantity of ice, how obtained and delivered, and general requirements, with opinions on manufactured ice; also the designs of ice-houses with plans of two storage houses. 6500 w. American Assn of Ry Supts of Bridges and Buildings.

Model Ice Storage House. Outlines and illustrates the plans and specifications of an ice-storage house at El Reno, Okla. 1500 w. Ice & Refrig—Sept., 1899.

**ICE MACHINE.**

See REFRIGERATING MACHINE; REFRIGERATING PLANT; REFRIGERATION.

**ICE MELTING.**

**Eaves.**—Melting Ice from Eaves of Flat Roofs. Considers different methods that have been tried and the degree of success attained. 600 w. Heat & Ven—Dec. 15, 1898.

**Gas Pipe.**—See GAS PIPE.

**Plumbing.**—See PLUMBING—Frozen Pipes.

**Water Pipe.**—See WATER PIPE—Thawing by Electricity.

**ICE QUARRY.**

**Casset Glacier, France.**—Quarrying Ice in the French Alps. Illustrates and describes the process of cutting and transporting by endless cable, the machinery employed, and the cost and capacity of the plant. 900 w. Ice & Refrig—Sept., 1898.

The Use of an Overhead Cableway for Operating the Glacier of Casset (Emploi des Cables Aériens pour l'Exploitation du Glacier du Casset). A. Dumas. Describes the method and mechanism used for the purpose of quarrying and conveying glacier ice to Paris for domestic use. 2000 w. 1 plate. Génie Civil—March 26, 1898.

**ICE SHIELDS.**

**Buffalo Water Works.**—Ice Shields at the Buffalo Water Works. Illustrated description of the apparatus used at Buffalo to keep stream and anchor ice out of the pumping wells. 500 w. Eng Rec—April 1, 1899.

**ICE YACHT.**

A Jib-Headed Mainsail Sloop Ice Yacht. H. Percy Ashley. Illustrates and briefly describes a late design. 300 w. Sci Am Sup—Jan. 6, 1900.

**IGNITER.**

**Electric.**—See BLASTING—Electric; FIREDAMP—Electric Ignition; GAS BURNER—Electric Ignition; GAS ENGINE—Electric Ignition; GASOLINE ENGINE.

**ILLUMINATION.**

See GAS LIGHTING; LIGHTING; PHOTOMETRY.

**INCANDESCENT GAS LIGHTING.**

See also GAS LIGHTING.

Experiences with the Incandescent Gas Light. Norton H. Humphreys. On the value of this invention to the gas industry and the general public, and some of the reasons why it has not been more cordially welcomed are considered in the present number. Serial. Jour Gas Lgt—April 4, 1899.

Facts on the Theory of Incandescent Gas Light. Dr. G. P. Drossbach. From "Journal für Gasbeleuchtung und Wasserversorgung." Gives experiments undertaken by the writer. 1200 w. Pro Age—July 1, 1898.

Gas Lighting by Incandescence. A general illustrated review of progress in the art of incandescent gas lighting, compiled from the most authoritative sources. Serial. Engng—Sept. 4, 1896.

Incandescent Gas Lighting. V. B. Lewes. An exceedingly interesting and valuable paper largely historical, but also ably treating the scientific and practical sides of the subject. With discussion. 12500 w. Gas Wld—May 23, 1896.

The New Gas. W. H. Y. Webber. Read before the Incorp. Gas Inst. Reviews the recent changes in gas manufacture and the use to which gas is applied, and the development of the idea of utilising the heating rather than the illuminating power, and so introducing incandescent gas, now so largely used. 9000 w. Gas Wld—June 16, 1900.

The Theory of Incandescent Gas Lighting. Abstract translation of an article by Dr. Moscheles, published in the "Zeitschrift für Beleuchtungswesen," on the cause of the intense development of light by Welsbach mantles in a gas flame. 1000 w. Jour Gas Lgt—June 1, 1897.

The Welsbach and Other Incandescent Gas Lights. George S. Barrows. Descriptions of fair examples of this kind of gas lights, and a description of the process of manufacture of the Welsbach light at Gloucester. Discussion. 3000 w. Pro Engs' Club of Phila—July, 1896.

Air Gas and Incandescent Lighting. This is a new system of lighting in which a non-luminous gas that will burn with sufficient heat is brought into contact with a mantle that is rendered incandescent. Air gas, that is, air charged with hydro-carbon vapor only to a point that will cause it to burn without luminosity is used. 1000 w. Am Mfr & Ir Wld—Nov. 8, 1895.

**Alcohol.**—See Denayrouze Alcohol.

**Atmospheric Burner.**—The Theory of the Atmospheric Burner, and Its Influence upon Incandescent Gas Lighting. Vivian B. Lewes. Experiments with results of researches into the phenomena of the Bunsen burner. Read before the Incorporated Gas Inst., at Bath. 7500 w. Gas Wld—June 19, 1897.

**Bandsept Burner.**—Development of an Atmospheric Burner. A. Bandsept. A pamphlet upon an auto-mixing "atomizing" burner for combustion of high intensity. Statement of the principles with illustrated description of burners and their action. 5000 w. Pro Age—Sept. 15, 1897.

Interview with M. Bandsept. Reported for this publication. An exposition by the inventor of the advantages of the Bandsept burner. 1300 w. Gas Wld—Nov. 30, 1895.

The Bandsept Incandescent Burner. A. Bandsept. Abstract of a paper read before the Belgian Assn. of Gas Fitters. Description with experiments and results. 1400 w. Pro Age—Sept. 1, 1897.

**Benzol.**—See LIGHTING.

**Boule Light.**—The Boule Light. Ernest Salzenberg. Read before the International Gas Congress, at

Paris. Briefly reviews the methods of obtaining the heat energy of gas in the form of light, the apparatus used for increasing the light by means of increased pressure. 3800 w. Jour Gas Lgt—Oct. 2, 1900.

**Bunsen Flame.**—The Bunsen Flame. Dr. W. H. Birchmore. Studies of the properties of the Bunsen flame, comparison with those of the flame of the Welsbach burner and an account of two series of experiments with a burner in which supply of gas and air were under perfect control. 4800 w. Am Gas Lgt Jour—Nov. 2, 1896.

See also **BUNSEN BURNER.**

**Burners.**—Some Incandescent Burners. N. W. Gifford. Read at meeting of New Eng. Assn. of Gas Engs. An account of tests made by the writer. Discussion. 7400 w. Am Gas Lgt Jour—March 7, 1898.

**Carburation.**—See **GAS MANUFACTURE.**

**Chimneys.**—Chimneys for Incandescent Gas Lamps. Ernest M. White. An account of experiments made with various forms of chimney, with illustrated description of an invention of the writer. 1000 w. Jour Fr Inst—Dec., 1898.

**Denayrouze.**—Incandescent Lighting by Gas and Electricity in Combination. The burner designed by Louis Denayrouze, Engineer, of Paris. The description is full and complete, being taken from the Austria-Hungarian "Patent Gazette," together with the drawings of the lamp accompanying the text of the specification. 1800 w. Pro Age—Nov. 15, 1895.

Introduction of Incandescent Gas Burners for Public Illumination at Paris. From the "Journal des Usines à Gaz." Particulars relating to the installation of the Denayrouze incandescent gas burners in the principal streets and squares of Paris. 700 w. Am Gas Lgt Jour—Oct. 3, 1898.

The Coming Light. From "L'Illustration." Illustrated description of the Denayrouze lamp. 1600 w. Sci Am Sup—Sept. 26, 1896.

The Improved Denayrouze Burner. States the improvements as explained at meeting of the Société Technique du Gaz en France. 900 w. Jour Gas Lgt—July 6, 1897.

The Self-Mixing Gas Burner. Particulars and engravings from "Revue Industrielle." Describes the new apparatus of M. L. Denayrouze. 1600 w. Sci Am Sup—Nov. 26, 1898.

**Denayrouze Alcohol.**—Illumination by Alcohol (L'Eclairage par l'Alcool). M. L. Denaryrouze. A paper before the Society of Civil Engineers of France, describing the use of carburetted alcohol lamps for use in connection with incandescent mantles. 2500 w. Mem Soc Ing Civ de France —June, 1899.

**Electricity Compared.**—See **LIGHTING.**

**Globes.**—A Photometric Comparison of Illuminating Globes. Robert B. Williamson and J. Henry Klinck. Illustrated description of tests made with the object of determining the relative merits of various globes for use with the Welsbach incandescent mantle. 1800 w. Jour Fr Inst—Jan., 1900.

Welsbach Lamp Globes and Reflectors. Reports results of tests made as to the distribution and diffusion of light by different globes used in conjunction with Welsbach mantles. Robert Williamson and Henry Klinck, in the "Journal des Usines à Gaz." Ill. 1000 w. Gas Wld—Sept. 29, 1900.

**High-Pressure.**—High-Pressure Incandescent Gas Lighting. Illustrated description of an automatically-operating compressor using water power, 1500 w. Gas Wld—Sept. 10, 1898.

Sugg's Increased Pressure and Christiania Incandescent Burner Systems. Illustrates and describes apparatus for high-power incandescent gas lighting, and the operation. 1800 w. Jour Gas Lgt—March 13, 1900.

**Indirect Illumination.**—Indirect or Diffused Illumination of Class Rooms and Workshops by Welsbach Incandescent Lamps. F. Kermaner and W. Prausnitz, in the "Journal des Usines à Gaz). Translated by Herman Poole. Presents the advantages of indirect illumination, and gives results of experiments made. 900 w. Am Gas Lgt Jour—Jan. 17, 1898.

Investigation of Diffused Illumination for Schoolrooms, Lecture Halls and Work-rooms by Means of Incandescent Gas Lights. F. Kermaner and W. Prausnitz. Investigates the proper distribution of lamps and the number which ought to be used. 2500 w. Pro Age—Feb. 1, 1898.

The Indirect Lighting of Schools by Welsbachs. F. Kermaner and W. Prausnitz. Abstract. States the fault of direct systems, the merits of indirect lighting, with practical results. 2400 w. Gas Wld—Jan. 1, 1898.

**Intensive.**—Intensive Lighting. M. A. Lecomte. Summary of a paper read before the Société Technique du Gaz en France. On the means of producing intensive lighting; the burners, chimneys, mantles, etc. Ill. 5000 w. Gas Wld—Aug. 5, 1899.

**Kern.**—Kern's Incandescent Gas Burner. A full abstract of the specification of the first patent, with illustrations accompanying it. 3000 w. Jour Gas Lgt—May 10, 1898.

The New Burner of the Welsbach Company. Favorable discussion of the new invention of M. Kern. 2000 w. Jour Gas Lgt—May 10, 1898.

The New Welsbach Burner. Describes an invention of Ottmar Kern which nearly doubles the efficiency of the burner. 2200 w. Gas Wld—May 7, 1898.

**"Kugel" Light.**—The Illuminating Power and Color of the "Kugel" High-Pressure Gas Light. Dr. H. Bunte and Dr. P. Eitner, in the "Journal für Gasbeleuchtung." An account of an exhaustive investigation of this high-pressure gas light, directed chiefly to the points named. 2700 w. Jour Gas Lgt—Jan. 30, 1900.

**Mantle.**—Incandescent Mantles. Vivian B. Lewes. Lecture delivered before the members of the Incorporated Inst. of Gas Engs., England. Part first reviews the history and development of mantles, and gives some of the explanations of the wonderful light given. Serial. Gas Engs' Mag —Dec. 11, 1899.

Incandescent Mantles. Vivian B. Lewes. Read before the British Inst. of Gas Engs. Reviews the discovery of the principle of the Welsbach mantle, the improvements, the theories advanced to explain efforts, etc. 7800 w. Gas Wld—May 6, 1899.

The Incandescent Gas Mantle and Its Use. Vivian B. Lewes. Cantor Lecture. An interesting paper reviewing the history of incandescent lighting and the development of Dr. Auer von Welsbach's discovery, giving also suggestions. 5000 w. Gas Wld—May 12, 1900.

The Incandescent Gas Mantle and Its Uses. Vivian B. Lewes. This first lecture reviews the development and history of mantles. 5200 w. Jour Soc of Arts—Oct. 19, 1900.

Thread Foundation for Incandescent Mantles. Illustrates a device for producing more durable and effective mantles. 500 w. Bos Jour of Com—Aug. 20, 1898.

**Mantle Brilliancy.**—Brilliancy of Incandescent Mantles for Gas Lighting. C. Killing. Experiments and conclusions drawn of the results. 2000 w. Gas Engs' Mag—Feb. 10, 1898.

**Mantle Cerium.**—Influence of Cerium in Incandescent Mantles. W. Bruno. Translated from "Zeitschrift für Beleuchtungswesen." Gives a report of observations and experiments. 1800 w. Pro Age—Oct. 2, 1899.

On Incandescent Mantles; Effects of Various Oxides. W. Bruno. Translated and abstracted from the "Zeitschrift für Beleuchtungswesen." Gives results of a long series of experiments in hardening the mantles, with discussion of the action of ceria. 2500 w. Gas Wld—Aug. 19, 1899.

The "Cerofirm" Mantle. Résumé of communication by W. Bruno in "Zeitschrift für Beleuchtungswesen." An account of researches which led to the manufacture of this mantle. 3200 w. Jour Gas Lgt—Oct. 10, 1899.

**Mantle Deterioration.**—Deterioration of the Candle Power of Welsbach Mantles. Report of recent investigations claiming to show that the drop in candle power of Welsbach mantles is even more rapid than that of the filaments of incandescent lamps. 600 w. Elec Wld—Oct. 1, 1898.

**Mantle "Jasper."**—The "Jasper" Incandescent Gas Mantle. Gives information concerning a mantle in demand in Germany, but not widely known elsewhere, with tests of its durability and report of its appearance. 1300 w. Jour Gas Lgt—March 14, 1899.

**Mantle Tests.**—Some Tests on Incandescent Gas Mantles. E. A. Medley. Gives tests made in 1893 on one of the old A form of Welsbach burner, and on a group of five C burners, with recent tests on several makes of "mantles" which can be bought in England and in Germany. 1800 w. Elec Rev, Lond—Dec. 10, 1897.

**Mantle, Voelker.**—A New Incandescent Gas Mantle. Information concerning the invention of William Lawrence Voelker, of Elizabeth, New Jersey. 2000 w. Jour Gas Lgt—Feb. 14, 1899.

**Monazite.**—See **MONAZITE; THORIUM.**

**Patent.**—Incandescent Gas Light Patents. Editorial review of important decisions of the German Patent Office. The Auer patents are sustained but their claims have been restricted. A patent to Rudolf Langhaus for the electrolytic production of an incandescent body for gas lighting was allowed. 700 w. Engng—Jan. 31, 1896.

Incandescent Gas Light Patents. Special correspondence of the "Eng. & Min. Jour." Review of recent decisions of the German patent office in cases involving incandescent gas lighting patents. 2300 w. Eng & Min Jour—Feb. 29, 1896.

The French Welsbach Patent Investigation. MM. Friedel and Bardy. Translated from the "Journal de l'Eclairage au Gaz." Investigations of the specifications and patent claims of the Auer patents. 900 w. Pro Age—Feb. 1, 1898.

The Judgments in the Incandescent Gas Light Trials. The full text of the judgments is given with editorial comment. These judgments are a complete compendium of the facts as presented in the evidence in this famous litigation. 16000 w. Gas Wld—April 25, 1896.

The Original Welsbach Patent. Translated extract from the specifications of the original patent with much valuable information. 5800 w. Pro Age—Dec. 15, 1897.

The Rawson Patents Sustained. The decision of Judge Shipman in the case of the Welsbach Light Co. vs. Apollo Incandescent Light Co. et al. 2300 w. Pro Age—April 15, 1899.

The Welsbach Patents in Germany. Summary of the official decision in the nullity suit. 2700 w. Jour Gas Lgt—Feb. 11, 1896.

**Photography.**—Incandescent Gas Lighting for Photographers. Extract from paper read before the Croydon Camera Club by Mr. John A. Hodges, reprinted from the "Gas Engineers' Mag." Discusses advantages of the incandescent gas light to photographers, and methods of applying it. 1900 w. Pro Age—Feb. 15, 1896.

**Ramsgate, Eng.**—An Afternoon in Ramsgate. Account of an interview with Mr. Valon, engineer to the Ramsgate corporation, chiefly touching incandescent burners, mantles, and gas consumption. 4000 w. Gas Wld—Sept. 3, 1898.

**Salzenberg.**—A New Illuminant. Reports an improvement in incandescent gas burners, invented by Ernest Salzenberg, director of the gas works of the city of Crefeld, Prussia. 200 w. Cons Repts—Dec., 1897.

**Scott-Snell Lamp.**—The Scott-Snell Self-Intensifying Gas Lamp. Illustrates and describes a novel invention, giving particulars regarding its operation. 2700 w. Jour Gas Lgt—Aug. 14, 1900.

**Self-Lighters.**—Recent Progress in Self-Lighters for Incandescent Lamps. M. Syssoyeff. Abstract of a paper read before the "Société Technique de l'Industrie du Gaz en France." Reviews the attempts that have been made to solve this problem and reports highly satisfactory results obtained in lighting gas by chemical reaction. 2000 w. Pro Age—June 15, 1898.

Recent Progress in Self-Lighters for Incandescent Lamps. M. Syssoyeff. Read before the French Society. A review of the attempts made to solve this problem and report of the results obtained in lighting by chemical reaction. 2300 w. Gas Wld—July 23, 1898.

**Street.**—Incandescent Burners for Public Lighting. Summary of report of Thomas H. Nesbit. The data given were collated from replies obtained to a circular letter. 4500 w. Gas Wld—May 22, 1897.

Street Lighting by Incandescent Gas Burners. C. R. Bellamy, superintendent of the Liverpool Corporation, reports concerning the Incandescent gas burner (Welsbach patent). States advantages, difficulties encountered and overcome, with results, and describes the lamp. Ill. 1600 w. Gas Wld—Sept. 11, 1897.

Street Lighting by Incandescent Gas Burners. J. H. Sheldrake. Read before the Eastern Counties' Gas Mgrs. Assn. Practical hints to assist those inexperienced, with general information and discussion. 7000 w. Gas Wld—April 21, 1900.

Street Lighting by Incandescent Gas Burners. Remarks, report and discussion at the meeting of the Eastern Counties' Gas Managers' Assn. at Peterborough, Eng. 7200 w. Jour Gas Lgt—April 26, 1898.

The Welsbach Incandescent Gas Light for Utility and Economy in Street Lighting. H. Wilkiemeyer. Read before the Western Gas Assn. Report of the success attained, with discussion and correspondence. 7000 w. Am Gas Lgt Jour—June 14, 1897.

Welsbach Street Lighting. Frederick P. Morrill. The obstacles encountered and the extent to which they have been surmounted. 2700 w. Pro Age—July 1, 1896.

Welsbach Street Lighting. J. W. R. Cline. Read at meeting of the Ohio Gas Light Assn. Calls attention to some of the difficulties met, and the manner in which they were overcome, noting features of interest in the apparatus. Discussion. 7000 w. Am Gas Lgt Jour—April 10, 1899.

**Street, Paris.**—Public Lighting by the Welsbach System in Paris. M. Maréchal. Abstract of an article contributed to "Génie Civil," with comments from the "Journal de l'Eclairage au Gaz," giving a French gas engineering view of the requirements and possibilities of street lighting. 2500 w. Jour Gas Lgt—Feb. 16, 1897.

**Sugg.**—See **High Pressure.**

**Thorium.**—See **MONAZITE; THORIUM.**

**United States.**—Development of Incandescent Gas Lighting in the United States. D. Walter Brown. A concise history of the subject in title, with patents related thereto. Serial. Pro Age—Feb. 15, 1898.

**Welsbach.**—Experiments with the Welsbach Lamp. F. H. Hess. Read at meeting of the Mich. Gas Assn., at Port Huron, Mich. Considers the fundamental principles upon which a perfectly burning lamp depend, and points out some of the errors to be avoided in the manipulation of a Welsbach lamp. 3800 w. Pro Age—March 1, 1898.

Incandescence in Welsbach Mantles. H. Bunte. Abstract from the "Journal für Gasbeleuchtung" and the "Journal de l'Eclairage au Gaz." Investigations demonstrating that the highly luminous properties are due to the high temperatures which they are capable of attaining. 1500 w. Gas Engs' Mag—April 11, 1898.

Incandescent Gas Lighting. Dr. H. Bunte. A paper before the International Gas Congress at Paris, showing the change the Welsbach light has made in the kind of gas produced, and giving results of photometric tests of Welsbach mantles. 8000 w. Jour Gas Lgt—Sept. 22, 1900.

The Welsbach Light. G. I. Kinney. Read before the Pacific Coast Assn. Details in regard to the installation of this light, that the writer has found important for its successful use. 1500 w. Am Gas Lgt Jour—Aug. 16, 1897.

**Welsbach Amalgamation.**—Proposed Amalgamation of the Welsbach Companies. Indicates the scope of the scheme, and reports its adoption. 2000 w. Gas Wld—Nov. 27, 1897.

**Welsbach Patents.**—See **Patents.**

**White Deposits.**—The White Deposit on Ceiling-Protectors and on the Chimneys of Incandescent Gas Burners. On the researches made by Dr. C. Killing and published in the "Journal für Gasbeleuchtung." 2000 w. Jour Gas Lgt—Feb. 18, 1900.

**Winchester, Eng.**—A Season's Experience with Incandescent Public Lighting. Frederick G. Dexter. Recent and extensive experience with the Welsbach light in street illumination in Winchester, Eng. Results highly favorable. Discussion. 6200 w. Gas Wld—June 13, 1896.

**Workshops.**—Some Experiences in Incandescent Lighting for Workshops, Sheds and Open Spaces. E. C. Riley. A short sketch of experiences in actual practice, adapting the Welsbach incandescent burners to requirements indicated in the title. 2800 w. Gas Wld—May 2.

See also **Indirect Illumination.**

**INCANDESCENT LAMP.**

See also **ELECTRIC LAMP; ELECTRIC LIGHTING; ELECTRIC STATION; INCANDESCENT LIGHTING.**

Incandescent Lamps. Franklin S. Terry. Abstract of paper read before the Northwestern Elec. Assn. Points of Practical interest to the central station. 2500 w. Elec Eng—Jan. 27, 1897.

Incandescent Lamp. Francis W. Willcox. Describes in detail some of the important and interesting features in the development. Ill. Serial. Jour Fr Inst—April, 1900.

The Incandescent Electric Lamp. Discusses recent statements in regard to their use and manufacture. 2200 w. Jour Gas Lgt—Dec. 12, 1899.

The Incandescent Lamp. Ed. C. De Segundo. Discusses the way in which energy is dissipated in an electric incandescent lamp, its efficiency, the improvements made, etc. Serial. Elec Rev, Lond—July 20, 1900.

The Incandescent Lamp. George White Fraser. A review of the history of the invention, with an account of tests, and drawing conclusions that will suggest the proper way to purchase and the proper way to run them. Serial. Can Elec News—April, 1896.

The Incandescent Lamp Question. An account of an interview with Messrs. Binswanger and Robertson, with tables. 1100 w. Ind & Ir—Dec. 13, 1895.

**American Construction.**—Incandescent Lamp and Transformer Construction in America. Henry E. P. Cottrell. Discusses the factors that determine the "candleage" of a lamp, and the details of construction upon which the efficiency of the transformers depends. Ill. Serial. Engr, Lond—Oct. 13, 1899.

**Automatic Cut-Out.**—Incandescent Lamp with Automatic Cut-Out (Glühlampe mit Selbstthätiger Stromunterbrechung). An illustrated description of an apparatus to be attached to an incandescent lamp, which will cut off the current automatically after the lamp has burned a fixed number of hours. 800 w. Elektrotech Rundschau—May 1, 1900.

**Berrenberg Factory.**—Berrenberg Incandescent Lamp Factory. A brief illustrated description of works being erected for the manufacture of glow lamps by the Berrenberg process. 1600 w. Elect'n, Lond—Nov. 3, 1899.

**Berrenberg Pump.**—See **AIR PUMP.**

**Candle-Power.**—Life and Candle-Power of Incandescent Lamps. From a recent publication issued by the General Electric Co., showing the folly of using lamps after their candle power has diminished. 3700 w. Elec Wld—Dec. 25, 1897.

Mistakes in the Rating of Incandescent Lamps. Arthur J. Rowland. A discussion of some things regarding the real candle-power and watts per candle power, etc. 2000 w. Jour Fr Inst—Oct., 1900.

Report of Committee on Standard Candle-power of Incandescent Lamps. Presented at the National Electric Assn. convention at Niagara Falls. Work of the committee with recommendations. 2200 w. Elec Eng—June 16, 1897.

The relation between Mean Spherical and Mean Horizontal Candle Power of Incandescent Lamps. R. A. Fessenden. Describes methods of making tests to determine if the distribution factor could be predicted from the length, position and shape of the filament giving results. Ill. 800 w. Elec Wld—Feb. 25, 1899.

See also **PHOTOMETRY.**

**Carbon Circuit.**—The Carbon Circuit of an Incandescent Lamp. Converse D. Marsh. Discussion with illustrations of the neglected features which injure the efficiency of lamps. 900 w. Elec Wld—Nov. 21, 1896.

**"Chemical" Exhausting.**—Exhausting Lamps by the "Chemical" Method at the Edison Lamp Works. Describes the method used and states its advantages. Ill. 1000 w. Elec Eng—March 31, 1897.

**Commercial Aspect.**—A Commercial Aspect of the Incandescent Lamp. George R. Metcalfe. An examination of the causes that have brought about the unsatisfactory condition of the lamp trade, and considerations that tend to place the competition along the line of quality. 2400 w. Elec—Feb. 12, 1896.

**Conductivity.**—Conductivity of Incandescent Carbon Filaments, and of the Space Surrounding Them. John W. Howell. The first part of the paper is in the nature of a discussion of a paper read by Prof. Anthony; and the second part is a discussion of the paper upon the "Edison Effect" in incandescent lamps which was read by Prof. Houston. Discussion follows. 10000 w. Trans Am Inst of Elec Engs—Feb., 1897.

Conductivity of Incandescent Carbon Filaments and the Space Surrounding Them. Abstract of paper by John W. Howell, presented at meeting of Am. Inst. Elec. Engs., with editorial comment. The paper considers the reversal in the temperature coefficient, and demonstrates that such reversal becomes more prominent as the treatment of the filament is increased. 3000 w. Elec Wld—Feb. 20, 1897.

**Cycle.**—Electric Cycle Lamps. J. Warren. The present article deals with the type deriving its current from a storage battery attached to the frame of the machine. Serial. Elec, Lond—Sept. 8, 1899.

**Decorative, Chicago.**—See **ELECTRIC LIGHTING.**

**Disconnected Glowing.**—Glowing of Disconnected Incandescent Lamps. N. S. Amstutz. Unpublished data with reference to experiment previously published. Ill. 1100 w. Elec—May 12, 1897.

**Edison Socket.**—See **Socket.**

**Efficiency.**—Economy of Electric Lamps. G. W. Baird. A discussion of the need of close inspection of the quality of incandescent lamps, reporting tests made. 1600 w. Jour Am Soc of Naval Engs—May, 1898.

Incandescent Lamp Efficiency. W. Stuart-Smith. Considering methods of maintaining their efficiency. 1800 w. Jour of Elec—Feb., 1896.

Incandescent-Lamp Efficiency: Its Importance to Central Stations. H. L. Monroe. Read before Texas Gas and Electric Light Assn. Considers the light-producing efficiency, lamp renewals, economy, etc. Discussion follows. 6300 w. Am Gas Lgt Jour—May 17, 1897.

The Cost of Incandescent Lighting from Central Stations. W. D. Marks. An argument and incentive for higher economy lamps. 1000 w. Elec Eng—Jan. 29, 1896.

The Present Efficiency of Incandescent Lamps. John E. Randall. Read before the Northwestern Elec. Assn., at Milwaukee. Part first reviews tests made, and history of work done, and discusses the points on which the quality, as an illuminant, depends. Serial. Elec Wld—Jan. 29, 1898.

The Proper Efficiency of Incandescent Lamps for Central Stations, Including a Description of the Nernst Lamp. E. E. Cary. Read before the Canadian Elec. Assn. A table of the efficiency and average life of lamps at various voltages is given and discussed, with consideration of some of the difficulties in the operation of the Nernst lamp. 3000 w. Can Engr—Aug., 1899.

The Difference Between Good and Bad Incandescent Lamps. Francis W. Willcox. On the means of distinguishing between good and bad lamps, with a short account of the Standard Oil Co.'s lamp test. 4000 w. Elec Wld & Elec Eng—March 18, 1899.

The Real Meaning of Incandescent Lamp Efficiency. Francis W. Willcox. An explanation of the terms and the basis for estimating the efficiency. 1800 w. Elec Wld—May 14, 1898.

See also Test; **PHOTOMETRY.**

**Filaments.**—Carbonisation of Filaments by Electricity. L. S. Powell. Describes an electric method devised for this purpose by the writer, with account of some experiments made to test its practicability, and suggestions for further investigations. 2700 w. Elec Rev, Lond—May 13, 1898.

Incandescent Lamp Filaments. Jno. C. Shedd. Reviews the early difficulties met with in this field and the solving of the problem. 1500 w. Am Elect'n—March, 1898.

**Filament, Long.**—The Advantages of Long Filaments in Incandescent Lamps. An explanation of the effect on high resistance, and discussion of the material used. 1800 w. Am Elect'n—Nov., 1899.

**Filament, High Voltage.**—See **High-Voltage Filament.**

**Filament, Welsbach.**—See **Welsbach Filament.**

**Germany.**—See **Test, German.**

**Grundle.**—New Lamps for Old. Illustrated description of an improved glow lamp, with experimental data obtained from a report by Mr. George Annesley Grundle. 2200 w. Elec Rev, Lond—Aug. 7, 1896.

**Heating Effects.**—See **ELECTRIC HEATING—Incandescent Lamps vs. Commercial Heaters.**

**High Efficiency.**—High Efficiency Lamps for Isolated Installation. James Whitcher. Discusses the private supply of electric lighting through a battery of accumulators. 3000 w. Elec Rev, Lond—June 1, 1900.

**High Voltage.**—American Experience with High Voltage Lamps. Review of progress and present status of high voltage lamps in the United States. 800 w. Elec Rev, Lond—Aug. 14, 1896.

High and Low Voltage Incandescent Lamp. John W. Howell. Presents the advantages of high voltage lamps, and the difficulties to be overcome in the manufacture of the lamps. 1500 w. Elec Wld—June 5, 1897.

High-Voltage Incandescent Lighting. Reports from a number of central stations and lighting plants using 220-volt lamps. 1400 w. Am Elect'n—Aug., 1896.

High-Voltage Lamps and Their Influence on Central-Station Practice. G. L. Addenbrooke. Paper read before the Inst. of Elec. Engs. The first part considers the possible sources of influence on central station practice, and the life of high-voltage lamps. Serial. Elec Eng, Lond—March 6, 1896.

High-Voltage Incandescent Lamps. George D. Shepardson. A discussion of the present situation and the conclusion that these lamps are a commercial success and coming into extensive use. 3600 w. Elec Wld & Engr—Sept. 1, 1900.

High-Voltage Lamps and Their Influence on Central Station Practice. G. L. Addenbrooke. Paper read before the Inst. of Elec. Eng. The first part considers possible sources of influence on Central Station practice, life of high-voltage lamps, and the effect of using high-voltage lamps on distribution. Serial. Ind & Ir—May 8, 1896.

Installation with Incandescent Lamps at High Voltage. Discusses whether it is preferable to use lamps of the volts with an efficiency of 2½ watts per candle-power, or lamps which absorb 4 watts with a tension of 220 volts. 1200 w. Elec Rev, Lond—Sept. 11, 1896.

The 1897 High-Voltage Lamp. The progress made during the past year. Ill. 1100 w. Elect'n—March 5, 1897.

The High-Voltage Lamp. A review of the present types now on the market. Ill. Serial. Elect'n, Lond—Nov. 17, 1899.

See also **200 Volt; 220 Volt; ELECTRIC LIGHT STATION—Alternating.**

**High-Voltage Filaments.**—High-Voltage Lamp Filaments. Alfred H. Gibbings. Deals with double and single-filament lamps, preferring the latter. Ill. 1000 w. Elec, Lond—April 30, 1897.

Maxim Method of Making Filaments for High Voltage Incandescent Lamps. Illustrates the apparatus used and describes the process. 1400 w. Elec Eng, N. Y.—Feb. 9, 1899.

**History.**—The Incandescent Lamp, Past and Future. Review of the changes and their effect upon the industry at large. 1100 w. Elec Eng—Jan. 6, 1897.

The Incandescent Electric Light. Gives interesting history, claiming that the original discovery of this light was in Toronto, Canada, and that Dr. Woodward's patent antedates the patent of T. A. Edison and was purchased by him. 3000 w. Can Elec News—Feb., 1900.

**Hollub Baseless.**—A Baseless Incandescent Lamp (Suppresion du Culot dans les à Incandescence). J. A. Montpellier. An illustrated description of the Hollub lamp, in which metallic terminals are attached directly to a glass projection at the bottom of the bulb. 700 w. Electricien—July 7, 1900.

**Life.**—See **Candle Power.**

**Maxim.**—Experiments on the Glow Lamp. Hiram S. Maxim. From London **Lightning.** On the experiments of the writer who claims that he can save from 25 to 33 per cent. 800 w. Elec Rev, N. Y.—Feb. 2, 1898.

See also **High Voltage Filaments.**

**Manufacture.**—Some Notes on the Manufacture of Incandescent Lamps. Fred De Land. Part first describes the process of properly preparing the filaments. Serial. Elec Engng—April 15, 1897.

**Miners'.**—See **SAFETY LAMP—Electric.**

**Moore Socket.**—Tests of the Moore Regulation Socket. William A. Anthony. Descriptive of two methods for decreasing the intensity of illumination in electric lights, with table showing results of experiments made to determine the comparative energy saved. 1000 w. Elec Eng—Dec. 25, 1895.

**Quality.**—The Importance of Quality in Incandescent Lamps. Francis W. Wilcox. Quality of far more importance than first cost. Defines a standard of valuation based on the maintenance of candle power during a given period. 2000 w. Elec Wld—Dec. 11, 1897.

**Railway Circuits.**—Incandescent and Arc Lamps for Electric Railway Circuits. Illustrated description of lamps adapted to railway circuits. 2200 w. Am Elect'n—Oct., 1896.

**Rating.**—See **Candle Power.**

**Regulation.**—See **Moore Socket.**

**Renewal.**—The Renewal of Burnt Out Incandescent Lamps. (Die Verwerthung Ausgebrannter Glühlampen). Describes the various methods which have been proposed for restoring burnt out filaments, none of which is found to pay. The latest method of Becher, of Vienna, is the most promising, and uses a lamp with a long neck which can be cut and a new filament inserted. 1500 w. Elektrotech Zeitschr—Dec. 23, 1897.

See also **ELECTRIC STATION MANAGEMENT.**

**Resistance.**—A New Method of Determining the Resistance of Incandescent Electric Lamps. (Ueber Eine Neue Methode zur Bestimmung des Elektrischen Leitungwiderstandes Stromdurchflossener Glühlampen). Drs. Apt and Hoffmann. A combination of two Wheatstone bridges and balancing resistances by means of which the resistance of incandescent lamps may be determined while the current is flowing. 2500 w. Elektrotech Zeitschr—Feb. 24, 1898.

**Shades.**—See **ELECTRIC LAMP.**

**Shelby.**—Incandescent Lamps as Manufactured by the Shelby Electric Company, Shelby, O. A detailed account of the manufacture of these lamps, noting their principal features. Ill. 300 w. Elec Eng, N. Y.—Oct. 13, 1898.

**"Smashing Point."**—On the Smashing Point of a Glow Lamp. F. W. Carter. The object of the article is to show when, in the life of a lamp, the user will have had the best value for his money. 800 w. Elec Rev, Lond—Aug. 19, 1898. See also **Candle Power.**

**Sockets.**—Gauges for Incandescent Lamp Sockets. (Kaliberlehren für Glühlampenfüsse). R. Hundhausen. A discussion of the construction of gauges for the standard lamp socket screw threads recommended by the German Electro-Technical Society. 1800 w. Elektrotech Zeitschr—June 2, 1898.

Standard Socket Threads for Edison Lamps. (Normalien für Edison-Gewinde). R. Hundhausen. A description of the standard screw thread system for incandescent lamp sockets, as recommended by the German Electrotechnical Society. 1800 w. Elektrotech Zeitschr—May 19, 1898.

Report of the Committee on Standard Thread for Edison Lamps (Bericht der Kommission zur Normirung von Edison Gewinden). The full text of the report to the German Elektrotechnic Society, together with discussion. Enlarged profiles of the proposed thread are given, and the subject of gauges discussed. 3000 w. Elektrotech Zeitschr—Aug. 4, 1898.

The Edison Lamp Socket. (Die Edison Fassung). A discussion of the Edison screw fastening for incandescent lamps in comparison with a number of other devices for the same purpose. 4500 w. Elektrotechnische Zeitschr—March 18, 1897.

Standard Socket and Bayonet Fastening for Incandescent Lamps (Normalien für Glühlampenfüsse und Fassungen mit Bajonettkontakt). Abstract from the report of the committee of the German Electrotechnical Society, with drawing of the socket and fastening. 1000 w. Electrotech Zeitschr—May 11, 1899.

See also **Moore Socket.**

**Street Fixture.**—A New Incandescent Street Lamp Fixture. A. B. Proal. Reviews the systems used in incandescent street lighting, and gives illustrated description of a new shunting device. 1200 w. Elec Wld & Engr—Sept. 1, 1900.

**Street Lighting.**—Arrangement of Incandescent Street Lamps. Alton D. Adams. A discussion of this subject, showing the incandescent lamps are satisfactory and economical when the right methods are used. 1400 w. Elec Rev, N. Y.—May 16, 1900.

Cost of Lighting by Incandescent Street Lamps. Alton D. Adams. Considers the conditions affecting the cost. 1500 w. Munic Engng—Oct., 1899.

Street Lighting by Electric Incandescent Lamps.

William George Walker. Read before the British Assn. Remarks on this subject with examples where they have worked satisfactorily. 1800 w. Elect Eng, Lond—Sept. 25, 1896.

Street Lighting in England by Incandescent Lamps. A few facts and opinions on the advantages and disadvantages of the system, from experts and practical men of England. 2100 w. Elec Wld—March 20, 1897.

**Sussmann Mine.**—See **SAFETY LAMP—Electric, Sussmann.**

**Temperature.**—The Temperature of Incandescent Lamps (Sur la Température des Lamps à Incandescence). A paper by M. Janet giving the methods used for measuring the temperatures of the filaments. Tests of 4 lamps of 10 candle power at 65 volts gave temperatures between 1610 degrees to 1720 degrees C. 1200 w. Comptes Rendus—March 7, 1898.

**Test.**—Important Considerations in Lamp Tests When Determining the Best Available Lamp for Central Station Use. S. E. Doane. Abstract of paper read before the Northwestern Electrical Assn. Thinks the most important consideration is that the true rated candles be properly determined. In the writer's judgment they are the maximum reached. 2700 w. Elec Wld—June 25, 1898.

Electric Glow Lamp Tests. William Henry Preece. Experiments to determine an expeditious and reliable way of testing the efficiency and durability of glow lamps, supplement of curves referred to, and full description. Read before the Brit. Assn. for the Advancement of Science. 2000 w. Elec Rev, Lond—Sept. 25, 1896.

Tests of Incandescent Lamps. Gives a method whereby it is claimed the value of lamps to consumers may be obtained. 1000 w. Ind & Ir—Nov. 22, 1895.

See also **Efficiency; PHOTOMETRY.**

**Test, German.**—The Glow Lamp Question in Germany. Report of a committee of Representatives of German Electric Supply Undertakings. From the "Electrotechnische Zeitschrift." 3000 w. Elect'n—Jan. 3, 1896.

Incandescent Lamps (Zur Glühlampenfrage). A discussion of the tests of incandescent lamps at Hanover, from the lamp manufacturer's standpoint. 3000 w. Elektrotech Zeitschr—Jan. 28, 1897.

Notes on the Incandescent Lamp Question (Beitrag zur Glühlampenfrage). Inspector Loch. An investigation of the endurance and maintenance of illuminating power, and also of the required increase of electrical energy. Tables and diagrams of the tests are given. 3000 w. Glaser's Annalen—Sept. 1, 1899.

**Testing Bureau.**—Lamp Testing Bureau Proposed for the National Electric Light Association. President Nichol's plan for establishing a lamp testing bureau. 1800 w. Elec Eng—March 10, 1897.

**Testing, New Orleans.**—The Lamp Testing Department of the New Orleans Edison Company. Lyman C. Reed. Describes the method of testing. Ill. 1300 w. Am Elect'n—March, 1900.

**Trolley Cars.**—The Selection of Incandescent Lamps for Use in Trolley Cars. W. Sonneberg. Points out the necessity for discrimination. 1100 w. Am Elect'n—March, 1897.

**200-Volt.**—On the Manufacture of Lamps and Other Apparatus for 200-Volt Circuits. G. Binswanger Byng. Read before the Inst. of Elec. Engs., England. Describes the appliances now upon the market, or under manufacture, pointing out deficiencies, and giving writer's views. Serial. Elec Rev, Lond—Feb. 25, 1898.

Two-Hundred Volt Lamps. Editorial on the change from 100 to 200-volt lamps in England, and giving conclusions from the discussion of Bingswanger Byng's paper before the Inst. of Elec. Engs. 1500 w. Engng—March 25, 1898.

**220-Volt.**—Relative Value of 220-Volt and 110-Volt Lamps. Francis W. Wilcox. Discussion of when it will pay to install a 220-volt system. 2800 w. Elec Wld—Oct. 2, 1897.

220-Volt Lamps. Alfred H. Gibbings. Considers this lamp and the reasons for and benefits accruing from its adoption. 2000 w. Am Elect'n—June, 1897.

220-Volt Lamps. G. D. Shepardson. Abstract of paper read before the Northwestern Electrical Assn. Gives lamp tests and information relating to their life and efficiency, with favorable reports. 1800 w. Elec Eng—July 29, 1897.

See also **High Voltage.**

**Vacuum Tests.**—The Determination of the Quality of a Vacuum by Electrostatic Discharge. Converse D. Marsh. An account of tests of lamps on the American market made under the direction of the writer to determine the quality of the vacuum. 1400 w. Elec Wld—Nov. 28, 1896.

**Welsbach Filament.**—A New Incandescent Filament for Electric Lights. Information concerning the improved incandescent filament announced by Dr. Auer von Welsbach. 500 w. Cons Repts—Sept., 1898.

New Electric Lamps, and Methods of Production (Neue Elektrische Lampe und Verfahren zu deren Herstellung). A description of the new incandescent electric lamp invented by Dr. Karl Auer von Welsbach. 1500 w. Glaser's Annalen—May 15, 1898.

The Welsbach Electric Lamp. Concerning the latest invention of Dr. C. Auer von Welsbach. 1700 w. Jour Gas Lgt—April 19, 1898.

The Welsbach Incandescent Electric Lamp. A. M. Gibson. Gives particulars taken from the complete specification. 1800 w. Elec Rev, Lond—April 15, 1898.

Welsbach's Electric Lamp. Discusses the materials of the new filaments and gives Dr. William H. Wahl's opinion. Thinks there is to be no great advancement in electric lighting because of this invention. 1200 w. Jour Gas Lgt—Sept. 20, 1898.

## INCANDESCENT LIGHTING.

See also **ELECTRIC LIGHTING; INCANDESCENT LAMP.**

Twenty-Five Years' Progress in Incandescent Lighting. J. W. Swan. A brief review of the development. 1700 w. Elec Rev, Lond—Nov. 12, 1897.

**Alcohol.**—See **ACETYLENE—Alcohol Incandescent Compared; INCANDESCENT GAS LIGHTING—Denayrouze Alcohol.**

**Architecture.**—Electric Lighting as Applied to Architecture. T. Ekin. Read at meeting of the Architectural Assn., London. Considers the lighting of buildings by the incandescent electric lamp, dealing with the distribution, the artistic effect, wiring, etc. 2300 w. Arch, Lond—May 13, 1898.

**Camp Meeting.**—Electric Lighting at the Pitman Grove Camp Meeting. Bingham Hood. A quite unusual installation is described, using a series incandescent system, but differing from any other in having no street fixtures, shunt boxes or other cut-outs. Ill. 1000 w. Elec Eng, N. Y.—Sept. 1, 1898.

**Gas.**—See **INCANDESCENT GAS LIGHTING.**

**Regulating Device.**—See **HYDRO-ELECTRIC PLANT—Mt. Whitney, Cal.; INCANDESCENT LAMP—Moore Socket.**

**Series Alternating.**—Connecting Incandescence Lamps in Series on Alternating Currents. E. B. In "L'Industrie Electrique." A study of incandescent lamps, and their connection in series on individual transformers. Serial. Elec Rev, Lond—Sept. 4, 1896.

## INCLINED PLANE.

Inclined Planes. Samuel Diescher. From a paper read before the Soc of Engs. of W. Penna. The first part discusses types and features, compares with cable and elctric roads, the balance system, safety devices, connection between engine and drum, drums and peculiar accidents. Serial. Ir Age—Dec. 3, 1896.

**Canal Boats.**—See **CANAL LIFT.**

**Rough.**—A Graphical Treatment of the Problem of the Rough Inclined Plane. G. A. Burls. Three cases are considered. 800 w. Engng—April 14, 1899.

## INCLINE RAILWAY.

See **CABLE RAILWAY; MOUNTAIN RAILWAY; RACK RAILWAY.**

## INDEPENDENCE HALL.

**Restoration.**—Restoration of Congress Hall, Philadelphia. George C. Mason. The article is intended to give a brief description of the building and the restorations now in progress. 4000 w. Arch & Build—March 14, 1896.

Restoring Independence Hall. Asa M. Steele. An account of the effort being made to restore the group of buildings to their original condition, at the time of the signing of the Declaration of Independence. Ill. 2000 w. Harper's Wk—July 24, 1897.

**INDEX.**

See also **CATALOGUE.**

**Decimal.**—A Decimal Index to Mechanical Engineering Literature. Describes the system of the Dept. of Mech. Engs., Univ. of Illinois. 2000 w. Eng Rec—Feb. 17, 1900.

Decimal Indexes of Mechanical Literature. Illustrated letter, from Albert B. Herrick, describing a combination of decimal indexing and filing methods, found useful for many specialties. 1000 w. Eng Rec—March 10, 1900.

See also **DRAWING ROOM—Record System.**

**Hydraulics.**—See **HYDRAULICS—Index.**

**Mechanical Engineering.**—See **Decimal.**

**Pattern.**—See **PATTERN—Index.**

**Photography.**—See **PHOTOGRAPHY—Data Collections.**

**Surveyor's Office.**—Index System in City Surveyor's Office, Hartford, Conn. Frederick L. Ford. Illustrates the card index for field notes and drawings. 900 w. Eng Rec—May 7, 1898.

**INDEX PLATE.**

See also **DIVIDING ENGINE; GEAR CUTTING.**

Making an Accurate Index Plate. G. P. Wetmore. Illustrates and describes the manner of doing the work. 1000 w. Am Mach—July 7, 1898.

Making Original Index Plates. William Baxter, Jr. Illustrated description of two methods devised by the writer. 1000 w. Am Mach—Aug. 4, 1898.

Originating an Index Plate. Illustrates and describes the work as carried out at the Pope Mfg. Co.'s works. 1400 w. Am Mach—Feb. 1, 1900.

Table for Spacing Holes in Circles. F. W. Seidensticker. A table of sides, angles at center, and sines for inscribed polygons up to 500 sides. 1600 w. Am Mach—Sept. 27, 1900.

**INDIA.**

Openings for Capital in British India. Abstract of an article published in a Calcutta weekly on the concentration of industries in British India and the openings for capital which present themselves in that country. 1800 w. Bd of Trd Jour—March, 1898.

**INDIA RUBBER.**

See **INSULATION—Rubber; RUBBER.**

**INDICATOR.**

See also **ELECTRIC INDICATOR; INDICATOR DIAGRAMS; SHIP TELEGRAPH; STEAM ENGINE; STEAM ENGINEERING.**

Indicator Practice. A. C. Lippincott. Illustrated dissertation of a practical character, dealing chiefly with reducing motion devices. 1200 w. Lord's Mag—Oct., 1896.

Remarks on the Steam-Engine Indicator. W. S. Bailey. Read at a meeting of Inst. of Engs. and Shipbuilders at Hong Kong. History of the invention and improvement in details, the manner of use, the diagrams, and general usefulness. 5500 w. Steampship—Aug., 1898.

Some Uses of the Steam Engine Indicator. Edward F. Miller. Read before the New England Ry. Club. Discusses the use in setting valves and in determining some defects. Ill. 2500 w. R R Gaz—May 26, 1899.

The Indicator. G. B. Risler. On the value of the indicator with directions for its proper use. 1500 w. Can Eng—Sept., 1897.

The Indicator and Revealer (Indicateur-Revelateur). G. Duchesne. A description of the method of testing the indicators used in the mechanical laboratory of the University of Liège; also of the revealer of Mr. Bryan Donkin for indicating the moisture in a steam cylinder. 4000 w. Rev de Méchanique—Aug., 1900.

The Steam-Engine Indicator. Discusses the faulty points and lines, giving a series of cards showing some of the incorrect positions and illustrating remedies. 1400 w. Prac Eng—Feb. 12, 1897.

**Continuous.**—A Continuous Mean-Pressure Indicator for Steam Engines. William Ripper. Gives description of the instrument; short-stroke type; long-stroke type, time-pressure diagrams. Relation between time-pressure and distance-pressure diagrams, etc. Ill. 4500 w. Inst of Mech Engs—Dec. 8, 1899.

A Continuous Steam-Engine Indicator. Thomas Gray. The instrument described was devised with the object of obtaining a record of the performance of a gas engine during a series of successive cycles of operation. Ill. 2000 w. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

A New Continuous Recording or Integrating Engine Indicator. Illustrates and describes an instrument invented by W. G. and C. W. G. Little, of Bexley, Kent, England, and explains its operation and theory. 1700 w. Eng News—July 28, 1898.

The Continuous Recording of Steam Engine Performance. Prof. William Ripper. A detailed exposition of Prof. Ripper's continuous mean-pressure indicator, with examples of its application to recent Cunard steamers. 3000 w. Eng Mag—Sept., 1900.

Little's Continuous Recording Indicator. Illustrated description of an instrument capable of integrating continuously the work done in the cylinder of an engine under all conditions of varying load, explaining the theory. 2700 w. Engng—Dec. 10, 1897.

**Faulty Points.**—The Steam-Engine Indicator. The faulty points. A series of cards is given to show some of the incorrect positions and to illustrate remarks upon the remedies to be applied. 1700 w. Am Elect'n—Jan., 1897.

**Incorrect Practice.**—Universally Incorrect Indicator Practice. Tecumseh Swift. Calls attention to some errors in the use of indicator diagrams. 1500 w. Am Mach—Sept. 15, 1898.

**Inertia.**—See **INERTIA—Indicator.**

**Marine Engines.**—Indicating Marine Engines. Lewis M. Ellison. Directions for indicating, with a study of diagrams. 700 w. Engr, N. Y.—Sept. 15, 1898.

The Application of the Indicator to the Main and Auxiliary Engines of a Cable Steamer. David Arnot. Diagrams and results collected with as great accuracy as possible. 1600 w. Prac Engr—March 23, 1900.

The Indicator and Its Uses Aboard Ship. R. W. Jack. Read before the Inst. of Engrs. & Shipbuilders at Hong Kong. A somewhat elementary description of the indicator and its use, with discussion of typical diagrams. Ill. 7600 w. Steamship—Sept., 1898.

**Power Measurement.**—Measurement of Power with the Indicator. Explains the principle upon which most indicators work, giving illustrated description of various types. Serial. Mech Engr—Dec. 3, 1898.

**Recording.**—A Recording Indicator. W. O. Amsler. Design of this instrument. 2000 w. Sib Jour of Eng—Oct., 1896.

See also **Continuous.**

**Rigging.**—See **INDICATOR RIGGING.**

**Testing.**—New Method of Testing Indicator Springs. Illustrated description. 1100 w. Power—Feb., 1897.

Methods of Testing Indicators. D. S. Jacobus. Describes in detail the methods used at Stevens Institute of Technology, for the purpose of soliciting a discussion. Ill. 2800 w. Trans of Am Soc of Mech Engs, No. 799—Nov., 1898.

Testing Indicator Springs. D. S. Jacobus. Describes the method finally adopted for testing indicator springs and obtaining the correct scale to use for a given indicator card. 3500 w. Stevens Ind—Oct., 1899.

Testing Indicator Springs. L. G. F. A description of several types of apparatus that have been used for testing indicator springs, both in this country and in Europe. Ill. 5000 w. Mach, N. Y.—Feb., 1899.

**INDICATOR DIAGRAM.**

See also **INDICATOR; STEAM ENGINE; STEAM ENGINEERING.**

Reading the Indicator Diagrams. F. F. Hemenway. Explanation of the significance of peculiarities of indicator diagrams adapted to the comprehension of those who have not familiarized themselves with the use of the instrument. 2000 w. Loc Eng—Nov., 1896.

The Commercial Value of Indicator Diagrams. Sidney R. Lowcock. Read before the South Staffordshire Institute of Iron and Steel Works Managers. Showing that diagrams, when properly taken, furnish a complete record of what takes place in the engine cylinder, and enable one to decide what steps to take to improve the economy. 1300 w. Col Guard—Nov. 26, 1897.

The Steam Engine Indicator Card. Ideal indicator cards are the only ones considered. Diagrams illustrate the text. 1300 w. Am Elect'n—Aug., 1896.

**Air Compressor.**—See **AIR COMPRESSOR—Indicator Diagram.**

**Combined.**—See also **STEAM ENGINE DESIGN—Combined Indicator Diagrams.**

**Cut-off.**—The Point of Cut-Off. Editorial on proper location of this point on the card and its importance. 700 w. Eng Rec—Aug. 27, 1898.

**Engine Changes.**—The Effect on the Indicator Diagram of Various Changes in the Valve, Eccentric or Governor Connections of an Engine. A. H. Eldredge. Gives diagrams taken by students in Sibley College, Cornell University, with explanations. 1000 w. Power—Sept., 1898.

**Locomotive.**—Indicator Diagrams from Locomotive "Schenectady." W. F. Goss. The engine named is mounted for testing purposes in the laboratory of Purdue Univ., La Fayette, Ind. Part first reviews briefly the precautions that were taken in securing the diagrams to be discussed. Serial. Ry Rev—Dec. 19, 1896.

Locating the Cut-Off and Other Events on Locomotive Indicator Cards. C. H. Robertson. Illustrates and describes the practice of the author in locating points named. 1500 w. R R Gaz—June 30, 1899.

Some Information from Indicator Cards. A series of six cards is given which were taken from locomotives, and they illustrate the work in the cylinder very clearly under different conditions. 1200 w. R R Gaz—Jan. 21, 1896.

See also **INDICATOR RIGGING; LOCOMOTIVE TEST.**

**Piping Effects.**—Effect of Piping Arrangements on the Indicator Diagram. D. T. Randall. Experiments with such a selection of data as will best show the difference in results obtained under various conditions of cut-off and pipe lengths. 1500 w. Technograph—No. XI., 1897.

The Effect, upon the Diagrams, of Long Pipe-Connections for Steam-Engine Indicators. W. F. M. Goss. Read before the A. S. M. E. An experimental investigation of this subject is given with illustrated description of means and methods employed, steam indicator diagrams showing effect of connections and conclusions. 8300 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

**Steam Consumption.**—The Calculation of Steam Consumption from the Indicator Card. Explains the manner of making the calculations. 1000 w. Prac Engr—March 3, 1899.

**Valve Gear.**—The Influence of the Indicator Diagram on the Design of Valve Gear. Considers that ingenuity, time and money have been wasted in efforts to obtain a diagram of a particular type, and the object is not worth the cost. 3200 w. Engr, Lond—Jan. 19, 1900.

**Water Consumption.**—Computing Horse Power from the Indicator Diagram—Approximate Water Consumption. F. F. Hemenway. Directions for computations, with plan for approximate water consumption used by the Buckeye Engine Co. 1000 w. Loc Engng—Dec., 1896.

**INDICATOR RIGGING.**

**Locomotive.**—A Substantial Indicator Rigging for Locomotives. Description and illustration of the Penna. R. R. rig, important on account of increasing use of indicator on locomotives. 800 w. Am Eng & R R Jour—June, 1896.

Indicator Rigging for Locomotives. A. W. Gibbs. Describes an improvement in the device recommended by Prof. Goss. With full drawings. 600 w. Am Eng & R R Jour—Sept., 1896.

**INDUCTANCE.**

See also **ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRO-PHYSICS.**

The Inductance of a Portion of an Electric Circuit. H. N. Allen. Shows some of the difficulties that may arise, and the means of avoiding them. 1700 w. Elect'n, Lond—Nov. 17, 1899.

**Mutual.**—Mutual Induction of Parallel Distributing Circuits. Dugald C. Jackson. A contribution to the calculation of the inductance of transmission lines. 900 w. Elec Wld—Sept. 19, 1896.

The Impedance of Circuits Having Mutual Induction (Ueber Richtungswiderstände bei Stromkreisen mit Gegenseitiger Induktion). Josef Herzog and Clarence P. Feldman. A theoretical discussion, with diagrams and formulae. 600 w. Elektrotech Zeitschr—April 19, 1900.

**Polyphase.**—Mutual Inductance of Three-Phase Circuits. Aug. J. Bowie, Jr. Discussing disturbances that arise and the means of overcoming them. Ill. 5300 w. Elec Wld & Engr—June 23, 1900.

**Secohmmeter.**—The Measurement of Inductance with the Secohmmeter. H. N. Allen. An account of a defect found in the secohmmeter and its removal, with a comparison of this method with the Rayleigh method of measuring inductance. 1800 w. Elect'n—July 16, 1897.

See also **ELECTRIC INSTRUMENT.**

**Wehnelt Interrupter.**—See **INTERRUPTER—Inductance.**

**INDUCTION.**

See **ELECTRO-PHYSICS; MAGNETIC INDUCTION.**

**INDUCTION COIL.**

See also **CATHODE RAYS; ELECTRO-PHYSICS; INTERRUPTER; RADIOGRAPHY; ROENTGEN RAYS.**

A Small Induction Coil. Howard B. Little. The writer's stated object is to describe in detail a coil whose parts are given definite proportions for definite reasons; with hints suggested by experience in the manufacture, sale and use of such apparatus. Ill. 2300 w. Elec, Lond—Aug. 5, 1898.

A Suggestion for the Construction of Induction Coils. George T. Hanchett. Practical suggestions for the improvements of these coils. 1200 w. Elec Wld—July 17, 1897.

How to Make an Induction Coil. George T. Hanchett. Illustrated description of recent improvements. 1500 w. Am Elect'n—Jan., 1897.

Improved Induction Coils. James Asher. Describes several simple methods of suppressing sparking without employing a condenser. 1500 w. W Elect'n—July 21, 1900.

**Action.**—The Action of Induction Apparatus (Ueber die Vorgänge im Induktionsapparat). An account of the investigations of Herr Walter, at Hamburg, into the relation between the condenser capacity and length of spark in induction coils. 1800 w. Elektrotech Rundschau—Nov. 15, 1897.

**Automobiles.**—Induction Coils. H. E. Wimperis. An illustrated account of the construction and working. Serial. Auto Jour—March, 1900.

See also **GASOLINE ENGINE—Electric Ignition.**

**High Frequency.**—A Quantitative Study of the High Frequency Induction Coil. W. P. Boynton. A discussion of the mathematical theory with description of experiments made to verify the agreement of the actual behavior of an oscillating system with two degrees of freedom with the approximate theory. 5000 w. Phys Rev—July, 1898.

**Tesla.**—See also **ELECTRIC INVENTION; ELECTRO-PHYSICS; INTERRUPTER.**

**Tesla X-Ray.**—New Tesla Coil for X-Ray Work. Describes a coil known as the modified Tesla coil, placed on the market by the L. E. Knott Apparatus Co. 700 w. Elec Rev—July 22, 1896.

**Tesla-Thomson High Frequency.**—Construction of a Tesla-Thomson High Frequency Coil. A. F. McKissick. Illustrated description. 600 w. Am Elect'n—Aug., 1896.

**Theory.**—The Theory of the Induction Coil. An examination of the mathematical theory of the induction coil as worked out by B. Walter, and of the experiments verifying the results. Serial. Elec Rev. Lond—Oct. 22, 1897.

**Thomson.**—A New Form of Inductive Coil. Elihu Thomson. Describes a new type employing the principle of a "substitute primary" or "secondary primary." Ill. 1500 w. Trans Am Inst of Elec Engs—May, 1897.

**X-Ray.**—An Induction Coil. J. B. Hall. The construction of an induction coil to give a 4-in. spark, to be used for producing X-rays with vacuum tubes. 900 w. Can Eng—Sept., 1896.

**INDUCTION CURVE.**

See **DYNAMO—Characteristic; HYSTERESIS; MAGNETIC INDUCTION.**

**INDUCTION JETS.**

A New Theory of Induction Jets (Nouvelle Théorie des Trompes). A. Rateau. A mathematical and general discussion of the action of hydraulic jets for inducing currents of water or air, with the results of many experiments. An important paper. 15000 w. Rev de Mécanique—Sept., 1900.

**INDUCTION MOTOR.**

See ELECTRIC MOTOR—Induction.

**INDUSTRY.**

See also LABOR; MANUFACTURE; and under specific geographical titles.

**Cuba.**—See MINERAL REGION.

**Diseases.**—See DISEASES OF OCCUPATIONS.

**Finance.**—The Relations of Finance to Industrial Success. Henry Clews. Showing the dangers of over-capitalization in industrial enterprises and the importance of periodical statements of their condition. 2300 w. Eng Mag—Aug., 1896.

**Modern Problems.**—Problems of Modern Industry. Reviews a recent book by Sydney and Beatrice Webb,—collection of essays and addresses on industrial problems, especially in England. 1700 w. Builder—July 30, 1898.

**Prosperity Conditions.**—What is Most Needed to Bring About Greater Prosperity for the General Industrial Interests of the Entire Country? Replies to the question from Courtenay De Kalb, and L. Warfield. 3800 w. Mfrs Rec—June 19, 1896.

**World Distribution.**—Economic and Labor Factors in the Distribution of Industries. John Richards. A discussion of the effects of trusts and protection as opposed to the laws of industrial evolution. 3500 w. Eng Mag—April, 1900.

**INERTIA.**

**Indicator.**—A New Inertia Indicator. Wilfred Lewis. Read before the Engs.' Club of Phila. Describes a convenient device for measuring inertia effects, stating how it came in use and some of its useful applications. Ill. 1600 w. Am Mach—June 23, 1898.

A New Inertia Indicator. Wilfred Lewis. Read before the Engs.' Club of Phila. Describes the instrument and illustrates its application. 900 w. Ir Age—Aug. 4, 1898.

**Moment.**—See MOMENT OF INERTIA.

**INFIRMARY.**

See also ASYLUM; HOSPITAL.

**Glasgow.**—The Royal Infirmary, Glasgow. A correspondent of the "Glasgow Herald" presents a scheme, considering the question in relation to its surroundings. 1600 w. Arch, Lond—June 11, 1897.

**Halifax, Eng.**—New Infirmary, Halifax. A general description. 1200 w. Builder—Aug. 8, 1896.

The Halifax New Infirmary. Illustrated description with information regarding the selection of location, plans and costs. 2500 w. Arch, Lond—July 17, 1896.

**INGOT MOLD.**

See also STEEL CASTING; STEEL INGOT.

**Brass or Bronze.**—See MOLD.

**INJECTOR.**

See also BOILER; FEED WATER; INDUCTION JET; PUMP—Feed Water.

Boiler Feeding by Injectors. James Whitcher. A discussion of the objections to the injector as a boiler feeder, comparing its advantages and disadvantages. 1200 w. Elec Rev, Lond—Aug. 26, 1898.

The Injector. M. W. Roe. Describes the mechanism and action of the injector, and reports a test. 1200 w. Sib Jour of Engng—Dec., 1897.

The Injector. J. Warren. Describes briefly the theory and construction, with the methods of working. 1600 w. Elec, Lond—Jan. 22, 1897.

**Locomotives.**—A Little About Injectors. C. B. Conger. A plain talk for railway engineers and firemen about operation of these instruments. 2400 w. Loc Engng—Feb., 1900.

Locomotive Injectors. J. A. Bischoff. Read at the Locomotive Foreman's Club, Chicago. Treats of the essential active parts of an injector, the action, and causes which prevent working, with suggestions. 3000 w. Ry Mas Mech—Feb., 1898.

Locomotive Injectors. George H. Baker. History of the invention and early use of injectors, with a discussion of its advantages over the pump, and the best injectors for locomotive service. 3000 w. Ry Mag—Jan., 1898.

Test of the Performance of a Locomotive Injector. A detailed description of the apparatus, the methods employed and some of the results that were obtained in a recent comparative test of locomotive injectors. 3500 w. R R Gaz—Dec. 11, 1896.

**Penberthy.**—Tests of the Efficiency of an Injector. Karl Andréa. Results and tabulated data obtained from a series of experiments upon a Penberthy injector. 700 w. Eng News—July 16, 1896.

**Steam Consumption.**—Steam Consumption of Injectors. Strickland L. Kneass. A discussion whether an injector using little or much steam is most economical, inasmuch as the only heat loss that can occur must be the radiation. 1800 w. Loc Engng—May, 1900.

**Test.**—A Comparative Test of Steam Injectors. George Henry Trautmann. A thesis submitted for the degree of Bachelor of Science in Mechanical Engineering, University of Wisconsin. Comparative tests of a number of well-known makes. Ill. and tables. 2500 w. Bull of Univ of Wis—No. 12, 1897-98.

See also PUMPING ENGINE.

**Testing Apparatus.**—Apparatus for Testing Injectors. Charles Francis Park. Illustrates and describes the apparatus which has been designed and placed in the engineering laboratories of the Mass. Inst. of Technology. 3000 w. Tech Q—Sept., 1899.

**Theory.**—A Theory of the Injector. Myron G. Stolp. The action of the injector is found analogous to that of the condensing steam-pump. An interesting and instructive article. 2000 w. Mas St Fitter—May, 1896.

**INLAND NAVIGATION.**

See CANAL; HARBOR; RIVER REGULATION; WATERWAY.

**INSPECTION.**

See also STEEL SPECIFICATIONS; TESTING.

Inspection—Its Place in Modern Engineering Practice. A. C. Beyer. Some account of the methods employed and work accomplished by inspectors. 2500 w. Engs' Year Book, Univ of Minn—1897.

Inspection Test. B. F. Spalding. An argument emphasizing the necessity of thorough inspection of work at the right stages, as an element of success in manufacturing. 2200 w. Am Mach—May 28, 1896.

Instructions to Inspectors at Mills and Shops. J. A. L. Waddell. Twenty suggestions to aid the work of inspectors. 1000 w. Ind Engng—Sept. 18, 1897.

Systematic Inspection of Material. L. S. Randolph. A general paper showing the tendency and importance of tests of material, such as is bought by the purchasing departments of railroads, and claiming that thus only can we avoid buying adulterated or imperfect material. 1800 w. Digest of Phys Tests—April, 1896.

The Inspection of Iron and Steel, Its Development, What It is, and Its Advantages. Frank C. Osborn. A brief description of the methods adopted by the Osborn Co., of Cleveland, O., illustrating the care taken in testing the materials. Serial. Bridges—May, 1899.

**INSULATED WIRE.**

See ELECTRIC CABLE; INSULATION.

**INSULATION.**

See also DIELECTRIC; ELECTRIC CABLE; ELECTRIC CONDUCTOR—Manufacture; ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE; ELECTRIC TESTING; ELECTROSTATIC CAPACITY; GUTTAPERCHA; RUBBER.

Insulation. W. M. Stine. The properties of insulating materials; mechanical difficulties; the care necessary in the application and use of insulation. 1200 w. Elec Eng—Nov. 25, 1896.

Substitutes for India Rubber and Gutta-Percha for Electrical Purposes. From the "Electro-Chemical Review." Concerning compounds that may be used as substitutes for many uses. 1200 w. Am Gas Lgt Jour—July 9, 1900.

Wire Insulation. H. W. Nelson. Remarks calling attention to a backward branch of electrical work, with suggestions for improvement. 1100 w. Can Elec News—Aug., 1896.

**Armature and Commutator.**—Armature and Commutator Insulation. William Baxter, Jr. Presents the advantages of double insulation. Ill. 1700 w. Am Mach—July 22, 1897.

**Armature Cores.**—See **ARMATURE—Core Insulation; Grooved Insulation.**

**Breakdowns.**—Mysterious Breakdowns of Insulation. Elihu Thomson. Reference to editorial in issue of Oct. 21 on this subject and calling attention to points that would tend to remove danger. 1000 w. Elec Eng—Nov. 11, 1896.

**Conduction.**—Insulation and Conduction. Reginald A. Fessenden. Gives an account of the manner in which a current passes through materials, discussing also the purposes for which insulation is used, and of substances best suited. Discussion and communications. 17000 w. Trans of Am Inst of Elec Engs—March, 1898.

Insulation and Conduction. Reginald A. Fessenden. Read before the Am. Inst. of Elec. Engs. Gives an account of the manner in which the current passes through materials, and discusses the purposes for which insulation is used, and the substances best suited to each case. 3300 w. Elec Wld—April 2, 1898.

**Dielectric Strength.**—Dielectric Strength of Insulating Materials. Thomas Gray. Paper read before the Am. Assn. for the Advancement of Sci., containing results of measurements of various substances. 3500 w. Phys Rev—Nov., 1898.

See also **DIELECTRIC STRENGTH.**

**Disruptive Strength.**—Experiments on the Disruptive Strength of Insulating Materials. Charles P. Hidden and Olaf M. Kelly. Graduation thesis. Gives results of a series of experiments made to measure as accurately as possible the electric pressures required to disrupt specimens of common insulating materials under conditions similar to those encountered in practice. 2200 w. Stevens Ind—April, 1898.

**Electric Instruments.**—The Insulation of Electrical Testing Instruments. J. Wright. Describes and illustrates several insulators applicable to different conditions. 2000 w. Elec Eng, Lond—Dec. 31, 1897.

**Electrostatic Field.**—See **ELECTRO-PHYSICS.**

**Gutta Percha.**—See **GUTTA PERCHA.**

**Heat Effect.**—See **Temperature Effect.**

**High-Potential Circuits.**—Insulation of Overhead and Underground Circuits Having a Difference of Potential of 2000 Volts and Over. William Brophy. Abstract of a paper read before the Electric Potentials, Boston. The author believes that all high potential circuiats should be placed underground, but as they are not so placed, he deals with the question of how to construct and insulate them. 2200 w. Elec—Nov. 27, 1895.

**Indicator.**—See **ELECTRIC INSTRUMENT—Insulation Indicator.**

**Liquid Air.**—See **LIQUID AIR—Insulator.**

**Manjak.**—See **MANJAK.**

**Materials.**—The Ethics of Insulating Materials. J. Wright. Considers the substances, chiefly india-rubber and gutta-percha, used for the insulation of electric cables and wires. 2000 w. Elec Rev, Lond—Sept. 21, 1900.

**Mica.**—See **MICA.**

**Organic Membranes.**—The Organic Membranes as Insulators. Benjamin Ward Richardson. Physiological observations are described in detail and conclusions given. Also editorial comments. 1800 w. Elec Rev—July 29, 1896.

**Overhead Wires.**—How Shall We Insulate Our Overhead Wires? Editorial remarks with extracts from contributions by William Brophy and B. J. Arnold. 4200 w. W Elec—Dec. 7, 1895.

**Paper.**—See **ELECTRIC CABLE.**

**Resistance.**—See also **ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE.**

**Resistance, Three-Wire.**—See **ELECTRIC MEASUREMENT—Insulation, Three-Wire.**

**Rubber.**—India-Rubber as Insulating Material for Cables. Oscar Schaefer. Information on the manufacture of india-rubber cores, land cables, and wires, etc. 1300 w. Elect'n, Lond—Jan. 19, 1900.

Rubber Prices and the Insulated-Wire Trade. Showing that high prices of rubber are not due to its use in the electrical field. 1400 w. Ind Rub Wld—July 10, 1896.

**Rubber Decay.**—See **RUBBER—Decay.**

**Rubber in Conduits.**—The Use of Rubber Insulated Wire in Steel Conduits. V. Zingler. Urging either another form of insulation, or a better grade of rubber, when the wires are drawn into metal tubes. 1800 w. Elec Rev, Lond—Jan. 5, 1900.

**Temperature Effect.**—Bates and Barnes on Insulating Materials. Discussion of paper on "The Effect of Heat Upon Insulating Materials," by Putnam A. Bates and Walter C. Barnes. 4800 w. Trans Am Inst of Elec Engs—Oct., 1897.

The Effect of Heat on Insulating Materials. Putnam A. Bates and Walter C. Barnes. Tests made to determine the real facts. 2500 w. Trans Am Inst of Elec Engs—May, 1897.

Effect of Temperature on Insulating Materials. George F. Sever, A. Monell and C. L. Perry. Conclusions drawn from results of 102 tests on samples of materials. Discussion and communications. 6000 w. Trans Am Inst of Elec Engs—June and July, 1896.

Effect of Temperature on Insulating Materials. George F. Sever, A. Monell and C. L. Perry. Conclusions drawn from 102 tests on samples of materials, which were furnished by several of the most prominent manufacturers of electrical machinery. 3800 w. Elec Wld—May 30, 1896.

The Effects of Temperature on Insulation Materials. William Esety. Describes tests, apparatus, and methods used in electrical laboratory of the Univ. of Illinois, to determine the behavior of insulating materials under different physical conditions. 4100 w. Technograph, No. 12—1897-98.

Effect of Temperature on Insulating Materials. Charles F. Scott. Statement of results obtained by Mr. C. E. Skinner in his work in this line. 1300 w. Elec Wld—July 11, 1896.

The Effect of Temperature on the Resistance of Paraffin and Resin Oil. H. P. Gaze. Investigations confined to the behavior of paraffin and resin oil, at various temperatures within the range met with in commercial apparatus. 1400 w. Elect'n—Feb. 7, 1896.

**Testing.**—See **ELECTRIC MEASUREMENT; ELECTRIC TESTING.**

**Underground Cables.**—Insulation of Underground Cables. E. J. Spencer. Comment on a former article: the communication sharply criticises paper and fiber insulation. 1000 w. St Ry Jour—May, 1896.

**Weatherproof.**—Concerning Weatherproof Wire. Alex. Dow. Defending the use of this covering and showing that it has a value. 2000 w. Elec Engng—Feb. 1, 1898.

**Wire-Covering Machines.**—See **ELECTRIC CABLE—Manufacture.**

**INSULATOR.**

See also **DIELECTRIC; ELECTRIC LINE; ELECTRIC TRANSMISSION; INSULATION.**

**Glass vs. Porcelain.**—The Insulation of Overhead Electric Lines (Isolement des Lignes Electriques Aériennes). A. Fleury. A discussion of the relative merits of glass and porcelain, with methods of testing their behavior in moist weather. 1800 w. L'Electricien—Feb. 25, 1899.

**Heating.**—High Voltage Heated Insulator. An illustrated description of A. S. Larsen's method of heating insulators by induced currents, in order to prevent moisture forming. 500 w. Elec Wld & Engr—Sept. 22, 1900.

**High Potential.**—High Potential Insulators. Frederic A. C. Perrine. A careful examination of the necessary details in the manufacture of porcelain for insulators and the need of careful study of material and form. 4200 w. Elec Engng—Dec. 15, 1897.

Insulators for Electric Power Transmissions. T. A. W. Shock. Read before the Santa Cruz Convention of the Pacific Coast Electric Transmission Assn. Reports the experience with insulators on the lines of the Sacramento Electric, Gas and Railway Co. 900 w. Jour of Elec—Sept., 1897.

Insulators for Use on High Voltages. Henry D. Sears. Read before the Santa Cruz Convention of the Pacific Coast Electric Transmission Assn. States the conditions to be fulfilled by a good insulator, and discusses the materials used, quoting extracts from standard authorities. 1600 w. Jour of Elec—Sept., 1897.

The Line Insulation of 16000 Volts. C. H. Van Norden. Read before the Santa Cruz Convention of the Pacific Coast Electric Transmission Assn. A solution of the problem of insulation as attempted by the Central California Electric Co., with experience gained. 1000 w. Jour of Elec—Sept., 1897.

**High Potential Testing.**—The Testing of Insulators for Tigh-Tension Service. J. R. Haskin. Describes the manner of testing the insulators for the Niagara-Buffalo transmission line. Ill. 1800 w. Elec Wld—Jan. 22, 1898.

**Porcelain.**—The Durability of Porcelain as an Insulator. James Pass. In favor of its use, and cautions regarding quality. 1200 w. Elec Eng—Nov. 20, 1895.

See also **PORCELAIN—Mold Making.**

**Railway.**—Test of Railway Insulators. L. A. Murray. A report of a test of glass and porcelain railway insulators made in the Electrical Engineering laboratory of Cornell University. 1400 w. Sib Jour of Engng—Oct., 1896.

**INSURANCE.**

See **FIRE INSURANCE.**

**INTAKE.**

See also **TUNNEL; WATER WORKS.**

**Buffalo, N. Y.**—Buffalo Water Works Intake Tunnel. Information relating to the construction of this tunnel, begun in July, 1895, and finished in Nov., 1897, at a cost of $90,000. 1200 w. Eng Rec—Dec. 18, 1897.

**Chicago.**—Description of the Construction of the New Chicago Waterworks Tunnel. William G. Atwood. The building of a ten-foot tunnel, four miles into the lake. 2200 w. Trans of Assn of Civ Engs of Cornell Univ—June, 1897.

New Tunnels, Intake Crib, and Pumping Stations, Chicago, Ill. Illustrated detailed description of extensive and important additions to the water supply system of this city. 4500 w. Eng News—Aug. 31, 1899.

The Chicago Waterworks Extension Tunnels. Illustrated description of the design and methods of construction of the North East Lake tunnel. Serial. Eng Rec—May 21, 1898.

The Chicago Waterworks Tunnel Extension. Illustrated detailed description. 1200 w. Eng Rec—Sept. 5, 1896.

**Cleveland, O.**—The Cleveland Waterworks Tunnel. A progress report on the construction of a tunnel which has already had two fatal gas explosions. 1000 w. Eng Rec—Dec. 17, 1898.

The Construction of the New Cleveland Waterworks Intake. Illustrated description of the building of this 9-foot, brick-lined tunnel, 26000-feet long, which presented many difficulties overcome by novel methods of working. 5000 w. Eng Rec—May 7, 1898.

The New Lake Tunnel and Cribs for the Cleveland, O., Waterworks. C. F. Schulz. Illustrated description of the work begun for securing a water supply untainted by sewage for the city of Cleveland. 3000 w. Eng Rec—May 22, 1897.

The New Waterworks Intake Tunnel for Cleveland, Ohio. A description, with illustrations, of the new tunnel and accessories, with brief reference to the old works. This is supposed to be the longest waterworks intake tunnel yet attempted. 6700 w. Eng News—Aug. 11, 1898.

See also **EXPLOSION; NATURAL GAS EXPLOSION.**

**Erie, Pa.**—Submerged Cast Iron Pipe Intake for the Waterworks of Erie, Pa. Walter C. Brough. The method of laying the pipes under water is described in detail. 2400 w. Eng News—Dec. 5, 1895.

**Great Lakes.**—The Intakes of the Great Lakes. Thomas W. Barrally. From a paper read before the Mich. Engng. Soc. Describes various intakes on the Great Lakes and the difficulties met with, favoring the submerged type. 1800 w. Ry & Engng Rev—Aug. 6, 1898.

**INTEGRATOR.**

See **PANTOGRAPH; PLANIMETER.**

**INTERCHANGEABILITY.**

Interchangeability of Units in Machinery. W. D. Forbes. On the value of the interchangeable unit, and the advantages. 1200 w. Jour Am Soc of Nav Engs—Feb., 1900.

Interchangeable Details of Machinery. The necessary appliances for the production of interchangeable details are herein ably discussed. Editorial. 2200 w. Mach, Lond—Oct. 15, 1896.

**INTERLOCKING.**

See also **BLOCK SIGNAL; GRADE CROSSING; RAILWAY SIGNAL; RAILWAY SWITCH.**

Study of Interlocking Mechanisms (Etude sur les Enclenchements). M. Descubes. A very elaborate illustrated study of the general subject of interlocking and an exposition of a method for determining secondary interlocking. A valuable paper. 14000 w. Rev Gen des Chemins de Fer—Nov., 1898.

**Bishopsgate, London.**—See **Westinghouse.**

**Boston Terminal.**—Electro-Pneumatic Switching and Signaling System at the South Boston Terminal Station. Illustrated description. 1200 w. Sci Am—March 3, 1900.

**Bouré System.**—The Bouré System of Interlocking Signals (Les Enclenchements par Serrures, Systeme Bouré). F. l'Heureux. Especially adapted to be used at small stations where a complete signal tower is not required. 5000 w. 8 plates. Rev Univ des Mines—Aug., 1898.

**Chicago.**—New Interlocking Plant at 101st Street, Chicago. Illustrated description. 1000 w. Ry & Engng Rev—Jan. 14, 1899.

**Chicago and Northern Pacific.**—Signaling and Interlocking in Chicago. A description of the Chicago & Northern Pacific Plant at Grand Central Station. 600 w. Ry Age—Sept. 11, 1896.

**Chicago, Milwaukee & St. Paul Ry.**—Interlocking Plant at Pacific Junction; Chicago, Milwaukee & St. Paul Ry. Illustrated description of a plant at a complicated junction. 900 w. Eng News—May 11, 1899.

**Distant Signals.**—Distant Signals and Care of Interlocking Apparatus. Charles Hansel. Letter to the editor taking the position that the power to change signals should be taken from the operator after the train has entered the interlocking limits. 1500 w. Ry Rev—March 21, 1896.

**Dolton, Ill.**—Dolton Interlocking Plant. An illustrated description of an important plant now being built. 800 w. R R Gaz—May 28, 1897.

Interlocking Plant, Dolton, Ill. Illustrated description of the largest interlocking plant in the United States. 900 w. Ry Rev—April 17, 1897.

**East Clinton, Ill.**—Small Interlocking Plant at East Clinton, Ill. Illustrated detailed description. Ry & Engng Rev—April 16, 1898.

**Electric.**—A Simple Electric-Locking Circuit for Interlocked Crossings. N. H. Elliott. Condensed from a paper read before the Railway Signalling Club. 1400 w. Eng News—Dec. 5, 1895.

Electric Interlocking Apparatus (Les Appareils de Vérouillage Electrique). M. Bouvier. An illustrated description of the electrical signal apparatus used on the Paris-Lyons-Mediterranean Railway. 7500 w. 2 plates. Rev Gen des Chemins der Fer—May, 1899.

Electric Interlocking the Block and Mechanical Signals on Railways. F. T. Hollins. Read at London Inst of Elec. Engs. Briefly describes the systems of electric interlocking in practical use, dealing more in detail with the Sykes system. Serial. Elec Eng, Lond—Jan. 29, 1897.

History of Electric Locking of Railroad Signals. V. Spencer. A paper read before the Railway Signalling Club, Chicago. The paper is devoted chiefly to the less familiar history of the application of the track circuit in connection with electrical locking of interlocking machine levers, and an argument for this practice. 2200 w. R R Gaz—May 15, 1896.

See also **Taylor.**

**Electro-Pneumatic.**—See **Boston Terminal; St. Louis; Westinghouse.**

**Elevated Ry., Chicago.**—Interlocking Work on the Metropolitan Elevated of Chicago. An illustrated description showing arrangement of switches, signalling apparatus, and lift drawbridge device. 1500 w. Ry Rev—Nov. 30, 1895.

Signalling and Interlocking on the Union Elevated or Down-Town Loop, Chicago. Description of the installation and operation with plan of the tracks. 800 w. R R Gaz—Aug. 21, 1896.

**Germantown, Pa.**—Two New Interlocking Plants. Illustrated description of two plants recently installed. One at Germantown Junction, Philadelphia and Reading R. R., the other at Seattle, Wash., Great Northern Ry. 800 w. Eng News—March 11. 1897.

**Grade Crossing.**—See GRADE CROSSING—Illinois Law; Indiana Law; Interlocking.

**Greensburg, Ind.**—Interlocking at Greensburg, Ind. Illustrated description of a plant especially interesting because of the arrangement of the levers. 1200 w. R R Gaz—Dec. 9, 1898.

**Hammond, Ind.**—Interlocking Plant at Hammond, Ind. Illustrated description of one of the largest interlocking plants in the United States. 700 w. R R Gaz—Dec. 17, 1897.

**Hartford, Conn.**—Interlocking at Hartford. Description of a 64-lever manual plant at crossing of N. Y., N. H. & H. & N. E. R. R., with plan of switches and signals, dog sheet and locking sheet, and views of machine, lever and connections. 400 w. R R Gaz—Aug. 14, 1896.

**Hawley, Ill.**—Automatic Interlocking at Hawley, Illinois. Illustrated description. The features of interest are the use of automatic brake-setting devices, and the use of "power-storing" machines for throwing all of the signals. 3000 w. Ry & Engng Rev—Jan. 6, 1900.

**Hydraulic.**—Hydraulic System for Working and Locking of Railway Points and Signals. A very simple and compact method is here given and illustrated by cuts of the levers, valves and gears. 3300 w. Engng—March 6, 1896.

**Jones System.**—Interlocking Signals. An illustrated description of a system for interlocking signals and points of an ordinary third-class station designed and patented by H. Sydney Jones, executive engineer, Rajputana-Malwa Railway. 800 w. Ind & East Eng—Jan., 1898.

**Liverpool Street, London.**—Signalling Arrangements at Liverpool Street Station. Illustrated description. In the size of its yard, the complexity of its junctions and cross-overs, and the number of its daily traffic movements, this station probably now takes precedence of any other railway terminus in the world. 7000 w. Engng—Dec. 4, 1896.

**Loop Facing Points.**—Interlocking Loop Facing Points. Illustrated description of a new invention. 1400 w. Ind & East Eng—Nov. 2, 1895.

**Manchester, N. H.**—Interlocking Plant at Manchester, N. H. Brief illustrated description of the first interlocking plant in the state of New Hampshire. 400 w. Ry Age—Feb. 11, 1898.

**National Co.'s Machine.**—New Interlocking Machine of the National. Illustrated detailed description. 700 w. R R Gaz—April 10, 1896.

**Paoli.**—Interlocking at Paoli, Pa. Brief descriptive account, with diagram, .plan of rods and wires, etc. 700 w. R R Gaz—Oct. 2, 1896.

**Pneumatic, Buffalo.**—Pneumatic Interlocking at Exchange Street, Buffalo. Describes a plant for the N. Y. C. & H. R. R. R., containing 25 switches and 33 signals, in which all the functions are performed by compressed air. Ill. 1500 w. R R Gaz—July 8, 1898.

**Pneumatic, Jersey City.**—Low-Pressure Pneumatic Interlocking at Jersey City. Illustrated description of an interlocking plant of the Erie R. R. at Grove St., Jersey City. 1500 w. R R Gaz—May 25, 1900.

**Release.**—Releasing Device for Interlocking Plants. Describes a new and interesting form of mechanical release for the electric locks which has been introduced in a plant installed at East Clinton, Ill. Ill. 800 w. Eng News—May 12, 1898.

**Rules.**—Definitions of and Regulations for the Use of Interlocking Switches and Signals. A reprint of the additions adopted by the American Railway Assn., Oct. 6, 1897. 1800 w. R R Gaz—Oct. 15, 1897.

Rules for Operation and Maintenance of Interlocking Signals. Report of H. D. Miles, W. C. Nixon, and Henry M. Sperry, committee for the Railway Signalling Club, Chicago. The rules are concise and condensed. 2400 w. Eng News—April 2, 1896.

Rules for the Operation and Maintenance of Interlocking Plants. A copy of the rules for operation and maintenance, recommended by the Railway Signalling Club. 2500 w. R R Gaz—Oct. 15, 1897.

**St. Louis.**—The Electro-Pneumatic Interlocking Plant at Grand Avenue, St. Louis. Description with plan of tracks and signals, cuts of the machine, sample charts of lever locking and dog-sheet. 2000 w. Ry Rev—April 18, 1896.

**Seattle, Wash.**—See Germantown, Pa.

**State Line, Ill.**—Interlocking Plant at State Line Crossing Near Chicago, Ill. Illustrates and describes one of the largest interlocking plants in the United States. 1700 w. Eng News—Jan. 20, 1898.

**Taylor Electric.**—New Interlocking Electric Switch and Signal System. J. R. Cravath. A well illustrated description of the Taylor system, which is entirely operated by electricity. 1600 w. Elec Wld & Engr—Sept. 15, 1900.

The Taylor Electric Interlocking System. Illustrates and describes an interesting installation at Edgewood, Ill., which has a number of novel features and promises success. 1300 w. Ry Rev—Jan. 9, 1897.

The Taylor Electric Switch and Signal Apparatus. A well illustrated account of this system, which is entirely electric. 2000 w. R R Gaz—Sept. 28, 1900.

**Toronto.**—Grand Trunk Signalling System at Toronto. Illustrated description of the manual system. 700 w. Can Eng—Dec., 1896.

Interlocking at Toronto. A short description, with illustrations, of the interlocked switches and signals recently installed in the yards of the Grand Trunk Railway in Toronto. The material used is English and this plant is the largest and most important installation of English signal apparatus in this country. 800 w. R R Gaz—April 3, 1896.

**Westinghouse Electro-Pneumatic.**—Electro-Pneumatic Signalling: Bavarian State Railways. An account of the installation of the Westinghouse electro-pneumatic system of signalling. 800 w. Engng—Nov. 26, 1897.

Electro-Pneumatic Signalling Plant. Illustrates and describes an interesting signalling plant recently carried out for the Great Eastern Railway Co., of England. 2500 w. Engng—June 16, 1899.

Westinghouse Electro-Pneumatic Switch and Signal System at the Bishopsgate Station of the Great Eastern Railway (Elektrisch Gesteuertes Druckluft-Stellwerk, Bauart Westinghouse, Ausgeführt von der Great Eastern Eisenbahn). A well illustrated description of the plant, with some switch and signal details. 2200 w. Glaser's Annalen—June 1, 1900.

## INTERNAL COMBUSTION ENGINE.

See GAS ENGINE; GASOLINE ENGINE; OIL ENGINE.

## INTERNATIONAL CONGRESS.

See ELECTRICAL CONGRESS; ENGINEERING CONGRESS; ENGINEERING SOCIETY; GAS CONGRESS.

## INTERPOLATION.

Formulae of Interpolation. Explains the Lagrange method of interpolation, as most generally applicable. 1400 w. Engng—March 26, 1897.

## INTERRUPTER.

See also CATHODE RAYS; ELECTRO-PHYSICS; RADIOGRAPHY; ROENTGEN RAYS.

A Current Interrupter (Stromunterbrecher). E. Grimsehl. An illustrated description of an interrupter consisting of a vibrating tongue, set in motion by compressed air, which makes and breaks contact with mercury. 700 w. Elektrotech Zeitschr—June 14, 1900.

A New Interrupter for Induction Coils. V. Cremieu. Note presented to the Académie des Sciences. Illustrated description of apparatus for overcoming the inconveniences arising from the induced electromotive forces, of opposite sign, not being equal in value. 500 w. Elec Rev, Lond—April 29, 1898.

An Improved Automatic Interrupter for Induction Coils. H. Lyman Sayen and Elmer G. Willyoung. Describes a new form of automatic interrupter, possessing many advantages over other forms. 1000 w. Jour Fr Inst—March, 1897.

An Improved Liquid Interrupter for Ruhmkorf Coils. A. A. Campbell Swinton. Description with illustration. 500 w. Elect'n, Lond—June 30, 1899.

Electrolytic Interrupters. Benj. F. Bailey. A study of direct current curves, giving interesting photographs of discharges, etc. 3300 w. Elec Wld & Engr—Aug. 11, 1900.

Rapid Interrupters for Induction Coils. C. Margot, in "La Nature." Illustrated description of two forms of interrupters. 1000 w. Sci Am Sup—July 2, 1898.

The Liquid Interrupter. A discussion of this instrument by Elihu Thomson, E. W. Caldwell, and others. 1800 w. Elec Rev, N. Y.—May 17, 1899.

**Caldwell.**—A Modification of the Wehnelt Interrupter (Ueber eine Abänderung des Wehnelt'schen Stromunterbrechers). H. T. Simon. A claim that the improved interrupter described by Caldwell had been previously invented by the writer. 2000 w. Elektrotech Zeitschr—June 22, 1899.

Some Experiments with the Caldwell Interrupter. Charles T. Child. Illustrated description, with suggested theory. Also brief note from Harris Goldstein. 1000 w. Elec Rec, N. Y.—May 10, 1899.

**Inductance.**—The Influence of Self-Induction Upon the Rate of the Wehnelt Interrupter (Ueber den Einfluss der Selbstinduktion auf die Unterbrechungszahl beim Wehneltschen Unterbrecher). Ernest Ruhmer. A discussion of the theory of Dr. Simon, and a comparison of the computed results with the writer's experiments. 2000 w. Elektrotech Zeitschr—Nov. 9, 1899.

**Irregularities.**—Irregularities in the Operation of the Recent Liquid Interrupters (Die Unregelmässigkeit der Unterbrechungen bei den Neueren Flüssigkeitsunterbrechern). Ernest Ruhmer. A mutoscopic investigation of the operation of Wehnelt and Simon interruptors, with illustrations and curves. 1800 w. Elektrotech Zeitschr—April 26, 1900.

**Measurements.**—See **ELECTRIC MEASUREMENT—Interrupter Circuits.**

**Mercury.**—Mercurial Interrupter for Powerful Induction Coils (Interrupteur à Mercure pour les Fortes Bobines de Ruhmkorff). M. Cornu. A note presented to the academy describing the new contact breaker of MM. Ducretet and Lejeune, by which violent sparking is avoided. 1000 w. Comptes Rendus—June 14, 1897.

Electrical Interrupters for High-Tension Transmission for Continuous Currents (Interrupteurs Electriques des Transformateurs à Haute Tension pour Courants Continus). O. Rochefort. Describing several forms of mercurial interrupters for use in connection with the transforming of continuous current. 2000 w. Soc Ing Civ de France—Dec., 1898.

Interrupting Devices for Induction Coils (Unterbrechungsvorrichtungen für Induktionsapparate). F. Dessauer. A general discussion of the subject, followed by a description of improved mechanically-operated mercury interrupters. 4000 w. Electrotech Zeitschr—March 23, 1899.

A New Type of Mercury Interrupter. Eugene W. Caldwell. Illustrated description. 700 w. Elec Rev, N. Y.—June 20, 1900.

A New Universal Mercurial Jet Interrupter (Ein Neuer Universal-Quecksilberstrahlunterbrecher). Dr. Max Levy. A toothed crown wheel is rapidly rotated by an electric motor, and a jet of mercury forced against the teeth. 2000 w. Elektrotech Zeitschr—Oct. 12, 1899.

**Number Recorder.**—Method of Determining the Number of Interruptions in Liquid Interrupters (Methoden zur Bestimmung der Unterbrechungszahlen von Flüssigkeitsunterbrechern). Ernst Ruhmer. The interruptions are recorded upon a revolving disk covered with lycopodium. 2000 w. Electrotech Zeitschr—Oct. 4, 1900.

**Parallel.**—Liquid Interrupters Connected in Parallel (Die Neuen Flüssigkeitsunterbrecher in Parallelschaltung). E. Ruhmer. Giving the results of experiments with Wehnelt interrupters. 2000 w. Elektrotech Zeitschr—Aug. 16, 1900.

**Pupin.**—See **ELECTRO-PHYSICS—String Alternator.**

**Röntgen Ray Work.**—Röntgen Ray Apparatus. The Current Interrupter. W. M. Stine. An examination of types of interrupters. 1200 w. Elec Eng—Nov. 11, 1896.

See also **ROENTGEN RAYS.**

**Spectroscopic Observations.**—Spectroscopic Observations with the Wehnelt Interrupter (Spektroskopische Beobachtungen am Wehnelt-Unterbrecher). Edm. Hoppe. A description of an apparatus for the steady observation of the spectra of metals and metallic salts in the Wehnelt spark. 1500 w. Elektrotech Zeitschr—June 21, 1900.

**Tesla.**—Mr. Tesla's Circuit Interrupters. An illustrated description of an extensive line of interrupters lately patented by Nikola Tesla for use in the production of high-frequency currents. 2800 w. Elec Wld—Aug. 20, 1898.

**Wave Currents.**—Concerning Wave Currents (Ueber Wellenströme). Dr. C. Heinke. A discussion of the "wave," or intermittent current in connection with experiments upon the Wehnelt interrupter. Two articles. 10000 w. Elektrotech Zeitschr—July 20, 27, 1899.

**Wehnelt.**—An Electrolytic Current Interrupter (Ein Elektrolytischer Stromunterbrecher). Dr. A. Wehnelt. An ingenious form of interrupter for use with induction coils; consisting of a lead plate and platinum wire as electrodes in dilute sulphuric acid. By the intermittent action the current is interrupted and restored in a very effective manner. 2000 w. Elektrotech Zeitschr—Jan. 26, 1899.

The Wehnelt Electrolytic Current Interrupter for Induction Coils. Dr. A. Wehnelt, in "Elektrotechnische Zeitschrift." Describes experiments giving results. Ill. 1200 w. Elec Eng, N. Y.—Feb. 16, 1899.

The Wehnelt Current-Interrupter (Der Elektrolytische Stromunterbrecher). Von Dr. A. Wehnelt. A description of the Wehnelt apparatus, especially in connection with the induction coil for the purpose of radiography. 2500 w. Elektrochem Zeitschr—July, 1899.

A Contribution to the Study of the Wehnelt Interrupter (Contribution à l'Etude de l'Interrupteur Wehnelt). H. Armagnat. An examination of the nature of the electrolytic action and the causes of the interruption and re-establishment of the circuit. 1000 w. Comptes Rendus—April 17, 1899.

Alternating Current Work with the Wehnelt Interrupter. Benjamin F. Bailey. Report of investigations made at the Univ. of Mich. 3300 w. Elec Wld & Engr—July 14, 1900.

The Wehnelt Electrolytic Current Interrupter. Elihu Thomson. Reports experiments made by the writer with this interrupter for use with induction coils and the remarkable results. Ill. 200 w. Elec Eng, N. Y.—March 2, 1899.

The Wehnelt Electrolytic Interrupter. Elihu Thomson. Observations recently made on this interrupter, the applications and methods of working. 1400 w. Elec Wld & Elec Eng—March 18, 1899.

A New Form of Wehnelt Interrupter. Elihu Thomson. Describes and illustrates a device embodying both anode and cathode, resembling somewhat a pencil. 800 w. Elec Wld & Elec Eng—May 6, 1899.

A Working Form of Wehnelt Interrupter. Weston A. Price. Illustrated description. 450 w. Elec Rev, N. Y.—April 11, 1900.

Comparison of Various Forms of Wehnelt Interrupter (Comparison de Diverses Formes de l'Interrupteur de Wehnelt). A. Turpain. A communication to the French Academy, giving quantitative measurements of the results, using two forms of Wehnelt interrupter, and one of Foucault's design. 1200 w. Comptes Rendus—Feb. 12, 1900.

Improvements in the Wehnelt Interrupter (Perfectionnements à l'Interrupteur Electrolytique de Wehnelt). J. Carpenter. A brief note to the French Academy describing the effects of operating the Wehnelt interrupter at elevated temperatures. 800 w. Comptes Rendus—April 17, 1899.

Experiments with the Wehnelt Interrupter. George T. Hanchett. An account of recent experiments and results obtained by the writer. 1400 w. Elec Wld & Elec Engr—April 8, 1899.

Observations on the Wehnelt Interrupter. George T. Hanchett and Charles T. Child. Describes experimental researches by the writers with the view of determining the best form to be given the interrupter and how it might best serve the purpose for which it was intended. States conclusions. Ill. 2000 w. Elec Wld & Elec Eng—March 25, 1899.

The Action of the Wehnelt Interrupter on Alternating Currents. George T. Hanchett. An explanation of effects observed while experimenting 1300 w. Elec Wld & Engr—June 16, 1900.

Some Conditions of Action of the Wehnelt Interrupter (Quelques Conditions de Fonctionnement de l'Interrupteur Electrolytique de M. Wehnelt). Paul Bary. A communication to the French Academy giving the results of a number of experiments. 1000 w. Comptes Rendus—April 10, 1899.

The Use of the Wehnelt Interrupter. Louis S. Levy. Gives results obtained in using the interrupter, stating the comparative effects of the Wehnelt interrupter and the ordinary form of vibrator. 800 w. Elec Wld & Elec Eng—March 25, 1899.

The Wehnelt Electrolytic Interrupter (Sur l'Interrupteur Electrolytique Wehnelt). A. Blondel. A note to the French Academy reviewing the author's experiments, and discussing the action of the device. 1000 w. Comptes Rendus—April 4, 1899.

The Theory of the Wehnelt Interrupter (Beitrag zur Theorie des Wehnelt'schen Unterbrechers). Ernst Ruhmer. Notes of experiments made by the writer, confirming the theory of the generation and condensation of gas at the point of interruption. 2500 w. Elektrotech Zeitschr—June 29, 1899.

The Wehnelt Electrolytic Interrupter. Ernest Merritt. A statement of some of the chief characteristics, with especial reference to its use. 1500 w. Sib Jour of Engng—June, 1899.

Wehnelt Interrupter Phenomena. Illustrates and describes experimental work conducted in the electrotherapeutic laboratory of the University of Michigan. 2300 w. Elec Wld & Elec Engr—July 29, 1899.

The Mechanism of the Wehnelt Interrupter. On the investigations by Voller and Walter explaining the various processes to which the action is due. 2400 w. Elec Rev, Lond—Oct. 20, 1899.

The Wehnelt Electrolytic Interrupter (Sur l'Interrupteur Electrolytique de Wehnelt). E. Rothé. A communication to the French Academy describing the behavior of the interrupter when, for a constant electromotive force, the external resistance is varied. 1200 w. Comptes Rendus—Oct. 30, 1899.

See also **Inductance; Irregularities; Spectroscopic Observations; Wave Currents.**

### INVENTION.

See also **ELECTRIC INVENTION; PATENT.**

Cultivation of the Inventive Capacity by the Solution of Constructive Problems. Leicester Allen. Presents problems and gives solutions. Ill. 2200 w. Am Mach—March 18, 1897.

Cultivation of the Inventive Faculty by the Solution of Constructive Problems. Leicester Allen. Presentation of two solutions of problem 8, with comments. 1100 w. Am Mach—May 13, 1897.

Forecasting the Progress of Invention. William Baxter, Jr. Discusses the lines along which development is expected, showing that the expectations in regard to some of them will never be accomplished, because they are impossible, and that others are not likely to be realized. 3500 w. Pop Sci M—July, 1897.

The Beneficent Inventor. An editorial on the progress due to the inventor, and the blessings conferred on humanity, and the essentials of success. 3000 w. Engng—Oct. 28, 1898.

The March of Invention. Editorial, the point of which is that inventions which much affect the progress of civilization, require a good deal of time before assuming such a commanding position as to divert the course of national or social life. 2800 w. Engng—April 10, 1896.

**Effect.**—The Effect of Inventions on the People's Life. Changes in the condition of the people resulting from inventions chiefly pertaining to the daily life, food, raiment, methods of working, books, newspapers, etc. 3500 w. Sci Am—July 25, 1896.

**Employer's Rights.**—Rights of Employers and Employés to Inventions of the Latter. D. Walter Brown. A statement of the principles that may be considered settled relating to this subject. 900 w. Am Mach—March 10, 1898.

The Right of Employers to the Inventions of Employees (Das Recht des Dienstherrn an Erfindungen von Angestellten). An examination of this important subject, with recommendations in connection with German patent law. 2500 w. Glaser's Annalen—Jan. 15, 1897.

**History.**—Contributions to the History of Inventions at the Commencement of the Nineteenth Century (Beiträge zur Geschichte der Erfindungen am Beginne des Neunzehnten Jahrhunderts). M. Geitel. A general review of the early inventive work in the present century, from the first German patent law of 1815. Two articles. 6000 w. Glaser's Annalen—Sept. 15, Oct. 1, 1899.

Notes on the History of Invention in the 17th and 18th Centuries (Beitrage zur Geschichte der Erfindungen im Siebenzehnten- und Achtzehnten Jahrhundert). An interesting contribution to the history of early patents in England and on the Continent. Serial. Glaser's Annalen—Oct. 15, 1897.

See also **Prize Essay.**

**Labor.**—See **LABOR—Invention.**

**Mechanical Progress.**—The Relations of Invention and Design to Mechanical Progress. C. L. Redfield. A comparative analysis of discovery, invention, design and manual skill and of the methods of fostering them. 2800 w. Eng Mag—Nov., 1896.

**Needed.**—Needed Inventions. Robert Grimshaw. The present article gives general remarks on the subject, and represents the need of a good accumulator or storage battery. Serial. Mod Mach—Feb., 1899.

**Patent Law.**—"Invention"—The Indefinable Requirement of the Patent Law. W. H. Smyth. The first part is an exceedingly able argument sustaining the thesis that the word "invention" as used in patent laws, is indefinable, that until recently it has been a dead letter, and that in its modern use it is a metaphysical myth. Serial. Min & Sci Pr—April 4, 1896.

What Is An Invention?" An able editorial criticism of a widely copied paper by W. H. Smyth, originally printed in the "Mining and Scientific Press," entitled "Invention: the Indefinable Requirement of the Patent Law." 1500 w. Eng, Lond—May 29, 1896.

The "Inventive" Faculty. W. H. Smyth. A reply to criticisms upon two articles, to wit: "Is the Inventive Faculty a Myth?" "Engineering Magazine," Aug., '95, and "Invention the Indefinable Requirement of the Patent Law," "Mining and Scientific Press," May 4th and 11th, '96. First part replies to a review, in the "Engineering Magazine," of the second article named. 1500 w. Min & Sci Pr—Aug. 1, 1896.

See also **PATENT.**

**Prize Essay.**—The Progress of Invention During the Past Fifty Years. Prize essay by "Beta" (Edward W. Byrn). A diagram showing ratio of increase of U. S. patents for each five years, and another, showing yearly increase or decrease, and the relation of increase or decrease with critical periods in the history of the country, are interesting features of this able essay. 2200 w. Sci Am—July 25, 1896.

$250 Prize Essay Composition. The Progress of Invention During the Past Fifty Years. Fourth Prize, won by (Semper Fidelis) Gardner D. Hiscox. An excellent historical review. 3200 w. Sci Am Sup—Aug. 15, 1896.

**United States.**—The March of Invention. Review of the last United States patent office report. 1800 w. Gunton's Mag—Oct., 1896.

### IODINE.

**Extraction.**—New Method of Extracting Iodine (Nouvelle Methode d'Extraction de l'Iode). This is a method of extracting iodine from the wet, unburned seaweed by treatment with a solution of caustic lime; the residue forms a very rich fertilizer. 2000 w. La Revue Technique—Feb. 10, 1897.

### IODOFORM.

**Electrolytic.**—The Electrolytic Production of Iodoform (Ueber die Elektrolytische Darstellung des Jodoforms). Giving details of researches into the conditions of current and temperature for the best results. 4500 w. Zeitschr für Elektrochemie—Aug. 20, 1897.

The Electrical Production of Iodoform (Ueber die Herstellung von Jodoform auf Elektrolytischem Wege). Foerster & Meves. Discussing the details of the method producing iodoform by electrolyzing an alcoholic solution of iodoform by potassium through which carbonic acid gas is passed. 3000 w. Zeitschr f Elektrochemie—Dec. 5, 1897.

### ION.

See **ELECTRO-CHEMISTRY.**

### IRON.

See also **BLAST FURNACE; CAST IRON; FOUNDRY IRON; METAL; METALLOGRAPHY; PIG IRON; STEEL; WROUGHT IRON.**

**Blue Heat.**—Blue Heat (Ueber Blauwärme). Investigating the behavior of iron at a blue heat under various tests. 7500 w. Glaser's Ann—Jan. 15, 1897.

**Carbide.**—Carbides of Iron. F. Lynwood Garrison A history of the efforts to explain the phenomena connected with the affinity of carbon for iron. 2500 w. Jour Fr Inst—Dec., 1895.

Preparation of Carbide of Iron by the Direct Union of the Metal and Carbon Préparation du Carbure de Fer par Union Directe du Métal et du Carbone). A communication by M. Moissan showing the conditions under which carbide of iron is produced in the electric furnace. 3000 w. Comptes Rendus—April 5, 1897.

**Carbon.**—Recent Investigations in Refining, and in the Modifications of Carbon by Heating (Neuere Arbeiten über Glühfrischen und die Veränderungen der Kohlenstoff-formen beim Glühen). Discussing the formation of carbon in iron, either as free graphitic carbon or as carbide of iron. 6000 w. Stahl und Eisen—Aug. 1, 1897.

Carbon in Iron. S. S. Knight. Comments on the slow progress in the chemical and scientific components of the iron industry. Considers the subject of carbon in its relation to iron, and gives the results of experiments. 1400 w. Foundry—Dec., 1896.

Relation of Carbon to Iron at High Temperatures. Results from experiments made in the metallurgical department of Mason College, Birmingham, as given in a paper by G. P. Royston, read before the British Iron and Steel Inst. 700 w. Am Mfr & Ir Wld—June 25, 1897.

See also **IRON ANALYSIS.**

**Carbon Diffusion.**—On the Rate of Diffusion of Carbon in Iron. Prof. Roberts-Austen. Abstract of paper read before the British Iron and Steel Inst. Facts of importance in relation to the question of the passage of sulphur and sulphides into the center of an ingot, especially the passage of solid carbon into solid iron. 2000 w. Ir & St Trs Jour—May 16, 1896.

**Carbonyl in Blast Furnaces.**—Iron Carbonyl in Blast Furnace. F. P. Venable. Some facts with regard to the possible part played by this compound in blast furnace processes. 900 w. Am Mfr & Wld—Oct. 28, 1898.

See **CAST IRON; FOUNDRY IRON; PIG IRON.**

**Changes of State.**—On the Changes of State in Iron and Steel. H. Le Chatelier, in "Comptes Rendus." A study of the transformations due to temperature changes. 800 w. Metalographist—Jan., 1900.

The Theory of the Iron-Carbon Alloys, According to Osmond and Roberts-Austen (Die Theorie der Eisen-Kohlenstofflegirungen nach Osmond und Roberts-Austen). E. Heyn. An illustrated review of the work of Osmond and Roberts-Austen and others on iron-carbon alloys. Cooling-off curves are given and points of recalescence shown. 5500 w. Stahl und Eisen—June 15, 1900.

The Changes of State of Iron and Steel (Sur les Changements d'Etat du Fer et de l'Acier). H. Le Chatelier. A communication to the French Academy giving the results of investigations into the phenomena of recalescence, and of magnetic and physical transformations. 1500 w. Comptes Rendus—July 31, 1899.

**Chilled.**—Chilled Iron and Chilling Iron. E. E. Putnam. Read before the convention of the American Foundrymen's Assn. Discusses the crystalline texture, chilled plows, the difficulties in making clean chilled work, etc. 4000 w. Tradesman—May 15, 1897.

Transverse Strength of Chilled Iron as Affected by the Relative Directions of Stress and Chill. Asa W. Whitney. Read at meeting of Foundrymen's Assn. Summary of tests, with comparison and explanation. 2000 w. Ir Tr Rev—Jan. 14, 1897.

See also **CAR WHEEL; ROLL.**

**Cooling.**—The Influence of Sudden Cooling on Nearly Pure Iron. J. O. Arnold. Criticises statements and experiments of H. Marion Howe, and report of experiments by the writer, with results. 1800 w. Engng—July 9, 1897.

The Influence of Sudden Cooling on Nearly Pure Iron. Albert Sauveur. A reply to paper by J. O. Arnold on the same subject. 1000 w. Eng & Min Jour—Oct. 23, 1897.

**Critical Ranges.**—The Critical Ranges in Iron and Steel. H. M. Howe. A discussion of points in Mr. Osmond's discussion, with three amendments. 1300 w. Metallographist—Oct., 1899.

**Crystalline Structure.**—The Crystalline Structure of Iron and Steel. John E. Stead. A résumé of the more practical points of a paper presented at the meeting of the Iron and Steel Inst., London. 3000 w. Ir & St Trds Jour—May 14, 1898.

See also **METALLOGRAPHY.**

**Crystallization.**—Crystallization in Iron and Steel. H. F. J. Porter. Considers the processes under which wrought iron and steel are manufactured, as explained by noted writers, with the view of showing that crystallization is not the cause of failures in service. 3000 w. Sta Eng—March, 1897.

**Diffusion of Elements.**—See **METALLOGRAPHY.**

**Egyptian.**—The Iron of Ancient Egypt. Proves that, contrary to general opinion, the ancient Egyptians were not unskillful iron workers. Illustrations of implements and weapons, now known to have been used by them, are given to substantiate this allegation. 1300 w. Ind & Ir—Dec. 13, 1895.

**Elasticity.**—Experiments Upon the Difference in Elasticity of Chilled Iron and Ordinary Cast Iron (Untersuchungen über den Unterschield der Elastizität von Hartguss und von Gusseisen Gewöhnlicher Härte). C. Bach. Discussing particularly the behavior of irons of different hardnesses when used as the runway for ball-bearings under heavy pressure. 7500 w. Zeitschr d Ver Deutscher Ing—July 22, 1899.

See also **ELASTICITY.**

**Expansion at High Temperatures.**—The Expansion of Iron and Steel at High Temperatures (Sur la Dilatation du Fer et des Aciers aux Températures Elevées). H. Le Chatelier. A communication to the French Academy showing the relation between the expansion and the molecular transformation of iron and steel. 1200 w. Comptes Rendus—Aug. 7, 1899.

**Gun.**—Iron and Steel for Ordnance. Facts taken from a paper read some years ago by Capt. Scott, before the Royal United Service Institution. Ill. 3600 w. Sci Am Sup—June 26, 1897.

Making of Gun Iron and Semi-Steel. Titus Ulke. Gives results of recent practice in the foundries of the United States. 3000 w. Ir Trd Rev—Dec. 1, 1898.

**Low Temperatures.**—Investigations on the Influence of Low Temperatures on Iron and Steel. M. Rudeloff. Extract from "Mittheilungen aus den Koeniglichen Technischen Versuchanstalten zu Berlin." The author gives the results of previous tests and also those recently conducted at the Imperial Navy Yard at Wilhelmshafen. 1500 w. Mech Wld, Lond—March 20, 1896.

**Malleable.**—See **MALLEABLE IRON.**

**Metallography.**—See **METALLOGRAPHY.**

**Meteoric.**—See **METEORIC IRON.**

**Ordnance.**—See **Gun.**

**Ornamental.**—See **IRONWORK.**

**Overstrain.**—On the Recovery of Iron from Overstrain. James Muir. Such recovery is known to be affected by time; and a summary of experiments is given showing the effect of moderate temperature, mechanical vibration, and magnetic agitation, giving compression tests illustrating the recovery. 1800 w. Engr, Lond—April 28, 1899.

**Passive.**—Passive Iron. James S. de Benneville. Read before the Iron and Steel Inst., Cardiff. It is proposed to follow the history of this question as developed in the researches of successive investigators; to try and trace the connection as showing progress of the central idea; and to consider the condition of the reagent in which passivity was secured. Part first is largely historical. Serial. Ind & Ir—Aug. 6, 1897.

**Phenomena.**—Some Phenomena Presented by Iron (Sur quelques Phénomènes que présente le Fer). M. Galy-Aché. An examination of phenomena relating to allotropic forms of iron, including behavior under high pressures and under rapid cooling. 1200 w. Comptes Rendus—Dec. 26, 1899.

**Pure.**—The Preparation of Chemically Pure Iron. W. A. McGillivray. From Journal of West of Scotland Iron and Steel Inst. Investigation carried out on the suggestion and under the supervision of the late Prof. William Dittmar. 3000 w. Ind & Ir—July 24, 1896.

**Recalescence.**—See **Changes of State.**

**Riddles.**—Riddles Wrought in Iron and Steel. Paul Kreuspointner. Considers some of the puzzling problems encountered, and the manifestations which are apparently the source of many of them. Discussion. Ill. 11400 w. Jour Fr Inst—May, 1900.

**Silicide.**—See **SILICON—Iron.**

**Solution Theory.**—Contributions to the Solution Theory of Iron and Steel (Beiträge zur Lösungstheorie von Eisen und Stahl). Baron Jüptner von

Jonstorff. A further contribution to the physical chemistry of steel and iron, with numerous examples in support of the solution theory. 2000 w. Stahl und Eisen—Sept. 1, 1900.

Notes on the Solution Theory for Iron and Steel (Beiträge sur Lösungstheorie von Eisen und Stahl. Baron Jüptner von Jonstorff. A very full discussion by this eminent authority, of the Theory of the solution of carbon in iron; with diagrams and curves, plotted from the researches of the author and of Eggerts and Howe. Four articles. 1 plate. Oesterr Zeitschr f Burg u Hüttenwesen—Jan. 13, 20, 27, Feb. 3, 1900.

The Solution Theory of Iron and Steel. Baron Jüptner von Jornstorff. Read before the Iron & Steel Inst., at Stockholm. The paper is a continuation of the writer's researches on the application of the laws of solution to the case of iron and steel. 2500 w. Ir & St Trds Jour—Sept. 10, 1898.

The Present Position of the Solution Theory of Carburised Iron. A. Stansfield. Abstract of paper read before the Iron and Steel Inst. Reviews the experimental evidence bearing upon this subject, and gives results of the writer's experiments. Ill. 1700 w. Ir & Coal Trds Rev—Sept. 28, 1900.

The Present Position of the Solution Theory of Carburised Iron. A. Stansfield. Read before the British Iron and Steel Inst. An explanation of the main features of this theory and its relation to the allotropic changes. 3800 w. Ir & St Trds Jour—Sept. 9, 1899.

See also IRON ANALYSIS—Carbon; METALLOGRAPHY; STEEL.

**Specifications.**—See STEEL SPECIFICATIONS.

**Stress Effect.**—The Effect of Alternate Positive and Negative Stresses on Iron and Steel. Thomas Gray. Experiments made on test pieces of cast-iron, wrought-iron, and mild steel, the results of which are given with autographic diagrams. 1800 w. Trans Am Soc of Mech Engs, Vol. XVIII.—May, 1897.

**Structure.**—See also Crystalline Structure; METALLOGRAPHY; STEEL.

**Swedish.**—Strength Tests of Swedish Iron and Steel. Interesting tests published by the "Järnkontoret," giving tables howing the percentages of carbon which have been proved suitable for various applications, and other information. 900 w. Engng—April 19, 1898.

**Temperature Effect.**—Effect of Temperature on Strength of Wrought Iron and Steel. R. C. Carpenter. An investigation conducted in the testing laboratory of Sibley College. Results tabulated. 800 w. Trans Am Soc of Mech Engs—Dec., 1895.

See also Blue Heat.

**Testing.**—See MATERIALS' STRENGTH; TESTING; STEEL.

**Theories and Facts.**—Theories and Facts Relating to Cast-Iron and Steel. Bertrand S. Summers. Abstract of a paper read before the British Iron and Steel Inst. Discusses the physics of cast-iron and steel, and the possibly important action of Prof. Ledebur's graphitic temper-carbon. 3200 w. Ir & Coal Trds Rev—May 12, 1899.

**Thermo-Chemistry.**—A Preliminary Thermo-Chemical Study of Iron and Steel. E. D. Campbell and Firman Thompson. A paper presented to the American Chemical Society. Describes work undertaken to determine whether carbon alone was responsible for the variations in the heat of solution of steel subjected to different heat treatments. 3300 w. Ind & Ir—Oct. 1, 1897.

**Thin Sheets.**—To Distinguish Iron From Steel When in Thin Sheets. Gus C. Henning. Ten tests are given, in response to an inquiry. 1600 w. Am Mach—March 24, 1898.

**Wrought.**—See WROUGHT IRON.

## IRON ALLOYS.

A Study of Some Alloys with Iron Carbides. Mainly Manganese and Tungsten. J. S. de Benneville. Paper read before the Iron and Steel Inst. Gives results of experiments upon the structure of iron alloys by a purely analytical method. Serial. Ir & Coal Trds Rev—Aug. 14, 1896.

**Copper.**—The Influence of Copper on Iron (Der Einfluss des Kupfers auf Eisen). W. Lipin. An account of the mechanical influence of a copper alloy in iron and steel, with the results of tests. Tables and illustrations. Serial. 2 parts. 5000 w. Stahl und Eisen—May 15, June 1, 1900.

**Nickel.**—See NICKEL IRON.

**Silicon.**—See also CAST IRON; IRON MANUFACTURE; SILICON.

**Silicon and Chromium.**—The Conditions in Which Silicon and Chromium are Found in Siderurgical Products (Recherches sur l'Etat où se Trouvent le Silicium et le Chrome dans les Produits Sidèrurgiques). MM. Carnot and Goutal. An examination of the manner in which silicon and chromium are combined with iron and carbon as a result of smelting operations. 2500 w. Comptes Rendus—May 2, 1898.

## IRON ANALYSIS.

See also CAST IRON—Physics; FOUNDRY IRON; IRON ORE ANALYSIS; PIG IRON—Grading; STEEL ANALYSIS.

Analysis of Pig Irons Used for Different Purposes. Discussion on "Physics of Cast Iron" before the A. I. M. E. The composition is given for five uses to which foundry iron is put. 700 w. Eng News—March 26, 1896.

Pig Iron Analysis. Edmund E. Johnston. A comparative statement of results obtained by different chemists from the same piece of pig iron. 3000 w. Ir Age—May 18, 1899.

Review of the Present Status of Iron Analyses. Gus C. Henning. Lecture delivered before the American Chemical Society, New York. 3800 w. Stevens Ind—April, 1896.

Some Present Possibilities in the Anaylsis of Iron and Steel. C. B. Dudley. Presidential addressed at meeting of Am. Chem. Soc. Surveys of some of the analytical methods in use in the iron and steel industry. Only five of the constituents affecting the quality are here considered, viz.: Carbon, phosporus, silicon, sulphur and manganese. 6500 w. Science—Feb. 12, 1897.

**Books.**—Best Books for an Iron and Steel Works Chemist. Albert Ladd Colby. Calling the attention of chemists to the best English and American books in the various branches of his analytical work and warning him against the poor ones. Serial. Ir Age—June 15, 1899.

**Carbon.**—Carbon Determinations in Pig Iron. Bertrand S. Summers. Illustrated description of apparatus by which the carbon may be determined with reasonable speed and accuracy. 900 w. Jour Am Chem Soc—Dec., 1896.

The Determination of Carbon as Hardening and as Carbide (Bestimmung von Härtungs und Carbidkohle). A discussion by Jüptner von Jonstorff, of the various forms of combined carbon, and its influence on iron and steel. 7000 w. Stahl und Eisen—July 15, 1897.

**Carbon Combustions.**—Carbon Combustions in a Platinum Crucible. P. W. Shiner. Illustrates and describes an apparatus devised by the writer, using a platinum crucible, with a water-cooled stooper, in place of the porcelain or platinum tube; an ordinary blast-lamp and Bunsen burner in place of the combustion furnace; and air instead of oxygen. Serial. Am Mfr & Ir Wld—Aug. 17, 1899.

**Carnegie Co.**—Analytical Methods at Duquesne. J. M. Camp. The determination of manganese by color test, of sulphur by the aqua regia or iodine method, and carbon by the method of combustion. Ill. 1600 w. Ir Age—Nov. 28, 1895.

Methods in Use for the Analysis of Ores, Pig Iron and Steel by the Carnegie Steel Co. John S. Unger. Report in response to a request from the Chemical Section of the Engineers' Society of Western Pennsylvania asking for the co-operation of chemists in an effort to collect for publication the methods in general use for the analysis of ores, pig iron and steel. 4000 w. Eng News—July 9, 1896.

**Electrolytic.**—See ELECTROLYSIS.

**Gas Volumetric.**—The Gas Volumetric Determination of Carbon in Iron and Steel (Zur Gasvolumetrischen Bestimmung des Kohlenstoffes in Eisen und Stahl). Describing an improved apparatus used in the laboratory of the Technical High School at Brünn. 1 Plate. 2500 w. Oesterr Zeitschr f Berg u Hüsenwesen—May 22, 1897.

**Phosphorus.**—An Iodometric Method for the Determination of Phosphorus in Iron. Charlotte Fairbanks. Describes experiments and gives table showing satisfactory results. 1500 w. Am Jour of Sci—Sept., 1896.

Iron and Phosphorus. J. E. Stead. Read before the Iron & Steel Inst. An account of researches and report of results of much interest. Serial. Engng—Oct. 19, 1900.

The Determination of Phosphorus in Iron and

Steel (Die Phosphor Bestimmung in Stahl und Eisen). A discussion by Herr Leopold Schneider, of the molybdate method of determining phosphorus and of the requisite conditions for obtaining reliable results. Two articles. 6000 w. Oesterr Zeitschr f Berg-u-Hüttenwesen—June 12, 19, 1897.

The Influence of Phosphorus on Cold Short Iron (Der Einfluss des Phosphors auf Kaltbruch). A valuable paper by von Jüptner, giving analyses and tests, and discussing the various forms in which phosphorus appears in combination. 5000 w. Stahl und Eisen—July 1, 1897.

The Rapid Determination of Phosphorus (Schnelle Phosphorbestimmung). A brief account of an improved method of determining the percentage of phosphorus in iron by the magnesia process, as used by M. Wdowiszewski, chemist of the Kulebaki iron works. Four hours' time is sufficient, instead of 1 to 3 days, as formerly. 1500 w. Stahl und Eisen—Oct. 1, 1897.

**Silicon.**—The Analysis of Ferro-Silicon and Silico-Spiegel. George T. Dougherty. Directions for the determination of silicon, manganese, sulphur, phosphorus, iron and carbon. 1200 w. Ir Age—March 18, 1897.

**Slag.**—The Determination of Slag in Iron and Steel (Die Bestimmung der Schlacke im Eisen und Stahl). Leopold Schneider. A description of methods of analysis. Serial. 2 parts. 3500 w. Oest Zeitschr f Berg u Hüttenwesen—May 19, 26, 1900.

**Standard.**—The Introduction of Standard Methods of Analysis. Baron Hanns Jüptner von Jonstorff. Abstract read before the British Iron and Steel Inst. A discussion of the subject, its difficulties and the important questions to be considered. A valuable paper of special interest to chemists in iron and steel works. It was followed by a discussion. 5800 w. Ir & St Trds Jour—May 16, 1896.

**Sulphur.**—An Enquiry into the Present Methods of Estimating Sulphur in Iron and Steel. F. A. Matthewman. Thirty chemists having made analyses of the same sample and not agreeing, the author attempts to point out where the cause for the variation lies. The results vary from 0.016 to 0.076 per cent. for pig iron sample. Serial. Ir & Coal Trds Rev—Nov. 29, 1895.

New Method for Determining the Amount of Sulphur Contained in Iron (Eine neue Methode zur Bestimmung des Schwefels im Eisen). Wilh Schulte. Description of new chemical compounds used for this purpose. 4300 w. Stahl und Eisen—Nov. 1, 1896.

Note "On the Causes of the Loss of Sulphur in Estimating it by Evolution Methods in Iron and Steel." E. S. Rhead. From the "Journal of the West of Scotland Iron and Steel Institute." A corroboration of the results arrived at by Mr. F. C. Phillips. 700 w. Ind & Ir—Aug. 21, 1896.

Sulphur in Iron. S. S. Knight. Some remarks on the harmful results of too large quantities of sulphur. 1200 w. Foundry—Jan., 1897.

The Determination of Sulphur in Iron (Bestimmung des Schwefels im Eisen). A discussion of Campredon's method by Herr W. Schulte, with illustrations of apparatus. 5000 w. Stahl und Eisen—June 15, 1897.

The Determination of Sulphur in Cast Iron. Francis C. Phillips. Investigation to ascertain as far as possible whether by a process of direct oxidation of the iron in a dry state a larger proportion of the sulphur could be recovered in weighable form than by the usual method of oxidation and solution in nitric acid. 2200 w. Jour Am Chem Soc—Dec., 1896.

The Occurrence of Sulphur in Iron. Its Introduction and Removal. E. L. Rhead. Read before the West of Scotland Iron and Steel Inst. The paper proposes to deal mainly with a mass of evidence accumulated by many workers, and as far as possible reduce it to order. Serial. Am Mfr & Ir Wld—April 2, 1897.

**Tri-Axial Diagrams.**—See **GRAPHICS.**

## IRON BARRELS.

How May Iron Barrels Be Satisfactorily Constructed to Avoid Accidents? (Wie Werden Zweckmässig Schmiedeiserne Transportfässer Hergestellt um Unfalle zu Verhüten?) H. Claussen. Showing that the use of electric welding for the joints of wrought iron barrels does not offer a sufficient strength, unless reinforced by riveting. 1800 w. Glaser's Annalen—Jan. 15, 1900.

## IRON CASTING.

See **CASTING.**

## IRON CORROSION.

See **METAL CORROSION; METAL PROTECTION.**

## IRON EXHIBITION.

**Paris.**—British Iron Trade Association. Report of the Secretary on Iron and Steel at the Paris Exhibition. A full report on the metallurgical and kindred exhibits at the Paris Exposition. Serial. Ir & Coal Trds Rev—Sept. 14, 1900.

Iron and Steel at the Mineral Exhibition, Paris, 1900. H. Bauerman. A paper prepared as a guide to members of the Iron & Steel Inst. visiting the exhibition. Serial. Engr, Lond—Oct. 12, 1900.

Iron and Steel at the Paris Exhibition. Reviews the exhibits of the various countries. Ill. 82000 w. Ir & Canal Trds Rev—Aug. 10, 1900.

See also **METALLURGICAL EXHIBITION; MINING AND METALLURGY.**

**Stockholm.**—The Stockholm Exposition and the Iron and Steel Trade of Sweden. James Douglas. Abstract of paper read at the Atlantic City meeting of Am. Inst. of Min. Engs. Describes the interesting exhibits of the iron and steel industries. 1500 w. Eng & Min Jour—Feb. 19, 1898.

See also **MINING AND METALLURGY.**

**Sweden at Paris.**—Sweden's Exhibit of Iron Manufactures at Paris (Die Pariser Weltausstellung. V. Schwedens Eisenindustrie-Austellung). A general account of the Swedish iron mining and metallurgical exhibit. 1000 w. Stahl und Eisen—June 15, 1900.

## IRON GEOLOGY.

See also **GEOLOGY; IRON MINE; IRON ORE; IRON REGION; MINERAL REGION.**

**Alabama Hematite.**—The Hematites of Alabama Geologically Considered. Henry McCalley. The more important ones are of Silurian formation; they are described, with statement of the advantages which have led to their remarkable development. An approximate general section of East Red Mountain, between Birmingham and Bessemer, is given. 2000 w. Eng & Min Jour—Jan. 9, 1897.

**Alabama Limonite.**—The Limonites of Alabama Geologically Considered. Henry McCalley. Description of deposits and their location. 1500 w. Eng & Min Jour—Dec. 19, 1896.

**Clealum, Washington.**—The Clealum Iron Ores, Washington. George O. Smith and Bailey Willis. Gives the general features, geology, and hypothesis concerning the origin, with short discussion. Map. 8300 w. Trans Am Inst of Min Engs—Aug., 1900.

**Georgia.**—Geological Relations of the Iron Ores in the Cartersville District, Georgia. C. Willard Hayes. Illustrates and describes the stratigraphy and structure of this region and the ore deposits. 6000 w. Trans Am Inst of Min Engs—Feb., 1900.

**Gogebic Range.**—Some Dike Features of the Gogebic Iron Range. C. M. Boss. A short description of the characteristics and peculiarities of the principal dikes which have been exposed in this range. 3300 w. Trans Am Inst of Min Engs—Sept., 1897.

**Lorraine.**—The Iron Ore Deposits of German Lorraine (Die Minetteablagerung Deutsch-Lothringens). W. Albrecht. With geological maps and sections of the workings. Two articles, two plates. 7500 w. Stahl und Eisen—April 1, 15, 1899.

The Oolitic Formation of German Lorraine (Die Minettenformation Deutsch-Lothringens). Dr. W. Kohlmann. A general account of the geology of the region, with fine geological map, sections and borings. 7500 w. 3 plates. Stahl und Eisen—July 1, 1898.

The Outcrop of the Oolitic Iron Ore in the Southern Part of German Lorraine (Das Vorkommen des Oolithischen Eisenerzes im Südlichen Theile Deutsch-Lothringens). Fr. Greven. A geological description, with large colored map and sections of the locality. 6000 w. 2 plates. Stahl und Eisen—Jan. 1, 1898.

See also **IRON REGION—Minette District, Europe.**

**Magnetic, Ontario.**—Investigation of Magnetic Iron Ores from Eastern Ontario. Frederick J. Pope. Considers some of the relations existing between the geological associations and elementary constituents of their iron-ore bodies. 11800 w. Trans Am Inst of Min Engs—Oct., 1899.

**Magnetite, Port Henry, N. Y.**—The Geology of the

Magnetites near Port Henry, N. Y., and Especially Those of Mineville. J. F. Kemp. Notes from special study of this region by the writer, containing valuable data. Ill. 15400 w. Trans Am Inst of Min Engs—March, 1897.

**Mesaba, Minn.**—Sketch of the Geology of the Eastern End of the Mesaba Iron Range in Minnesota. U. S. Grant. Information of the physical features, geology, iron ore, etc. Map. 4200 w. Year Bk of Soc of Engs, Univ of Minn—1898.

**Minnesota.**—The Geological Structure of the Western Part of the Vermilion Range, Minnesota. Henry Lloyd Smyth and L. Ralph Finlay. A valuable contribution on the origin and associations of the rocks in this iron ore locality. 18000 w. Trans Am Inst of Min Engs—Nov., 1895.

**North Carolina.**—On the Magnetite Belt at Cranberry, North Carolina, and Notes on the Genesis of this Iron Ore in General in Crystalline Schists. James P. Kimball. Describes topography, formation and developments; gives analyses and interesting particulars. 4300 w. Am Geol—Nov., 1897.

## IRON INDUSTRY.

See also **COAL INDUSTRY; IRON EXHIBITION; IRON MANUFACTURE; IRON MINE; IRON MINING; IRON REGION; IRON WORKS; MINERAL INDUSTRY; MINING AND METALLURGY; PIG IRON; STEEL INDUSTRY.**

Progress of the Iron Trade in the Three Leading Countries of the World. Statistics of the production of pig iron in the United States, Great Britain and Germany. 1400 w. Eng News—July 29, 1897.

The Cost and the Conditions of Producing Iron and Steel in Different Countries. Part first deals with the manufacture of pig iron in Great Britain. It is proposed to show in this series of articles the true economic circumstances in which Great Britain stands. Serial. Ir & Coal Trds Rev—April 1, 1898.

**Address.**—Presidential Address of Edward P. Martin, at Annual Meeting of Iron and Steel Institute, London. Interesting retrospect concerning the early history of the Bessemer process, a broad general survey of the present condition of the iron-making industry, with particular notice of the enormous advance in blast-furnace practice, etc. 4500 w. Col Guard—May 14, 1897.

Presidential Address of F. W. Paul at the Glasgow meeting of the West of Scotland Iron and Steel Institute. Deals with blast-furnaces and by-products, open-hearth steel, melting furnaces, Bertrand-Thiel process, Stockman process, etc. Serial. Ir & Coal Trds Rev—Oct. 29, 1897.

**Africa, West.**—The Native Iron Industry in German West Africa. F. Hupfeld, in "Stahl und Eisen." Describes the manner of working, the location of deposits, etc. 1300 w. Col Guard—March 30, 1900.

**Alabama.**—A Great Outlook for Birmingham. James Bowron. Full text of address at the Cincinnati meeting of the Am. Foundrymen's Assn. A statement of the conditions which have helped to advance the iron and steel industries at this place, the importance of the coal deposits, etc. 4000 w. Ir Trd Rev—Sept. 22, 1898.

Iron Making in Alabama. William B. Phillips. Extract from the 1896 report of the Alabama Geological Survey. Historical review of the past 25 years. 1800 w. Am Mfr & Ir Wld—Aug. 14, 1896.

The Iron Industry of Birmingham and Bessemer, U. S. A. Jeremiah Head. The facts and opinions of the writer, as presented, are the result of two visits to Alabama, and of information since obtained. 4200 w. Ir & Coal Trds Rev—May 15, 1896.

See also **U. S. Southern; COAL INDUSTRY.**

**America.**—See also **United States.**

**American Competition.**—American Competition and the Question of Transport (Der Amerikanische Wettbewerb und die Frachtenfrage). E. Schrödter. A paper before the convention of the Verein Deutscher Eisenhüttenleute, showing the important relation which the cost of transport bears to the successful meeting of American competition in the iron trade. 7500 w. Stahl und Eisen—March 15, 1898.

American Competition in the World's Iron Trade. Richard Moldenke. Condensed translation of address of E. Schrödter, discussing the growth of the American iron production and the invasion of foreign markets, with brief comments. 2700 w. Ir Trd Rev—Jan. 6, 1898.

Trade Following Pig Iron. William C. Dreher. Comments on the German fear of American competition, with report of the pig iron prices and related matters. 1500 w. Mfrs Rec—Dec. 16, 1898.

See also **Pittsburg in England; Supremacy; United States Supremacy; ENGINEERING COMPETITION.**

**American in Brazil.**—American Trade with Brazil. Reviews the iron and steel trade with this country, explaining the falling off in the 1897 trade, and giving some information concerning trade opportunities. 1800 w. Am Mfr & Ir Wld—Sept. 30, 1898.

**American in China.**—United States' Trade with China in Iron and Steel. Indications of soon becoming a large market for these products. 1500 w. Am Mfr & Ir Wld—Jan. 13, 1899.

**American in Denmark.**—Trade with Denmark. Hints on the requirements of the Danish market in iron and steel manufactures and urging the increase of the United States trade. 1800 w. Am Mfr & Ir Wld—Oct. 14, 1898.

**American in England.**—United States Iron and Tools in England. Information of interest and importance concerning trade in these products. 5200 w. U S Cons Repts, Vol. LIX—Feb., 1899.

**American in Great Britain.**—Great Britain's Need of American Iron. From the "London Statist." Gives the comparative outputs of the United Kingdom, United States and Germany for each of the last seven years, and discusses the changed conditions of the iron market. 700 w. Ir Trd Rev—March 31, 1898.

**American in India.**—American Trade in British India. Prepared by the Philadelphia Commercial Museum. Hints helpful to the export trade, with brief criticism of American methods, and information concerning iron and steel made goods. 2500 w. Am Mfr & Ir Wld—Sept. 2, 1898.

**American in Ireland.**—The American Iron Trade in Ireland. Willard S. Mattox. Information relating to the trade in Belfast. 1500 w. Ir Age—Dec. 1, 1898.

**American in Netherlands.**—United States Trade in Iron and Steel with the Netherlands. Report of the trade based on Dutch statistics. 1600 w. Am Mfr & Ir Wld—Nov. 25, 1898.

**American vs. British.**—Iron and Steel—British and American. Editorial comment on the particulars of the iron industry in the United States as compiled by J. M. Swank, making comparison with Great Britain. 3200 w. Engng—March 16, 1900.

The American Iron and Steel Industries. A Comparison. Walter Dixon. Read before the West of Scotland Iron & Steel Inst. Impressions of an Englishman on visiting American works. Considers the management, labor, resources, and part played by electricity, with conclusions. 4000 w. Col Guard—April 21, 1899.

**American vs. British Methods.**—See **ENGINEERING—English vs. American Methods.**

**American vs. German.**—American Competition in the German Iron Market. Jacob Muench. An account of the German iron industry and a discussion of the possibilities of foreign competition. Serial. Ir Trd Rev—Feb. 2, 1899.

The Competition of the American Iron Industry (Der Wettbewerb der Amerikanischen Eisenindustrie). An address by Herr Schrödter discussing the growth of the American iron production and the invasion of German foreign and home markets. 5000 w. Stahl und Eisen—Nov. 15, 1897.

**Australia.**—Australian Market for American Iron and Steel. Some information showing that it would be of advantage to American manufacturers to extend the lines of goods in this market. 1700 w. Am Mfr & Ir Wld—Aug. 19, 1898.

**Austria.**—The Development of the Austrian Iron Industry During the Past 50 Years (Entwicklung der Oesterreichischen Eisenindustrie in den Letzten 50 Jahren). A review presented at the semi-centennial celebration of the Austrian Society of Engineers and Architects. 3000 w. Stahl und Eisen—July 15, 1899.

**Austria-Hungary.**—The Iron Industry of Austria-Hungary. From a British Foreign Office Report, describing the mines, charcoal furnaces, and iron works in Styria and Betler. 1200 w. Col Guard—Feb. 7, 1896.

**Belgium.**—Coal and Iron in Belgium (Kohle und

Eisen in Belgien). A statistical and comparative view of the Belgian coal and iron industry from 1870 to 1895. 6000 w. Stahl und Eisen—Nov. 15, 1897.

The Iron Industry in Belgium. M. Emile Harsie, in the "Annales des Mines de Belgique." Gives information on iron mining, iron smelting, finished iron making, steel production, steam engines and boilers, and coal consumption in mining and metallurgy. 1000 w. Col Guard—March 5, 1897.

See also **Germany and Belgium.**

**Boom of 1879-80.**—The Iron and Steel Boom of 1879 and 1880. A complete history of the celebrated boom from the annual report of James M. Swank, Secretary of the Iron and Steel Assn., dater May 20, 1880. 1500 w. Bull of Am Ir & St Assn—Sept. 10, 1897.

**British.**—A Review of the Iron Trade; Its Condition and Prospects. Charles Lancaster. Address before the Liverpool Chamber of Commerce. Considers the conditions in Great Britain. 1200 w. Col Guard—May 26, 1899.

Glimpses of the British Iron Industry. An interesting review. Serial. Ir Age—Aug. 9, 1900.

Iron and Steel Prospects. An editorial discussing the situation in the British iron and steel trade, as affected by American and German competition, with diagrams. 1800 w. Engng—Sept. 7, 1900.

Shipping Freights and Conferences as Affecting the Iron and Steel Trades. J. Stephen Jeans. Read before the British Iron Trade Assn. A statement of the conditions which seem to be greatly affecting the position and prospects of British trade. 4500 w. Ir & Coal Trds Rev—June 3, 1898.

The English Iron Market. Willard S. Mattox. On the standing of American iron in England, the reasons why orders cannot now be filled. Also reports of the English iron districts, and observations on the shipping. 1600 w. Ir Age—Feb. 16, 1899.

The Iron Industry of the United Kingdom. Leonard H. Courtney. The second part of a presidential address on "Jevons' Coal Question: Thirty Years After," delivered before the Royal Statistical Society. 2300 w. Col Guard—Dec. 24, 1897.

The Recovery of Our Industrial Supremacy in the Trade of Iron Making. B. H. Thwaite. Showing that the natural advantages of England in this field are unrivalled, and examining the causes for alarm and for inability to compete with other countries. The cost of carriage, and the difficulties with British workmen are considered of greatest importance. 1800 w. Ir & Coal Trds Rev—May 15, 1896.

See also **American vs. British; Production, United Kingdom; PIG IRON.**

**British, 1850.**—The Iron Trade of Great Britain Half-a-Century Ago. From Vol. 109 "Quarterly Review." Historical review of the iron trade, tracing the progress and causes that have influenced it. 2500 w. Ir & Coal Trds Rev—May 1, 1896.

**British, 1895.**—Iron Ore Mining and Pig Iron Production. From the "Mineral Statistics of the United Kingdom" for 1895. A general summary of the production during 1895 and the quantity and value of pig iron. 1400 w. Col Guard—Oct. 16, 1896.

**British, 1896.**—The Iron and Steel Trades in 1896. Yearly review of these industries in the United Kingdom show advances both absolute and relative. 3000 w. Ir & Coal Trds Rev—Dec. 24, 1896.

**British, 1897.**—The British Iron and Steel Industries in 1897. General review of the condition of these industries, giving the furnaces in blast, exports, wages, etc. 3000 w. Ir & Coal Trds Rev—Dec. 17, 1897.

**British, 1898.**—The Iron and Steel Trades in the United Kingdom in 1898. General review of the conditions, output, rates, charges and imports. 10000 w. Ir & Coal Trds Rev—Dec. 30, 1898.

**British, 1899.**—Our Review of the Iron and Steel Trades in 1899. A review of British imports and exports, and report dividends paid. 4400 w. Ir & Coal Trds Rev—Dec. 29, 1899.

The Iron Trade Situation in Great Britain. J. S. Jeans. Comments on the statistics of the British Iron Trade Assn., for the first six months of 1899. 1700 w. Ir Age—Sept. 21, 1899.

**British Exports.**—Twenty-Five Years of Iron and Steel Exports to Our Colonies. Deals with the exports of the United Kingdom to various parts of the Empire of hardware and cutlery, iron (wrought and unwrought), machinery and millwork. 2800 w. Col Guard—Nov. 25, 1898.

See also **COAL INDUSTRY.**

**British Foreign.**—Our Foreign Trade in Iron and Steel. Editorial on British imports and exports of iron and steel for the first eight months of 1899 and 1900. 900 w. Ir & Coal Trds Rev—Sept. 14, 1900.

What Is the Competitive Outlook in the World's Iron and Steel Trades? or, more particularly, What is the Outlook for the British Iron Trade? H. J. Skelton. Read before the British Iron Trade Assn. Discussion of subject. 7200 w. Ir & Coal Trds Rev—June 15, 1900.

**British History.**—The Iron Industry of Great Britain Sixty Years Ago. Interesting information from a report of a journey through the iron manufacturing districts. 3200 w. Ir & Coal Trds Rev—Nov. 5, 1897.

**British Progress.**—Progress in the Iron and Steel Industries. W. Roberts-Austen. Abstract of a presidential address to the Iron and Steel Inst. A consideration of British efforts in connection with these industries. 7000 w. Nature—May 11, 1899.

**British vs. Continental.**—Continental Competition. William Jacks. Paper read at meeting of British Iron Trade Assn. Abstract of a general review and discussion of the situation and of the economic conditions of the British and continental iron industries. 4500 w. Engng—May 15, 1896.

**British vs. Foreign.**—Foreign Competition in the Iron Trade. H. M. Punnett. The views of the author are interesting as he is understood to be the mouthpiece of the opinions of the Midland Iron & Steel Wages Board. 4500 w. Eng, Lond—April 17, 1896.

**British Victorian Age.**—The British Iron and Steel Industry during the Queen's Reign. Part first deals with the position of this industry in the early period of the reign. 1100 w. Ir & St Trds Jour—Sept. 18, 1897.

**British View-Point.**—The Iron Situation from a British Point of View. J. Stephen Jeans. Summarizes recent events, the trend of prices, supply and consumption all over the world, and the effect of prevailing high prices in checking constructive enterprise. 2700 w. Eng Mag—July, 1900.

**Canada.**—The Canadian Iron Trade. From a commercial standpoint this article is very interesting. It shows that the imports into Canada from the United States are more than double those from England, and that the British trade is rapidly decreasing. 1600 w. Ir Age—April 9, 1896.

The Canadian Pig Iron Industry. George E. Drummond. An article of commercial interest, showing that Canada is using and producing more iron than is generally supposed. The producing localities are treated in detail. Serial. Can Eng—Feb., 1896.

See also **COAL INDUSTRY.**

**Canada, 1896.**—Review of the Pig Iron Trade of 1896. George E. Drummond. Reviews the markets with which the Canadian iron producers have to compete and deals with the Canadian pig iron industry in some of its bearings. Also discussion. 12500 w. Can Min Rev—Feb., 1897.

**Chicago.**—Early Iron Making in Chicago. O. W. Potter. History of the mills from 1857 to the present. 2200 w. Ir Age—Jan. 2, 1896.

**Chicago, 1897.**—The Chicago Iron Trade in 1897. George W. Cope. A review of the leading features of the trade, tracing the improvement by months, and giving statistics of pig iron, finished iron and steel, rails, etc. 4500 w. Ir Age—Dec. 30, 1897.

**Chicago, 1898.**—The Chicago Iron Trade in 1898. George W. Cope. General review of the trade, with a partial record of prevailing prices. 4500 w. Ir Age—Jan. 5, 1899.

**Chicago, 1899.**—The Chicago Iron Trade in 1899. Reviews the general features, and also the trade by months, giving tables of prices, and reporting a very encouraging outlook. 5000 w. Ir Age—Jan. 4, 1900.

**China and Japan.**—Iron and Steel in China and Japan. R. V. B. The condition of the market for these products is discussed, with a review of the history of these industries in the countries named, and the changes brought about in China. 2000 w. Ir Age—Nov. 19, 1896.

**Convention, German.**—The General Convention of the Society of German Iron Masters at Düsseldorf (Die Haupsversammlung des Vereines Deutscher Eisenhüttenleute zu Düsseldorf am 23 Oktober, 1898). A very full report of the proceedings at this important meeting, with abstracts of the papers. Two articles. 10000 w. Zeitschr d Ver Deutscher Ing—Nov. 19, 26, 1898.

**Convention, German and British.**—Convention of the Eisenhüttenleute, and of the Iron & Steel Institute (Die Haupt Versammlung des Vereines Deutscher Eisenhüttenleute und die Versammlung des Iron & Steel Institute). A general report, from the German standpoint, of these two great conventions, with valuable tables and data. Two articles. 12000 w. Glückauf—June 5 and 12, 1897.

**1896.**—An International Comparison of Iron and Steel Exports in 1896. Compares the exports from Great Britain with Germany, France and Belgium. Shows that Great Britain has succeeded in improving her position. 2200 w. Ir & Coal Trds Rev—Feb. 19, 1897.

1896 in the Iron Trade. Review of the production and prices for a year. 1700 w. Ir Trd Rev—Dec. 31, 1896.

The Course of the Iron Markets in 1896. Yearly review which notes many important changes and fluctuations. 8200 w. Eng & Min Jour—Jan. 2, 1897.

**1897.**—See also **COAL INDUSTRY.**

**1898.**—The Competition for Iron and Steel Markets in 1898. Statements based on figures from official reports of various countries showing progress or regress of exports, and comparisons showing that the progress made by the United States has surpassed all others. 2800 w. Ir Age—Dec. 29, 1898.

**1899.**—Iron and Steel. Report of the year 1899, showing great prosperity and productiveness. 7500 w. Eng & Min Jour—Jan. 6, 1900.

**Famine.**—See also **PIG IRON.**

**France.**—"Temporary Admissions" in the French Iron and Steel Trade. J. W. Root. States the conditions in France which handicap her iron and steel industries, explaining the admission of foreign imports under name designated, and the working up of this semi-raw material. 2200 w. Ind & Ir—Dec. 30, 1898.

The Iron and Steel Industry of France. A report on the development and progress from 1888 to 1898. 3500 w. Ir Age—Oct. 4, 1900.

**France, 1897.**—The French Iron and Steel Trade in 1897. Statistics from recent returns of the foreign commerce of France. 2000 w. Ind & Ir—Dec. 23, 1898.

**German vs. American.**—See **American vs. German.**

**Germany.**—A Contest in the German Iron Trade. On account of the exhaustion of cheap high phosphorus iron ore, the Rhenish-Westphalian district, which makes basic steel, desired a reduction of freight on government railways. This was opposed by a competing district and extensive investigations followed. It shows, as in the United States, the tendency to move furnaces near the ore rather than near the coal supply. 1100 w. Ir Age—Nov. 21, 1895.

Changing Conditions in the German Iron and Coal Markets. A statement of the situation and showing the gravity of the competition which producers will have to meet. 1800 w. U S Cons Repts, No. 781—July 16, 1900.

Present and Prospective Ore Requirements of German Blast-Furnaces. E. Schrödter. Paper read before the Verein Deutscher Eisenhüttenleute. The condition of the industry in each of the five districts in Germany is described, giving production and area of each. 2200 w. Ir & Coal Trds Rev—March 27, 1896.

Statistics (Statistisches). Tables giving German exports and imports for January and February, 1899 and 1900; iron consumption, 1861-1899; and the production of mines and iron works in 1899. 1500 w. Stahl und Eisen—May 1, 1900.

The Iron and Steel Industries of Germany. R. M. Daelen. Shows the recent development of the iron industry, and the improvements in the works. 3800 w. Ir & Coal Trds Rev—Dec. 29, 1899.

**The Iron Industry of the Saar and the Moselle.** M. Jung. A paper communicated to the German Association of Engineers on the minette ores of Germany and their smelting, with economic considerations. Serial. Ir & Coal Trds Rev—Nov. 8, 1895.

The Iron Industries of Germany. Interesting statistics concerning production, imports and exports and related information. 3000 w. Ir Age—May 31, 1900.

See also **Convention.**

**Germany and Belgium.**—Economic Conditions of the Iron and Steel Industry in Belgium and Germany. The official report just issued of the commission appointed by the British Iron Trade Assn., to investigate the comparative labor and industrial conditions on the continent. 5000 w. Col Guard—Jan. 24, 1896.

**Germany, 1899.**—The German Iron Industry in the Year 1899. Emil Schrödter. Reports a very prosperous year for both iron and coal. 1900 w. Ir & Coal Trds Rev—Dec. 29, 1899.

**Great Britain.**—See **British.**

**Great Lakes Export.**—See **Lake Superior; Pittsburg in England; STEEL INDUSTRY.**

**Hungary.**—The Iron Industry of Hungary. David A. Louis. Read before the Iron and Steel Inst., Aug., 1897. A review of the production of recent years, with information of the leading companies, etc. Ill. 7000 w. Col Guard—Aug. 13, 1897.

See also **Austria-Hungary.**

**India.**—The Iron and Metal Work in India. Interesting information relating to the advancement of these industries, the articles imported, etc. 1500 w. Ir Age—Sept. 29, 1898.

I. The Iron Industry in the Territory of His Highness the Nizam Shamsul Ulama Syed Ali Bilgrami. II. India as a Center for Steel Manufacture. R. H. Mahon. Two papers read before the British Iron and Steel Inst., and discussed together. The first deals with the kinds of ores found; and the second records facts relating to the possibility of manufacturing iron and steel at a profit in India. 4000 w. Col Guard—Aug. 18, 1899.

The Manufacture of Iron and Steel in India. R. H. Mahon. Abstract of a report to the Indian Government, 1899. Information relating to the capability of India for steel manufacturing. Map. Serial. Col Guard—Jan. 19, 1900.

The Practicability of Establishing an Iron Industry at or near Salem (India). Comment on paper on this subject by Jeremiah Head. The report deals exhaustively with the subject and gives conclusions which finally pronounce the opinion that the work is not at present practicable. These conclusions are examined. 3000 w. Ind Engng—March 13, 1897.

See also **IRON MANUFACTURE; IRON REGION.**

**Italy.**—The Iron and Steel Industry of Italy. Interesting particulars in regard to the progress and development. 3000 w. Ir Age—March 15, 1900.

See also **Lombardy.**

**Japan.**—Japan as a Producer of Iron. Irvin McDowell. The scheme of Japan for making her own iron, steel and rails is discussed, with some of the difficulties she must overcome. 1000 w. Ir Trd Rev—Dec. 2, 1897.

The Basis of the Japanese Iron Industry (Die Grundlagen der Japanischen Eisenindustrie). A review of the iron and manganese ore supplies of Japan, together with the fire clays and other materials. 1000 w. Stahl und Eisen—June 15, 1898.

The Demand and Supply of Iron in Japan. Discussion upon an article in the "Japan Daily Mail," by the ex-director of the Japanese Mining Bureau. 1000 w. Ir & Coal Trds Rev—March 27, 1896.

The Raw Materials of the Japanese Iron Industry. Translated from "Stahl und Eisen." Information of the iron ore deposits, the manganese ores, and refractory materials. 600 w. Ir & Coal Trds Rev—June 24, 1898.

The Recent Industrial Development of Japan (Die Neure Industrielle Entwicklung Japans). Especially discussing the iron and steel industry, with plan and illustration of the Imperial Japanese Steel Works at Yawatamura. 3000 w. Stahl und Eisen—Dec. 15, 1899.

**Lake Superior.**—Development of Lake Superior Iron Ores. D. H. Bacon. Read before the Am. Inst. of Min. Engs., Tower, Minn. A short résumé of what has been done in this industry. 1300 w. Ir Trd Rev—Aug. 12, 1897.

**The Development of Lake Superior Iron Ores.** D. H. Bacon. A short résumé of what has been done in this industry. 1400 w. Trans Am Inst of Min Engs—Sept., 1897.

Greatest Lake Iron Ore Output. Horace J. Stevens. Review of the tonnage during this and past years, giving estimates of future outputs. 3000 w. Am Mfr & Ir Wld—Jan. 4, 1900.

Lake Iron Ore Matters. A Duluth letter discussing mines, prices, shipments, etc. 1500 w. Ir Age—Sept. 27, 1900.

Lake Superior Iron and Copper. Horace J. Stevens. The history of a prosperous year in the mining business of this district. 2000 w. Mines & Min—Jan., 1899.

The Lake Ore Trade. F. B. Richards. General description. 3000 w. Ir Age—Jan. 2, 1896.

Thirteenth Annual Review of the Lake Superior Iron Ore Trade. Horace J. Stevens. Report of large output and small profits, giving much information. Also discusses the prospects for the coming year. 2200 w. Am Mfr & Ir Wld—Jan. 6, 1899.

See also **IRON MANUFACTURE—Marquette; IRON MINE; IRON MINING; IRON ORE HANDLING; IRON ORE TRANSPORTATION; IRON REGION; MINING.**

**Lehigh Valley, Pa.**—The Iron Industry of the Lehigh Valley. Oliver Williams. Interesting reminiscences of this great iron producing region. 1800 w. Ir Age—Jan. 2, 1896.

**Literature, 1897.**—See **COAL INDUSTRY.**

**Lombardy.**—A Study of the Iron District of Lombardy (Studie über die Eisenindustrie in der Lombardei). A very full review of the iron production in Northern Italy, with map, and details of operation and cost; the district produces about 30000 tons per year. Two articles. 1 plate. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 5, 12, 1899.

See also **Italy.**

**Metric Classification.**—Metric Classification of German Iron Manufacturers. A copy of the classification of German iron manufacturers as given in the report of the British Consul. 700 w. U S Cons Repts, No. 635—Jan. 23, 1900.

**National Ideals.**—National Ideals the Prime Influence in Iron Trade Development. H. J. Skelton. A discussion of the close relations between political and social order and the development of the iron trade. 3500 w. Eng Mag—Oct., 1900.

**New Phases.**—New Phases in the Iron Trade. Charles Kirchhoff. Address before Metal Section of the Manufacturers' Club, Philadelphia. 2500 w. Ir Age—Nov. 16, 1899.

**Norway.**—The Possibility of an Iron Industry in Norway. H. C. Carpenter. A review of Prof. J. H. L. Vogt's estimate of the cost of making pig iron in Norway. 1000 w. Eng & Min Jour—Sept. 29, 1900.

**Nova Scotia.**—The Outlook for an Iron and Steel Industry in Nova Scotia. A discussion of present conditions and future developments. 2200 w. Eng News—Sept. 13, 1900.

**Ohio.**—The Iron Industry of Jackson County, Ohio. S. S. Knight. Gives history of this region, aiming to show its suitability for the location of blast furnaces. 4000 w. Ir Age—Dec. 7, 1899.

**Pennsylvania, Western.**—Iron in Western Pennsylvania. From "The News," Scottdale, Pa. Gives history of early blast furnaces and account of ores found and their uses. 2000 w. Am Mfr & Ir Wld—June 21, 1900.

**Philadelphia, 1897.**—The Philadelphia Iron Market. Thomas Hobson. A review of the year 1897, with tabulated statements, and general information. 2500 w. Ir Age—Dec. 30, 1897.

**Philadelphia, 1899.**—The Philadelphia Iron Trade in 1899. Thomas Hobson. Review of the most eventful year ever experienced. 3000 w. Ir Age—Jan. 4, 1900.

**Pittsburg.**—Pittsburg as an Iron Center. William Metcalf. Setting forth the advantages possessed by the city by reason of its vicinity to oil, coal and transportation; also discussing the smoke and labor problems. 2700 w. Ir Age—Jan. 2, 1896.

**Pittsburg, 1896.**—The Pittsburg Iron Trade in 1896. Review of the year, also discusses in detail the trade in pig iron, steel billets, finished iron and steel, plates and bars. 7400 w. Ir Age—Jan. 7, 1897.

**Pittsburg, 1897.**—The Pittsburg Iron Trade in 1897. Robert A. Walker. A summary of the trade for the year, the special features, and review of different classes of work. 6500 w. Ir Age—Dec. 30, 1897.

**Pittsburg, 1898.**—Pittsburg Iron Trade in 1898. Report concerning pig iron, plates, sheets, and other finished materials, with general remarks. 2200 w. Ir Trd Rev—Jan. 5, 1899.

The Pittsburg Iron Trade in 1898. Robert A. Walker. An interesting review of the year, dealing with production, foreign trade, new construction, combinations and trusts, and the outlook. 7400 w. Ir Age—Dec. 29, 1898.

**Pittsburg, 1899.**—The Pittsburg Iron Trade in 1899. Robert A. Walker. Report of the greatest year the iron trade has ever known, discussing details. 12500 w. Ir Age—Jan. 4, 1900.

**Pittsburg in England.**—Pittsburg Pig Iron in England. Clippings from British journals in regard to the shipping of 2000 tons of pig iron to Birmingham. 2000 w. U S Cons Repts, No. 346—Feb. 9, 1899.

**Prices.**—Recent Movement of Prices of Iron Ores, Iron and Steel in Different Countries. Reports output and prices in the most important countries regarding iron ore, pig iron, and finished iron and steel. 2200 w. Ir & Coal Trds Rev—June 24, 1898.

**Prices, 1895 and 1896.**—Iron and Steel Prices in 1895 and 1896. Diagram showing the course of prices in the iron and steel business during the last two years, with review of the period. 500 w. Eng News—Jan. 14, 1897.

**Production.**—Some Graphic Statistics. George R. Bale. Diagrams showing production of iron and steel of various countries in 25 years, with the present position, are given in part first. Serial. Prac Eng—April 29, 1898.

The Iron Ore Supply. John Birkinbine. Interesting review of statistics of production in the United States and other countries. 3300 w. Trans Am Inst of Min Engs—Nov., 1897.

See also **BLAST FURNACE; PIG IRON.**

**Production, Alabama.**—See **COAL PRODUCTION—Alabama.**

**Production, United Kingdom.**—See also **British.**

**Production, United Kingdom, 1896.**—Iron Ore and Pig Iron Production in 1896. Report of the United Kingdom compiled from the "Mineral Statistics." 2000 w. Col Guard—Oct. 1, 1897.

**Production, United Kingdom, 1897.**—Iron and Pig Iron Production in 1897. Statistics for the United Kingdom compiled from the General Report on Mines and Quarries. 1300 w. Col Guard—Nov. 18, 1898.

**Production, United States.**—American Iron and Steel. Editorial on the annual report of the iron and steel production just issued by the American Iron and Steel Association. 1400 w. Engng—July 23, 1897.

See also **United States.**

**Production, United States, 1894.**—The Production of Iron Ores in the United States in 1894. John Birkinbine. From "The Mineral Resources of the United States." The production of iron ores classified by years, by states, by most prominent mines, and by countries, is given in tabular form. It is an official report to the U. S. Geol. Survey. 2800 w. Ir Age—Nov. 21, 1895.

**Production, United States, 1898.**—Our Iron and Steel Production in 1898. Information from the statistical report of the Am. Iron and Steel Assn., compiled by James M. Swank. 1500 w. Ir Age—May 25, 1899.

**Production, World.**—An Economic Study of the World's Production of Iron Ore and Pig Iron (Volkswirthschaftliche Studien über die Gewinnung der Eisenerze und die Erzeugung von Roheisen auf der Erde). Franz Kupelwieser. A very complete statistical review, with results tabulated by countries. Three papers. 12000 w. Zeitschr d Oesterr Ing u Arch Ver—June 2, 9, 16, 1899.

The World's Iron Output. J. Stephen Jeans. A short account of the iron trade situation in Europe, and the bright outlook for the southern states in America. 2000 w. Am Mfr & Ir Wld—Sept. 7, 1899.

**Russia.**—Iron Industry of Russia. Translated from the "Vienna Handels-Museum." The report shows that there is a large demand in Russia for pig iron and iron manufactures, and the industries are advancing so rapidly that foreign manufacturers will find a ready market for their products, though at small profits. 2300 w. Cons Reports—Feb., 1896.

Production and Sale of Iron in Russia during 1897. The country has advanced to the fifth place in iron producing. Gives information concerning the quality, production, prices, etc. 1600 w. U S Cons Repts—Dec., 1898.

The Development of the Russian Iron and Steel Industry. From the London "Times." Facts showing the growth of this industry. 1400 w. Col Guard—Sept. 23, 1898.

The Iron and Steel Industries of South Russia. The first of a series of short illustrated articles. It describes the Krivoi Rog Iron Works, which have a production of 50000 tons of pig iron per year. Serial. Ir & St Trds Jour—Feb. 22, 1896.

The Iron Industry and Iron Trade in Russia (Die Eisenindustrie und der Eisenhandel in Russland). A statistical paper showing the rapid growth of the Russian iron industry in recent years. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 1, 1898.

The Iron Industry of Southern Russia (Die Eisenindustrie in Südrussland). Giving commercial data as to production revenue and other statistics. 4000 w. Stahl und Eisen—July 1, 1897.

The Russian Iron Trade. Report showing that the industry is steadily developing. 900 w. Mach, Lond—July 15, 1897.

The Iron Industry of Southern Russia. From report of M. Trasenster, printed in the "Revue Universelle des Mines." Treats of the ore deposits and iron and steel works. 3800 w. Ir Age—July 16, 1896.

The South Russian Iron and Coal Industries. Professor Thimé. Translated by G. Kamensky. Information of coal mines and iron works gathered on a recent journey, and intended to illustrate the actual condition of these industries in the region named. Serial. Col Guard—Oct. 15, 1897.

See also Ural; COAL INDUSTRY; IRON WORKS.

**Scotland.**—The Iron Making Districts of Scotland. Part first describes the tube industry of Coatbridge. Ill. 1300 w. Ir & Coal Trds Rev—Sept. 23, 1898.

The Iron and Steel Industries of Scotland. Illustrated description of the Carron Iron Works, the oldest in Scotland. 3000 w. Ir & Coal Trds Rev—Aug. 21, 1896.

**Scotland, West.**—The Manufacturing Industries of the West of Scotland. A comprehensive review of the iron ore and coal output, and the pig iron, malleable iron, and steel manufactures, with other information of a general character. 20000 w. Ir & Coal Trds Rev—Aug. 7, 1896.

**Spain.**—The Iron and Steel Industry of Spain. Pablo de Alzola. Some information regarding the iron ore deposits and the importance of the workings, with consideration of the iron and steel industry. 6300 w. Col Guard—Sept. 4, 1896.

The Present Position of the Iron Ore Industries of Biscay and Santander. William Gill. Part first relates to the province of Biscay and treats of the deposits, mines, working, transport and shipping, concentration and calcination. Serial. Ir & Coal Trds Rev—Sept. 11, 1896.

**Staffordshire.**—The Future of the South Staffordshire Iron and Steel Trades. H. Le Neve Foster. Extract from presidential address, considering the manner in which further progress could be made in the Midlands, and noting many points of interest. 2000 w. Col Guard—Jan. 13, 1899.

**Supremacy.**—Future Supremacy in the Iron Markets of the World. J. Stephen Jeans. The opening of the Lake Superior Region, the improvements in machinery and methods and especially the greater value of high priced labor, give the American iron industry controlling advantage in the competition with European manufacturers. 4800 w. Eng Mag—Nov., 1897.

The Importance of Supremacy in the Iron Trade. J. Stephen Jeans. Particularly discussing the relations of European countries to each other as competitors, based largely upon the report of the British delegation of the iron trade industry upon labor conditions on the continent. The greatest factor in favor of the continental producer is the lower cost of transport. 4500 w. Eng Mag—Dec., 1897.

Future Supremacy in the Iron Markets of the World. J. Stephen Jeans. Compares the relative advantages of various countries in point of crude materials, and shows the strength of England's position in this respect. 4500 w. Eng Mag—Jan., 1898.

Future Supremacy in the Iron Markets of the World. J. Stephen Jeans. In this paper Mr. Jeans discusses the conditions affecting the economical value of finished products in different countries. The prediction is made that the United States will become a larger seller and smaller buyer and ultimately become the richest country in the world. 5000 w. Eng Mag—Feb., 1898.

See also United States Supremacy; IRON MANUFACTURE—Labor Costs.

**Sweden.**—A Review of the Development of the Iron Industry in Sweden (Einige Hauptsüge der Entwicklung der Eisenindustrie in Schweden). A paper presented by Axel Wahlberg before the international congress for testing materials at Stockholm. 2500 w. Stahl und Eisen—Sept. 1, 1897.

The Development of the Swedish Iron Industry. Richard Akerman. Read before the Iron and Steel Inst., Stockholm. Historical review. 6000 w. Col Guard—Aug. 26, 1898.

The Iron Industry of Sweden. David A. Louis. A very fully illustrated account of the plant and practice of the Swedish mines and iron and steel industry. 4500 w. Eng Mag—June, 1899.

See also IRON EXHIBITION—Stockholm.

**Sweden, 1895.**—The Swedish Iron, Steel and Coal Industries in 1895. A résumé taken from the official report just issued. 1400 w. Eng, Lond—Dec. 25, 1896.

**Sweden, 1896.**—The Swedish Iron, Steel, Metal, and Coal Industries in 1896. Report of these industries showing the output to be the highest on record. 1600 w. Engr, Lond—April 8, 1898.

**Tariff.**—Comparison of Iron and Steel Duties in the Wilson Tariff and the Dingley Bill. A careful comparison of the duties on iron and steel and manufactures of iron and steel. 1700 w. Bull of Am Ir & St Assn—April 10, 1897.

**Texas.**—The Iron Products of Texas. James F. Fuller. An interesting paper on the iron interests of this great state read before a recent meeting of Texas Foundrymen. 1800 w. Tradesman—July 1, 1896.

**Transportation, Germany.**—See American Competition; IRON ORE TRANSPORTATION.

**Transportation of Material.**—See also IRON ORE HANDLING; IRON ORE TRANSPORTATION; MECHANICAL HANDLING.

**United Kingdom.**—See British; Production, United Kingdom.

**United States.**—A German Expert View of the American Iron and Steel Industries. Translation from the "Berliner Tageblatt." Concerning the significance of the commercial museum at Philadelphia. 1200 w. U S Cons Repts, No. 594—Dec. 4, 1899.

American Iron Developments. A review of existing conditions and recent changes in the iron industry of America. 2000 w. Engr, Lond—Sept. 1, 1899.

A View of the Iron and Steel Trade. Walden Fawcett. Condensed from a monograph issued by the Treasury Dept. Bureau of Statistics of the United States. 8700 w. Eng & Min Jour—Oct. 27, 1900.

Some Recent Features of the American Iron Industry. With special reference to the enterprise of Americans and the magnitude of their undertakings. Serial. Ir & Coal Trds Rev—Jan. 81, 1896.

Statistics of the Iron and Steel Industries. Review of the domestic iron trade as presented in the annual report of the American Iron and Steel Assn. A table compiled from figures given in the report shows in convenient form the condition of these and allied industries. 1600 w. Eng News—June 11, 1896.

The American Iron Industry. Extracts from an article written by James M. Swank, and published in the Annual Report of the Association for 1895. Reviews the progress of the iron and steel industries from the middle of the 17th century, calling attention to the effect of the protective policy upon iron making in this country since 1860. 2400 w. Gunton's Mag—Nov., 1896.

The Competitive Basis and Conditions of the American Iron Trade. Franklin Hilton. Read before the annual meeting of the British Iron Trade Assn. Considers iron ore supplies, coal and coke supplies, railway transport, lake, canal and river transport, labor, equipment, royalties, the Carnegie Co.—with conclusions. 4200 w. Ir & Coal Trds Rev—May 21, 1897.

The Future of the American Iron Trade. James M. Swank. Reviewing the rise of American iron and steel industries, showing by statistics their growth, and pointing out the factors likely to contribute to their increase. 5500 w. Eng Mag —Jan., 1896.

The Growth of the Iron Industry in the United States. F. W. Taussig. Abstract of a paper in the "Quarterly Journal of Economics." An outline of the factors that have influenced this industry and caused the almost marvelous development. 1500 w. Col Guard—March 16, 1900.

The Outlook in the American Iron Industry. Archer Brown. A definite, comprehensive summary of the conditions and influences producing the recent extraordinary advance affecting the present situation, and determining the future course of production and prices. Reviews authoritatively the export movement and its future. 4500 w. Eng Mag—Oct., 1899.

See also **American Competition; American vs. British; Production, United States; Supremacy.**

**United States, 1870-96.**—The American Iron Trade Since 1870. A valuable epitome of progress. 9500 w. Ir Age—Jan. 2, 1896.

**United States, 1895-96.**—Review of the American Iron Trade in 1895; and in the First Four Months of 1896. J. M. S. From the "Annual Statistical Report of the American Iron and Steel Association for 1895." Improvement in business and increase in prices, accompanied by general advance in wages of iron and steel workers, coke workers, and coal miners. 3000 w. Bull of Am Ir & St Assn—May 20, 1896.

**United States, 1896.**—Statistics of the American Iron Trade for 1896. From the annual report of the American Iron and Steel Association. Interesting information of prices, shipments, consumption, exports, production, etc. 4800 w. Col Guard—June 25, 1897.

**United States, 1897.**—The American Iron and Steel Industries in 1897. Perry F. Nursey. A general review of the iron and steel trades as represented in the latest annual report of the Am. Ir. & St. Assn. Serial. Ind & Ir—Nov. 11, 1898.

**United States, 1897-98.**—Review of the American Iron Trade in 1897 and in the First Seven Months of 1898. From the Annual Statistical Report of the American Iron and Steel Assn. for 1897. Low prices and the cause; great increase in exports; remarkably active consumption. 1000 w. R R Gaz—Aug. 19, 1898.

**United States, Southern.**—The Southern Iron Trade. William B. Phillips. Discusses the course with reference to the inspection of materials. 10000 w. Tradesman—Jan. 1, 1897.

The Southern Pig Iron Market. A commercial paper giving the production of the southern United States, the distribution of shipments of the Tennessee Coal and Iron Co., and suggestions toward improving the market. 1200 w. R R Gaz—Dec. 13, 1895.

See also **Alabama; Texas; PIG IRON.**

**United States Supremacy.**—American Steel Supreme. D. Allen Willey. Showing that the price of fuel and supply of ore enable America to supply the world, if transportation rates can be obtained on an equitable basis. 1700 w. Mfrs Rec—Nov. 26, 1897.

**Ural.**—The Iron Industry of the Urals. G. Kamensky. Reviews the history of this industry, its immense resources, the treatment required for the ores, etc. 3000 w. Col Guard—July 1, 1898.

The Iron Industry of the Ural Mountains. J. Kowarsky. Describes briefly the ore, mines and methods. 1600 w. Am Mfr & Ir Wld—Nov. 20, 1896.

The Iron Industry in the Ural (L'Industrie du Fer dans l'Oural). P. Kouindjy. A complete review of the subject, based upon official reports and issued by the Russian Ministry of Finance. 8000 w. Bull Soc d'Encour—July, 1900.

The Iron Ores of the Oural Mountains, Russia. H. B. C. Nitze. An illustrated description of this region, the development of the mines, the ores, etc. 1200 w. Jour Fr Inst—June, 1899.

See also **Russia; MINERAL REGION.**

**Victorian Age.**—See **COAL INDUSTRY.**

**Wales.**—See also **COAL INDUSTRY.**

**Warrant System.**—See **PIG IRON.**

**World.**—The Iron and Steel Industries of the World. From the summary prepared by James M. Swank for the United States Geological Survey. 4000 w. Col Guard—Aug. 25, 1899.

**World's Markets.**—The Competitors for the World's Iron Markets in 1899. J. S. Jeans. A comparison of the exports of 1899 of Great Britain, Germany, France, Belgium, and the United States. 2500 w. Ir Age—March 29, 1900.

**IRON MANUFACTURE.**

See also **BLAST FURNACE; CASTING; IRON INDUSTRY; IRON MINING; IRON WORKS; METALLURGY; PIG IRON; STEEL MANUFACTURE; STEEL WORKS; WROUGHT IRON.**

Present State of Iron Metallurgy. From a communication to the "Revue Générale des Sciences," by Emile Demenge, reviewing modern methods in metallurgy. 2200 w. Col Guard—Sept. 14, 1900.

The Manufacture of Iron and Steel. William Kent. Reviews the history of iron manufacture, and traces some of the stages of development during the last two centuries. 3000 w. Sib Jour of Engng—Feb., 1900.

The Metallurgy of Iron and Steel. A. Humbolt-Sexton. Part first discusses the importance of iron, chemical and physical properties, magnetism, iron oxides, etc. Serial. Mech Engr—Nov. 26, 1898.

**Ancient.**—The "Art" of Iron Making in 1750. A copy of old engravings and letter press, illustrating and describing the methods employed about the middle of the last century. Serial. Ir & St Trds Jour—Jan. 28, 1899.

The Production of Iron. A description of ancient methods, including its early history in England. Ill. 1700 w. Mach, Lond—Feb. 15, 1896.

See also **IRON WORKS—Colonial American.**

**Bar Iron.**—Suggested Improvements in the Manufacture of Bar Iron. Samuel Peters. Describes a method which the author thinks will give desirable results, and it is hoped furnish a wrought iron that will compete with steel. 2500 w. Pro of Engs Soc of W Penna—May, 1899.

**Birmingham, Alabama.**—Notes on the Birmingham District. John S. Kennedy. Information as to improved practice and low cost of production. Serial. Ir Age—April 22, 1897.

The Tennessee Company's Properties. A number of views and brief description of representative furnace plants and iron ore mines of the Birmingham district. 800 w. Ir Trd Rev—April 1, 1897.

**Blooming Mill.**—See **ROLLING MILL.**

**British.**—See also **France and England; IRON INDUSTRY.**

**By-Products.**—New Economies in Iron Making. Herman L. Hartenstein. Describes the method of producing carbolite and its value as an illuminant, and for other uses. 2800 w. Am Mfr & Ir Wld—April 22, 1898.

The Recovery of By-Products in the Iron Industry. The utilization of the ammonia in furnace gases, the tar and ammonia from coke ovens, high phosphorus slags, etc., in Great Britain. In Scotland their value is said to be 3s. per ton of pig iron made. 1200 w. Ir & Coal Trds Rev—Nov. 8, 1895.

See also **BLAST FURNACE GAS.**

**Charcoal.**—Southern Charcoal Iron. S. L. Graham. Discusses its manufacture for car wheel purposes from an economic standpoint. 3000 w. Tradesman—Sept. 15, 1897.

**Concentration.**—Concentrating Lake Superior Ore. L. M. Hardenburgh. Paper read at the Lake Superior Mining Inst. on the treatment of lean Pewabic ore. 1000 w. Am Mfr & Ir Wld—May 10, 1900.

High Grade Iron Ores. Walter J. May. Discusses the necessity of dealing with the deposits of low grade ores and concentrating them at the mines to a high metallic value. 900 w. Col Guard—Aug. 12, 1898.

See also **Roasting; MAGNETIC SEPARATION.**

**Cost Reduction.**—A Decade of Progress in Reducing Costs. C. Kirchhoff. Presidential address before the Am. Inst. of Min. Engs. Notes discoveries and improvements in practice and equipments which have contributed to progress in reducing costs, showing the effect on pig iron, Bessemer ingots, rolling rods and lead smelting. 3700 w. Ir Age—March 2, 1899.

A Decade of Progress in Reducing Costs. Charles Kirchhoff. Presidential address at the New York meeting. Presents data indicating to what extent improvements in practice and equipment have effected the cost sheet. 3800 w. Trans Am Inst of Min Engs—Feb., 1899.

**Direct Process.**—The Direct Production of Iron with a Definite Percentage of Carbon (Directe Eisengewinnung mit Bestimmtem Kohlenstoffgehalt). John Landin. A description of a process for producing iron direct from the ore, involving the preparation of briquettes, containing ore, coal, lime and other ingredients. 1000 w. Oest Zeitschr f Berg u Hüttenwesen—July 14, 1900.

See also Otto Process; Puddling Direct; Stassano Process; **STEEL MANUFACTURE.**

**Education.**—Technical Instruction in Its Application to Ironmaking. Thomas Turner. The paper is given in full, with discussion. Read before the South Staffordshire Inst. of Iron and Steel Works' Managers. 5300 w. Ir & St Trds Jour—Feb. 15, 1896.

See also **EDUCATION.**

**1897-98.**—Review of Recent Progress in the Metallurgy of Iron (Revue des Progrès Récents de la Metallurgie du Fer). MM. de Billy and Marillier. The annual review of the Société d'Encouragement, giving a résumé of the notable advances made during the year. 7500 w. Bulletin de la Société d'Encour—Sept., 1898.

**Electro-Metallurgy.**—See **ELECTRO-METALLURGY —Iron Industry.**

**Fibrous vs. Crystalline.**—The Conditions which Cause Wrought Iron to Be Fibrous and Steel Low in Carbon to Be Crystalline. W. F. Durfee. Observations and conclusions derived from practical acquaintance with the manufacture and employment of iron and steel. Contributive to a correct understanding of the structural relations or as indicative of their proper treatment. 13000 w. Jour Fr Inst—Aug., 1896.

**Finely Divided Ore.**—See **IRON ORE.**

**France and England.**—Presidential Address Before the Iron and Steel Institute in Paris. On metallurgical progress in England and France. Serial. Engng—Sept. 21, 1900.

**Heat Treatment.**—Effects of Heating and Working on Iron and Steel. H. E. Smith. Treats of the effects of working and heat treatment which result in bringing out the highest qualities of the iron or steel, or which unfit the metal for the use intended. 3700 w. Jour Assn of Engng Soc's—March, 1898.

Notes on the Heat Treatment of Iron and Steel. Harry E. Smith. Considers some of the characteristics which a piece of tool or cast steel can be made to assume by the application of heat. Outlines some of the physical and chemical changes. 3000 w. Eng's Year Book, Univer of Minn—1897.

Problems of Heat Treatment. Discusses malleable work, chemistry and carbon conversion and the need of perfect combustion. 2500 w. Ir Trd Rev—Oct. 26, 1899.

**India.**—Manufacture of Iron in the East. B. H. Thwaite. Reviews the history of this industry and discusses the advisability of increasing the production in colonies possessing the raw materials. Ill. 1800 w. Ind & East Engr—Dec., 1899.

The Manufacture of Iron and Steel in Southern India. W. Naylor, in the "Madras Mail." An account of the successful introduction of European methods, and the excellent quality of the steel. 1700 w. Ind & East Eng—April 11, 1896.

The Manufacture of Iron and Steel in India. Some account of modern work in India in the manufacture of iron and steel. In most establishments iron and steel continue to be made on methods of unknown antiquity. The reasons for non-success of modern attempts are given. 2000 w. Ir & Coal Trds Rev—April 17, 1896.

See also **IRON INDUSTRY; IRON REGION.**

**Kiln, Davis-Colby.**—Improvement in the Davis-Colby Ore Kiln. Charles J. Christian. Gives the experience of the writer with the kilns as originally constructed and also as modified according to plans shown. 1200 w. Am Mfr & Ir Wld—May 5, 1899.

**Labor Costs.**—Comparative Labor Costs. Discussion of this subject with criticisms of the position taken by Mr. Jeans in articles published in the "Engineering Magazine." 3300 w. Gunton's Mag—Dec., 1897.

See also **IRON INDUSTRY—Supremacy.**

**Lowmoor, Yorkshire.**—Best Yorkshire Iron, and How It Is Made. E. Windsor Richards. An address at the opening of the metallurgical department of the Glasgow and West of Scotland Technical College. History of Lowmoor Iron Works, with a description of the methods adopted there. 4700 w. Eng, Lond—Oct. 16, 1896.

**Magnetic Separation.**—See **MAGNETIC SEPARATION.**

**Marquette, Mich.**—Iron Ore Manufacture at Marquette. Extended abstract from a report by John Birkinbine. The first portion deals with ore supply, production, transportation, fuel, flux, etc. Serial. Ind & Ir—Sept. 9, 1898.

Iron Manufacturing at Marquette. Extracts from a report of John Birkinbine, made for J. M. Longyear. A masterly discussion of Marquette for iron and steel manufacture. 10000 w. Ir Age—Aug. 4, 1898.

See also **IRON INDUSTRY—Lake Superior.**

**Metal Mixers.**—Metal Mixers and Casting Machines. E. J. W. Richards. Abstract of a paper read at meeting of West of Scotland Iron & Steel Inst. Urges the employment of a chemist, describes the practice at the Carnegie works, refers to the Uehling casting machine and its advantages and gives his suggestions for manner of working in Scotland. 2400 w. Col Guard—Nov. 25, 1898.

See also **CASTING MACHINE; PIG IRON—Sandless.**

**Mixer Patent.**—Carnegie Mixer Patent Sustained. An abstract of the opinion of Judge Buffington in the action of the Carnegie Steel Co. vs. the Cambria Iron Co., sustaining the complaint. 3200 w. Ir Trade Rev—Sept. 8, 1898.

The Jones Iron Mixer Patent. Illustration and a summary of the specifications of this patent, the object of which is to make the product of the converters as uniform as possible. 1800 w. Eng & Min Jour—Oct. 1, 1898.

**Modern Methods.**—See **IRON MINING.**

**New Zealand Magnetic.**—On the Treatment of New Zealand Magnetic Iron Sands. E. Metcalf Smith. Paper read before the Iron and Steel Inst. A description of the extensive deposit, analysis and treatment. 800 w. Col Guard—May 8, 1896.

**Nova Scotia vs. Southern.**—Notes on Some Comparisons Between Southern and Nova Scotian Iron Methods. C. A. Meissner. A comparison of conditions, with special reference to price and quality. 5500 w. Can Min Rev—Jan., 1897.

**Otto Process.**—A New Direct Process. Briefly reviews various methods that have been tried, and describes the process patented by Carl Otto for the direct production of iron and steel, with critical comment. Ill. 2800 w. Ir & Coal Trds Rev—April 13, 1900.

The Direct Production of Iron and Steel. Carl Otto. Translated from 'Stahl und Eisen." 2500 w. Am Mfr & Ir Wld—March 20, 1896.

**Puddling, Direct.**—The Direct Puddling of Iron. Emile Bonehill. The author's reply to the discussion of his paper on Direct Puddling, read at the Iron & Steel Inst. meeting. It contains much detailed information. 2200 w. Ir & St Trds Jour—Feb. 29, 1896.

**Puget Sound.**—A Pacific Situs for Ironmaking. W. C. Cronemeyer. Investigations of the region around Puget Sound, to ascertain the prospects which that part of the country offered for the manufacture of iron and steel. 3000 w. Ir Trd Rev—June 15, 1899.

**Raw Materials.**—Value of Raw Materials in Ironmaking. William B. Phillips. Read before the Alabama Industrial and Scientific Society. Many interesting points in furnace practice are brought out. Eleven irons are given, with the burden required in each case. 1900 w. Tradesman—Dec. 15, 1895.

**Reducibility of Ores.**—Methods of Determining the Reducibility of Iron Ores (Verfahren zur Bestimmung der Reducirbarkeit der Eisenerze). Prof. J. Wiborg. A paper read before the International Association for Testing Materials, at Stockholm, 1897. Description of various methods and table of results for different ores. Two articles. 7500 w. Stahl und Eisen—Oct. 1, 15, 1897.

**Roasting.**—The Roasting of Iron Ores, with the View to Their Magnetic Concentration. H. Wedding. Extracts from paper discussing the influence of roasting on the reducibility of iron ores, and for subsequent magnetic treatment with other interesting matter. 8300 w. Ir & Coal Trds Rev—Sept. 4, 1896.

**Scotch Coal.**—See **COAL—Scotch.**

**Scotland, West.**—Sixty years in the Iron Works. George Beard. Presidential address delivered to the West of Scotland Iron and Steel Inst. Discusses production, protection and features of interest. 5300 w. Ir & St Trds Jour—Oct. 28, 1899.

**Silicon.**—Governing Mixtures by Silicon. A contribution to the discussion of a paper by Bertrand S. Summers, read at the Buffalo meeting of the Am. Inst. of Min. Engrs. 4000 w. Ir Trd Rev—July 13, 1899.

See also **CAST IRON.**

**Stassano Process.**—The Stassano Process for the Production of Iron and Steel. John B. C. Kershaw. Considers this process, being tried in Italy, and discusses the economy of the electric current when used for heating. 1700 w. Elec Rev—June 15, 1900.

**Sulphide Ores.**—The treatment of Sulphide Ores. William Thomas. Read before the South Wales Inst. of Engs. Shows that all processes previously applied to these ores have proved disappointing and describes the treatment given at Tow Law, Weardale, Durham. 2400 w. Col Guard—Dec. 23, 1898.

**Swedish in Canada.**—Swedish Iron Metallurgy and Its Application to Canada. James Douglas. Read before the Canadian Mining Inst. Compares the similar conditions of Canada and Sweden, and shows how the former country may learn from the latter. 4800 w. Can Min Rev—Feb. 28, 1899.

**Titaniferous and Phosphoric Ores.**—The Effects of Additions of Titaniferous to Phosphoric Iron Ores in the Blast Furnace. August J. Rossi. Some very curious and unexpected results obtained in experimenting in mixing these ores. 1500 w. Trans Am Inst of Min Eng—April, 1896.

**Titaniferous Ores.**—The Smelting of Titaniferous Ores. A. J. Rossi. The general considerations, methods of treatment, and the properties of titanic minerals are fully discussed. Serial. Ir Age—Feb. 6, 1896.

**Transportation of Materials.**—See **IRON ORE HANDLING; IRON ORE TRANSPORTATION.**

**Tri-Axial Diagram.**—See **GRAPHICS.**

**United States.**—The Development of Iron Manufacture in the United States in the Past Seventy-five Years. John Fritz. Full address delivered on the occasion of the celebration of the seventy-fifth anniversary of the Franklin Institute. History of the early developments in the United States. 8000 w. Jour Fr Inst—Dec., 1899.

The Progress in the Manufacture of Iron and Steel in America and the Relations of the Engineer to It. John Fritz. Presidential address presented at the N. Y. meeting, Dec., 1896, of the Am. Soc. of Mech. Engs. Part first gives a brief account from its infancy to 1895, and a succeeding article will show the wonderful changes since that time. 2500 w. Am Eng & R R Jour—Jan., 1897.

See also **IRON INDUSTRY.**

**United States Practice.**—Notes on American Iron and Steel Practice. Archibald P. Head. Read before the South Staffordshire Inst. of Iron & Steel Works' Managers. Notes taken during eight visits to the United States in the last eight years. Ill. Serial. Engng—March 25, 1898.

**Washer.**—Removal of Sand from Waste Water of Ore Washers. J. E. Johnson, Jr. Abstract of a paper read before the Am. Inst. of Min. Engs., at the Atlantic City meeting. Illustrates and describes the machine used at the plant of the Longdale Iron Co., in Virginia. 1200 w. Eng & Min Jour—March 12, 1898.

## IRON MINE.

See also **IRON GEOLOGY; IRON INDUSTRY; IRON MINING; IRON ORE; IRON REGION; METAL MINE; MINERAL REGION.**

**Algiers.**—The Iron Mines of Rar-el-Maden (Die Eisenerzgrube von Rar-el-Maden). With illustrations of these extensive mines, near Oran, Algiers, showing the cableways, and methods of working. 1000 w. Stahl und Eisen—July 15, 1899.

**China.**—Iron Mines in China. Reprint of an article from the "North China Daily News," giving a description of the iron and coal mines near Hankow, in Hupeh, of interest to those concerned in the railroad development of China. 1800 w. Cons Repts—June, 1897.

**Cuba.**—Bessemer Hematite from the Island of Cuba. Details of the iron ore mines of Cuba, with illustrations, and the low cost of production which makes it possible to ship it to British and European markets. 700 w. Ir & Coal Trds Rev—April 8, 1898.

Santiago Iron Mines. An illustrated description and history of the principal iron and manganese mines of Cuba, by whom they are operated, the quality of the ores, the methods by which they are mined, and the facilities for handling and transportation. 2000 w. Mines & Min—Oct., 1898.

The Iron Mines of Cuba. A report by Robert P. Porter. Shows past and present conditions and the effect of the recent military operations on this industry. 2200 w. Ir Age—Aug. 17, 1899.

See also **MANGANESE; MINERAL REGION.**

**Edison.**—Edison Ore Mines. An interview with Mr. Edison with a description of works and processes. 3000 w. Elec Rev, N. Y.—Oct. 27, 1897. Also Ir Age—Oct. 28, 1897.

See also **MAGNETIC SEPARATION—Edison.**

**Hodbarrow.**—The Hodbarrow Hematite Iron Ore Mines. Information of these deposits which, until the discovery of the Lake Superior mines, turned out a greater tonnage than any other iron mine in the world. The location of the deposit adds to the difficulties in working. 900 w. Col Guard—June 3, 1898.

**Lake Superior.**—Lake Superior Iron Mines in 1899. Review of the ore shipments, mining purchases, and other matters of interest. 2000 w. Eng & Min Jour—Jan. 13, 1900.

Lake Superior Iron Mines. Dwight E. Woodbridge. An account of what has been done during the past year and the preparations for the coming year. 2500 w. Mines & Min—Dec., 1899.

Lake Superior Iron Mines. Facts relating to these mines, with supplement giving the shipments for 1896 and the past forty-one years. 1200 w. Ir Trd Rev—Jan. 21, 1897.

The Lake Superior Iron Ore Mines and Their Influence Upon the Production of Iron and Steel. J. Head and A. P. Head. Read before the Inst. of Civ Engs. (British). The writers visited this district to satisfy themselves concerning the competition to be expected, and to investigate the mines, ores, means of mining, loading and unloading and transporting. Part first describes the region, its topography and geology, the mining methods, mines, etc. Ill. Serial. Col Guard—Sept. 8, 1899.

See also **Marquette; Minnesota; IRON INDUSTRY; IRON MINING; IRON REGION.**

**Mahoning.**—The Mahoning Iron Mine. An illustrated account of this mine and its working. 1800 w. Ir Age—Nov. 9, 1899.

See also **IRON WORKS.**

**Marquette Range.**—The Marquette Range—Its Discovery, Development and Resources. James E. Jopling. Interesting history of this valuable iron-range. Ill. 4000 w. Trans Am Inst of Min Engs—Nov., 1897.

**Minnesota.**—Characteristic American Metal Mines. Horace V. Winchell. Describing the Mines of the Minnesota Iron Company. Ill. 4000 w. Eng Mag—Sept., 1897.

**Minnesota, 1897.**—The Iron Mines of Minnesota in 1897. Reports a larger production than ever before with information regarding labor, transportation, etc. 1500 w. Eng & Min Jour—Jan. 8, 1898.

**Mountain Lease to Carnegie.**—The Lease of the Mountain Iron Mine. Recent arrangements made by the Carnegie Steel Co., Ltd., with editorial comment. 2500 w. Ir Trd Rev—Dec. 24, 1896.

**Newfoundland.**—The Wabana Iron Ore Mines. H. B. C. Nitze. Illustrates and describes rich deposits on the island of Newfoundland which are mined by open quarries close to deep water shipping facilities. 1000 w. Mines & Min—April, 1900.

**Sweden.**—The Gellivare Iron Ore Mines. H. Bauerman. Describes the location, deposits, working, shipping, etc. 2700 w. Col Guard—May 5, 1899.

The Grängesberg Iron Ore Mines. A description of the occurrence of the ore, methods of exploitation and working, separation, power-installation, and labor conditions. 2700 w. Ill. Ir & Coal Trds Rev—Sept. 9, 1898.

**Tilly Foster, New York.**—The Tilly Foster Mine. Edward K. Landis. Gives the history of this iron mine and the method of working. 1000 w. Jour Fr Inst—Sept., 1900.

**Turtle Lake, Canada.**—An Unusual Piece of Mining Work. J. T. Donald. Describes the deposits and mining at Turtle Lake, on the Canadian Pacific Railway, and gives the method used to determine the quantity of ore. 1000 w. Eng & Min Jour—July 24, 1897.

**U. S. Southern.**—The Iron Mines of the South, and How They Are Being Developed. Frank G. Carpenter. Historical review of the iron industry of this country, especially in the south. 3500 w. Tradesman—Jan. 15, 1897.

**Value.**—Determining the Value of an Iron Mine. Nelson P. Hulst. A consideration, in the order of their importance, of the factors that influence the commercial worth of iron mines. 3800 w. Eng Mag—April, 1896.

See also **MINE VALUATION.**

**IRON MINING.**

See also **IRON INDUSTRY; IRON MANUFACTURE; IRON MINE; IRON ORE; IRON REGION; MINERAL INDUSTRY; MINING; MINING AND METALLURGY; MINING MACHINERY.**

**Alabama and Georgia.**—Southern Iron Mining. William M. Brewer. A description of the iron ore mines of Alabama and Georgia. The methods of mining red hematite and brown limonite and manganese ores and the different processes of washing and preparing them for the furnace. Ill. 4000 w. Col Eng—Oct., 1897.

**Canada.**—Canadian Mining Project. An account of what it is expected will prove one of the largest iron and steel enterprises in the world. 900 w. U S Cons Repts, No. 538—Sept. 26, 1899.

**Commonwealth, Wis.**—Method of Mining at the Badger Mine, Commonwealth, Wis. O. C. Davidson. Read before the Lake Superior Mining Inst. Describes the methods used and the difficulties met. The maximum product attained in one month was 38000 tons. 800 w. Mines & Min—May, 1900.

**Costs, Readjustment.**—Readjustment of Iron Mining Costs. William Kelly. Synopsis of the presidential address before the Lake Superior Min. Inst. 3000 w. Ir Trd Rev—Feb. 15, 1900.

**Iron Mountain, Mich.**—Mining Ore Bodies of Uniform Grade. E. F. Brown. Read at the fifth annual meeting of the Lake Superior Mining Inst. Describes a system of mining in successful operation at the Pewabic mine, Iron Mountain, Mich. 1000 w. Ir Trd Rev—Sept. 1, 1898.

**Lake Superior.**—Lake Superior Iron Ranges. John Birkinbine. A general article on the conditions of working. 2800 w. Ir Trd Rev—Jan. 2, 1896.

Methods of Mining Iron Ore in the Lake Superior Region. Nelson P. Hulst. Descriptions of the methods used, with illustrations. 10500 w. Pro of Eng's Soc of W Penn—Feb., 1899.

The Lake Superior District in 1900. Waldon Fawcett. Some of the conditions tending to increase the production of iron ore. Preparations for haulage, storage and loading. Ill. 1500 w. Am Mfr & Ir Wld—April 5, 1900.

See also **Mesaba; Minnesota; IRON INDUSTRY; IRON MINE; IRON REGION; MINING.**

**Mesaba, Minn.**—Minnesota Iron Mines in 1896. Horace V. Winchell. An explauation of Mesaba Range problems and their solution, and of the three methods adopted for mining these flat deposits, with a statement of the conditions for the immediate future. 2000 w. Ir Trd Rev—Jan. 7, 1897.

**Mesaba Range.**—Explorations in the Mesaba Range. E. J. Longyear. The mode of occurrence and methods of work are explained. 2000 w. Trans Am Inst of Min Engs—Nov., 1897.

Mining Methods on the Mesaba Range. C. E. Bailey. A résumé of methods of mining in this region. The ore is a soft hematite, and the two systems of operating are the stripping or open pit, and the underground system. 3000 w. Trans Am Inst of Min Engs—Nov., 1897.

Mining Methods on the Mesaba Range. C. E. Bailey. From a paper read at the Tower meeting of the Am. Inst of Min. Engs. Describes the deposits, systems of operating, etc. 2500 w. Ir Age—July 29, 1897.

**Michigan.**—Early Iron Mining in Michigan. William P. Kibbee. Historical account of discovery and early development. 2900 w. Ir Age—June 25, 1896.

Iron Ore Mining in Michigan. A review of conditions based on report of the Commissioner of mineral statistics. 1000 w. Col Eng—Aug., 1896.

See also **Iron Mountain.**

**Minnesota.**—Iron Ore Mining. Charles Dean Wilkinson. From the Year Book of the Soc. of Engs., Univ. of Minnesota. Systems of mining used in Minnesota iron mines. 1600 w. Col Eng—Feb., 1896.

Methods of Iron Mining in Northern Minnesota. F. W. Denton. An illustrated description of the methods of mining employed. 9000 w. Trans Am Inst of Min Engs—Sept., 1897.

**Modern Methods.**—Modern Methods of Iron Mining and Smelting. William P. Kibbee. Brief account of the chief grades of iron ores, with methods of treatment, etc. 1500 w. Sci Am Sup—Sept. 5, 1896.

**Scotia, Pa.**—Iron Ore Mining. H. H. Stoek. The mining and washing of iron ores at Scotia, Penna. 3000 w. Col Eng—Dec., 1895.

**Sweden.**—Characteristic Features of Swedish Iron Ore Mining. G. Nordenstrom. Read before the Iron and Steel Inst., Stockholm. The geographical distribution of iron ores, their occurrence, nature and composition are considered, use of magnetic instruments in exploring, prospecting by means of diamond drilling, methods of working, ventilation, etc. 10300 w. Col Guard—Aug. 26, 1898.

Mining the Iron Ores of Arctic Europe. David A. Louis. This interesting article describes the mines and mining methods of the Aktiebolaget Gellivare Malmfält in northern Sweden. The mines are located within the Arctic circle, and work the colossal ore deposits of that region. The mines are generally open cuts and the ore very hard, dynamite being used to blast it out. Highly modern methods are used, the hauling being accomplished by electric locomotives in most cases. Two maps and many fine illustrations accompany the article. 3700 w. Eng Mag—Jan., 1899.

Mining Practice in Sweden (Ueber Schwedische Bergbaubetriebe). Josef Mauerhofer. Describing especially the methods employed in mining and handling the iron ores of Northern Sweden. Serial. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 1, 1899.

See also **IRON INDUSTRY; IRON REGION.**

**World Statistics.**—See **COAL MINING; IRON INDUSTRY.**

**IRON ORE.**

See also **IRON GEOLOGY; IRON INDUSTRY; IRON MINE; IRON MINING; IRON REGION.**

Notes on the Iron Ore Resources of Different Countries. Part first gives an illustrated account of the resources of the United States. 1600 w. Ir & Coal Trds Rev—May 28, 1897.

Some Common Iron Ores. Considers varieties of the magnetites, hematites, and carbonates. 2200 w. Eng & Min Jour—Dec. 16, 1899.

The Iron Ore Supply. John Birkinbine. Presented at the Lake Superior meeting of the Am. Inst. of Min. Engs. Shows the importance of the Lake Superior region as a contributor to the iron ore supply, its development and present status, and advances made elsewhere. 2800 w. Ir Age—Sept. 2, 1897.

**American vs. British.**—American as Compared with British Iron Ores. Walter J. May. Extracts from the report on the Mesaba Iron Range in Minnesota, by J. Edward Spurr; the ores are compared with English ores; methods of working are discussed, and related matters of interest treated. 2500 w. Prac Eng—Aug. 5, 1898.

**British Supply.**—British Iron Ore Requirements and Sources of Supply. Part first describes the position of the United Kingdom, and countries of Europe in regard to the supply. Serial. Col Guard—July 8, 1898.

On the Iron Ore Supplies Available for the British Iron Trade. Josiah T. Smith. Paper read before the recent conference of the British Iron Trade Assn. Discusses the extent to which some supplies may be further utilized, and the sources of cheap and suitable ores from various countries. 3000 w. Ir & Coal Trds Rev—June 18, 1897.

Our Iron Ore Supplies. Walter J. May. Suggestions for increasing the supplies of native iron ores without increasing the prices. 1000 w. Col Guard—May 26, 1899.

**Concentration.**—See **IRON MANUFACTURE; MAGNETIC SEPARATION.**

**Cuban.**—Cuban Iron Ore. Editorial on a project for establishing an extensive iron and steel plant at Boston for the working of ores from Cuba and Spain. 2500 w. Engr, Lond—Nov. 17, 1899.

**English West Coast.**—The Iron Ores of the West Coast. Reviews the history of the ores of the west coast of England, the deposits, cost of production, etc. 1500 w. Ir & Coal Trds Rev—July 14, 1899.

**European Supply.**—Foreign Iron Ores at the Disposal of European Works. Circumstances relating largely to Great Britain's supply. The ores of Spain and Sweden are specially discussed. 2000 w. Ir Age—Aug. 18, 1898.

**Finely Divided.**—Use of Finely Divided Iron Ore. J. Wiborgh. Read before the British Iron and Steel Inst. Considers the ways in which powdered iron ores obtained by concentration may be utilised. Ill. 3500 w. Col Guard—Aug. 18, 1899.

**Georgia.**—Some Notes on the Brown Iron Ores of Georgia. S. W. McCallie. Illustrates and describes the deposits and manner of working. 1500 w. Eng & Min Jour—March 3, 1900.

**High Class.**—The World's Chief Deposits of High Class Iron Ores. An account of the chief iron ore deposits of the world, with illustrations of the workings. 3000 w. Ir & Coal Trds Rev—Nov. 18, 1898.

**India.**—The Iron Ores of India. Details of the iron ore supplies as given in report of Major Mahon. 4000 w. Ir & Coal Trds Rev—Oct. 20, 1899.

**Limonite.**—The Limonites and Their Use in the Blast Furnace. J. C. Foster. Considers these ores and the manner of treating them, the plan of buying the ores on the basis of analysis, the objections to them, etc. 1200 w. Am Mfr & Ir Wld—March 17, 1899.

**Limonite, Amazon.**—See **MANGANESE.**

**Limonite, North Carolina.**—The Limonite Ores of Cherokee County, North Carolina. H. B. C. Nitze. Describes the deposits and the work on the different belts. 3000 w. Eng & Min Jour—April 3, 1897.

See also **IRON GEOLOGY—Alabama Limonites.**

**Limonite, Pennsylvania.**—Limonite Ores of Pennsylvania. T. C. Hopkins. Their composition and forms, and an account of the various places in the State where they are mined. Ill. 3800 w. Mines & Min—Oct., 1900.

**Magnetic Separation.**—See **MAGNETIC SEPARATION; PHOSPHATE—Magnetic Iron Ore.**

**Magnetic Prospecting.**—See **MAGNETIC PROSPECTING.**

**Malaga, Spain.**—See **NICKEL ORE.**

**Mesaba.**—See American vs. British; **BLAST FURNACE—Top Explosions; IRON INDUSTRY—Lake Superior; IRON MINE—Lake Superior; IRON MINING; IRON REGION.**

**New Zealand Magnetic.**—See **IRON MANUFACTURE.**

**Oriskany, Virginia.**—The Oriskany Iron Ores at Rich Patch Mines, Va. Edmund C. Pechin. General description. Serial. Eng & Min Jour—Feb. 1, 1896.

**Sampling.**—Methods of Sampling Iron Ore. C. T. Mixer. Presents the schemes adopted at some mines in Marquette County, to separate properly their various ores, with remarks on the occurrence of the iron and phosphorus in some of the deposits. 2300 w. Pro L Sup Min Inst—Aug., 1896.

See also **SAMPLING.**

**Sardinia.**—Discoveries of Iron Ore in Sardinia (Neue Eisenerzfunde auf der Insel Sardinia). Giving a geographical and geological account of the recent valuable discoveries in Sardinia. The ores are mostly magnetite and red hematite. 3500 w. Stahl und Eisen—July 1, 1897.

**Spain.**—See also **IRON INDUSTRY.**

**Supply.**—See British Supply; European Supply; **IRON INDUSTRY—Production.**

**Titaniferous Magnetites.**—A Brief Review of the Titaniferous Magnetites. J. F. Kemp. Reviews and summarizes what is known of the occurrences of the titaniferous magnetites in different parts of the world, giving a series of analyses illustrating the ranges in composition. Serial. Sch of Mines Quar—July, 1899.

**Values.**—Formulas for Determining the Value of Iron Ores. G. Teichgraber. Translated from "Stahl und Eisen." The formulas for the different elements affecting the cost of pig iron are worked out. 900 w. Eng & Min Jour—Oct. 10, 1896.

The Valuation of Iron Ore. G. Teichgraber. From "Stahl und Eisen." Showing what determines the cost of pig iron. 800 w. Am Mfr & Ir Wld—Sept. 4, 1896.

### IRON ORE ANALYSIS.

See also **IRON ANALYSIS.**

A Method for the Complete Analysis of Iron Ores, with Notes on Särnström's Method of Determining Manganese. George Auchy. A paper presented before the American Chemical Society. Investigations and experiments, with results. 1200 w. Ind and M—March 19, 1897.

Some Points in Connection with the Composition of Iron Ores. Part first deals with peculiarities of the magnetic ores. Serial. Col Guard—July 6, 1900.

**Manganese.**—Särnström's Method of Determining Manganese in Iron Ores. C. T. Mixer and H. W. Du Bois. This volumetric method gives results in about half an hour, and checks very closely with gravimetric methods. 1400 w. Jour Am Chem Soc—April, 1896.

**Phosphorus.**—Notes on the Determination of Insoluble Phosphorus in Iron Ores. Charles T. Mixer and Howard W. Dubois. Describes experiments made with the purpose of determining either the total phosphorus or the insoluble phosphorus by itself. 1400 w. Trans Am Inst of Min Engs—May, 1897.

**Spectrographic.**—A Spectrographic Analysis of Iron Ores and Associated Minerals. W. N. Hartley and Hugh Ramage. Brief report of results in examination of the spectra of the flame from the converter used in the basic Bessemer process, and investigations of a large number of iron ores. 700 w. Ir & Coal Trds Rev—Aug. 13, 1897.

**Sulphur.**—The Estimation of Sulphur in Iron Ores. R. W. Atkinson and A. J. Atkinson. Description of method of analysis which gives very satisfactory results. 1000 w. Ir & Coal Trds Rev—Sept. 11, 1896.

### IRON ORE HANDLING.

See also **CONVEYOR; DOCK; IRON ORE TRANSPORTATION; MECHANICAL HANDLING.**

**Bilbao.**—Past and Present (Altes und Neues über Bilbao). A. Kaysser. A descriptive sketch of former and modern methods of handling iron ore at the Spanish port. 3000 w. Stahl und Eisen—April 15, 1898.

**Conneaut, O.**—How Ore Is Handled. Illustrates and describes the ore-handling machinery and methods used at Conneaut, Ohio, on Lake Erie. 2800 w. Marine Rev—June 22, 1898.

**Great Lakes.**—Iron Ore Loading on the American Great Lakes. H. J. Slifer. With illustrations of the apparatus and harbor facilities by means of which about ten million tons of iron ore are handled in a season, in the Lake Superior region. With maps of the Gogebic Iron Region. 3000 w. Eng Mag—Nov., 1897.

See also **IRON INDUSTRY—Lake Superior; IRON REGION—Lake Superior.**

### IRON ORE TRANSPORTATION.

See also **IRON ORE HANDLING; MINERAL TRANSPORTATION; TRANSPORTATION.**

Economy in the Transport of Raw Materials in Iron Manufacture (Ersparnisse in der Bewegung der Rohstoffe für die Eisendarstellung). E. Schrödter. A paper before the December convention of the Verein Deutscher Eisenhüttenleute discussing railway tariffs, and transport facilities for iron ore, fuel, etc.; the use of mechanical conveyors, etc.; also discussion. 3000 w. Stahl und Eisen—Jan. 1, 1900.

**Great Lakes.**—Iron Ore—From Mine to Furnace. Waldon Fawcett. Illustrated description of transportation facilities from Lake Superior mines to the vicinity of Pittsburg. 1800 w. Eng & Min Jour—Jan. 20, 1900.

The Control of Lake Ore Shipping. Waldon Fawcett. Discusses the elements of strength held by the Rockfeller and other ore-moving interests. 1600 w. Am Mfr & Ir Wld—July 28, 1900.

Transportation of Lake Superior Ores. Waldon Fawcett. An illustrated account of the ore-carrying vessels, handling cargoes, railways, etc. 2200 w. Mod Mach—Oct., 1900.

See also **IRON INDUSTRY—Lake Superior; IRON REGION—Lake Superior.**

**Pittsburg.**—The Bessemer Road and Its Conneaut Terminals. Presents some features of the Pittsburg, Bessemer and Lake Erie route from Conneaut to Pittsburg, the harbor arrangements, and dock improvements and the importance of the road in the handling and transportation of ore. Ill. 1200. Ir Trd Rev—March 31, 1898.

**IRON PIPE.**

See **GAS PIPE; PIPE; WATER PIPE.**

**IRON PLATE.**

See also **ARMOR PLATE; MATERIALS' STRENGTH; PLATE; STEEL PLATE.**

**Krupp Oxidation Experiments.**—Krupp's Oxidation Experiments with Iron and Steel Plates. H. Otto. Results of twelve years' experiments on annealed and unannealed iron and steel of varying composition. 1200 w. Ir & Coal Trds Rev—Aug. 14, 1896.

**Strength Computations.**—Computations for Rectangular Sheet Iron Plates (Calcul des Tôles Rectangulaires). M. Koechlin. A mathematical discussion of the strength of a rectangular plate of sheet iron supported at two or four edges, and uniformly loaded over the entire surface. 2500 w. Génie Civil—Nov. 25, 1899.

**IRON PRODUCTION.**

See **IRON INDUSTRY—Production.**

**IRON PROSPECTING.**

**Magnetic.**—See **MAGNETIC PROSPECTING.**

**IRON PROTECTION.**

See **METAL CORROSION; METAL PROTECTION.**

**IRON REGION.**

See also **IRON GEOLOGY; IRON INDUSTRY; IRON MINE; IRON MINING; IRON ORE; MINERAL REGION.**

**Alabama.**—The Brown Ore Deposits Near Leeds, Alabama. William B. Phillips. Report from personal observations of the writer, who holds that the district will become a notable producer. Ill. 2000 w. Eng & Min Jour—April 23, 1898.

**British Columbia.**—Iron Ore Deposits of Vancouver and Texada Islands. William M. Brewer. An account of rich deposits which have received little attention. 1200 w. Eng & Min Jour—May 5, 1900.

See also **MINERAL REGION.**

**Canada.**—Canada: Its Iron Resources and Possibilities. Walter R. Nursey. Information concerning the deposits in Canada, their richness and extent. 3800 w. Ir & Coal Trds Rev—April 27, 1900.

Canada as a Future Competitor in Coal and Iron. Concerning the iron ore resources of Nova Scotia and Ontario. 2200 w. Ir & Coal Trds Rev—Aug. 24, 1900.

**Cape Breton Island.**—Cape Breton Island and Its Magnetic Iron Deposit. Martin A. Macpherson. Brief account of the island and its immense wealth, the ore deposits, quantity, smelting, etc. 2200 w. Ir & Coal Trds Rev—Aug. 25, 1899.

**Cebolla River.**—See **MANGANESE.**

**China.**—The Iron Ore Deposits in the Tayeh District Province of Hupeh, China (Eisenerzvorkommen im Tayeh-Bezirk, Prov. Hupeh, China). G. Leinung. A general review of the geological and mineralogical conditions of this important deposit of iron ore, and an account of the present workings. 5000 w. Stahl und Eisen—March 1, 1898.

The Iron Ore Deposits of the Tayeh District, China. G. Leinung. Condensed translation. Concerning the importance of the district and the principal ore occurrences. 1200 w. Am Mfr & Ir Wld—April 1, 1898.

The Iron Ore Beds in the Tayeh District, Hupeh Province, China. G. Leinung. Abstract translation from "Stahl und Eisen." Report concerning the red iron ore and magnetic iron deposit, and the hematite ore deposits. 2000 w. Ir & Coal Trds Rev—April 15, 1898.

See also **COAL REGION.**

**Cuba.**—See **IRON MINE; MINERAL REGION.**

**Cumberland, Eng.**—The Cumberland Iron Ore Deposits. W. Wilson Barnes. Considers the probability of new discoveries of hematite iron ore, and things necessary to secure prosperity for the British iron and steel industry. 2000 w. Ir & St Trds Jour—Feb. 18, 1899.

**Elba.**—The Iron Ores and Blast Furnaces of Elba. Information concerning the arrangements being made for the erection of blast furnaces on this island, and the iron ores. 1600 w. Ir & Coal Trds Rev—July 6, 1900.

**France.**—The Deposits of Oolitic Ore in the New Basin of Briey (Les Gisements de Minerais de Fer Oolithiques du Nouveau Bassin de Briey, Meurthe-et-Moselle). G. Rolland. An account of the development of these new sources of iron ore in the northeastern part of France. 1500 w. Mon Ind—Feb. 12, 1898.

**Georgia Brown Ore.**—Georgia's Brown Ore Fields. Interesting detailed description of the extensive deposits and their commercial character. 1400 w. Am Mfr & Ir Wld—June 7, 1900.

**Germany.**—The Iron Ore Deposits of Germany. A. Kowastch. Calls attention to rapidly approaching exhaustion of many of the oldest mines, and recommends Germany as a market for southern ores. 1500 w. Tradesman—June 1, 1897.

**India.**—The Iron Resources of India. Editorial on the report of Jeremiah Head, quoting some facts. 2500 w. Engng—May 6, 1898.

See also **COAL REGION; IRON INDUSTRY; IRON MANUFACTURE.**

**Labrador.**—The Iron Ores of the Labrador Peninsula. A. P. Low. An interesting illustrated account of a personal examination of some yet unworked deposits, describing the occurrence, character, and analysis of the ores and the general facilities of the region. Ill. 2200 w. Eng Mag—May, 1900.

**Lake Superior.**—The Lake Superior Iron Ore Region. Horace V. Winchell. Gives the facts as to the discovery and early history, with description of the mines and account of the present methods of exploiting them. Ill. 20000 w. Trans of the Federated Inst of Min Engs (England)—June 8, 1897.

See also **Marquette; Minnesota; IRON INDUSTRY; IRON MINE; IRON MINING.**

**Madagascar.**—The Iron Industry of Madagascar (L'Industrie du Fer à Madagascar). A review of the tour of investigation recently made by M. Breton, showing the presence of workable deposits of iron ore in various parts of the island. 2000 w. Mon Ind—Jan. 6, 1900.

**Marquette, Michigan.**—The Marquette Iron Range of Michigan. George A. Newett. Description of the district and mines, with map. Ill. 7700 w. Pro L Sup Min Inst—Aug., 1896.

**Minnesota.**—The Iron Resources of Minnesota. Horace B. Winchell. Read before the Northwestern Immigration Convention. Valuable statistics are given and the economic phase of the industry is fully discussed. 3500 w. Ir Trd Rev—Dec. 5, 1895.

**Minette District, Europe.**—The Minette District of Lorraine, Luxembourg and France. Illustrated account of the iron deposits, production, mining cost, etc. Map. Serial. Ir Age—June 28, 1900.

See also **IRON GEOLOGY—Lorraine.**

**Newfoundland.**—A Newfoundland Iron Deposit. R. E. Chambers. Paper read before the Min. Soc. of Nova Scotia. The deposits are located on Great Belle Island in Conception Bay and have been worked. The ore contains from 54 to 59 per cent. metallic iron. 1200 w. Ir Age—April 2, 1896.

**New South Wales.**—Iron Ore in New South Wales. Extracts from a preliminary report by J. B. Jaquet, Geological Surveyor to the New South Wales Mine Department, upon deposits of iron ore in the Carcoar district. 1000 w. Col Guard—Sept. 14, 1900.

Iron in New South Wales. Some facts and figures regarding the iron deposits and iron works in country named. 1000 w. Eng News—Oct. 15, 1896.

**New Zealand.**—Iron Ores and Lands of New Zealand. James Hector. Notes from the Handbook of New Zealand, 1886. 1800 w. N Z Mines Rec——July 16, 1900.

See also **IRON MANUFACTURE.**

**Norway.**—Iron Ore Deposits of Dunderland, Norway. H. L. Geissel. Brief account of rich deposits of great extent. 700 w. Eng News—April 26, 1900.

The Silicious Iron Ores of Northern Norway. H. T. Newbigin. Describes iron-ore deposits lying between 66 and 68 degrees North. 1200 w. Ir & Coal Trds Rev—April 8, 1898.

**Nova Scotia.**—The Iron Ores of Nova Scotia. George George B. Cowlam. Describes new discoveries of magnitude and economic importance. 1500 w. Col Guard—July 20, 1900.

**Russia.**—See COAL REGION; IRON INDUSTRY; MINERAL REGION.

**Scandinavia.**—The Scandinavian Iron Ore Beds (Ueber die Bildung der Skandinavischen Eisenerzlager). A review by Prof. Vogt of Christiania, of the geological and mineralogical conditions of the iron ore beds of the Scandinavian Peninsula. 5000 w. Glückauf—June 5, 1897.

**Spain.**—See COAL REGION; IRON INDUSTRY.

**Sweden.**—A Description of Some Little Known Iron Ore Deposits in Northern Sweden (Beschreibung einiger bisher Wenig Bekannter Erzvorkommen in dem Erzrevier von Jukkasjärvi (Schweden) und Umgebung). From an article by Walfr. Peterson in "Jernkontorets Annaler," giving an account of the iron ores in the extreme north of Sweden. 2 parts. 2000 w. Glückauf—July 21, Aug. 4, 1900.

Some Little Known Iron Ore Deposits in Northern Sweden (Ueber einige Weniger Bekannte Eisenerz Vorkommen im Nördlichen Schweden). Otto Vogel. An article, founded on Swedish official reports, describing the location of ore beds and giving analyses of ores, with tables and map. 2 parts. 1 plate. 5000 w. Stahl und Eisen—May 15, June 1, 1900.

Sweden's Wealth in Iron Ore (Schwedens Eisenerzschätze). Abstract of an article in "Jernkontorets Annaler" by C. Nordenström, giving statistical information with tables. Serial. Stahl und Eisen—May 1, 1900.

Swedish Iron Ore Deposits. Hjalmar Lundbohm. A summary of a general report made to the Swedish Board of Trade, and presented at the Stockholm meeting of the Iron and Steel Institute. Sections of the ore beds are given and the results of chemical analyses. 8000 w. Engng—Sept. 9, 1898.

The Great Magnetite Deposits of Swedish Lapland. David A. Louis. An account of the rich iron ore deposits of Northern Europe and the opening up of the region by railway construction. 3000 w. Eng Mag—July, 1899.

The Iron Ore Deposits of Kiirunavaara and Luossavaara. Hjalmar Lundbohm. Read before the Iron and Steel Inst., Stockholm. An account of these large deposits in Sweden, describing their situation, area, quality, various types, etc. 4400 w. Col Guard—Aug. 26, 1898.

The Iron Ores of the Arctic Circle. Perry F. Nursey. In connection with the meeting of the Iron & Steel Inst., at Stockholm, an excursion is to be made to the arctic mines. Information concerning these deposits is given. Serial. Ind & Ir—Aug. 19, 1898.

The Iron Ores of Northern Sweden. A narrative of the visit of the members of the Iron and Steel Institute to the Swedish mines, with valuable data as to the nature of the ores, methods of working, etc. Serial. Engng—Sept. 2, 1898.

See also IRON INDUSTRY; IRON MINE; IRON MINING; RAILWAY—Sweden-Norway.

**Tasmania.**—An Extensive Iron Formation, West Coast of Tasmania. David Jones. Describes one of the largest deposits of iron known in Tasmania, and probably in the world. 2000 w. Trans of Aust Inst of Min Engs—Vol. V.

**Virginia.**—Iron Ores of the Potsdam Formation in the Valley of Virginia. Charles Catlett. A description of the general nature of these ores, cost of mining, capacity of the deposits, methods, etc. 4000 w. Trans Am Inst of Min Engs—Feb., 1899.

The Rich Patch Iron Tract, Virginia. H. M. Chance. Describes the location, topography, geology, ores, mining development, and methods. Ill. 3500 w. Trans Am Inst of Min Engs—Feb., 1899.

**IRON SPECIFICATIONS.**

See STEEL SPECIFICATIONS.

**IRON TESTS.**

See IRON; MATERIALS' STRENGTH; STEEL; TESTING.

**IRON TRADE.**

See IRON INDUSTRY.

**IRONWORK.**

See also METAL WORK.

**Architectural.**—Notes on the Design and Erection of Architectural Ironwork. Henry A. Cutter. A paper read before the Royal Institute of Public Health. Reviews the development under the influence of costly sites, concentrating population, and demands for light, air, and fire protection. Considers structural shapes and formulates principles of design and erection. 2500 w. Ill. Builder—Sept. 3, 1898.

**Ornamental.**—Architectural Wrought Iron Ornament. W. Martin Aiken. An illustrated article describing the ornamental and mechanical features of wrought iron work in architectural decoration. 3500 w. Eng Mag—July, 1898.

The Use, Design and Manufacture of Iron in Ornament. Chester B. Albree. Full paper. Discusses ancient and modern work, describing processes of manufacture, and showing the importance of architects and engineers studying how to use this material effectively. Ill. 6000 w. Pro Engs' Soc of W Penna—March, 1899.

The Use, Design and Manufacture of Iron in Ornament. Chester B. Albree. Abstract of a paper read at the monthly meeting of the Engs. Soc. of W. Penna. Discusses the ancient and modern work and the need of a better understanding on the part of architects and designers of the processes of manufacture. 900 w. Ir Trd Rev—March 30, 1899.

**Wrought and Cast.**—Wrought and Cast Ironwork. Historical illustrated description. 3800 w. Ill Car & Build—Aug. 21, 1896.

**IRON WORKS.**

See also BLAST FURNACE; IRON INDUSTRY; IRON MANUFACTURE; IRON REGION; STEEL MANUFACTURE; STEEL WORKS.

Iron and Steel Works Plant. Harry B. Toy. Read before the South Staffordshire Iron and Steel Inst. Describes an economical plant for producing about 1000 tons per month of iron bars, criticising in detail. 3800 w. Col Guard—Dec. 22, 1899.

**Apollo.**—The Apollo Iron and Steel Company's Works at Vandergrift. Franklin Hilton. Illustrated detailed description of a plant in the United States for the production of sheets. 2000 w. Ir & Coal Trds Rev—Dec. 3, 1897.

The New Works of the Apollo Iron and Steel Company. Illustrated detailed description of a model plant, possessing many features of novelty. 3000 w. Ir Age—June 17, 1897.

**Bilbao, Spain.**—The Iron and Steel Works of the North of Spain. Particulars of the Viscaya Company's plant at Bilbao. 2200 w. Ir & Coal Trds Rev—Aug. 14, 1896.

**Bowling, Yorkshire.**—The Bowling Iron and Steel Works. Description of a Yorkshire iron works started in 1780, but now compelled to shut down permanently. 700 w. Ir & St Trds Jour—March 14, 1896.

**Chinese Government.**—The Government Iron and Steel Works at Han-yang, China. G. Toppe. Description by the director general, of the Government Iron and Steel Works, consisting of two 60-ft. blast furnaces and mills for turning out merchant iron and steel and rails. There are 34 Europeans employed in the works. 1200 w. Am Mfr & Ir Wld—April 10, 1896.

**Colchester, Eng.**—Davey, Paxman and Company's Works, Colchester. Illustrated account of these noted works, noticing special features observed on a recent visit. Serial. Engr, Lond—Dec. 10, 1897.

**Colonial American.**—Colonial Ironworks in 1731 and Afterwards. Historical account of the industry in this country in colonial times. 1500 w. Bull Am Ir & Steel Assn—July 20, 1897.

**Commentry-Fourchambault Co., France.**—Mines and Works of the Commentry-Fourchambault Company. From a descriptive notice prepared for the International Jury at the Bordeaux Exhibition. The various collieries are briefly described. The iron and steel works, dating from 1825, employ 2700 men. while the mines have 6500 employees. The yearly output is 1,000,000 tons of coal, coke, and briquettes; 80,000 tons of pig iron, and 40,000 tons of finished iron and steel. 2500 w. Col Guard —Dec. 18, 1895.

**Cyfarthfa, Wales.**—The Iron and Steel Institute. An account of two excursions, one in Old Dowlais, and the other to the Cyfarthfa Iron and Steel Works, with historical account of the latter which are especially interesting because of the antiquity. 4800 w. Eng, Lond—Aug. 20, 1897.

**"Deutscher Kaiser," Westphalia.**—The "Deutscher Kaiser" Company's Iron Works. From "Stahl und Eisen." Illustrates and describes this recent and extensive construction. 1000 w. Ir & Coal Trds Rev—June 30, 1899.

The "Deutscher Kaiser" Iron Works at Bruckhausen on the Rhine (Gewerkschaft "Deutscher Kaiser" in Bruckhausen am Rhein). A general description of this large new works in the Westphalia district with views of the furnaces, and elevation and details of compound blowing engines. 2500 w. 1 plate. Stahl und Eisen—June 15, 1899.

**Dowlais-Cardiff.**—The New Dowlais-Cardiff Iron and Steel Works. Brief history with illustrated description of plant and appliances. 4000 w. Ir & Coal Trds Rev—May 21, 1897.

**Embreville, Tenn.**—The Embreville Estate, Tennessee. Guy R. Johnson. A brief description of the Embreville property and the iron made there. 2000 w. Trans Am Inst of Min Eng—April, 1896.

**Glengarnock, Scotland.**—The Glengarnock Iron and Steel Works. Illustrated description. 3000 w. Ir & Coal Trds Rev—Aug. 28, 1896.

**Hofors, Sweden.**—The Hofors Iron Works, Sweden. Illustrated description. 2500 w. Engng—Oct. 7, 1898.

**Japan.**—The Manufacture of Iron in the East. R. H. Thwaite. Detailed description of the new Japanese Government Iron and Steel Works. 2000 w. Ind & East Engr—March, 1900.

**"Kraft," Stettin.**—The "Kraft" Iron Works (Das Eisenwerk "Kraft"). Illustrated description of these new works at Kratzwiek, near Stettin, on the Oder, with plate of blast furnace details. 3500 w. Stahl und Eisen—Sept. 1, 1897.

**Mahoning Valley, Pa.**—Iron Works of the Mahoning Valley. Illustrated description. 2200 w. Ir Tr Rev—Jan. 2, 1896.

See also **IRON MINE.**

**New South Wales.**—See **IRON REGION.**

**Palmer's Jarrow-on-Tyne.**—The Works and Operations of Palmer's Shipbuilding and Iron Company. Illustrates and describes principally the foundries and blast-furnaces, and methods of manufacture of pig iron and steel. 2400 w. Ir & Coal Trds Rev—Feb. 16, 1900.

**Pencoyd, Pa.**—The Plant of the Pencoyd Iron Works, Pencoyd, Pa. Detailed description with drawings and illustrations. 4500 w. Eng News—Sept. 29, 1898.

**Russia.**—The Iron and Steel Industries of South Russia. Illustrated description of the Briansk Company's Alexandroffsky Iron and Steel Works. 900 w. Ir & St Trds Jour—April 4, 1896.

See also **IRON INDUSTRY.**

**Seraing, Belgium.**—The Seraing Works of the Cockerill Company, Belgium. This company employs 10,000 men in its mines and works. The wages of the men are given, and the works described. 2000 w. Ir & Coal Trds Rev—Jan. 31, 1896.

**United States.**—Iron and Steel Works of the United States. From the "Directory of Iron and Steel Works." Information respecting the development and present number of works and manufacturing plants. 1200 w. Am Arch—Aug. 29, 1896.

The Iron and Steel Works of the United States. Items taken from the introduction to the "Directory of Iron and Steel Works," respecting the development and present number of works and manufacturing plants in these industries. 1600 w. Eng, Lond—July 13, 1896.

**United States, 1898.**—Our Iron and Steel Works in 1898. James M. Swank. Extracts from preface to the Fourteenth Edition of the Directory to the Iron and Steel Works of the United States, published by the American Iron & Steel Assn. 1800 w. R R Gaz—July 8, 1898.

**Vandergrift, Pa.**—See Apollo.

## IRRIGATION.

See also **CANAL; DAM; DESERT; RESERVOIR; RIVER REGULATION; WATER FLOW.**

A Few Hints to Students of Irrigation Engineering. A. M. Ryon. The work in this field that will be required in the future, and the importance that the irrigation engineer should understand the laws and business side of the undertaking. 2600 w. Sch of Mines Quar—Jan., 1897.

Irrigation. Guy M. Walker. Reviews the history of irrigation in ancient and oriental countries, and calls attention to its importance in this country, offering suggestions for the raising of the needed funds. 2000 w. State's Duty—June, 1897.

Irrigation Studies. Elwood Mead. Extracts from the report of the U. S. Dept. of Agriculture, concerning methods of distributing and using water in irrigation. 6600 w. Pro Am Soc of Civ Engs—May, 1900.

The Importance of Water in Plant Production. Thomas F. Hunt. A scientific dissertation, useful not only to agriculturists, and horticulturists, but to students of the art of irrigation. 5200 w. Clay Rec—March 14, 1896.

The Importance of Water in Plant Production. Thomas F. Hunt. The writer considers the water supply the most important factor in farming and gardening operations. 6000 w. Brick—March, 1896.

The Irrigation of Arid Lands. J. J. Miller. Deals with the artificial means of making arid lands profitable. 2000 w. Yale Sci M—Nov., 1896.

**Appliances.**—See **WATER FLOW—Measuring Appliances.**

**Artesian.**—Artesian Irrigation. The method of irrigation used in South Dakota, where the supply is obtained from artesian wells, is described. 1100 w. Sci Am—July 23, 1898.

See also **Pump; Subsoil Water; U. S. Western; ARTESIAN WELL.**

**Bear River, Utah.**—The Bear River Irrigation System, Utah. W. P. Hardesty. The article contains full details of the work and is illustrated by cuts and sections of the dam and tunnel. Serial. Eng News—Feb. 6, 1896.

**California, Southern.**—Water Supplies in Southern California. J. L. Van Ornum. A consideration of the physical characteristics of this region, with a study from personal investigations made eighteen months ago in the San Gabriel and San Bernardino Valleys. The chief mode of development is by tunneling, though it contains examples of all important methods. 5500 w. Jour Assn of Engng Soc—Feb., 1897.

**Canada, North-West.**—Irrigation in North-West Canada. From the Annual Report of the Dept. of the Interior for 1895. Information of the area of arid region in Canada. Serial. Ind Engng—April 10, 1897.

Irrigation in the North-West Territories. William Pearce. A general talk on the benefits of irrigation and the advantage to be derived from its use in all localities. 2000 w. Can Eng—June 1897.

**Canal, Mexico.**—See **Mexico.**

**Carey Law.**—The Stepchild of the Republic. William E. Smythe. A discussion setting forth the importance of Arid America, its size and character. The Carey law and what it has done and will do for the situation. Steps necessary for the final solution of the problem. 3800 w. N Am Rev—July, 1896.

**China.**—Kuan Hsien Irrigation Works. Description of one of the oldest irrigation works in the world taken from a report of a journey made by S. J. L. Litton to North Ssu-Ch'uan. 1200 w. Engr, Lond—Oct. 21, 1898.

Irrigation in the Celestial Empire. Illustrated account of Chinese works 2000 years old which are constructed and maintained in an unusual, though successful manner. 1400 w. Eng Rec—Jan. 28, 1899.

**Civilizer.**—Irrigation as a Civilizer. Extracts from a paper by F. W. Blackmar, basing his plea upon social considerations, with discussion of the views presented. 3400 w. Gunton's Mag—Oct., 1898.

**Colorado.**—Immense Drainage Project. Richard H. Edmonds. An account of an irrigation development in the Arkansas river valley, in Prowers Co., Colorado, through the enterprise of New York capitalists. 3000 w. Mfrs Rec—March 3, 1899.

Peculiar Features of Irrigation Engineering in Colorado. H. A. Crafts. A fully illustrated account of irrigation methods in Colorado with details of ditch construction and data as to cost, capacity, and operation. 3500 w. Eng Mag—Feb., 1898.

Some Late Features of the Hydraulics of Irrigation. From Bull. No. 33, of the Colorado Agricultural Experiment Station, showing that in the Poudre River district, one-third the irrigating water returned to that river, and about 30 per cent. on the Platte. 900 w. Eng Rec—April 4, 1896.

Their Currents Turned Awry. H. A. Crafts. Describes the modes of storing water for irrigation, and gives an illustrated account of the diversion of water from the head of the Big Laramie River to the Cache la Poudre River. 1600 w. Harper's Wk—June 12, 1897.

See also **Mountain; Water Measurement; CANAL—Wyoming and Colorado.**

**Colorado, Montrose Canal.**—The Montrose Irrigation Canal, Colorado. W. P. Hardesty. Illustrated description of features of interest of a canal which irrigates about 6000 acres. 2200 w. Eng News—March 23, 1899.

**Corona, Cal.**—Pipe Line No. 2 and the Lands Irrigated under it at Corona, Riverside Co., Cal. H. Clay Kellogg. Gives the source of the supply, materials used, the engineering work, etc. 3000 w. Jour Assn of Engng Socs—Nov., 1897.

**Cyprus.**—Irrigation Works in Cyprus. Discussion of the work about to be undertaken to store up the supply of water for irrigation of the plains during the dry season. 1200 w. Engr, Lond—Nov. 26, 1897.

**Economy.**—The Conservation of Soil Moisture and Economy in the Use of Irrigation Water. E. W. Hilgard and R. H. Loughridge. Considers the amount of water required by crops, the most economical mode of using irrigation water, and the conservation of the moisture imparted to the soil. 3200 w. Ind Forester—Dec., 1898.

**Egypt.**—Public Works in Egypt. Summary of report for 1897, of Sir W. E. Garstin, Under Secretary for Public Works, upon the Irrigation Dept. Briefly reports the increase in the chief crops, and gives information of drainage works and other improvements. 1600 w. Arch, Lond—Nov. 11, 1898.

See also **DAM—Assouan; RIVER REGULATION—Nile.**

**Idaho.**—Irrigation in Idaho. Brief review of the work that has been done, with illustrations. 800 w. Sci Am—Sept. 8, 1900.

**India.**—Irrigation in India. F. C. Cotton. The object of the paper is to show how the nation may be rescued from famines and enriched by the water of its great rivers, and the prosperity that will follow. 6300 w. Jour Soc of Arts—Oct. 12, 1900.

Irrigation in India. Russick Loul Roy. Discusses the need of improving the water supply for irrigation purposes, reviews the different districts, what has already been done and the results. 1600 w. Ind Engng—Aug. 14, 1897.

Irrigation Works in the Jeypore State, Rajputana, India. Charles Egremont Stotherd. A short description of some of the works, showing the different methods adopted, and the results attained. Ill. 4400 w. Ind & East Engr—June, 1900.

Lower Coleroon Anicut. An account of the proposed improvements and their cost. 1200 w. Ind Engng—Sept. 24, 1898.

Tank Irrigation in Central India. George Palmer. Describing the reservoir system of irrigation used in the State of Hyderabad, with an account of the topographic, climatic, and administrative influences affecting the system; with maps and tables. 3000 w. Eng Mag—April, 1898.

Tank Irrigation in Central India. George Palmer. The second paper shows the arrangement of a typical series of tanks, with illustrations of tanks, weirs, and feeders. 3000 w. Eng Mag—May, 1898.

The Palar Anicut System. General plan of the head works and a cross-section of the anicut, giving particulars of interest to the irrigation engineer. 900 w. Ind Engng—Dec. 25, 1897.

See also **Jeypore; Madras; Madura; Nira; Punjab; Sind; DAM.**

**India, Northwest.**—Irrigation in the Northwest. From the report of the Irrigation Branch of the Northwest Provinces, on the Great Ganges Canal, the Eastern Jumna Canal, the Agra Canal, the Betwah Canal, with reports of progress. 1600 w. Ind & East Eng—March 28, 1896.

**Jeypore, India.**—Irrigation in Jeypore State. Describes the type of heavy earth dams, built where labor alone is cheap, which are afterwards fitted with masonry core walls when they appear necessary. 2200 w. Eng Rec—Jan. 13, 1900.

**Law.**—The Law of Water and Modern Irrigation. Richard J. Hinton. Reviewing the United States Circuit Court decision that the California laws creating municipal irrigation districts are unconstitutional, and favoring State ownership of water. 3800 w. Eng Mag—Jan., 1896.

Schemes for Extending Irrigation. W. Hughes. Note presenting a few schemes likely to be of use in preventing famine. 700 w. Ind Engng—Nov. 6, 1897.

**Madras Experimental.**—An Experimental Irrigation Farm at Bellary. Discussion of the proposed plan of experimental farms being opened to promote agricultural education in the Madras Presidency. 1500 w. Ind Engng—March 6, 1897.

**Madura, India.**—The Diversion of the Periyar. John Pennycuick. Abstract from "Proceedings of the Institution of Civil Engineers" (England), Vol. CXXVIII. An account of work in India for the irrigation of the Madura district. 1700 w. Jour W Soc of Engs—Oct., 1897.

**Methods.**—Methods of Irrigation. F. P. Hallahan. Describes the two methods in general use, and favors the modern method. 700 w. Am Soc of Ir Engs—April, 1895-1896.

**Mexico.**—Canal Irrigation in Modern Mexico. C. P. MacKie. Descriptive of the Tlahualilo canal system and its construction. Ill. 3800 w. Eng Mag—May, 1897.

Canal Irrigation in Mexico. Hunter Morrison. Explains the system of the Tlahualilo company of Mexico, the difficulties in the accomplishment of the work, the administration and operation. 1700 w. Yale Sci M—May, 1898.

Irrigation in Mexico. An account of proposed undertakings which will undoubtedly be of great benefit to the country. 1100 w. U S Cons Repts, No. 451—June 14, 1899.

See also **DRAINAGE—Mexico.**

**Montana.**—Possibilities of Irrigation in Montana. S. B. Robbins. Claims 20,000,000 acres of arable land in the State which could be profitably irrigated. Reviews the advantages and the conditions. •2000 w. W Min Wld—Nov. 21, 1896.

**Mountain, Colorado.**—Difficulties of Mountain Irrigation Engineering. H. A. Crafts. Illustrates various features of mountain construction known as North Fork ditch, in Colorado. 1600 w. Sci Am—Oct. 1, 1898.

**Navaho Reservation.**—Recent Irrigation Work on Navaho Reservation. Cosmos Mindeleff. A brief illustrated account of the work to benefit the reservation, but largely devoted to description of the tribe inhabiting the region. 2000 w. Sci Am—Jan. 23, 1897.

**Nile Barrage.**—See **Egypt; DAM—Assouan; RIVER REGULATION—Nile.**

**Nira, India, Canal.**—The Nira Irrigation Canal. Describes one of the large works designed for famine-relief purposes. Maps and sections. Serial. Engr, Lond—Feb. 5, 1897.

**Ontario, Cal.**—See **Tunnel, Ontario, Cal.**

**Pecos Valley, Texas-New Mexico.**—The Irrigation Works of the Pecos Valley. Elwood Mead. An interesting description of the method used in this valley and the changes wrought by water. 1800 w. Purdue Soc of Civ Engs—1896.

The Pecos Valley Irrigation System. L. B. Howell. Describes a system having at present 200000 acres under its operated canals. Gives map, cross-section of lower dam and views. 1500 w. Eng News—Sept. 17, 1896.

**Practical Points.**—Some Practical Points in Irrigation Engineering. R. C. Gemmell. Hints to the young engineer regarding irrigation surveys and construction. 4500 w. Technic—1897.

**Progress.**—Recent Progress in Irrigation. F. H. Newell. Read at Irrigation Congress, at Lincoln, Neb. Recent development has been along the line of increase of area cultivated. Very few large systems have been constructed. The small works have usually been successful. Discusses why large corporate enterprises often fail. 2800 w. National Advocate (San Francisco)—Dec., 1897.

**Pump.**—Pump Irrigation in the West. Hunter Morrison. Describes method of irrigating the Great Plains of Kansas, Nebraska, etc., and the benefit derived. Ill. 1500 w. Yale Sci M—Feb., 1898.

Pump Irrigation on the Great Plains. H. V. Hinckley. Showing that pump irrigation contributes to the preservation of small farming and increases the value of land, and giving directions regarding selection of plant and power. Ill. 3400 w. Eng Mag—April, 1896.

See **Artesian; U. S. Western.**

**Punjab, India.**—Punjab Irrigation, Ancient and Modern. James Broadwood Lyall. An exceedingly interesting paper read before the Indian section, Feb. 13, from which many valuable hints may be derived by modern engineers in irrigation. Prefaced by remarks from the chairman of the meeting and followed by a discussion. 15500 w. Jour Soc of Arts—Feb. 21, 1896.

**Rio Grande.**—Submerged Wooden Pipe and Concrete Diverting Dam for the Rio Grande Dam and Irrigation Co. J. L. Campbell. Describes features of a comprehensive system of irrigation, which, if completed, will supply water to 300000 acres of land. Ill. 2000 w. Eng News—July 15, 1897.

**Seepage.**—Seepage from Canals. Review of important investigations showing that in Colorado alone water worth $6,000,000, at least, is lost through leakage from ditches. 1200 w. Eng Rec—Aug. 27, 1898.

The Effect of Temperature on the Seepage of Water from Irrigation Canals. A collection of information from various sources, bearing upon the losses of water by absorption, evaporation, etc. 1500 w. Eng News—May 12, 1898.

**Siam.**—Irrigation in Siam. Account of the progress made by the Siamese in the art of irrigation, from which it appears that artificial irrigation is well advanced in Siam and its advantages fully appreciated. A description of some important irrigation works now in progress follows. 1000 w. U S Cons Repts—May, 1896.

**Sind, India.**—The Sind Irrigation Report, 1896-97. A. R. Gives a short history of the Sind Irrigation Works, and a favorable report for the year. 1400 w. Ind Engng—Sept. 3, 1898.

**Storage Reservoirs.**—Surveys of Sites for Irrigation Storage Reservoirs by the U. S. Geological Survey. A statement relating to water storage, proposed by F. H. Newell, of the Div. of Hydrography of the U. S. Geol. Surv. 1500 w. Eng News—Nov. 23, 1899.

**Subsoil Water.**—Irrigation by Gravitation Channels from the Subsoil Water. J. E. Hilton. *Showing that advantage can be taken of the high level at which the subsoil water stands in some of the submontane districts to convey the water by gravitation to the surface. Ill. 1800 w. Ind Engng—March 26, 1898.

See also **Artesian; Pump; U. S. Western.**

**Temperature.**—The Temperature of Irrigation Fields. A review of observations with soil thermometers showing how irrigation affects temperatures. 900 w. Eng Rec—Oct. 29, 1898.

**Tunnel, Ontario, Cal.**—Water Development by Tunneling at Ontario, Cal. James T. Taylor. The object of this tunnel was to intercept the underflow from the mountain range known as the Sierra Madre and divert the water so developed by gravity into the present system for an increased supply of the Ontario lands. Account of work thus far. 800 w. Eng News—Dec. 24, 1896.

**Turlock, Cal.**—A Great Irrigation Enterprise. Some information relating to the Turlock irrigation enterprise in San Joaquin, Cal., valley. Ill. 700 w. Min & Sci Pr—June 18, 1898.

**United States.**—Irrigation in the United States. Elwood Mead. Describing the influences which retard the development of irrigation works in the United States. 2200 w. Eng Rec—Aug. 25, 1900.

**U. S. Engineering.**—Irrigation Engineering in the United States. C. H. Kendall. The importance of the question is shown, and in a general way the paper discusses the present practice and methods employed in the west. 2500 w. Engs' Year Book, Univ of Minn., 1896.

**U. S. Western.**—A Problem of Aridity. C. M. Harger. The situation in the West, decrease in value of property and serious conditions to be met by the people of the semi-arid regions. 1700 w. N Am Rev—Dec., 1896.

Experiences in the "Arid Southwest." Solon M. Allis. Describes the physical features of this region, and the difficulties in obtaining the needed water supply, giving personal experiences. 3500 w. Jour of New Eng Waterworks Assn—June, 1898.

Our Sub-Arid Belt. E. V. Smalley. An examination of that portion of the prairie land where climate and soil appear inviting to agriculture, but where there is not sufficient rain fall for profitable tillage. The conditions that have proved discouraging are presented, and irrigation by artesian wells, and what it has accomplished is explained. 3800 w. Forum—June, 1896.

The Arid Public Lands, Their Reclamation, Management and Disposal. Elwood Mead. The inefficiency of the existing public land system is shown and the evils resulting from it. Discussion follows. 17500 w. Trans Am Soc of Irr Eng—Jan., 1897.

Ways and Means in Arid America. William E. Smythe. An interesting illustrated account of the rise of irrigation on the plains, and its achievements. 6800 w. Cent Mag—March, 1896.

See also **Artesian; California; Carey Law; Colorado; Pump; Storage Reservoirs; Utah; Wyoming; Yakima Co., Washington.**

**Utah.**—Irrigation in Utah. Some interesting figures of results obtained as given in "The Utahnian," having special reference to the work being carried out by the Mount Nebo Land and Irrigation Co. 700 w. Eng & Min Jour—July 11, 1896.

The Mt. Nebo Reservoir and Canal System, Utah. W. P. Hardesty. Illustrated description of the construction work. 3000 w. Eng News—Dec. 3, 1896.

See also **Bear River.**

**Water Control.**—The Ownership and Control of Water in the Irrigable West. Elwood Mead. Letter calling attention to features of the water laws not generally understood. 1200 w. Eng News—Dec. 17, 1896.

The Ownership and Control of Water in the Irrigated West. Discusses some of the broader phases which are intimately connected with the character of irrigation works. 2000 w. Eng News—Dec. 3, 1896.

**Water Measurement.**—The Measurement of Water for Irrigation. J. B. Pope. An attempt to demonstrate the importance of abolishing the "miner's inch" and adopting cubic feet per second as a unit of measurement for all water systems. Tables, carefully calculated and their correctness demonstrated, are given with explanations. 3500 w. Eng News—Dec. 3, 1896.

Water Measurement and Manipulation in Colorado. H. A. Crafts. Illustrations with description of the method of distributing water for irrigation purposes. 1600 w. Sci Am—Aug. 11, 1900.

Water Measurement in Colorado. Illustrated explanation of methods used in irrigation districts. 1000 w. Fire & Water—Sept. 29, 1900.

See also **Wyoming; WATER FLOW.**

**Water Rights.—See WATER RIGHTS—Irrigation.**

**Wyoming.**—Stream Gaugings and Other Studies Relating to Irrigation in Wyoming. Elwood Mead. Extracted from a forthcoming annual report. A statement of the conditions of streams and the influence of subterranean waters. 3500 w. Eng News—Dec. 29, 1898.

**Wyoming and Colorado.—See CANAL.**

**Yakima Co., Washington.**—Irrigation in Yakima County, Washington. A. B. Wyckoff. An illustrated description endeavoring to show the results of irrigation. 1500 w. Sci Am Sup—Jan. 16, 1897.

**ISOLATED PLANT.**

See **ELECTRIC PLANT.**

# J

**JACKET.**

**Locomotive.**—See **LOCOMOTIVE JACKET.**

**Steam.**—See **STEAM JACKET.**

**JACQUARD MACHINE.**

See **TEXTILE MACHINERY—Jacquard.**

**JAIL.**

See **PRISON.**

**JAMAICA.**

Jamaica as a Field for Investment. Sir Henry A. Blake. An interesting description of the natural resources and commercial opportunities of this island, in which the climate is healthy, the soil fertile, and in which it is predicted the unthrifty methods that have hitherto prevailed are soon to be replaced by systematic cultivation, and increased facilities for transit. 2000 w. N Am Rev—March, 1896.

**JAPAN.**

See also **CHINA; SIBERIA.**

A Record of Industrial Progress. A summary of the industrial progress of Japan, in its relation to British and East Indian commerce, and attempt to forecast the future. 1700 w. Ind & East Eng—June 27, 1896.

Foreigners in Japan. Remarks on the conditions of life of foreign residents, with summary of the main points of the new treaties and the influence of commerce and industries. 2500 w. Engng—Oct. 29, 1897.

Industrial Japan. Editorial on the industrial development, and the views of Mr. Brenan and Count Okuma. 2000 w. Engng—Feb. 25, 1896.

Progress and Present Condition of Japan. Observations upon the army, the marine, railway systems, the schools both public and private, a notable characteristic of the school system being enforced military drill. 1300 w. U S Cons Repts—May, 1896.

The Competition of the Industries of Japan with Imports from Europe. The productive capabilities of Japan are briefly discussed with special reference to their influence on German export trade. 900 w. Bd of Trd Jour—Dec., 1895.

The Industrial Movement in Japan. Caspar Whitney. General remarks on the activity and achievements of the past 25 years. Ill. 2000 w. Harper's Wk—Jan. 8, 1898.

The Industrial Revolution in Japan. William Eleroy Curtis. The facts on which this article is based were collected by Mr. Curtis, personally, while in Japan during the past year. The article gives an account of the wonderful progress, and a forecast of the industrial future of the Japanese. 7700 w. Bull Dept of Labor—Jan., 1896.

The Industrial Situation in Japan. Lamar Lyndon. Devoted especially to Japan as a machinery market and discussing the national characteristics of the people considered as machinery buyers and makers. 3000 w. Eng Mag—June, 1899.

The Industries of Osaka and Competition with Australian Products. This town is described as the "Manchester of the Far East," the largest and most important commercial city in Japan. Its commercial resources and relations are interesting topics. 1900 w. Bd of Trd Jour—June, 1896.

Why Japan Left China Behind. J. Morris. The first of a series of articles, showing the influence of engineering in opening the interior of Japan, and contrasting their achievements with the Chinese. Serial. Ind & East Engr—Jan., 1899.

**U. S. Manufactures.**—American Manufactures in Japan. An attempt to answer in a comprehensive manner, an inquiry made in department instruction in regard to the prospects of American competition in the Japanese empire. The writer thinks that a mistake is made by the American manufacturer in the attempt to educate the Japanese to our way of doing things, instead of accepting existing conditions, and attempting to supply what the conditions call for, as European competitors are doing. 1000 w. U S Cons Repts—May, 1896.

**U. S. Trade.**—United States Trade with Japan. Commercial education in Japan; Japanese manufactures, agricultural and mineral products; wages; foreign vs. Japanese products; Japanese banking and foreign trade; Japanese producing capability; effects of opening up China to trade; imports and exports of Japan; and how to increase American trade in Japan, are topics treated in this report. 3800 w. U S Cons Repts—May, 1896.

**JET PUMP.**

See **INDUCTION JET.**

**JETTY.**

See also **BREAKWATER; BULKHEAD; HARBOR; RIVER REGULATION; SHORE PROTECTION.**

**Columbia River.**—Jetty Construction on the Pacific Coast. Gwynn A. Lyell. A fully illustrated account of the construction of the successful jetty at the mouth of the Columbia river. 3000 w. Eng Mag—Aug., 1898.

The Great Training Jetty at the Mouth of the Columbia River, Oregon. Illustrated description of this very successful engineering work. 1700 w. Sci Am—Jan. 15, 1898.

**Gulf of Mexico.**—Origin of the Gulf Stream and Circulation of Waters in the Gulf of Mexico, with Special Reference to the Effect on Jetty Construction. N. B. Sweitzer, Jr. Reviews the theories advanced regarding these currents, and gives conclusions from careful observations and from examination of the jetty construction upon the coasts of Texas and Mexico. Ill. 5400 w. Proc of Am Soc of Civ Engs—April, 1898.

**JIG.**

See also **DRILL JIG; GOLD METALLURGY; MACHINE TOOL; MINING MACHINERY; TOOL.**

An Example of Jig Making. A. H. Cleaves. Illustrated description of a good example of jig construction designed by Fred Smith, manager of the Chicago Manufacturing Optical Co. 400 w. Am Mach—April 7, 1898.

A Novel Drill Jig. Joseph V. Woodworth. Illustrated description of the jig and its use. 400 w. Am Mach—April 12, 1900.

**Armature Cores.**—The Construction of Jigs for Drilling Holes in the End Rings of Armature Cores. William Baxter, Jr. Shows the necessity for obtaining accurate spacing of the holes, and in order to secure it the need of having a jig perfectly true, and explains how to secure this accuracy. Ill. 2000 w. Am Mach—Sept. 16, 1897.

**Bending.**—Bending Jigs. Joseph V. Woodworth. Illustrates and describes bending in sheet metal that it would be impracticable to do in the press. 600 w. Am Mach—Aug. 23, 1900.

**Eccentric.**—Eccentric Jig, with Adjustable and Automatic Lower Discharge Arranged for the Full Width of the Bed and for One or More Compartments. Edgar G. Tuttle. Illustrated description. 1800 w. Trans Am Inst of Min Engs—July, 1896.

**Middle Product.**—Middle Product Jig. E. G. Tuttle. Illustrated description of a jig arranged for separating the middle product or middlings obtained in the concentration of certain ores, minerals, coal, etc., with adjustable and automatic discharges for the middle and lower products. 1700 w. Trans Am Inst of Min Engs—July, 1896.

**Milling.**—Two Milling Jigs. A. H. Cleaves. Illustrates and describes two jigs, whose most important feature is said to be the facility they afford for taking a heavy cut with a small hold on the work. 800 w. Am Mach—March 9, 1899.

**Plunger.**—The Cycle of the Plunger Jig. Communications in discussion of the paper of Prof. Robert H. Richards, Boston, Mass., presented at the Pittsburg meeting, Feb., 1896. 1800 w. Trans Am Inst of Min Engs—July, 1896.

The Cycle of the Plunger Jig. Robert H. Richards. A series of 41 curve diagrams representing the pulsations in the Harz, Crank, and Collon jigs, and the deductions that can be drawn from them. Interesting data are given as to the jig practice in a number of our principal ore dressing works. 2800 w. Trans Am Inst of Min Engs—Feb., 1896.

**Sprocket Wheels.**—Jigs for Drilling Sprocket Wheels.

A. G. Miles. Sketches showing a pair of tandem sprockets and the two jigs for drilling the same, so that when the smaller one is mounted upon the larger one they shall revolve true together. Describes the operation. 700 w. Am Mach—Feb. 22, 1900.

**JOINT.**

**Flexible.**—See **FRAMEWORK—Joint Flexible.**

**Rail.**—See **RAIL JOINT.**

**Riveted.**—See **RIVETED JOINT.**

**JOULE EFFECT.**

**Liquefaction of Air.**—The Joule Effect. C. E. Basevi. This phenomenon jointly investigated by Joule and Kelvin in 1852 and 1853, is discussed in its relation to liquefaction of air by the most recent processes, and is held to be inadequate to account for the results attained. A criticism of Joule's and Kelvin's experiments and an explanation of the processes is presented. 3200 w. Eng, Lond—May 29, 1896.

**JOURNAL BOX.**

See **CAR BEARINGS; HOT BOX; LUBRICATION.**

## K

**KALSOMINING.**

Kalsomining, or Water Color Painting. A. Ashmun Kelly. Full directions for securing perfect results. 1100 w. Pl & Dec—Sept., 1896.

**KAOLIN.**

See also **CLAY; FIRE CLAY.**

The Mining and Preparation of Kaolin. T. C. Hopkins. Abstract of paper in "The Mineral Industry," Vol. VII. Describes methods of mining and washing. Ill. 1400 w. Eng & Min Jour—Aug. 26, 1899.

**Florida.**—A Florida Kaolin Mine. This interesting description is from the "Jacksonville (Fla.) Citizen." The process for preparing porcelain clays for market is described in popular style. 1800 w. Clay Rec—March 28, 1896.

**North Carolina.**—Notes on the Kaolin and Clay Deposits of North Carolina. J. A. Holmes. The paper treats of both the kaolin deposits "in place" and the sedimentary clays, describing their method of occurrence and uses to which they are put. 2000 w. Trans Am Inst of Min Engs—Feb., 1896.

**Pennsylvania.**—Feldspars and Kaolins of Southeastern Pennsylvania. T. C. Hopkins. Information based on field work, describing the mode of occurrence, method of quarrying, uses, origin, etc. 9500 w. Jour Fr Inst—July, 1899.

**Vermont.**—Kaolin in Vermont. J. Nelson Nevius. Deposits found at South Wallingford, Vt. Ill. 800 w. Eng & Min Jour—Aug. 14, 1897.

**KEEL.**

**Bilge.**—See **NAVAL ARCHITECTURE—Bilge Keel.**

**Cambered.**—See **NAVAL ARCHITECTURE—Keel Cambered.**

**KEELY MOTOR.**

The Keely Motor. E. A. Scott. Describes a visit to Mr. Keely's laboratory and the experiments witnessed, with the conclusion that there was no evidence produced that a new form of force had been discovered. Ill. 10000 w. Pro Engs' Club of Phila—Jan., 1898.

**KELVIN.**

Lord Kelvin. Interesting biographical sketch of this master in science. 1600 w. Elec Wld—June 20, 1896.

Lord Kelvin's Jubilee. A. Gray. An interesting and complete account of this successful festival, with lists of delegates and visitors, letters and addresses. 18500 w. Nature—June 25, 1896.

Lord Kelvin's Researches. G. F. F. G. A summary of his work and its benefits. 5000 w. Elect'n—June 19, 1896.

**KEROSENE ENGINE.**

See also **GASOLINE ENGINE.**

**Two-Cycle.**—See **GAS ENGINE—Two-Cycle.**

**KEY.**

**Standard.**—Standard Keys. Henry Hess. Gives proportions for straight and taper keys, with derivation of the formulas. 1000 w. Mach, N. Y. —Oct., 1899.

**KEY-FITTING.**

Different Ways of Fitting a Key. John Randol. Illustrates and describes the process of fitting a key. 1200 w. Am Mach—April 29, 1897.

**KEYSEATING.**

See also **PLANER.**

Devices for Keyseating Hubs, Couplings, etc (Die Herstellung der Keilnuten in Radnaben, Wellenkupplungen, usw). Hermann Fischer. With numerous illustrations of machines for cutting keyways in pulley hubs, etc. English and American devices principally are shown. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Feb. 19, 26, 1898.

**KINEMATICS.**

See also **MECHANICS.**

**Gas Lighting Mechanism.**—A Curious Mechanical Movement. C. W. MacCord. Describes and illustrates an ingenious piece of mechanism for turning on and shutting off gas at a distance and which is possibly applicable to other purposes. 1400 w. Stevens In—Jan., 1896.

**Link Accelerations.**—The Accelerations of the Links of a Mechanism. G. A. Goodenough. The object of the article is to apply stated principles and constructions to one or two simple mechanisms and thus furnish concrete examples for the aid of those who wish to study this subject. Diagrams. 2300 w. Technograph—No. XI.

**Lobed Wheels.**—See **LOBED WHEELS—Holditch.**

**Machine.**—See **MACHINE—Kinematics.**

**Mechanical Movement.**—A New Mechanical Movement. C. R. Gabriel. Illustrated description of a new movement especially useful in mechanism in which a rotary gear is to be driven for a part of a revolution at a constant speed, and started and stopped without jar. 1200 w. Am Mach—May 17, 1900.

**Straight Line Motions.**—Straight Line Motions. From a paper by John B. Peddle in "The Rose Technic." Illustrates and describes various classes. 1800 w. Am Mach—March 15, 1900.

**KINETIC MOTOR.**

The Kinetic Motor. Describes this motor, now in use between Babylon and Farmingdale, on the Long Is. Ry. and illustrates one of the trucks. 900 w. R R Gaz—Dec. 1, 1899.

The Kinetic Motor. An illustrated description of an independent motor for railway and tramway service. 1400 w. Ry Wld—Feb., 1898.

Superheated Water Motor for Railroad Traction. An illustrated explanation of a system which is being tested on the New York & Putnam Railway. 1900 w. Sci Am—Aug. 25, 1900.

The Cost of Mechanical Traction on Tramways (Sur le Prix d'Exploitation de Traction Mécanique Appliquée aux Tramways). A general examination of the items of cost of operation of the fireless locomotive system, based upon data obtained from actual experience. 2000 w. La Revue Technique—May 10, 1898.

**KITCHEN.**

See also **COOKING; ELECTRIC COOKING.**

The Kitchen. Editorial article on good arrangement and fittings. 1000 w. Nat Build—Sept., 1897.

**KITE.**

See also **AERONAUTICS.**

Kites: Their Theory and Practice. B. F. S. Baden-Powell. Information from the practical ex-Baden-Powell. The personal experiences of the theoretical principles, and discussion. Ill. 8000 w. Jour Soc of Arts—March 4, 1898.

Kites: Their Theory and Practice. B. F. S. Baden-Powell. The personal experience of the writer who has given much time to researches in this line, giving a summary of results of experiments. Ill. Serial. Sci Am Sup—June 4, 1898.

**Franklin's Experiment.**—Franklin's Kite Experiment with Modern Apparatus. Alexander McAdie. Gives the kite experiment as described by Franklin in 1752, and describes later experiments with modern kites. Ill. 1800 w. Ap Pop Sci M —Oct., 1897.

**Scientific Use.**—Recent Experiments in Scientific Kite Flying. Illustrated description of the Hargrave kite, Lamson's multiplane folding kite, and Lamson's modified Hargrave kite, with experimental use of these kites. Abstract of article in "Aeronautical Annual" for 1896. 1800 w. Sci Am—March 14, 1896.

Scientific Kite Flying. Cleveland Moffett. An interesting account of the work of Mr. Eddy, of Bayonne, N. J., treating of how to make a scientific kite; how to send up a kite; runaway tandems; the meteorological use of kites; the highest flight ever made by a kite; drawing down electricity by a kite string; the use of kites in photography, the possible use of kites in war, etc. Also reproductions of photographs taken from a kite and other pictures. 8000 w. McClure's Mag—March, 1896.

I. Scientific Kite Flying. J. B. Millett. II. Experiments with Kites. Hugh D. Wise. III. Photographing from Kites. William A. Eddy. Three illustrated articles. The first has special reference to the Blue Hill experiments; the second includes an account of the writer's ascent from Governor's Is.; the third includes accounts of the first photographing and the first telephoning and telegraphing through a line held by kites. 12800 w. Cent Mag—May, 1897.

**Weather Bureau.**—A Weather Bureau Kite. C. F. Marvin. Illustrated description of a kite used for meteorological observations. 2400 w. Sci Am Sup—July 4, 1896.

**KRYOLITH.**

See also **ALUMINUM MANUFACTURE; BAUXITE.**

Kryolith—Its Mining, Preparation and Utilization. William C. Henderson. An interesting account of this isolated deposit in Greenland, the methods of mining, process of producing soda, and other uses. 2500 w. Jour Fr Inst—Jan., 1898.

Kryolith—Its Mining, Preparation and Utilization. The only deposit of commercial importance known is in Greenland. Its principal use is in the manufacture of soda. 2000 w. Min & Sci Pr—Oct. 1, 1898.

**KURSAAL.**

**Continental.**—Continental Kursaals. Brief description of these public assembly halls at the various resorts. 2300 w. Arch, Lond—March 31, 1899.

**KYTCHTYM MEDAL.**

The Kytchtym Medal. Dr. Persifor Frazer. Discussion of paper presented at the meeting of Dec., 1897. Ill. 1200 w. Trans Am Inst of Min Engs—Oct., 1898.

The Kytchtym Medal. Dr. Persifor Frazer. This medal was one of the souvenirs given on the Ural excursion of the VIIth International Geological Congress. Describes the process of manufacture and the constitution of the metal. 600 w. Trans Am Inst of Min Engs—Dec., 1898.

# L

**LABOR.**

See also **INDUSTRY; PIECE WORK; PREMIUM PLAN; PROFIT SHARING; STRIKE; TRADE UNION; WAGES; WORKMEN'S DWELLINGS; WORKS MANAGEMENT.**

A New Remedy for an Old Evil. E. J. Smith. The first of a series of articles by the chairman of the Bedstead Makers' Association, with editorial, commenting favorably upon a speech of Mr. Chamberlain, British Colonial Secretary, with reference to the scheme, and appreciative remarks of other public men, and upon Mr. Smith's movement, by which the profits of the Association have not only been increased, but whereby the wages of workmen have been increased 25 per cent., while the product has been much improved in quality. 6200 w. Mach, Lond—April 15, 1896.

Labor from a Technical and Economic View (Technische und Wirtschaftliche Arbeit). An address by Prof. Dr. Ehrenberg, discussing the relation of applied technology to the practical industrial and commercial problems of the day. 7500 w. Zeitschr d Ver Deutscher Ing—Dec. 17, 1898.

Manufacturers' Association, Labor Organizations, and Arbitration. H. W. Hoyt. An example of practical co-operation between employers and trade unions is depicted, and the application of the same principles in other lines is strongly urged. 1800 w. Eng Mag—May, 1900.

Relationship Between Employers and Workmen in the Engineering Trades. Benjamin C. Browne. Presidential address before the Northeast Coast Inst. of Engs. and Shipbuilders, discussing the question stated. 4400 w. Col Guard—Oct. 14, 1898.

**Accidents.**—Protection to Workingmen (Arbeiterschutz). A statistical report of the Journeymen's Association, giving much information as to the protection of workingmen in Germany against accidental injury. Data are given up to 1897, with comparisons for the ten years between 1885 and 1895. 4000 w. Glaser's Annalen—Jan. 1, 1898.

The Law Upon Accidents to Workingmen (Loi sur les Accidents du Travail). The full text of the new French law fixing the responsibility for accidents occurring to workingmen during the course of labor. Indemnities for death or disability are based upon the earning capacity of the individual. 3000 w. La Rev Tech—May 25, 1898.

See also **Compensation Act; COAL MINE ACCIDENT; COAL MINER; FACTORY ACCIDENT; MINE ACCIDENT.**

**American Federation.**—The American Federation of Labor. Editorial review of the proceedings of the fifteenth annual convention of this organization, held in New York Dec. 9 to 17, 1895. It is regarded as the leading radical society on this hemisphere, and as having a great future before it. 1800 w. Gunton's Mag—Feb., 1896.

**Apprentice.**—See **APPRENTICE; EDUCATION.**

**Arbitration.**—Arbitration in Mining Disputes. Arbitration as controlled by English mining laws, giving cases. 2700 w. Col Guard—March 25, 1898.

Conciliation and Arbitration in the Boot and Shoe Industry. T. A. Carroll. Review of methods adopted and a study of results, obstacles, etc., with comparison of different plans. 17300 w. Bull of Dept of Labor—Jan., 1897.

Industrial Arbitration in Congress. Carroll D. Wright. An explanation of bill pending in Congress, showing how it differs from the law of 1888, and analyzing it. 4000 w. Gunton's Mag—April, 1898.

**Benefit Funds.**—Benefit Funds in the Lake Superior Iron Mining Industry. William G. Mather. President's address at the annual meeting of the Lake Superior Mining Inst. Suggestions for furthering the good condition of the workmen, such as relief funds, housing, physical condition of the miners, etc. 4400 w. Ir Trd Rev—Sept. 1, 1898.

**Boiler Room.**—The Cost of Boiler Room Labor. Extracts from a circular issued by the Mutual Boiler Insurance Co., of Boston, Mass., with remarks. 900 w. Eng News—July 28, 1898.

See also **FIRING—Labor Cost.**

**Brickyard, Georgia.**—How a Georgia Manufacturer Handles His Men. Wm. Miller. The system and rules which are said to be extremely satisfactory in a brickyard employing colored workmen. 900 w. Brick—Sept., 1898.

**British.**—Labor Statistics. A Review of the 2d Annual report of the Labor Department of the Board of Trade. 2300 w. Engng—Nov. 8, 1895.

Some Recent Phases of the Labor Question. Part first considers coal miners and their unions, in the light of statistics furnished by the Labor Department of the British Board of Trade. Serial. Ir & Coal Trds Rev—Jan. 20, 1899.

See also **Steel Works, England; MACHINERY—Labor; PIG IRON—Cost.**

**British, Iron and Coal.**—British Labor and the Iron and Coal Industries. Abstracts from the annual report of the British Board of Trade, giving tables on trades unions, boards of arbitration, wages, etc. 1000 w. Ir & Coal Trds Rev—Nov. 8, 1895.

**British Workmen.**—The Future of the British Workman. Presidential address delivered by Mr. John Inglis before the Institute of Marine Engineers, with editorial comment. 5000 w. Engng—Jan. 27, 1899.

**Brussels Exhibition.**—Social Economy Exhibits at Brussels. This class of exhibits comprised all that relates to teaching and apprenticeship, the organization of labor, the safeguarding and regulation of labor, labor economics, etc. An account of some of the exhibits is given in part first. Serial. Engng—Feb. 4, 1898.

**Capital.**—Mr. Carnegie's Johnstown Address. An extract giving the speaker's opinion of the cause of business depression and the relation of capital and labor. 1800 w. Ir Trd Rev—Jan. 28, 1897.

**China.**—Labor and Wages in China. The lowest wages paid in any known country prevail in China. The labor supply is also more abundant than in any other land. Notwithstanding this, in utility and lasting qualities, Chinese manufactures take a high rank. The causes of these peculiarities are interestingly discussed. 1500 w. U S Cons Repts—Jan., 1896.

**Coal Mine, Anzin, France.**—Industrial Communities. W. F. Willoughby. The information in this first part relates to the employees of the coal mining company of Anzin, and is presented in such a way as to furnish opportunity for statistical comparison of present and former conditions of men, the general and physical conditions of whose labor have remained practically identical, and the conclusion is that there has been a steady betterment of their condition in almost every particular. 15000 w. Bull of U S Dept of Labor—March, 1896.

**Coal Mines, U. S.**—Labor Conditions at the Anthracite Mines of the United States. A review of the history of these mines since 1820, giving information of the workers, wages, accidents, conditions of life, etc. 3500 w. Col Guard—Dec. 10, 1897.

**Coal Mining.**—See **COAL INDUSTRY—Capital and Labor; COAL MINER.**

**Compensation Act.**—The Definition of a "Factory" and the Workmen's Compensation Act. Shows how the absence of a definition for the word factory has given rise to many difficulties since this act first became law. 2700 w. Engr, Lond—Dec. 29, 1899.

The Working of the Compensation Act at Yorkshire Collieries. James Lindsay. Read at meeting of the Yorkshire Branch of the National Assn. of Colliery Managers. Thinks that four months' experience shows that it affects employers most seriously and unjustly, and is not a blessing to the employed. Gives instances in the district named. 2300 w. Ir & Coal Trds Rev—Nov. 11, 1898.

See also **COAL MINER—Compensation Act.**

**Conciliation Act.**—Conciliation and Arbitration in Trade Disputes. From an article by Sir Edward Fry in the Nov. issue of the "Law Magazine and Review." Considers the Conciliation Act now in force in England. 1200 w. Col Guard—Nov. 4, 1898.

**Conciliation Councils.**—Conciliation Councils in Milan. Commentary on the proposed introduction into Milan of a system analogous to the Conseils de Prud'hommes; summarizes the law and explains the functions of the "colleges of probiviri," which are more than mere boards of arbitration. 1800 w. Arch, Lond—Aug. 26, 1898.

**Congress, Bristol, Eng.**—The Trades Congress. Editorial discussing the proceedings of the Labor Parliament held at Bristol, England, with especial reference to the proposed regulation of hours of labor, rates of wages, and federation of interests. 2000 w. Engng—Sept. 9, 1898.

**Convict.**—The Convict Labor Problem. Explains position taken in former article and further discusses this question. 1800 w. Gunton's Mag—Feb., 1897.

**Costs.**—See **Boiler Room; IRON MANUFACTURE—Labor Costs.**

**Cotton Mill.**—Indian vs. American Cotton Mill Operatives. J. W. Bennett. A brief account of the very cheap labor in the mills of India, and the simple way of living, in contrast with that practiced by workers in the same field in America. 800 w. Am Mag of Civ—Jan., 1896.

**Dangerous Trades.**—Dangerous Trades. Editorial review of the report of a committee of British Home Office, showing that the amelioration of the dangers to health incurred in various trades, is a matter of national importance in its relation to the physique of future generations. 1500 w. Engng—Aug. 14, 1896.

**Demarcation of Work.**—Demarcation of Work. Editorial discussion of one of the most difficult and unpleasant features of modern labor troubles. 2000 w. Engng—July 24, 1896.

**Diseases.**—See **DISEASES OF OCCUPATIONS.**

**Eight-Hour Day.**—Capital and Labor. G. P. Clapp. The author thinks the present dearth of employment should be met by the universal adoption, by all civilized nations, of an eight-hour law. 2800 w. Can Eng—July, 1896.

Eight Hours and the Constitution. On the need of establishing uniform hours of labor throughout the whole country. 3500 w. Gunton's Mag—Nov., 1898.

How to Attain the Eight-Hour Day. Rev. Jesse H. Jones. Suggestions for the attainment of this end and arguments showing that business will be as profitable as on the ten-hour system. 2000 w. Gunton's Mag—March, 1897.

**Engineering.**—See **ENGINEERING—Labor.**

**Factory in South.**—Factory Labor in the South. The conditions existing in the south, and the need of changes. A reply to an article published in the Atlanta "Constitution." 4800 w. Gunton's Mag—April, 1898.

**Foundry.**—See **FOUNDRY—Labor.**

**France.**—French Labor Question. H. K. Landis. Description of labor system in the works of the Société J. & A. Pavin de Lafarge. 2500 w. Gunton's Mag—July, 1896.

**French Working Hours.**—Working Hours in French Industrial Establishments (La Durée du Travail dans les Etablissements Industriels). Résumé of the report of a commission appointed to supervise the application of the French factory law of 1897, with statistical data. 1200 w. Moniteur Industriel—Jan. 7, 1899.

**Gas Works.**—Statistical Studies Concerning Labor Conditions. Director H. Schneider. Translation from the German, of a paper describing an investigation of the health statistics of working people, employed in gas works for a period of 32 years. The results indicate that this labor is not more unhealthy than the average of other occupations. 1200 w. Am Gas Lgt Jour—March 9, 1896.

**Germany.**—The Scarcity of Workmen (Ueber den Arbeitermangel). A discussion of the causes of the scarcity of workmen in Germany, this being mainly attributed to higher wages attracting skilled workmen to other countries. 2000 w. Stahl und Eisen—Dec. 1, 1898.

**Invention.**—Does Invention Lessen Employment? Remarks on information from the Report of the Commissioner of Patents for 1897, showing that invention increases employment. 2500 w. Gunton's Mag—May, 1898.

See also **INVENTION.**

**Iron Manufacture.**—See **IRON INDUSTRY—Supremacy; IRON MANUFACTURE—Labor Cost; PIG IRON—Cost.**

**Japan.**—Labor Troubles in Japan. Discussing the hard conditions necessarily accompanying the transition from ancient to modern methods. 2400 w. Gunton's Mag—March, 1898.

**Law.**—Employer and Employee under the Common Law. Victor H. Olmsted and Stephen D. Fessenden. The first number treats of master and servant definitions; the relation, its creation and existence; the contract of service; combinations and coercion of servants; employer's liability for injuries of employees. Serial. Ir Age—Nov. 28, 1895.

**Legislation, N. Y.**—Legal Regulation of Occupations in the State of New York. Louis Dow Scisco. Tracing the development of legislation affecting occupations. 2000 w. Am Mag of Civ—Dec., 1895.

**Legislation, New Zealand.**—Land Taxation and Labor Laws in New Zealand. Details of each different system under which land may be obtained in this colony; also reasons why the writer cannot encourage immigration from the United States, with discussion of labor conditions. 40-000 w. U S Cons Repts—Jan., 1897.

**Legislation, United States.**—Labor Legislation in the United States. Horace G. Wadlin. The labor legislation is roughly classified under three heads: (1) those affecting the health, education and moral welfare of the worker; (2) those insuring personal safety in the performance of work; (3) those enforcing duties and obligations between the employer and employed. 3700 w. Chau—June, 1896.

**Legislation, Utah.**—Extract Relating to Labor from the New Constitution of Utah. Sections 1 to 7 inclusive. 400 w. Bull U S Dept of Labor—Jan., 1896.

**Liability.**—Employers and Workmen's Liability

Laws. Pasquale Villari. Translated from "Nuova Antologia." A study of the law and its effects in the countries most obedient to it. 2200 w. Chau—June, 1898.

**Litigation, U. S.**—Decisions of Courts Affecting Labor. Current decisions in the different States briefly summarized. 1200 w. Bull U S Dept of Labor—May, 1896.

Decisions of Courts Affecting Labor. Review of recent decisions rendered by the supreme courts of different States, and of the United States, affecting the legal status of employers and employed. 13000 w. Bull Dept of Labor—Jan., 1896.

The Relation of the Federal Courts to Organized Labor. William H. Taft. A labored and learned answer to the charge, admitted to be true, that judicial action has been, and is, much more efficient to restrain labor excesses than corporate evils and greed. The justification is found in the nature of the two evils. Physical force is involved in the one and not in the other. The writer regards corporate wrong as in its nature almost wholly beyond the reach of the courts in the United States. 2400 w. Ry Rev—Nov. 16, 1895.

**Machinery.**—See **MACHINERY—Labor; TRADE UNION; WORKS MANAGEMENT—Labor-Saving Machinery.**

**Management.**—The Management of Men. Editorial on the address of Sir Benjamin C. Browne to the Northeast Inst. of Engs. and Shipbuilders. 1800 w. Engng—Oct. 21, 1898.

**Mechanic's Climacteric.**—The Mechanic's Climacteric. Editorial. Notes the causes why mechanics approaching and passing the age of forty-five years, find inreasing difficulty in finding steady employment. 2200 w. Engng—Aug. 21, 1896.

**Mexico.**—The Condition of the Laboring Classes in Mexico. Theodore C. Knauff. Excerpts from a lecture delivered at Association Hall, Philadelphia. Interesting account of this country and the conditions affecting the laboring classes. 4200 w. Sci Am Sup—Dec. 18, 1897.

**New York.**—See **Legislation.**

**New Zealand.**—See **Legislation.**

**Piece Work.**—See **WAGES.**

**Premium Plan.**—See **WAGES.**

**Profit Sharing.**—Labor's Share of Profits. Editorial showing that the benefit to the working classes from increased share of profits is not due to what the trade union advocates have done, but has followed upon events which were prompted by capital. The benefits arising from the Limited Liability Act are discussed. 1800 w. Engng—Jan. 15, 1897.

See also **WAGES.**

**Railway.**—Condition of Railway Labor in Europe. Walter E. Weyl. A study of the general conditions of railway labor in a number of characteristic countries of Europe undertaken to furnish material by which to judge American experience. 40000 w. Bull of U S Dept of Labor—Jan., 1899.

The Railway Problem and Labor. Robert P. Porter. Shows that if rates continue to decline, and properties to deteriorate in the United States, a reduction of wages will be absolutely necessary. Also urges an examination of the question and its effect on every class of labor. 2200 w. Ry Mag—Oct., 1897.

See also **RAILWAY EMPLOYEE.**

**State Bureau Reports.**—Recent Reports of State Bureaus of Labor Statistics. A digest of the reports of the state bureaus of labor statistics in Connecticut, Indiana, Michigan, Minnesota, Missouri, and Wisconsin is given, and will be followed, in subsequent numbers, by similar presentations from the reports of the bureaus in other States. As far as possible quotations have been made from the results of the original investigations conducted by the different bureaus. 8500 w. Bull U S Dept of Labor—Nov., 1895.

Recent Reports of State Bureaus of Labor Statistics. Colorado, Illinois, Maine, Maryland, New Hampshire, Ohio. 8000 w. Bull Dept of Labor—Jan., 1896.

Recent Reports of State Bureaus of Labor Statistics. Summaries of reports of bureaus, Massachusetts, Missouri and Utah. 2200 w. Bull U S Dept of Labor—May, 1896.

Recent Reports of State Bureaus of Labor Statistics. Summaries: Connecticut, eleventh annual report, 1895; Iowa, sixth biennial report, 1894-95; Montana, second annual report, 1894; Nebraska, fourth biennial report, 1893-94; New York, twelfth annual report, 1894; North Carolina, eighth annual report, 1894; North Dakota, third biennial report, ending June 30, 1894; Pennsylvania, annual report, Vol. XXII., 1894; Rhode Island, eight annual report, 1895; Tennessee, fourth annual report, 1895, and West Virginia, report for 1893-94. 5400 w. Bull of U S Dept of Labor—March, 1896.

**Statistics.**—Contemporary Labor (Le Travail Contemporain). Col. Fix. A comparison of labor statistics, in various parts of Europe, in connection with the development of various lines of industry. Serial. La Rev Tech—June 25, 1898.

Development of Labor Statistics. States not having and those having such bureaus. Review of Bulletin of the National Department of Labor. 800 w. Bradstreet's—Nov. 30, 1895.

Recent Foreign Labor Statistics. Brief report of items, selected from various sources, relating to the labor conditions of the Netherlands, France, Belgium and Russia. 1800 w. Gunton's Mag—Feb., 1898.

**Steel Works, England.**—Capital and Labor. R. H. Hadfield. Results of experience in an extensive English steel works. The effort to get employers and employed on a better footing is urged as a possible solution of many differences between them. 2200 w. Eng & Min Jour—Feb. 8, 1896.

See also **IRON INDUSTRY—Supremacy.**

**Street Cleaning.**—See **STREET CLEANING—Labor, New York.**

**Strike.**—See **STRIKE.**

**Trade Union.**—See **TRADE UNION.**

**Transvaal Mines.**—The Labor Question in the Transvaal Mines. Pierre Leroy-Beaulieu. Translated and abstracted from letter in "L'Economiste Français." The article shows the labor market in a rather demoralized condition at present. 1400 w. Eng & Min Jour—March 14, 1896.

**United States.**—See **Legislation; Litigation; State Bureau Reports; IRON INDUSTRY—Supremacy; IRON MANUFACTURE—Labor Cost; MACHINERY—Labor; PIG IRON—Cost.**

**U. S. Southern.**—See **Factory in South.**

**Utah.**—See **Legislation.**

**Wages.**—See **WAGES.**

**Women and Children.**—A Woman's View of the Industrial Problem. Alice L. Woodbridge. A well written paper, in which reduction of hours of labor, the abolition of child labor, and the payment of the same price for the same work to both women and men are advocated. 2500 w. Am Mag of Civ—July, 1896.

## LABORATORY.

See also **COLLEGE; EDUCATION; EXPERIMENT STATION; HYDRAULIC LABORATORY; SCHOOL; TESTING; UNIVERSITY.**

**Berlin.**—Report of the Work of the Royal Technical Testing Bureau for the year 1896-1897 (Bericht über die Thätigkeit der Königlichen Technischen Versuchsanstalten in Etatsjahre 1896-1897). The official report of this important Government bureau, with detailed classification of the number and character of tests. 7500 w. Mitt aus den Kgl Tech Versuchsansalt—Part 6, 1897.

Report on the Work of the Royal Technical Testing Laboratory, Berlin, for the Year 1898-99 (Bericht über die Thätigkeit der Königlichen Technischen Versuchsanstalten im Etatsjahre, 1898-99). Record of the tests conducted at this institution, of metals, building materials, paper, oils, and list of chemical analyses. 5200 w. Mitt aus d Kgl Tech Versuchsanst—No. 6, 1899.

**Berlin Technical School.**—The Engineering Laboratory of the Berlin Technical High School. Information concerning this establishment and the work done in it. 3000 w. Engng—June 8, 1900.

**Brooklyn Waterworks.**—Mount Prospect Laboratory. George C. Whipple. Illustrated description of the chemical laboratory, and the biological and chemical analysis of Brooklyn's drinking water. 6800 w. Sci Am Sup—June 30, 1900.

The Mt. Prospect Laboratory of the Brooklyn Waterworks, Greater New York. George C. Whipple. Illustrated description of the building, and of the work carried on. 7200 w. Eng News—June 7, 1900.

**Carnegie Engineering.**—See **Engineering.**

**Edison.**—The Edison Laboratory. Illustrated description of the buildings, materials, apparatus, and work, with brief description of Mr. Edison. 3000 w. Am Elect'n—June, 1896.

**Engineering, Stevens Institute.**—The Carnegie Laboratory of Engineering. Illustrated description. 1500 w. Stevens Ind—April, 1900.

**Flour Testing.**—In a Flour Testing Laboratory. Describes the laboratory and the means and methods in use for testing the quality of flour. 1700 w. Milling—Feb., 1898.

**Giessen University.**—The Physical-Chemical Laboratory of Giessen University (Das Physikalisch-Chemische Laboratorium der Grossherzoglich Hessischen Landes-Universität Giessen). Prof. K. Elbs. A description, with plans, of this new laboratory. 1800 w. Zeitschr f Elektrochemie—April 26, 1900.

**Hanover Technical School.**—The Engineering Laboratory of the Technical High School at Hanover (Das Ingenieurlaboratorium der Königlichen Hochschule zu Hannover). F. Frese. A very full account of this completely equipped mechanical laboratory, with plans of the buildings, and illustrations of apparatus. Two articles. 8000 w. Zeitschr d Ver Deutscher Ing—Feb. 17, 24, 1900.

**Hydraulic.**—See **HYDRAULIC LABORATORY.**

**Madrid.**—See **MATERIALS' STRENGTH—Spanish Laboratory.**

**Peoria, Ill., Municipal.**—A Municipal Testing Laboratory. A. D. Thomson. Illustrated description of what is believed to be the first complete testing laboratory yet established. It is at Peoria, Ill. 2000 w. Pav & Mun Eng—Jan., 1896.

**Philadelphia.**—A Few Remarks on the Testing Laboratory of the City of Philadelphia. Richard L. Humphrey. Describes recent additions in the equipment of the laboratory, and gives some results of tests which have been made. Discussion. Ill. 4500 w. Pro Engs' Club of Phila—May, 1899.

**Railway Testing.**—A Railroad Testing Laboratory. William O. Webber. Illustrated description of the Chicago, Burlington & Quincy R. R. laboratory at Aurora, Ill. 1200 w. Mach—Jan., 1897.

The Function of a Railroad Testing Laboratory. Samuel Stockton Voorhees. Brief summary showing its importance in selecting material that will give the greatest efficiency at the lowest cost. 1500 w. Jour Assn Engng Socs—June, 1899.

The C. B. & Q. Testing Laboratory. Illustrated description of the plant and work. 2000 w. Ry Mas Mech—Feb., 1897.

**Reichsanstalt.**—Report of the Work of the Physical-Technical Reichsanstalt (Thätigkeits Bericht der Physikalisch-Technischen Reichsanstalt). A general résumé of the work of the Imperial testing bureau, giving many details of work done, especially in examining and comparing standards. Two articles. 6000 w. Elektrotech Zeitschr—Feb. 3, 10, 1898.

**Stevens Institute.**—See **Engineering.**

**Worcester (Mass.) Polytechnic Institute.**—A New Power Laboratory. Sidney A. Reeve. Illustrated description of two new laboratory buildings and their outfits, for the department of mechanical engineering of the Worcester Polytechnic Institute. 1000 w. Mach, N. Y.—Sept., 1896.

**Yorkshire College, Leeds.**—See **MATERIALS' STRENGTH.**

**LADDER.**

A Peculiar Style of Ladder. Gives a description of the ladder and its operation. Ill. 1000 w. Sci Am Sup—Oct. 8, 1898.

**Tests.**—Tests of Ladders. George D. Rice. Illustrated account of tests recently made by writer, with testing machine used. 700 w. Eng & Min Jour—Dec. 25, 1897.

The Strength of Ladders. Robert Gilman Brown. Describes tests made of ladders of the common "Bull" pine of the Sierra region. 800 w. Eng & Min Jour—June 12, 1897.

**LADLE CAR.**

See **STEEL MANUFACTURE—Ladle Carriage.**

**LAGGING.**

See also **STEAM-PIPE COVERING.**

**Carbonizing.**—The Carbonizing of Wooden Lagging on Cylinders and Pipes. Review of an investigation carried on by the Boston Manufacturers' Mutual Fire Insurance Co. The results are important. It is found that fire hazards are increased by the use of this kind of laggings. 1600 w. Power—March, 1896.

The Carbonizing of Wooden Lagging on Steam Pipes. Report of Inspector F. L. Pierce, of the Boston Manufacturers' Mutual Fire Insurance Co., with excellent engravings illustrating the carbonizing of wood lagging on steam pipes, thus rendering it liable to spontaneous combustion, or at least greatly increasing its combustibility. 1200 w. Heat & Ven—April 15, 1896.

**Cylinders.**—Lagging Small Engine Cylinders. F. H. Illustrates and describes the work. 2500 w. Mech Wld—Nov. 11, 1898.

**Locomotives.**—Boiler and Steam Pipe Lagging. A R. Urging the importance of lagging locomotives, and discussing the method. 1200 w. Am Eng & R R Jour—May, 1898.

Locomotive Laggings. Wallace W. Johnson. Extracts from a paper read at meeting of N. Y. R. R. Club. The importance of protecting the heat radiating surfaces of the American locomotive, and the coverings used. 1500 w. R R Gaz—Feb. 25, 1898.

Utility and Characteristics of Locomotive Laggings. Wallace W. Johnson. Considers the subject of non-heat-conducting boiler and cylinder laggings and the loss of heat by radiation. Also discussion. 8500 w. N Y R R Club—Feb. 17, 1898.

**LAKE LEVEL.**

**Great Lakes.**—See **GREAT LAKES.**

**Nicaragua.**—See **CANAL—Nicaragua Lake Level.**

**LAMP.**

See **ARC LAMP; INCANDESCENT LAMP; SAFETY LAMP,** etc.

**LAMPBLACK.**

**Coal Gas and Acetylene.**—See **ACETYLENE BLACK.**

**LANDING STAGE.**

See also **PIER.**

**Liverpool.**—The New Liverpool Landing Stage. Illustrated description of a floating stage at dock and a recent large extension of the same. 1500 w. Eng, Lond—May 29, 1896.

**Movable.**—A Contractor's Movable Landing Stage. Describes an arrangement used by F. H. Hebblethwaite in unloading a quantity of material from vessels in Manaos, in the Rio Negro, Brazil. 1300 w. Eng Rec—Dec. 4, 1897.

**LAND RECLAMATION.**

See **DRAINAGE; SHORE PROTECTION.**

**LANDSCAPE ARCHITECTURE.**

See also **ARCHITECTURE—Landscape Gardening; PARK.**

**Harvard Course.**—The Harvard Course in Landscape Architecture. An outline of the studies to be pursued in the first course of the kind established in the United States. 1000 w. Eng Rec—March 24, 1900.

**University of California.**—Landscape Phase of the University of California Plan. Warren H. Manning. Reviews the conditions and requirements of interest to those who have entered the competition for the architectural plan of this university. 2800 w. Am Mach—July 16, 1898.

**LANDSCAPE ENGINEERING.**

Landscape Engineering in Connection with an Engineer's General Practice. W. K. Eldridge. Showing how the study and thorough knowledge of landscape design and management is helpful to the engineer. 5500 w. Purdue Soc Civ Engs—1896.

**LANDSLIDE.**

See also **EARTH SLIP.**

Landslides. Abstract of a discussion before the Institution of Civil Engineers, by Mr. Crowell, giving some especial instances of the behavior of sliding earth in connection with engineering works. 1000 w. Eng Rec—Sept. 10, 1898.

**Bohemia.**—The Landslide Disaster at Klappai in Bohemia (Die Bergsturz Katastrophe bei Klappai in Böhmen). K. Kress. With photographs and a topographical map showing the nature of the disturbance, together with the engineering works for the prevention of a recurrence of the disaster. 8500 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—March, 1899.

**Canadian Pacific Ry.**—Landslides on the Canadian Pacific Railway. Robert B. Stanton. Abstract of paper read at meeting of the Inst. of Civ. Engs., England. Describes these slides and discusses the causes. 1000 w. Engng—Jan. 7, 1898.

**Railways.**—Railway Building and Reconstruction Work in Sliding Ground (Ueber Eisenbahnbau und Reconstructionsarbeiten in Rutschterrain). Soulavy & Schmit. An important discussion of the nature of landslides in connection with the geological formation, with examples of original and reconstruction work in various parts of Europe. Three articles. 12000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—Jan. 7, 14, 21, 1898.

**Rosendale, N. Y.**—See **BOILER EXPLOSION—Landslide.**

**LANTERN.**

**Optical.**—See **OPTICAL LANTERN.**

**LATENT HEAT.**

See also **HEAT—Latent.**

**Liquid Air.**—See **LIQUID AIR—Latent Heat of Evaporation.**

**LATHE.**

See also **MACHINE TOOL; MACHINE SHOP.**

Lathe and Shaper Work. A. H. Cleaves. Illustrated description of methods of doing work. 1500 w. Am Mach—Dec. 30, 1897.

**Alignment.**—Alignment of Engine Lathes. S. Ashton Hand. The object of the article is to show how lathes should be aligned in the process of building and also to enable owners of lathes to test them properly for accuracy. Ill. 900 w. Mach, N. Y.—Oct., 1897.

**American-German.**—A Spindle Lathe with 150 Millimeters Height of Centers (Leitspindelbank von 150 mm. Spitzenhöhe). C. Schals. A very well illustrated description of a metal lathe having a bed of the American pattern in general, but with various modifications. 1500 w. 1 plate. Zeitschr d Ver Deutscher Ing—May 26, 1900.

**Bench.**—An 8 by 20-inch Bench Lathe for the Amateur Electrician. Herbert I. Washburn. Illustrated description of a proposed design. 600 w. Am Mach—Feb. 10, 1898.

**Building Tools.**—Some Tools Used in Lathe Building. W. L. Shellenback. Illustrated description of devices and manner of using them. 500 w. Am Mach—July 7, 1898.

**Cataract Bench.**—Improved Bench Lathe. Illustrated description of the Cataract bench lathe. 700 w. Am Mach—Feb. 15, 1900.

**Chucks.**—A New Lathe Chuck. F. A. Halsey. Illustrated description of work done on a new chuck having a wide range of capacity, and designed by M. A. Sangster, foreman of the Canadian Rand Drill Co. 800 w. Am Mach—Oct. 8, 1896.

See also **CHUCK.**

**Cones and Back Gears.**—Lathe Cones and Back Gears. R. E. Marks. Explanation of these questions which often trouble mechanics and draughtsmen. Serial. Mach—Jan., 1897.

**Dogs.**—Automatic Equalising Lathe Dogs (Ueber Selbstthätig-Ausgleichende Mitnehmer). Herman Fischer. Illustrating various methods of driving work by which the turning pressure may be equalized. 2000 w. Zeitschr d Ver Deutscher Ing—May 28, 1898.

**Duplex.**—Henry Duplex Lathe. Illustrated description of a very powerful lathe for dealing with shafting of the heaviest class. 700 w. Engng—Oct. 27, 1899.

**Error Limits.**—Small Error Limits in Large Lathes. John Randol. Discusses the error limit allowable, and cites the case of two 60-inch lathes of the same dimensions and details, recently ordered, one of which was accompanied by a minute detail of error limits and cost twice as much. Questions whether this excess of cost money was well spent. 2500 w. Am Mach—Aug. 26, 1897.

**57-Inch.**—A 57-Inch Lathe. Describes an interesting lathe recently built for the Union Iron Works, San Francisco. Two half tones and the plan, elevation and cross-section give a good idea of the lathe. 600 w. Am Mach—Dec. 10, 1896.

**German Universal.**—A Novelty in Lathe Design. Illustrates and describes a novel universal lathe made in Germany. 1800 w. Am Mach—Oct. 18, 1900.

**Granite Columns.**—Mammoth Lathe for Turning Granite Columns. An illustrated description of a lathe which swings 6 feet 6 inches by 60 feet long. 1000 w. Ir Age—Sept. 20, 1900.

**Gun.**—Lathe for Boring and Turning Sixteen-Inch Guns at Watervliet Arsenals. Illustrated detailed description of a lathe weighing 280 tons, 188 ft. long, whose head stock alone weighs 52 tons, and each carriage 18 tons. The 16-in. guns turned in this lathe weigh 142.5 tons and are 50 ft. long. 5400 w. Am Mach—April 9, 1896.

The Practice of the Ordnance Department, U. S. A., in Doing Lathe Work on Heavy Guns. Anthony Victorin. Illustrated detailed description. 5200 w. Am Mach—April 9, 1896.

See also **GUN MANUFACTURE.**

**Le Blond.**—A Lathe With Some New Features. Illustrates and describes the Le Blond lathe. 1500 w. Am Mach—Nov. 2, 1899.

**Paris Exposition.**—Lathes at the Paris Exhibition. A general review of the exhibit of lathes by all nations. 2100 w. Engng—Sept. 14, 1900.

See also **Turret, Paris Exposition.**

**Pattern.**—A Large Pattern Lathe. John Randol. Illustrates and describes a heavy pattern lathe at the iron works of Struthers, Wells & Co., Warren, Pa. 1800 w. Am Mach—March 30, 1899.

Conveniences for a Pattern Maker's Lathe. Illustrates and describes satisfactory attachments used for a number of years. 1000 w. Am Mach—May 24, 1900.

**Precision.**—Professor W. A. Roger's Precision Lathe. An account of the methods used in this machine, which was destroyed by fire, and whose inventor is dead, with editorial on the call for this class of machinery. 2500 w. Am Mach—May 25, 1899.

Some of the Products of Professor W. A. Rogers' Precision Lathe. An illustrated description of some of the more important pieces of work done on the lathe before its destruction by fire. Serial. Am Mach—July 27, 1899.

**Shafting.**—A Shafting Lathe. Describes a lathe having some new features, which is intended both for general lathe work and for turning shafting, and arranged so as to be quickly changed from one kind of work to the other. Ill. 700 w. Am Mach—Aug. 18, 1898.

**Slide Rest.**—Notes on the Invention and Development of the Slide Rest. W. F. Durfee. Historical in character and of much interest. 2800 w. Am Mach—Jan. 23, 1896.

**Slotting.**—Slotting in the Lathe. John Randol. Describes a rather unusual piece of shop work. 1000 w. Am Mach—Jan. 20, 1898.

**Small.**—The Choice of a Small Lathe. Joseph Horner. Gives details of the construction of the 5-in. lathe, with the writer's idea of details desirable in a machine, where only one lathe is owned, or can be accommodated. Serial. Mech Wld—Dec. 16, 1898.

**Staff.**—A Staff Lathe. A. H. Cleaves. Illustrated description of a machine used extensively in watch and clock work. 1000 w. Am Mach—Aug. 23, 1900.

**Steady-Pin.**—A Steady-Pin Lathe. A. H. Cleaves. Illustrates and describes a special tool used by watch makers, but also useful for other work. 700 w. Am Mach—Aug. 11, 1898.

**Support for Long Screws.**—Lathe Work Support. John Randol. Illustrated description of a support used in making long screws. 500 w. Am Mach—Aug. 6, 1896.

**Tangye.**—A New English Lathe. James Vose. Illustrates and describes the Tangye engine lathe. 700 w. Am Mach—Sept. 14, 1899.

**Taper Turning.**—Taper Turning Attachments. Illustrated description of an attachment for this work. 1000 w. Ir Age—Sept. 2, 1897.

**Tap Threading.**—A Special Lathe for Threading Taps. Illustrates and describes a special tool made for a tap and die factory, to cut threads upon the taps. 800 w. Am Mach—Nov. 17, 1898.

**Testing.**—Testing the Accuracy of a Lathe Without Special Tools. Theodore H. Miller. Gives a very cheap and simple method, covering the points desirable to be tested. Ill. 1500 w. Am Mach—March 3, 1898.

Tools for Lathe Testing. Oscar E. Perrigo. An illustrated account of a simple and not expensive apparatus for this purpose. 1000 w. Am Mach—July 21, 1898.

**Tool Shape.**—One Million Shapes for a Diamond-Point Lathe Tool. How to Designate Them. Tecumseh Swift suggests a scheme for accurately describing and recording the shape of the cutting point of the tool. 1500 w. Am Mach—Feb. 18, 1897.

**Turret.**—44-Inch Turret Chucking and Turning Lathe. Illustrated description of a machine designed by John J. Grant. 600 w. Am Mach—Nov. 30, 1899.

Hexagon Turret Lathe. Illustrated detailed description of a fine English tool, exhibited by Alfred Herbert, Ltd., at the Crystal Palace. 5000 w. Engr, Lond—Nov. 17, 1899.

Modern Turret Lathes and Screw Machines. Joseph Shepherd. Abstract of a paper and interesting discussion presented at meeting of Glasgow Assn. of Students of the Inst. of Civ. Engs. Deals considerably with the superiority of foreign made tools, describing some of them, and showing the great saving by their use. 5000 w. Engr, Lond—March 24, 1899.

Origin of the Turret, or Revolving Head. E.

G. Parkhurst. Historical review of inventions belonging to this class, illustrating and describing some of them. 2200 w. Am Mach—May 24, 1900.

The Home of the Flat Turret Lathe. Illustrated description of the shops and work of the Lamson Machine Company, at Springfield, Vt. 2000 w. Mach, N. Y.—Oct., 1897.

Vertical Cross Turret Lathe. Illustrated description of a fine English machine tool. 1700 w. Engr, Lond—Oct. 6, 1899.

**Turret, Automatic Release.**—Adjustable Automatic Feed Release for Turret Lathes. Illustrates and describes an interesting adjustable device. 600 w. Am Mach—Oct. 25, 1900.

**Turret, Paris Exposition.**—Turret Lathe Work at the Paris Exhibition. Reviews the most interesting of the exhibits and remarks on the degree of progress shown. Ill. 2300 w. Engng—Oct. 19, 1900.

See also **Paris Exposition.**

**Watervliet Arsenal.**—See **Gun.**

**Water Flood.**—Lathe Work Under a Flood of Water. Illustrates and describes the lathe, and gives examples of work. 1000 w. Am Mach—Sept. 13, 1900.

**Wrist Pins.**—Lathe Attachment for Turning Cast Wrist Pins. C. P. Benns. Illustrates and describes the arrangement and its operation. 1500 w. Am Mach—Nov. 3, 1898.

### LATHE WORK.

**Interior Decoration.**—Lathe Work in Interior Decoration. Fred T. Hodgson. Showing how lathe work may be effectively applied to interior finishing. Ill. 1400 w. Can Arch—Jan., 1898.

### LATIN AMERICA.

See also **CENTRAL AMERICA; SPANISH AMERICA.**

### LATITUDE.

**Determination.**—Latitude. William R. Hoag. An article showing how a civil engineer, with his ordinary transit, can easily establish his latitude within 10 seconds and with the aid of a sextant within 3 to 5 seconds. 2000 w. Engs' Year Book Univ of Minn—1896.

See also **NAVIGATION.**

### LAUNCH.

See also **BOAT.**

**Aluminum, Victoria Nyanza.**—Navigation on African Lakes. C. Du Riche Preller. Brief description of an aluminum launch constructed for the Victoria Nyanza.—400 w. Engng—Aug. 12, 1898.

**Cornell.**—Coaching Launch Used by the Cornell University Rowing Club. Illustrated description with statement of the requirements of a launch for this use. 1000 w. Marine Engng—July 2, 1898.

**Electric.**—See **ELECTRIC BOAT.**

**Gasoline.**—See **GASOLINE ENGINE—Griffin Launch; Wolverine Marine; GASOLINE YACHT.**

**Naphtha.**—Our Builders. Where Naphtha Launches Grow. Describes a visit to the works of the Gas Engine and Power Co., and Charles L. Seabury & Co., at Morris Heights, N. Y. Ill. 1800 w. Rudder—Dec., 1898.

The Naphtha Launch of the Gas Engine and Power Company, of New York City. Illustrated description. 900 w. Sci Am Sup—Feb. 27, 1897.

**Trials.**—Speed and Power Trials of a Light-Draught Steam Launch. Charles Ward. Describes the boat and trials, giving tabulated results. 2600 w. Jour Am Soc of Nav Engs—Feb., 1598.

**Vapor.**—A Vapor Hunting Launch. Illustrated description of a launch built for H. M. Birge, of Buffalo. 900 w. Sci Am—July 24, 1897.
See also **BOAT—Alco-Vapor Motor.**

### LAUNCHING.

See also **SHIPBUILDING; STEAMSHIP; WARSHIP.**

**Battleship.**—On the Launch of a Battleship. H. R. Champness. A detailed description of the launching of a modern battleship and of the appliances used for the purpose. 6500 w. Engng—July 28, 1599.

**Bridge.**—See **BRIDGE ERECTION—Launching.**

**France.**—The Launching of Vessels in France. From "La Vie Scientifique." Processes and material employed in French practice are illustrated and described. 700 w. Sci Am Sup—Sept. 12, 1896.

**"Kentucky" and "Kearsarge"**—See **BATTLESHIP; WARSHIP—United States.**

**Mishaps.**—Launching Mishaps. Gives a brief enumeration of representative examples, with remarks. 1700 w. Engr, Lond—Oct. 21, 1898.

**"Oceanic."**—See **STEAMSHIP—"Oceanic."**

### LAUNDRY.

The Arrangement of Public Laundries (Industrielle Wäschereien). With plans of the arrangement of machinery, including hospital service. 3500 w. Gesundheits Ingenieur—Jan. 31, 1897.

**Machinery.**—Steam Laundry Machinery. Sidney Tebbutt. Read before the Inst. of Mech. Engs., England. Part first considers briefly the arrangement of the laundry, and method of washing, but is largely a description of washing machines. Ill. Serial. Engng—June 17, 1898.•

### LEAD.

See also **LEAD METALLURGY; LEAD MINE; METAL MINE; MINERAL REGION; SMELTING; TIN; ZINC.**

**Australia.**—See also **SILVER REGION—Australia.**

**British Columbia.**—See **SILVER REGION—British Columbia.**

**1899.**—Lead in 1899. Report of the production in the United States and of the New York and London markets. 2200 w. Eng & Min Jour—Jan. 6, 1900.

**Iowa.**—Lead and Zinc Deposits in Iowa. A. G. Leonard. Brief account of the deposits, working of mines and output. 1900 w. Eng & Min Jour—June 27, 1896.

Lead and Zinc. A. G. Leonard. A description of the mines of Iowa in the upper Mississippi region, with illustrations. The mode of occurrence of the ores, the minerals associated with them and the theories in regard to their deposition, with a description of some of the mines. 2300 w. Col Eng—Oct., 1896.

Origin of the Iowa Lead and Zinc Deposits. A. G. Leonard. A review of the various ascension, lateral secretion and descension theories of Messrs. Whitney, Chamberlain, Winslow, Blake, Kemp and Jenner, and concluding that the ore deposited was contemporaneous with the enclosing limestone and came from above. 2700 w. Am Geol—Nov., 1895.

**Missouri.**—Lead and Zinc Ores. E. Hedburg. The manner of their occurrence and their geological relation to the coal area of Missouri. Ill. 1400 w. Mines & Min—Feb., 1898.

The Lead and Zinc Industry of Southwest Missouri. F. W. Draper. Read before the Ap. Sci. Soc. of McGill Univ. Describes the deposits, discussing their origin, and the methods of mining and preparation for market. 2100 w. Can Engr—Aug., 1900.

See also **LEAD METALLURGY—Joplin, Mo.; LEAD MINE; ZINC INDUSTRY—Missouri.**

**New Mexico.**—See **COPPER REGION.**

**Smithfield, N. S.**—On the Occurrence of Galena at Smithfield, N. S. John E. Hardman. Gives what is said to be the first correct account, and suggests the possibility of future development, proving the deposits to be of economic value. Jour of Can Min Inst—Vol I, Pt I.

**Tasmania.**—See **SILVER REGION.**

**United States.**—The Lead Indnstry of the United States. Edward A. Caswell. A general review of the industry with conditions which have influenced the trade. 4000 w. Ir Age—Jan. 2, 1896.

**U. S. Production.**—Production of Lead and Zinc in 1896. Charles Kirchhoff. From the Annual Report of the U. S. Geological Survey. Tabulated statements of the total gross production since 1873, with comment. 900 w. Am Mfg & Ir Wld—Sept. 24, 1897.

### LEAD ALLOY.

See also **TIN ALLOY.**

**Testing.**—Quick Testing of Lead-Tin and Lead-Antimony Alloys. Joseph Richards. Describes methods of quick determinations sufficiently true for the purpose required. Ill. 1200 w. Jour Fr Inst—May, 1899.

### LEAD METALLURGY.

See also **LEAD; LEAD MINE; METALLURGY; SILVER METALLURGY; SMELTING; TIN; ZINC; ZINC METALLURGY.**

**Ashcroft Process.**—The Ashcroft Process for the Treatment of Mixed Lead and Zinc Sulphide Ores.

Walter Renton Ingalls. A statement of the difficulties encountered at Cockle Creek, N. S. W., and some of the features involved in the problem. Also editorial. 5000 w. Eng & Min Jour—Oct. 22, 1898.

**Bartlett Process.**—See ZINC METALLURGY.

**Dust and Fume Collection.**—See DUST.

**Electrolytic.**—See ELECTRO-METALLURGY.

**Furnace Gas Temperature.**—Temperature of Gases from Lead Furnaces. Malvern W. Iles. The method used in the temperature determinations is fully explained. The author says the separation of slag from matte is more perfect at higher temperatures. 2500 w. Sch of Mines' Quar—Nov., 1895.

**Furnace Liquid.**—A Liquid from the Fumes of Lead Furnaces. Malvern W. Iles. A study of the chemical reactions which take place in the lead blast furnace. 1600 w. Eng & Min Jour—Nov. 11, 1899.

**Furnace, Wall Accretions.**—Wall Accretions of Lead Blast Furnaces. Malvern W. Iles. In the opinion of the writer these accretions can never be entirely prevented, but to a certain extent can be controlled. An examination of the causes and statements with reference thereto are given, with other interesting information. 1800 w. Sch of Mines Quar—Nov., 1896.

**Joplin, Mo.**—Lead and Zinc Milling and Concentrating in the Joplin, Mo., District. E. Hedburg. The primitive mode procedure and the latest modern plants, showing the different systems in use in its several stages for the different classes of ores. Ill. 2000 w. Mines & Min—June, 1898.

Lead Smelting in the Joplin, Missouri, District. E. Hedburg. Early history and the different processes now in use. A description of the Scotch lead furnace, also the Lewis Bartlett process and system of making sublimed white lead as carried on at the works of the Picher Lead Co. Ill. 2200 w. Mines & Min—July, 1898.

See also LEAD—Missouri.

**Murcia, Spain.**—Note on the Metallurgy of Lead in Murcia, Spain (Note sur la Metallurgie du Plomb dans la Province de Murcie, Espagne). P. Jannettaz. A general description of the région, the lead ores, galena particularly, and their metallurgical treatment. 2000 w. Mem d l Soc d Ing Civils de France—No. 12, 1900.

**Roast Reaction Process.**—A Proposed New Method of Smelting Lead Concentrates. Henry F. Collins. Outlines a process which he calls a roast-reaction process. 2500 w. Can Min Rev—Oct. 31, 1898.

**Smelting.**—See also Joplin; SMELTING; ZINC METALLURGY.

**Smelting Slags.**—Blast Furnace Slags in Lead Smelting. C. C. Longridge, in London "Mining Journal." How to secure good separation, giving the composition of several useful slags, and discussing the effect of various constituents. 1500 w. B C Min Rec—Sept., 1900.

**Smelting Tin Plate Scrap.**—The Application of Tin Plate Scrap in Lead Smelting (Verwerthung von Weissblechabfällen im Bleihüttenbetriebe). A paper by Dr. August Harpf describing his process for using tin plate cuttings in the reduction of lead. Two articles. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 14, 21, 1897.

**Sulphides.**—See also Ashcroft Process; METALLURGY; SILVER METALLURGY.

**LEAD MINE.**

See LEAD; LEAD METALLURGY; METAL MINE; TIN MINE; ZINC; ZINC MINE.

**Accident.**—See Snaefell, Isle of Man, Accident.

**Broken Hill, N. S. W.**—See SILVER MINE—Broken Hill, N. S. W.

**Dubuque.**—The Dubuque Lead and Zinc Mines. H. Foster Bain. Describes the geological position and mode of occurrence of the ores and gives an account of their peculiarities. 3200 w. Mines & Min—Aug., 1899.

**Halkyn Ore Dressing.**—Halkyn Mines. E. Ashton, Jr. Describes the development of the dressing plant of this lead mine. 2500 w. Min Jour—Feb. 20, 1897.

**Joplin, Mo.**—Lead and Zinc Mining. E. Hedburg. A brief history of the methods used in prospecting and mining in the Joplin, Missouri, District, describing the manner of shaft sinking and developing and giving some figures showing cost of the plants and their operation. Ill. Mines & Min—April, 1898.

**Missouri.**—The Lead Mines of Southeastern Missouri. Interesting information concerning the deposits of this district, the mining and concentration. 1800 w. Eng & Min Jour—July 28, 1900.

See also LEAD.

**Missouri and Kansas.**—See also ZINC MINE.

**Missouri La Motte.**—A Sketch of Mine La Motte, Missouri. Charles R. Keyes. Describes one of the most famous lead mines of the country. 2000 w. Eng & Min Jour—Nov. 21, 1896.

**Park City, Utah.**—See SILVER MINE.

**St. Joseph.**—Characteristic American Metal Mines. J. Wyman Jones. Describing the plant of the St. Joseph Lead Company. Ill. Serial. 1st part. Eng Mag—June, 1897.

**Silesia.**—The Underground Work of the Samuelsglück Mine at Beuthen (Unterwerksbau der Samuelsglück-Grube bei Beuthen). An account of the extension of the underground work of a lead and zinc mine in Upper Silesia. Steam is conducted 2500 feet underground, to operate pumping and hoisting machinery. 1500 w. Zeitschr d Ver Deutscher Ing—Jan. 1, 1898.

**Snaefell, Isle of Man, Accident.**—Report on the Snaefell Lead Mine Accident. Abstract of report of C. Le Neve Foster on the circumstances attending the underground fire at the Snaefell lead mine in the month of May, 1897. 7000 w. Col Guard—June 3, 1898.

**LEAD WORK.**

See also PLUMBING.

Lead Work, Plain and Decorative. F. W. Troup. Describes the uses made of lead by early architects, as roofs, crockets, figures, etc. Discussion. 8500 w. Builder—March 5, 1898.

Lead Work. W. R. Lethaby. Read before the Soc. of Arts. Abstract. Discusses lead cisterns, fountains and conduits; lead roofs, spires, domes, and belfrys, and ornamental lead work. 3300 w. Brit Arch—April 16, 1897.

Ornamental Lead and Lead-Casting. F. W. Troup. Read before the Birmingham (Eng.) Archt. Assn. Historical review, quoting from various authors, with illustrated description of work. 10000 w. Jour Roy Inst of Brit Archts—May 12, 1900.

**LEATHER.**

**Germany.**—Leather Manufactures in Germany. Reports the striking progress in the tanning and leather industries, and gives suggestions for American shoe manufacturers, for increasing trade. 1800 w. U S Cons Repts, No. 820—Jan. 10 1899.

The German Leather Industry. States the preference for American dressed leather and shows that manufacturers have an opportunity to gain a permanent foothold. 600 w. Cons Repts—April 2, 1898.

**Manufacture.**—Preparation of Lamb and Kid Skins for Gloves. Illustrated description of appliances and processes. 900 w. Sci Am—March 21, 1896.

**Refuse.**—The Value of Leather Refuse. J. B. Lindsey. An account of experiments with conclusions and tabulated statements with results. 2000 w. Jour Am Chem Soc—July, 1896.

**Strength.**—Some Experiments on the Strength of Leather. Walter G. McMillan. Description and results of mechanical tests made by the Indian Ordnance Department, to determine the tensile strength of harness leather. 2800 w. Discussion. Leather Mfrer—July, 1896.

**LEVEE.**

See also FLOOD; FLOOD PREVENTION; RIVER REGULATION.

**Louisiana.**—The State Levees of Louisiana. A brief record of the work in Louisiana. There are at present 1194 miles of levees in the State, and 90 miles in Arkansas. 1200 w. Eng Rec—Sept. 24, 1898.

**Mississippi.**—A New Levee System. Guy M. Walker. Outlines a plan for protecting the banks of the Mississippi, and the advantages of permanent protection. 2000 w. State's Duty—May, 1897.

The Mississippi Levees and the Flood. Extracts from a letter by H. B. Richardson, chief state engineer of Louisiana, reviewing the experience with the levees during the recent flood. 2200 w. R R Gaz—Sept. 3, 1897.

**Red River, La.**—Levees, with Special Reference to the Red River System. Frank M. Kerr. The geographical position of Red River and some of its general features are given, with an account of the work in progress and its aim. 7000 w. Jour Assn of Engng Soc's—Dec., 1898.

The Levees of the Red River in Louisiana. F. M. Kerr. Abstract from paper presented to the Louisiana Engng. Soc., reviewing the past conditions of this valley, the influences at work and the progress made in protecting the land from overflow. 1800 w. Eng News—May 12, 1898.

**Shawneetown Disaster.**—The Shawneetown Levee Disaster. Statement of two possible causes of this fatal accident. 800 w. Eng Rec—April 23, 1898.

**Standard Sections.**—Standard Levee Sections. H. St. L. Coppée. Explains the work along the Mississippi and the standards adopted in the various sections. Also gives comparison of the third district levee section with the old American notions and with those used in foreign countries, in order to determine what evolution there has been, and how the practice in various places compares. Tabulated results and many illustrations. 4000 w. Pro Am Soc of Civ Engs—Jan., 1898.

**LEVEL.**

**Lakes.**—See **CANAL—Nicaragua Lake Level; GREAT LAKES—Levels.**

**Surveying Instrument.**—See **SURVEYING INSTRUMENT—Level.**

**LIBRARY.**

See also **COLLEGE; SCHOOL; UNIVERSITY BUILDING.**

New Ideas in Library Buildings. William E. Foster. Extract. Considers some details of the architecture and arrangement of libraries. 1800 w. Am Arch—July 30, 1898.

**Basel, Switzerland.**—The New University Library at Basle (Die Neue Universitäts Bibliothek in Basel). Elevation, plans and details of book stack of this new university library. 1200 w. Deutsche Bauzeitung—March 26, 1898.

**Boston.**—The New Building of the Boston Public Library. T. R. Sullivan. A very interesting and finely illustrated description. 3800 w. Scribner's Mag—Jan., 1896.

**Brick.**—A Public Library, to Cost One Hundred Thousand Dollars. Thomas M. Kellogg. The first of a series of articles illustrative of a library building, and showing the possibilities of brick architecture. Serial. Br Build—Nov., 1899.

**Chicago.**—Chicago Public Library. Illustrated description of a fine building of classic style. 1600 w. Harper's Wk—Sept. 18, 1897.

**Civil Engineers.**—An Opportunity for the American Society of Civil Engineers. Editorial. Suggests that an extension should be made to the scope and usefulness of the Society's library, making it of great value to the engineering profession. 1600 w. Eng News—Jan. 13, 1898.

**Cologne.**—Record and Library Building for the City of Cologne (Archiv und Bibliothek der Stadt Köln). Plans, photographic views and detailed description of the fine new building for the archives and city library. 3000 w. 3 plates. Oesterr Monatschr f d Oeffent Baudienst—May, 1898.

**Columbia University.**—Architecture and Mural Painting. Charles H. Coffin. Brief description with illustrations of interior of Columbia College library, and description of the mural paintings of the Art Gallery of Bowdoin College. 1600 w. Harper's Wk—Sept. 25, 1897.

See also **UNIVERSITY BUILDING.**

**Congressional, Washington, D. C.**—The New Congressional Library. E. A. Hempstead. Historical and descriptive, with plan and illustrations. 4800 w. Chau—Sept., 1896.

The Building for the Library of Congress. J. K. Orvis. A general account of the leading architectural characteristics, mentioning some of the most striking works of art which it contains. Ill. 11000 w. Arch & Build—April 3, 1897.

The Congressional Library. An abbreviated description and illustrations of this fine library in Washington, D. C. 1000 w. Archts' & Builds' Mag—July, 1900.

The National Library. Notes on a lecture by Mr. Barnard R. Green. Ill. 2500 w. In Arch —March, 1897.

The Nation's Library. A. R. Spofford. Illustrated description of the new building and special features of the Congressional Library, as given by the Librarian. 4500 w. Century Mag—March, 1897.

The New Congressional Library. Illustrated historical description. 2300 w. Inv Age—Jan., 1896.

The New Library of Congress. Russell Sturgis. An interesting study of the decorative work with brief history of the building, its architecture and plan. Ill. 8700 w. Arch Rec—Jan., March, 1898.

The New Library of Congress. Montgomery Schuyler. Interesting illustrated description of the architectural features. 7000 w. Scribner's Mag—June, 1897.

**Jersey City, N. J.**—The New Free Public Library, Jersey City, N. J. Illustrates and describes a large library building. 1400 w. Eng Rec—May 20, 1899.

**Manchester.**—The John Ryland's Library, Manchester. Basil Champneys. Illustrated description of a building founded on English types. Also discussion. 5000 w. Jour Roy Inst of Brit Archts —Jan. 27, 1900.

**Massachusetts.**—The New Massachusetts State Library Building, at Boston, Mass. Brief illustrated description of the new extension to the Massachusetts State Capitol. 1500 w. Sci Am Sup—Aug. 28, 1897.

**Middle Ages.**—The Libraries of the Middle Ages. T. G. Jackson. Describes the libraries of the middle ages, comparing them with those of the present day. Illustrations and discussion. 13600 w. Jour Roy Inst of Brit Archts—May 21, 1898.

**New York.**—New York's New Public Library. Edwin Emerson, Jr. Illustrations of the outside of the building with some remarks on special features of the accepted design. 1200 w. Harper's Wk—Dec. 11, 1897.

The New York Public Library. Description with illustrations and general information. 1600 w. Eng Rec—Dec. 11, 1897.

Preliminary Competition for the New York Library Building. Information regarding the proposed building and the committee's manner of obtaining plans. 1600 w. Arch & Build—June 5, 1897.

**N. Y. University.**—New Library Building, University of the City of New York. Illustration showing the main features of plan and arrangement of the new building, with brief description. 300 w. Eng Rec—March 28, 1896.

**Oakland, Calif.**—The Oakland Public Library. Illustrated description of Carnegie library, with shelf room for 80,000 volumes. 600 w. Eng Rec —Oct. 13, 1900.

**Orange, N. J.**—The Stickler Memorial Library, Orange, N. J. Illustrated description of building for 45,000 volumes. 600 w. Eng Rec—June 30, 1900.

**Princeton.**—The New University Library at Princeton. Andrew F. West. Illustrated description. 600 w. Harper's Wk—June 12, 1897.

**Providence, R. I.**—The Providence Public Library. Illustrated description of the general design of a building for 225,000 volumes, with numerous rooms for educational and other purposes; the heating arrangements are explained in detail. 3300 w. Eng Rec—July 21, 1900.

**Public.**—Public Libraries. J. M. Brydon and F. J. Burgoyne. The paper by Mr. Brydon discusses what has recently been done in library building, giving illustrations. Mr. Burgoyne considers the planning and fitting. Discussion. 13000 w. Jour Roy Inst of Brit Archts—Feb. 25, 1899.

**Washington.**—The Washington Public Library. Illustrated description of the general arrangement of the Carnegie library. 1800 w. Eng Rec—Nov. 11, 1899.

See also **Congressional.**

**LICH-GATES.**

Lich-Gates. John S. Holbrook. Illustrates and describes these structures, peculiar to England, which are built at the entrance to churchyards so as to form a shelter under which the bier or coffin may rest. 1000 w. Am Arch—Sept. 24, 1898.

**LIFEBOAT.**

See also **BOAT.**

**Hydraulic.**—Hydraulic Lifeboats. Sydney Walker Barnaby. Paper selected from the transactions of Inst. of Civ. Engs., England. Describes the latest steam lifeboat which has been built by Messrs. Thornycroft and Company for the South Holland Lifeboat Institution, and which is stationed at the Hook of Holland. Ill. 1700 w. Prac Eng—Dec. 24, 1897.

Oil Fuel Experiments on Hydraulic Life Boat "Queen." John Platt. A general description of the boat and the results of a series of experiments made burning both coal and oil in a Thornycroft boiler. Ill. 2300 w. Jour of Am Soc of Naval Engs—May, 1898.

Oil Fuel Experiments on Hydraulic Life Boat "Queen." John Platt. Read before the Washington meeting of the Am. Soc. of Nav. Engs. General description with particulars of trials, and drawings of the boiler. 2200 w. Ir Age—Jan. 20, 1898.

**Twin-Screw.**—Twin-Screw Lifeboat for the U. S. Life Saving Service. O. H. McLellan. Describes experiments recently made with a gas engine as motive power with gratifying results. Ill. 1800 w. Marine Engng—Jan., 1900.

**LIFE BUOY.**

**Electric-Lighted.**—Electric-Lighted Life Buoys. James H. Bates. Illustrated description of a device, the invention of C. J. Bates. 1100 w. Elec Rev—Feb. 12, 1896.

**LIFE-SAVING APPLIANCES.**

**Mine.**—See also **COAL MINE EXPLOSION—Rescue Appliances; MINE—Rescue Appliances.**

**Sea.**—Competition for the Best Life-Saving Device in Cases of Disaster at Sea. The official regulations regarding the competition for the Anthony Pollak $20,000 prize for life-saving devices. 900 w. Sci Am Sup—Jan. 27, 1900.

Life Saving Appliances (Les Moyens de Sauvetage). Giving the text of the new French law providing for life saving appliances at sea, with discussion, by M. Dibos. 3500 w. La Revue Technique—July 25, 1897.

See also **BOAT; LIFE-BOAT; LIFE-BUOY; NAVIGATION; WRECK.**

**LIFE SAVING SERVICE.**

Organisation and Development of the United States Life-Saving Service. An illustrated account of this work from data furnished by Sumner I. Kimball, chief of the service. 3500 w. Marine Rev—Oct. 12, 1899.

**LIFT.**

See also **ELEVATOR.**

**Air.**—See **AIR LIFT.**

**Canal.**—See **CANAL LIFT; LOCK.**

**Electric.**—See **CRANE; ELECTRIC ELEVATOR; ELECTRIC HOISTING; HOISTING—Electric.**

**Water.**—See **AIR LIFT; WATER RAISING.**

**LIFTING MACHINERY.**

See also **CRANE; HOISTING; HOISTING ENGINE.**

**LIGHT.**

See also **ELECTRO - PHYSICS; LIGHTING; PHOTOMETRY; PHYSICS; RADIOGRAPHY.**

**Absorption by Glass.**—The Absorption of Light Rays Through Transparent and Translucent Glass. Th. Stort. Considering whether losses of light take place, and the extent, etc. 800 w. Pro Age—Jan. 15, 1896.

**Efficient.**—A Cold Light. A brief account of experiments now being carried out in Europe by Puluj. 700 w. Bos Jour of Com—March 27, 1897.

Cold Light. W. M. Stine. A consideration of the great waste of all forms of artificial illumination, and the problem of the economical production of light. The writer considers the ultimate accomplishment almost a certainty. 2500 w. Elec Wld—March 14, 1896.

The Light of the Future. E. Hospitalier. The ideal light—light with the minimum of heat. The author thinks we are approaching the realisation of this ideal. 700 w. Pro Age—Sept. 1, 1896.

The Mistaken Ideal of Artificial Light Improvers. W. H. Birchmore. Criticism of the work of Palaz, and a discussion with the object of showing that it is not in the dicta of a Bunsen photometer that we must find our standards, but in the brightness of certain colors and in the "spectra of reflection." 2400 w. Elec Eng—Jan. 1, 1895.

**Theory.**—The Origin of Waves of Light. W. Wedding. The frequency and rate of transmission of ether waves which manifest thmeselves upon the retina as light of different colors. Differences between solar and artificial illumination. Abstract of paper read before the German Assn. of Gas and Water Engs. 1500 w. Jour Gas Lgt—Oct. 27, 1896.

**LIGHTHOUSE.**

Lighthouses. Alfred J. Glasspool. Part first comments on the need of placing these signals to guide vessels in safety, and reviews the early systems and the progress made in this field. Serial. Arch, Lond—April 16, 1897.

Lighthouse Engineering at Home and Abroad. J. A. Purves. Abstract of a paper read before the Inst. of Engs. and Shipbuilders in Scotland. An illustrated historical review. 6000 w. Engs' Gaz—Dec., 1899.

Lighthouse Progress, 1887-1897. J. Kenward. In 1887 the writer prepared an article on the lighthouse work and progress covering the preceding fifty years. This article covers the past ten years, and both together will give a summary record of what has been attained during the Victorian era. 4000 w. Nature—July 22, 1897.

**Alguada, Burmah.**—Alguada Reef Lighthouse. Information and description relating to one of the most important lighthouses off the coast of Burmah. 1600 w. Ind Engng—July 16, 1898.

**Apparatus.**—Methods of Revolving the Optical Apparatus for Lighthouses. D. P. Heap. Illustrated description. 2200 w. Sci Am—Nov. 25, 1899.

Modern Lighthouse Apparatus. J. A. Purves. Illustrated descriptions of the mercury float feu-éclair light, and the spindle-eclipsing apparatus. 800 w. Nature—Feb. 22, 1900.

The Optical Apparatus of Lighthouses (Appareils Optiques des Phares). M. Ribière. A graphical and mathematical treatment of the figures for the lenses of lighthouse apparatus, with experimental verification of the theoretical deductions. 10000 w. 3 plates. Ann des Ponts et Chaussées—4 Trimestre, 1897.

See also **LIGHTHOUSE LENS.**

**Bombay.**—The Prongs Lighthouse. J. H. E. Hart. An illustrated account of a lighthouse built at the entrance of the Bombay harbor. 4800 w. Engr, Lond—June 3, 1898.

**Concrete.**.—See **Lorient, France.**

**"Eckmühl," France.**—The "Eckmühl" Lighthouse (Le Phare d'Eckmühl). A description of the fine new lighthouse erected on the Point de Penmarch, France, with plate of details of lighting apparatus, and pneumatic siren. 7500 w. 1 plate. Génie Civil—Oct. 9, 1897.

The Construction of the Eckmühl Lighthouse (Construction de l'Edifice du Phare d'Eckmühl). M. Duperrier. Devoted especially to the construction of the tower and buildings, and to the general and ornamental features. 5000 w. 1 plate. Ann des Pont et Chaussées—3 Trimestre 1899.

The New Electric Lighthouse of Penmarch-Eckmühl (Finisterre). C. S. Du Riche Preller. Illustrates and describes the distinctive features of this lighthouse of the Bay of Biscay. Serial. Engng—May 6, 1898.

See also **Electric.**

**Electric.**—Electric Lighthouses. Recent improvements in the systems used, with illustrated description of the Penmarch light. 1000 w. W Elect'n—Sept. 24, 1898.

Electric Lighting and the Eckmühl Lighthouse (L'Eclairage Electrique et le Phare d'Eckmühl). M. de Joly. A general description of the extensive introduction of electric lighting in the lighthouses on the coast of France, together with an account of the inauguration of the new Eckmühl lighthouse. 12000 w. 2 plates. Ann des Ponts et Chaussées—4 Trimestre, 1897.

See also **Eckmühl.**

**Electric Communication.**—See **SPACE TELEGRAPHY; TELEGRAPH.**

**Electric, Staten Island.**—Testing an Enormous Electric Beacon. Describes the electric beacon known as the Lepoute "bivalve" being tested at Tompkinsville, Staten Island, N. Y. Ill. 600 w. Elec Wld—Jan. 15, 1898.

**Formosa, Japan.**—Lighthouse Illumination in Japan.

C. S. Du Riche Preller. Illustrated description of the salient features of the new Japanese light, erected in the Island of Formosa. Lightning flash apparatus. 1400 w. Engng—July 30, 1897.

**France.**—An account of the French Lighthouse System (Die Entwicklung des Französischen Leuchtfeuerwesens). Commenting most favorably upon the administration of the French lighthouse system, and describing in detail the arrangements of arc electric lights and Fresnel prisms. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 28, 1897.

Coast and Lighthouse Illumination in France. C. S. Du Riche Preller. The first part deals with the recent great extension of the French coast-light system, and gives an illustrated statement or three different systems of classification of lights with their characteristics. Serial. Engng—May 1, 1896.

French Lighthouses at the Paris Exposition (Les Phares Français à l'Exposition de 1900). A review of French modern practice as illustrated at the Exposition. 1100 w. Moniteur Industriel—July 28, 1900.

The Latest Improvements in the French Lighthouse System. Jacques Boyer. The first portion of a detailed account of the great advances in coast illumination made in France. Many illustrations are given of the improved "lightning flash" optical system. 3000 w. Eng Mag—Oct., 1898.

The Latest Improvements in the French Lighthouse System. Jacques Boyer. The second paper gives a very full account of the great Eckmühl lighthouse on the Fréton coast, and concludes with a discussion of lightships and illuminated buoys, with many illustrations. 3500 w. Eng Mag—Nov., 1898.

See also **Eckmühl; Electric; Lorient; Sautter, Harié & Co.**

**German Exhibit at Paris.**—See **MERCHANT MARINE.**

**History.**—A Contribution to the History of the Development of the Lighthouse (Zur Geschichte und Entwickelung der Leuchtfeuer). An address mainly historical and descriptive delivered by Constructor Veilmeyer before the Society of German Engineers in Berlin. 4000 w. Glaser's Annalen—April 1, 1896.

Recent Improvements in Lighthouse Illumination. Illustrated historical account of improvements since 1822. 1700 w. Nature—Nov. 26, 1896.

Recent Progress in Coast Illumination (Les Progrès Récents de l'Eclairage des Côtes). Jean Rey. An illustrated account of the development of modern systems of lighting, from the compound lenses of Fresnel to the latest "lightning flash" method. 12000 w. Bull de la Société d'Encour—April, 1898.

The Evolution of Lighthouses (Die Konstructive Entwickelung der Seefeuer). M. Geitel. A paper before the Verein Deutscher Maschinen-Ingenieure, giving an illustrated account of the historical and technical development of lighthouses; based on a forthcoming book by Veitmeyer. Serial. 2 parts. Glaser's Annalen—July 15, Aug. 1, 1900.

**Illuminants.**—Lighthouse Illuminants. Lawrence Irwell. Discusses the use of oil, gas and electricity. 1800 w. Marine Rec—May 4, 1899.

**Jenningtree Point, Kent.**—Lighthouse at Jenningtree Point. Drawing and brief description of a steel-frame lighthouse. 500 w. Engr, Lond—Sept. 21, 1900.

**Lake Erie.**—Lights on Lake Erie. An interesting communication from Col. Wm. Anderson, of Ottawa, relative to a new plan of lighting Pelee Passage. 700 w. Marine Rev—Aug. 30, 1900.

**Lepoute Bivalve.**—See **Electric, Staten Island.**

**"Lightning Flash."**—Feux-Eclairs or Lightning Flash Lights. John A. Purves. The object of the paper is to show how the feux-eclairs system has evolved out of the old and existing order of lights and to point out its reasonable explanation. Ill. 2500 w. Engng—Oct. 29, 1897.

See also **Apparatus.**

**Lorient, France, Concrete.**—A French Lighthouse Tower of Concrete. A description with illustrations of a lighthouse tower recently built at Lorient, in the Bay of Biscay. The structure is entirely of concrete. 2500 w. R R Gaz—March 6, 1896.

A Monolithic Beacon Tower, France. Illustrated description of a new lighthouse at Irvis-Pierres, at the entrance to the harbor of Lorient, France. 1100 w. Eng News—Sept. 3, 1896.

**Lundy Island, Eng.**—The New Lighthouses on Lundy Island. The importance to mariners of this island at the entrance of Bristol Channel, is explained; the old lighthouse and the changes made in it reviewed; and the new lighthouses described. Serial. Engng—Jan. 7, 1898.

**Norway.**—The Electric Lighthouse at Ryvingen, Norway (Le Phare Electrique de Ryvingen, Norvège). Ch. Delgobe. An illustrated account of this fine new work, with plate showing the arrangement of the lantern and the production of the flashes. 3500 w. 1 plate. Génie Civil—June 18, 1898.

**Penmarch.**—See **Eckmühl; Electric.**

**Sautter, Harié & Co., France.**—The Lighthouse and Signal Devices of Sautter, Harié & Co. (Phares et Signaux Sonores Sautter, Harlé et Cie). With illustrations of the workshops and detailed descriptions of the lights and sound signals constructed by this famous French establishment. 2500 w. Rev Tech—Sept. 25, 1900.

**Sfax, Tunis.**—The Construction of the Ras-Tina Lighthouse (La Construction du Phare de Ras-Tina). M. Regnoul. Description with plate of details of this important new work at the port of Sfax in Tunis. 4000 w. 1 plate. Ann des Ponts et Chaussées—Pt. I., 1897.

**Wisconsin.**—A Circular Steel Light Tower at Sturgeon Bay Canal, Wisconsin. Illustrated description of a new type of lighthouse, favored because of its simplicity, small cost and lasting qualities. 700 w. Eng News—Nov. 9, 1899.

**LIGHTHOUSE LENS.**

On a New Form of Lighthouse Refractor. John A. Purves. Describes a new prismatoidal lens for lighthouses, with diagrams. This lens is claimed to be more powerful and of less weight and bulk than the Fresnel. 1700 w. Eng, Lond—Dec. 20, 1895.

**LIGHTHOUSE TENDER.**

**"Armeria."**—From Light to Light. Kirk Munroe. A description of the "Armeria," one of her regular cruises, the lighthouses supplied by her, the supplies delivered, and customary incidents of such a cruise. Popular and entertaining style. Ill. 7300 w. Scribner's Mag—Oct., 1896.

**"Heather."**—New Lighthouse Tenders. Illustrated description of the "Heather," to be built for Oregon coast service. 700 w. Marine Rev—Feb. 8, 1900.

**LIGHTING.**

See also **ARC LIGHTING; ELECTRIC LIGHTING; GAS LIGHTING; HEATING; HEATING AND VENTILATION; INCANDESCENT GAS LIGHTING; MECHANICAL PLANT.**

Artificial Illumination. G. P. Lewis. Abstract of a lecture, briefly reviewing progress, considering thermal and lighting efficiencies, illuminating power and illuminating effect, etc. 1500 w. Jour Gas Lgt—Feb. 16, 1897.

Herr W. von Oechelhaeuser on Progress in Artificial Lighting. An epitome of the inaugural address of the President of the German Assn. of Gas and Water Engs. On the recent advances in the lighting industries. 2800 w. Jour Gas Lgt—Sept. 26, 1899.

Illumination vs. Glare. Albert Scheible. Consideration of lighting for the shop window, the home, and the street. 1700 w. Elec Eng—Dec. 11, 1895.

The Elements of Illumination. Louis Bell. Considers some of the fundamental principles, optical, physiological and aesthetic, which underlie the proper use of artificial illuminants, and how to adapt them to existing conditions. Serial. Elec Wld & Engr—April 14, 1900.

The Production of an Artificial Light of the Same Character as Daylight. A. Dufton and W. M. Gardner. Abstract of paper before British Association, discussing the subject generally, and describing a means of modifying the electric arc's light by passing it through pale blue glass. 800 w. Electrician—Sept. 14, 1900.

**Acetylene.**—See **Comparative Systems; ACETYLENE.**

**American Surety Building, N. Y.**—See **HEATING—Office Building, N. Y.**

**Benzol.**—Benzol as an Illuminating Agent (Das Benzol und seine Bedeutung als Leuchtstoff). Giving comparative results with other illuminants, both photometrically and commercially. Especially good results are obtained by using a mixture of alcohol and benzol to heat an incandescent mantle. 2500 w. Gesundheits Ingenieur—June 30, 1897.

**Berlin.**—Dr. H. Lux on the Lighting of Berlin. Review of a book which presents an excellent survey of the present position of gas manufacture, and of the supply of electrical energy throughout Germany. 1700 w. Am Gas Lgt Jour—Sept. 21, 1896.

**Buffalo Real Estate Exchange.**—See **VENTILATION.**

**Car.**—See **CAR LIGHTING.**

**Club House.**—See **HEATING AND VENTILATION.**

**Columbia Library.**—See **Diffused.**

**Comparative Systems.**—A Comparison of Different Systems of Lighting. From a communication in the "Transaction of the Société Technique du Gas en France," by M. Bouvier, giving results of investigations to ascertain the comparative value of different systems of lighting. 700 w. Jour Gas Lgt—Oct. 11, 1898.

Artificial Illumination for Ordinary Business and Domestic Purposes. Leon P. Lowe. Read at meeting of the Pacific Coast Gas Assn. A comparison of the illuminating power and cost of gas light, Welsbach light, electric incandescent, and acetylene gas. 2200 w. Am Gas Lgt Jour—Aug. 7, 1899.

Artificial Light: Modern Methods Compared—Electric-Incandescent, Welsbach, Acetylene. D. S. Jacobus. A lecture introduced by experiments in colors, discussing candle-power developed per cubic foot of gas, electrical energy to produce the electric light, relative heating and contamination of atmosphere, explosive properties of acetylene, etc. 3600 w. Jour Fr Inst—May, 1897.

Experimental Researches in the Efficiency of Lighting (Versuche mit Verschiedenen Beleuchtungsarten). Tabulated results of comparative tests for lighting of schools. The results are for arc and incandescent electric lamps, and for ordinary, Siemens, and Welsbach gas lamps. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—May 7, 1897.

Systems of Illumination Graphically Compared. Ad. Bouvier. Read before the International Gas Congress, at Paris. Gives the facts to be expressed and explains how this is done graphically. 800 w. Jour Gas Lgt—Oct. 16, 1900.

The Cost of the More Generally Used Sources of illumination (Kosten der Gebräuchlichsten Lichtquellen). An investigation of the relative cost of illumination in Germany, using various forms of gas burners, acetylene, spirit incandescent lamps, petroleum, and various electric lamps. 8500 w. Gesundheits Ingenieur—March 15, 1898.

The Production and Utilisation of Light Waves (Ueber Entstehung und Ausnützung von Lichtwellen). An investigation of the illuminating efficiency and cost of various modes of artificial lighting, including the heating and color effects. 1500 w. Gesundheits Ingenieur—April 30, 1897.

See also **Gas vs. Electric; Rouen.**

**Diffused.**—Diffused Illumination. William Hallock. Some points on illumination in general, with consideration of the application of diffused illumination in the lighting of Columbia University Library. Ill. 1800 w. Pro Age—March 1, 1898.

**Distribution of Lights.**—Distribution of Lights for Illumination. J. H. Kinealy. Part first discusses the things to be considered in designing a lighting system, the standard of intensity, etc., giving opinions of writers on this subject. Serial. Heat & Ven—July, 1899.

**Electric.**—See **ARC LIGHTING; ELECTRIC LIGHTING; INCANDESCENT LIGHTING.**

**Electric vs. Gas.**—See **Comparative Systems; Gas vs. Electric; Rouen.**

**Fredereau's Globes.**—Fredereau's Light Diffusing Globes. Illustrated description of these globes and explanation of their operation, their configuration being claimed to strictly accord with laws of geometrical optics. 700 w. Gas Wld—Nov. 16, 1895.

**Fresno, Cal.**—See **Gas vs. Electricity, Fresno, Cal.**

**Gas.**—See **Gas vs. Electric; GAS LIGHTING; INCANDESCENT GAS LIGHTING.**

**Gas vs. Electric.**—Artificial Light, With Special Reference to Gas and Electricity. A. Yuill. Read at the Stirling meeting of the North British Assn. Reviews early methods of producing light, and the history of the gas industry, comparing gas and electricity. Discussion. 4500 w. Gas Wld—July 29, 1899.

Electric Lighting versus Gas. John Martin. Read before the Pacific Coast Elec. Trans. Assn. Considers the two methods of illumination with a view to determining the proper rates. 2400 w. Jour of Elec—July, 1899.

Gas vs. Electricity for Lighting Public Institutions. Abstract of an article by Carlton Lambert, contributed to "The Hospital." Gives the relative cost of each at London prices, and generally favors the Welsbach light. 1200 w. Jour Gas Lgt—Dec. 13, 1898.

Incandescent Gas and Electric Lighting: A Comparison. W. W. Gillespie. Claims superiority of the Welsbach incandescent gas light over other methods and suggests means of extending its use. Also discussion. 3000 w. Am Gas Lgt Jour—Aug. 16, 1897.

Some Facts Relating to Gas and Electricity. J. F. Seaman. Remarks the early effect of electricity upon gas stocks, and compares the central station and gas plant; storage battery and gasholder, and other related matters. 2200 w. Am Gas Lgt Jour—Feb. 15, 1897.

Some Facts Relating to Gas and Electricity. Discussion of Mr. Seaman's paper at the annual meeting of the Ohio Gas Light Association. 4500 w. Am Gas Lgt Jour—Feb. 22, 1897.

Some Notes of the Comparative Cost of Supplying Light by Gas and Electricity in Manchester. G. E. Stevenson. The question is confined to the cost of supply. In manufacturing, gas shows but little advantage over electricity, but in distribution there is a decided difference in favor of gas. 1800 w. Gas Eng's Mag—April 10, 1897.

The Cost of Lighting by Gas and by Electricity. A. P. Trotter. A comparison attempted but considered impossible without further data, but concluding that if the two systems were placed on equal conditions, the cost of gas lighting would largely exceed that of the contract for electric light. 3000 w. Elect'n—Dec. 6, 1895.

The Economy of Incandescent Lamps (Ueber Oekonomie von Glühlampen). A paper by Dr. Weber before the Electrotechnical Society, maintining the greater economy of the incandescent electric lamp over the Welsbach gas burner. 1000 w. Elektrotech Zeitschr—March 25, 1897.

The Production of Light by Electricity and Gas. Ed. C. de Segundo. A discussion of the relative merits of gas and electric lighting. Serial. Elec Rev, Lond—April 6, 1900.

The War of the Incandescents: Gas Versus Electric. J. H. Moxon. Read before the Ohio Gas Lgt. Assn. Suggests the means and presents the importance of pushing the sale of the best incandescent gas burners. 2000 w. Am Gas Lgt Jour—March 28, 1898.

Two Incandescent Lights—Gas vs. Electric. J. H. Moxon. Suggestions for popularizing the incandescent gas burners. 1500 w. Gas Engs' Mag—July 11, 1898.

Village Lighting: A Comparison. R. G. Shadbolt. Read at Belfast meeting of the Incorporated Gas Inst. Showing the effect on cost of electricity by using the oil engine, and its comparison with the price of gas; urging the same skill and economy in villages that is practiced in cities, thereby enabling the gas industry to successfully compete with electricity. Ill. 4000 w. Gas Wld—June 25, 1898.

**Gas vs. Electric, Fresno, Cal.**—Gas in Competition with Electricity by Water Power. A. Gutsch. Read at meeting of the Pacific Coast Gas Assn. A statement of facts as they are found at Fresno, Cal. Also discussion. 3600 w. Am Gas Lgt Jour—Aug. 15, 1898.

**Gas vs. Electric, Glasgow.**—Electricity vs. Gas in Glasgow. Concerning the charges made to consumers of electric light as compared with gas charges. 1400 w. Gas Wld—Sept. 2, 1899.

**Gas vs. Electric, Manchester.**—Some Notes on the Comparative Cost of Supplying Light by Gas and Electricity in Manchester. G. E. Stevenson. Read before the Manchester District Inst. of Gas Engs. Generally favorable to the gas industry. Followed by discussion. 6000 w. Jour Gas Lgt—Dec. 1, 1896.

**History.**—Artificial Lighting. George D. Shepardson. An outline of the history of lighting with a study of illumination. 6500 w. Jour Assn of Engng Soc—May, 1897.

On the History of Our Ideas Concerning Illumination. Henry Crew. Reviews the history of windows and of the progress in artificial light, ing, covering twenty centuries. 2800 w. Am Arch—Oct. 1, 1898.

The Development of Artificial Lighting. From the "Inst. of Civ. Engs." Summary of an interesting article by Herr C. Kjaer, which appeared in "Ingenioren," of Copenhagen. 1200 w. Jour Gas Lgt—Oct. 2, 1900.

**Holophane Globes.**—See **HOLOPHANE GLOBES.**

**Horticultural Hall.**—See also **HEATING AND VENTILATION.**

**Hydrocarbons vs. Gas.**—The Use of Hydrocarbons as Illuminants in Competition with Gas. A. Lecomte. Read before the International Gas Congress, at Paris. Treats of lighting by volatile hydrocarbons, distributed at the ordinary temperature. 4200 w. Jour Gas Lgt—Oct. 16, 1900.

**Hygienic.**—Hygienic Lighting. F. Erismann. Translated from "Journal für Gasbeleuchtung." Considers the quantity of light, the contamination of the air, heating, radiation, effect on the eye, etc. 5800 w. Pro Age—March 15, 1900.

**Indirect.**—See also **Diffused; INCANDESCENT GAS LIGHTING—Indirect Illumination.**

**Interior.**—Experiments in Room Illumination. I. C. Thompson. Gives an illustrated account of tests made to determine whether a room was sufficiently lighted. 1500 w. Elec Eng, N. Y.—March 17, 1898.

Interior Lighting (Reflected Lights, etc.). W. Eckstein. Read at meeting of the Architectural Assn., London. Discusses means of obtaining the best and most useful daylight, and gives much information of use to architects. Ill. 4800 w. Builder—May 14, 1898.

The Spectrum of Reflection and the Efficient Illumination of Confined Space. Dr. W. H. Birchmore. A study of spectra to determine why our lamps do not give satisfactory illumination. Serial. Elec Eng—Sept. 30, 1896.

See also **GAS LIGHTING.**

**Luxfer Prisms.**—See **Prismatic.**

**Machine Shop.**—Artificial Light, with Special Reference to Engineers' Shops. A. E. A. Edwards. Read before the Birmingham (Eng) Assn. of Mech. Engs. Considers the reflecting power of various surfaces and colors, shades, height, different illuminants, etc. 4200 w. Gas Wld—June 2, 1900.

**Mineral Oils.**—See also **HEATING.**

**Municipal.**—See **MUNICIPAL OWNERSHIP.**

**Petroleum.**—See also **INCANDESCENT GAS LIGHTING; PETROLEUM VAPOR.**

**Petroleum "Arc."**—Petroleum "Arc" Lighting. J. G. Dudley. Illustrated description of a lighting system which claims to give safety, simplicity and steadiness, with great brilliancy and economy. 8500 w. Pro Age—Dec. 1, 1897.

**Philadelphia Bourse.**—See **HEATING.**

**Prismatic.**—Prismatic Lighting for the Illumination of Dark Interiors. Wm. H. Greene. A brief review of the art of prismatic lighting. Ill. 2500 w. Jour Fr Inst—Aug., 1900.

The Luxfer Prisms (Les Prismes Luxfer). P. Grandjeau. An examination of the theory of the use of prisms for improving the lighting of rooms, with examples showing the practical application. 8000 w. Rev Univ des Mines—Aug., 1899.

**Railway Stations.**—The Lighting of Isolated Railroad Stations. Describes and illustrates a connected system of oil lighting, in use on the New York, New Haven & Hartford Railroad. 1600 w. Am Eng & R R Jour—Aug., 1897.

See also **HEATING.**

**Rouen, France.**—The Cost of Various Illuminants at Rouen in France. O. Piequet. Translated from the "Bulletin de la Société Industrielle de Rouen." A résumé of data in this vicinity with notes relative to each method. 1800 w. Pro Age—Nov. 1, 1897.

**Scott-Sisling System.**—Lighting Country Residences and Institutions. Henry Stooke. A description of the Scott-Sisling system. 1000 w. Ill Car & Build—June 26, 1896.

**Shades.**—See **ELECTRIC LAMP.**

**Small Districts.**—The Lighting of Small Districts. F. J. Warden-Stevens. Discusses the conditions affecting the lighting of small districts in England, and recommends electric lighting. 2000 w. Arch, Lond—July 30, 1897.

**Street.**—The Cost of Street Lighting. A statement of the method of comparing costs in different cities. Discussing facts presented in a report by N. Matthews, Jr. 1500 w. Eng Rec—Oct. 8, 1898.

See also **ELECTRIC LIGHTING; INCANDESCENT GAS LIGHTING; INCANDESCENT LAMP.**

**Vacuum Tube.**—See **VACUUM TUBE LIGHTING.**

**Woodbridge Building.**—See **MECHANICAL PLANT—Office Building, N. Y.**

## LIGHTNING.

See also **ELECTRIC DISCHARGE; KITE—Franklin's Experiment; LIGHTNING ARRESTER; LIGHTNING PROTECTION.**

Two Remarkable Lightning Strokes (Zwei Bemerkenswerthe Blitzschläge). In both cases tall factory chimneys without lightning rods were rent vertically, the lightning leaping down the line of iron steps built in the masonry. 1200 w. Elektrotech Zeitschr—June 3, 1897.

What We Have Learned About Lightning Since the Time of Franklin. John Trowbridge. Explains the views held by Franklin, and the progress made since, due largely to photography. 2000 w. Chau—Nov., 1897.

**Arc Lamps.**—The Effects of Lightning Upon Electric Lamps. Sydney Webb and G. G. Stokes. Gives illustrations showing effects obtained when attempting to photograph lightning in a field including arc lamps. 2800 w. Nature—Feb. 8, 1900.

**Destruction Statistics.**—Destruction of Life and Property by Lightning. M. F. O'Reilly. Discusses the effect of lightning stroke and electric shock, giving statistics concerning the destruction of life and property and general information. 4500 w. Engng—June 15, 1900.

**Electric Transmission Lines.**—See **ELECTRIC TRANSMISSION—Lightning; LIGHTNING PROTECTION.**

**Globular.**—Notes on Globular Lightning. O. C. Marsh. A minute and extremely interesting account of an instance of this rare form of lightning, as accurately noted by a competent observer—one of the editors of the journal quoted. 500 w. Am Jour of Sci—Jan., 1896.

## LIGHTNING ARRESTER.

See also **ELECTRIC CIRCUIT-BREAKER; ELECTRIC DISCHARGE; ELECTRIC SWITCH; LIGHTNING; LIGHTNING PROTECTION.**

Lightning and Lightning Arresters. H. E. Raymond. Gives the results of several years' observations and experiments in the line of protection against damage from atmospheric disturbances. Serial. Elec Wld—June 11, 1898.

Lightning Arresters. W. R. Garton. Abstracts from a paper read before the Chicago Elec. Assn. The essentials of a good arrester and things to be considered in placing, etc. 1400 w. St Ry Rev—Feb. 15, 1896.

Lightning Arresters. W. R. Garton. Abstract of a paper read before the Northwestern Elec. Assn. The principle is explained, and the forms that have been considered standard, with reference to difficulties. 1100 w. Elec Eng—July 29, 1896.

Lightning Arresters. W. R. Garton. Read before the Northwestern Electrical Assn. A general dissertation upon the principles and different forms of lightning arresters. 2800 w. Elec Rev—Aug. 19, 1896.

Lightning Arresters for Electric Conductors (Les Parafoudres sur les Canalisations Electriques). M. Bochet. A paper read before the Société Internationale des Electriciens, with illustrations of various forms of arresters. 7500 w. Bull de la Soc Int des Electriciens—April, 1899.

Lightning Protecting Devices for Heavy Current Installations. Contributions from various electrotechnical societies to the question how heavy current installations can be protected from the danger of lightning. Experience of German institutions. Serial. Elec Rev, Lond—Aug. 28, 1896.

**American Types.**—Types of American Lightning Arresters. Henry E. Raymond. Illustrates and describes many types, showing the great dissimilarity in the application of similar principles. 2200 w. Am Elect'n—Nov., 1898.

**Electric Transmission Lines.**—See **ELECTRIC TRANSMISSION—Lightning; LIGHTNING PROTECTION.**

**E. M. F., Striking Distance.**—A Method of Increasing the Striking Distance of a Given E. M. F. A letter from C. E. Skinner describing interesting phenomenon observed while experimenting with high tension apparatus, which he concluded would be useful in the construction of lightning arresters. Also, letter from A. J. Wurts giving experiments and analysis of phenomenon. 1900 w. Elec Eng—June 10, 1896.

**Welles.**—Welles' Safety Fuse Lightning Arrester for Telephone Apparatus (Blitzableiter-Abschmelzsicherung der Telephon-Apparat-Fabrik Fr. Welles). An arrangement of carbon lightning conductors and fusible wire connections, to be used in connection with the station switchboard. 1000 w. Elektrotech Zeitschr—Jan. 20, 1898.

**Wurts.**—Lightning Arresters. A. J. Wurts. Abtract of an address before the Northwestern Elec. Assn. Discusses the power of protection from lightning, considering especially two types of arresters. 2000 w. Elec Wld—July 2, 1898.

Notes on Protection Against Lightning Collected During the Summer of 1895. A. J. Wurts. Notes taken during the summer of 1895, for the purpose of obtaining information regarding lightning arresters on the McKeesport and Wilmerding Railway. 1000 w. Elec Pow—March, 1896.

Protection Against Lightning for High Potential Power Transmission Circuits. A. J. Wurts. Diagrams illustrating system of protection with explanation. 500 w. Elec Eng—Sept. 30, 1896.

## LIGHTNING PROTECTION.

See also **LIGHTNING; LIGHTNING ARRESTER.**

Approved Lightning Protection. Nevil Monroe Hopkins. On the historic and modern lightning-rod and its incorrect application. Ill. 3700 w. Sci Am Sup—March 25, 1899.

Concerning Lightning Rods (Zur Blitzableiterfrage). Prof. A. Weiler. A suggestion that effective protection against lightning may be obtained by four metallic conductors running from a common point on the roof to the ground down the four corners. This is based on the fact that an electroscope surrounded by four such wires shows no indication even of strong sparks. 200 w. Elektrotech Rundschau—Nov. 1, 1896.

The Lightning Conductors. A review of the present state of knowledge on this subject, with rules for the erection of conductors, which are said to be based on the highest scientific authority. 4000 w. Builder—Oct. 24, 1896.

Protection Against Lightning. Philip Atkinson. Comments on the ignorance and prejudice against lightning rods, and shows how these conductors should be constructed to insure protection. 900 w. Elec Eng—Sept. 2, 1897.

The Protection of Structures from Lightning. Information from a pamphlet recently issued by the U. S. Weather Bureau bearing upon this subject. 1800 w. Eng News—Aug. 10, 1899.

**Electric Machines.**—Protection from Lightning. Discusses the means taken to preserve the armatures of generators and motors from damage by electric storms, giving the experience in various cities. Ill. 2000 w. St Ry Rev—Dec. 15, 1897.

**Electric Transmission Lines.**—I. Lightning on Transmission Lines. Theo. E. Theberrath. II. Lightning at Sacramento. C. W. Hutton. III. Lightning in Nevada County. E. J. De Sabla, Jr. IV. Lightning and Long Transmission. E. W. Sutcliffe. V. Insulators for Transmission Lines. John Martin. Papers read before the Sacramento convention of the Pacific Coast Electric Transmission Assn. 10000 w. Jour of Elec—Nov., 1897.

On the Protection of Electric Power Transmissions from Lightning. J. T. Morris. Miller prize paper read at students' meeting of the Inst. of Civ. Engs. Part first gives illustrated descriptions of lightning arresters. Serial. Elec Rev, Lond—Jan. 5, 1900.

The Effect of Lightning upon Overhead Power Circuits and the Cheapest Method of Distributing Power. Arthur H. Gibson. Gives statements relating to a power transmission plant installed in South Africa, in a district particularly infested by lightning, giving peculiar behavior of arrestors. Advises polyphase machinery, with sunk windings or hole wound, where lightning is troublesome. 1500 w. Elec Rev, Lond—June 3, 1898.

See also **ELECTRIC TRANSMISSION—Lightning.**

**German Regulations.**—Discussion of Regulations for the Protection of Buildings against Lightning, drawn up by a Committee of the Elektrotechnischer Verein (Antrag des Technischen Ausschusses auf Annahme der "Leitsätze über den Schutz der Gebäude gegen den Blitz" durch den Elektrotechnischen Verein). Discussion at a meeting of the Verein, opened by K. Strecker. 1100 w. Elektrotech Zeitschr—July 12, 1900.

Improvements in Lightning Conductors (Vereinfachnung der Gebaüdeblitzableiter). A very full discussion before the Electrotechnical Society. 20000 w. Elektrotech Zeitschr—Aug. 5, 1897.

Lightning Rods (Ueber Gebäude-Blitzableiter). K. Strecker. Report of a committee of the Elektrotechnischer Verein, reviewing the subject, and proposing certain regulations and specifications. 2500 w. Elektrotech Zeitschr—April 26, 1900.

The Arrangement of Lightning Conductors (Ueber die Anlage von Blitzableitern). Giving precautions as to connections and grounding, together with proportions of surface protected by given arrangements. 2000 w. Elektrotech Zeitschr—April 22, 1897.

**Public Buildings.**—The Protection of Public Buildings from Lightning. Killingworth Hedges. Discusses methods of protection used, and gives suggestions. General discussion. Ill. 11000 w. Jour Roy Inst of Brit Archts—April 28, 1900.

## LIGHT RAILWAY.

See also **ELECTRIC RAILWAY; MOUNTAIN RAILWAY; NARROW GAUGE RAILWAY.**

Light Railways. A review of Mr. R. J. Money's paper before the Inst. of Civ. Engs., is made the basis of a discussion of gauge, favorable to the retention of standard gauge, or to slight reduction only. 1100 w. Ind Eng—June 6, 1896.

Light Railways. Discussion of a book by J. C. Mackay on "Light Railways for the United Kingdom, India, and the Colonies." The review questions the advantages of light railways under the conditions existing in England. 2000 w. Builder—June 20, 1896.

Light Railways. Editorial inquiry into the saving of expenses alleged for this class of road, because of lesser cost of construction. 1800 w. Engr, Lond—Oct. 8, 1897.

Light Railways: Their Advantages, Nature, and Working. An article on their importance, and quoting freely the statements made by Mr. Brewer. 1100 w. Ill Car & Build—April 3, 1896.

Light Railways: Their Construction and Working. William Rose Smith. This class of construction is well defined and its application in Mexico, Holland, Italy, Prussia, Belgium, Ireland and America described. 4000 w. Ry Wld—Jan., 1896.

**Argentina.**—Light Railways in Argentina. A general report of the light railways and the laws relating to them. 500 w. U S Cons Repts, No. 451—June 14, 1899.

**Arizona.**—Note on the Operation of a Light Mineral Railroad. James Douglas. Statistics of the Arizona Southeastern Railroad. 1400 w. Trans Am Inst of Min Engs—Oct., 1898.

**Barsi.**—Barsi Light Railway; Details of Pressed Steel Bogie. Plan and profile with mean elevation and description of the experimental line constructed near Leeds for the purpose of illustrating the method of working adopted in the Barsi Light Railway. Also illustrated description of rolling stock. 2400 w. Engng—Jan. 22, 1897.

The Barsi Light Railway Exhibition. Illustrated description of the rolling stock which was shown at Newlay. 1800 w. Ry Wld—Nov., 1896.

The Barsi 2 ft. 6 in. Gauge Light Railway. Everard R. Calthrop. The theory of the narrow gauge light railway is explained; the history of this railway given, with discussion of traffic, rolling stock, permanent way and general information. Followed by discussion. 12500 w. Jour Soc of Arts—Feb. 19, 1897.

See also India; **NARROW GAUGE RAILWAY—Transshipment Car.**

**Belgium.**—A Belgian Light Railway. The article gives general features of construction and equipment, with map of the road and terminals and drawings of rolling stock. 1100 w. Ry Wld—June, 1896.

Belgian Tramways and Light Railways. Illustrated description of the system of communication. There are twenty-nine lines belonging to seven companies. Ill. 2000 w. Ry Wld—April 7, 1898.

Light Railways in Belgium. A report of the remarkable progress of these lines. 2000 w. Eng, Lond—Aug. 6, 1897.

Notes on Light Railways Abroad: Their Permanent Way and Rolling Stock. The first number deals with Belgian light railways, especially the construction and cost of permanent way and the problem of transhipment to standard gauge roads. Serial. Eng, Lond—April 10, 1896.

Remarkable Extension of Light Railways in Belgium. Information concerning results attained in less than fourteen years. 2000 w. Engr, Lond—Sept. 22, 1899.

Two Years' Extension and Working of Belgian Light Railways. Some general figures of mileage, capitalisation, equipment and passenger and freight receipts. 3000 w. Eng, Lond—July 3, 1896.

**British.**—Light Railways. An editorial dealing with the questions of government aid, gauge, rates, etc., anticipating a report to be issued by one of the two light railway associations just formed in England. 2500 w. Engng—Dec. 6, 1895.

Light Railways. Editorial on the schemes promoted in Great Britain since the Light Railways Act came in force, giving some of the conditions stipulated, and tabulated lists of railways, approved, and applied for. 2500 w. Engng—June 17, 1898.

Light Railways. Lists of applications granted and new schemes under consideration, with editorial comment on the effect in England of the Light Railways Act, motive power, etc. 1500 w. Ry Wld—July, 1897.

The High Cost of Light Railroads in England. W. M. Acworth. Does not consider that light railways are likely to prove remunerative undertakings, unless their capital cost can be brought down. 700 w. R R Gaz—Sept. 30, 1898.

See also **RAILWAY.**

**British and Colonial.**—British and Colonial Light Railways. Editorial discussion of the working of the British Light Railway Act. 3800 w. Engng May 25, 1900.

**British Commission.**—The Work of the Light Railway Commission. R. H. Scotter. Read at meeting of the Tram. & Light Rys. Assn. Reviews the history of the movement in England and the work of the commission, with suggestions. 2500 w. Engr, Lond—July 6, 1900.

**British Law.**—A New Tramway Monopoly. Robert Donald. A discussion of the light railways Act of 1896, and the way in which it has miscarried. 2400 w. Contemp Rev—Aug., 1899.

The Light Railways Bill. The bill is now presented to Parliament and will probably pass. The editor's remarks upon it are interesting as they reflect the sentiment and opinion of many. 2000 w. Trans—Feb. 28, 1896.

**Calthorp Car.**—See **NARROW GAUGE RAILWAY—Transshipment Car.**

**Cape Colony.**—See **South Africa.**

**Colombia.**—The Construction of a Light Mountain Railroad in the Republic of Colombia. E. J. Chibas. An excellent and very full description of typical construction in undeveloped country, where cheap first construction is essential, with map and half tones. 3500 w. Am Soc of Civ Engs—May, 1896.

**Crowland & District.**—An English Light Railway. A discussion of the principal clauses of the charter of the Crowland & District Light Railway, showing how the very strict regulations as to railroad building have been relaxed to permit construction where a standard railroad would be unprofitable. 2200 w. R R Gaz—Sept. 9, 1898.

**Eaton Hall, Eng.**—A Light Railway at Eaton Hall. From the "London Times." Particularly respecting a light railway recently completed in the Duke of Westminster's estate for connecting it with the Great Western Railway, three miles distant. 1000 w. Prac Eng—Nov. 13, 1896.

The Eaton Light Railway. Illustrated description of a line of very light construction on the Cheshire estate of the Duke of Westminster. 1000 w. Ry Wld—Dec., 1896.

The Narrow Gauge Railway from Eaton Hall to Balderton (Schmalspurige Kleinbahn von Eaton Hall nach Balderton). An illustrated account of the Duke of Westminster's 15 inch gauge railway, mainly from English sources. 5000 w. Mitt d ver f d Ford d Local u Strassenbahnwesens—July, 1897.

**Economy.**—What Is True and False Economy in Light Railway Construction. A brief discussion of some of the requirements and of conditions that should regulate expenditure. 1000 w. Mach, Lond—July 15, 1897.

**Exhibition, London, 1900.**—See **TRAMWAY.**

**France.**—Light Railways in France. Illustrations and information of the subsidiary system affiliated to that of the Western Railway of France. Also describes the type of locomotives used. 1000 w. Engng—Jan. 20, 1899.

Light Railways in France. The first of a series of articles on the construction and working, considering only the practical points of completed lines. Ill. Serial. Engr, Lond—April 6, 1900.

**Germany.**—Proposed Construction of Light Railways in Germany. Brief history of light railways to the present time with abstract of the new bill for the extension of the system. 900 w. Bd of Trd Jour—June, 1897.

**Hungary.**—A British Consular Report on Hungarian light, secondary railways showing that but eight out of sixty have paid dividends and the total percentage deficit has been, in 1892, 11.09 per cent. 700 w. Ind & East Eng—Oct. 26, 1895.

The Light Railways of Hungary in 1897 (Die Ungarischen Kleinbahnen in Jahre, 1897). Rudolf Nagel. A tabulated review of street and electric tramways and light suburban railways, giving the traffic earnings, and operative data. 2000 w. Glaser's Annalen—July 1, 1899.

**India.**—Light Railways. Describes the Barsi Light Railway and the Darjeeling-Himalayan Railway. Serial. Ind Engng—May 21, 1898.

See also **MOUNTAIN RAILWAY.**

**Ireland.**—Irish Light Railways. Gives a map showing the positions of the various lines and summarises the experience obtained from light railway construction in Ireland. 1600 w. Ry Wld—Nov. 10, 1898.

Light Railways and Tramways. R. H. Dorman. A paper read before the incorporated Assn. of Munic. & County Engs. of Londonderry. The methods of construction of such railways in Ireland are fully described. Serial. Ind & East Eng—Nov. 2, 1895.

**Lartigne System, Ireland.**—A Novel Irish Railway. Alfred Slater. Presidential address before the Gloucestershire Engineering Society. Describes a novel light railway built on the Lartigne system. A single-rail line. 1800 w. Arch, Lond—Dec. 17, 1897.

**Locomotive.**—See **LOCOMOTIVE—Light Railway; Narrow Gauge.**

**Motor-Cars.**—Light Railways and Motor-Cars. R. H. Rew. A discussion of the importance and relations of light railways to agriculture, with comment on continental experience and practice. Serial. Ind & Ir—Aug. 28, 1896.

See also **CAR—Automotor; Steam Motor.**

**South Africa.**—Light Railways for the Cape. A summary of information collected by a commission appointed by the government, to visit and report upon the Continental and Irish systems. Favors the construction of light railways, by contract and by private companies. 1500 w. Engng—April 30, 1897.

**Sunderland, Eng.**—The North Sunderland Light Railway. Brief illustrated description. 1200 w. Transport—Aug. 26, 1898.

**Sussex, Eng.**—A Rural Steam Tramway in Sussex. A private enterprise in the line of light railways. The gauge is 3 ft., and the road is fitted with 26 lb. rails, and is 1¾ miles long. The traffic is entirely local. 1300 w. Ry Wld—March, 1896.

**LIGHTSHIP.**

See also **NAVAL ARCHITECTURE; MARINE ENGINEERING.**

**Cape Hatteras.**—Diamond Shoal Lightship. A short description of the staunchest and most thoroughly equipped vessel of her class in the world, to be placed off Cape Hatteras. 600 w. Marine Rev—Sept. 13, 1900.

Lightship No. 72 for the Diamond Shoals. Relates the difficulties experienced in protecting vessels from this point of danger, and gives illustration and brief description of the new vessel. 900 w. Marine Rev—Aug. 9, 1900.

Steam Electric Lightship for Cape Hatteras. Illustrated description. 1200 w. Sci Am—March 17, 1900.

**Compressed Air Plant.**—See **COMPRESSED AIR PLANT—Lightship.**

**Electric Communication.**—See **TELEGRAPH—Lighthouses and Lightships; Lightships; SPACE TELEGRAPHY.**

**Electric, U. S.**—The United States Composite Electric-Light Vessels, Nos. 68 and 69. Illustrated description with dimensions of vessels which are to be stationed on the Atlantic coast of the United States at Fire Island, and the Diamond-Shoal off Cape Hatteras. 2400 w. Marine Engng—Nov., 1897.

**Oil Engine Plant.**—Oil Engine Signaling Plant on United States Lightship No. 42. Illustrated detailed description. 1600 w. Sci Am—July 4, 1896.

**Veering Drums.**—Veering Drums for Lightships. Illustrated description of invention of H. Benest for use in the problem of telegraphic communication with light ships. 900 w. Elec Rev, Lond—Oct. 30, 1896.

**LIGNITE.**

See **BROWN COAL.**

**LIME.**

See also **CEMENT; CONCRETE; FLUX; MORTAR.**

Lime. Hydraulic Cement, Mortar and Concrete. Clifford Richardson. This first part deals only with lime in its various forms. Serial. Br Build—Jan., 1897.

Lime, Mortar and Cement. Their Composition and Analyses. W. J. Dibdin. Part first deals with the characteristics of various limes. Serial. San Rec—April 29, 1898.

**LIME ROCK.**

See also **FLUOR-SPAR; FLUX.**

**Alabama.**—See **FLUOR-SPAR.**

**Maine Quarries.**—Mining Lime Rock by Electrically-Operated Cableways in Open-Pit Mining at Rockland and Rockport, Maine. Frank B. Knight. Description of the quarries and hoisting plant and a comparison of the earlier and later built cableways, showing the reasons for the greater economy of the latter. Ill. 4000 w. Mines & Min—Aug., 1899.

**Quarry.**—See also **FLUX—Smelters; QUARRY.**

**LINK MOTION.**

See **LOCOMOTIVE VALVE GEAR; VALVE GEAR.**

**LINOLEUM.**

**Manufacture.**—Machinery for Manufacturing Linoleum. Part first describes the hand manufacture of floor cloth, the methods of manufacturing linoleum, the proportion of ingredients used, the general arrangement of a typical factory, and gives illustrated description of some of the machinery used. Serial. Engng—Aug. 6, 1897.

**LIQUEFACTION.**

See also **LIQUID AIR; LIQUID CARBONIC ACID.**

Compression and Liquefaction of Gases. Arthur L. Rice. Historical and scientific review. 4500 w. Trans Am Soc of Mech Engs, No. 829—Dec., 1899.

Liquefied Gases and Air in the Industries. Ernesto Mancini. A review of experimental progress in this field, and the uses to which the gases have been or may be applied. 3800 w. Chau—Feb., 1899.

Liquefied Gases. Robert M. Chamberlin. Reviews briefly what has been accomplished in this field. Ill. 1800 w. Yale Sci M—Oct., 1899.

The Liquefaction of Gases. Raymond Jerry, in "Revue Encyclopédie Larousse." A review of the researches in this field, and the most recent results. Ill. 4000 w. Sci Am Sup—Nov. 19, 1898.

**Dewar Apparatus.**—Professor Dewar's Apparatus for Liquefying Air and Oxygen. Illustrated description of an apparatus whereby a temperature of —180 degrees C. is obtained in from 25 to 30 minutes. 200 w. Engng—Feb. 21, 1896.

**Helium.**—See **Hydrogen and Helium; HELIUM—Liquefaction.**

**Hydrogen and Helium.**—The Liquefaction of Hydrogen and Helium (Sur la Liquéfaction de Hydrogène et de l'Helium). The original communication to the French Academy by Prof. Dewar, communicated by M. Moissan. 2400 w. Comptes Rendus—May 16, 1898.

**LIQUID AIR.**

See also **LIQUEFACTION.**

Commercial Value of Liquid Air. Alfred Siebert. Gives reasons for its inapplicability for refrigeration and power, considers its cost and refrigerating capacity, etc. 2500 w. Ice & Refrig—May, 1900.

Facts versus Claims for Liquid Air. Hudson Maxim. Considers some of the claims, and the applications in which it is most likely to be of value. 2400 w. Sci Am—March 17, 1900.

Fluid Air for Industrial Uses. Describes methods of liquefying air, and some of the uses. 700 w. Cons Repts—May, 1897.

Liquefied Air. George F. Barker. Considers the processes for liquefying air, its appearance, means of transportation, effect on other substances, applications, etc. 2500 w. Chau—Aug., 1898.

Liquefied Air. Sol. D. Benoliel. Gives an account of the work of Charles Tripler, with references to the patents of Dr. C. Linde, of Germany, and W. Hampson, of England, and describes investigations of the properties. 1800 w. Elec Eng, N. Y.—April 14, 1898.

Liquid Air. George F. Barker. A lecture delivered at the Friends' Inst. Lyceum, Philadelphia. Part first reviews the history of the liquefaction of gases, giving some account of the work of various experiments. Serial. Sci Am Sup—Sept. 24, 1898.

Liquid Air. W. Hampson, in "British Refrigeration." Historical review of facts connected with this subject, with criticism of statements attributed to Mr. Charles E. Tripler. 3500 w. Sci Am Sup—July 1, 1899.

Liquid Air. W. C. Peckham. Describes three methods of measuring low temperatures, giving experiments. 1200 w. Sci Am—April 23, 1898.

Liquid Air. Ira Remsen. Explains the method employed in its production, gives an account of some of its properties, and indicates some of the uses to which it may be applied. 5300 w. Ap Pop Sci M—May, 1899.

Liquid Air and Its Phenomena. W. C. Peckham. Illustrates and describes experiments with liquid air and apparatus used in compressing. Methods of measuring low temperatures are described. 4200 w. Sci Am Sup—April 27, 1899.

Liquid Air and its Uses. G. D. Hiscox. An interesting account of its action on various substances, its appearance, advantages, etc. 2500 w. Compressed Air—Aug., 1897.

Liquid Air and Low Temperatures. W. H. Swenarton. Reviews the methods of producing low temperatures, and the attempts made to liquefy gases, giving experiments made with liquid air. 2700 w. Yale Sci M—April, 1899.

Liquid Air. Its Production and Properties. Samuel A. Tucker. Briefly reviews the history of the liquefaction of gases, especially of air, and discusses the properties of liquid air, describing interesting experiments. 5500 w. Sch of Mines Quar—July, 1898.

Liquid Atmospheric Air (Ueber Flüssige Atmosphärische Luft). Franz Walter. A general account of the method of producing liquid air, and a description of the phenomena of intense cold produced by it. Its practical applications are stated to be limited. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—March 2, 9, 1900.

**Air Ship.**—See **AERONAUTICS—De Bausset Ship.**

**Applications.**—The Technical Applications of Liquid Air (Ueber die Anwendbarkeit Flüssiger Luft in der Technik). Carl Linde. A discussion of the various possible uses of liquid air, as a source of power, as an explosive, as a means of producing oxygen, etc., etc. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 20, 1900.

**Automobile.**—Liquid Air for Automobile or Portable Service. Frank Richards. Outlines a scheme for using liquid air for an auto-car motor. 1200 w. Am Mach—Aug. 10, 1899.

**Companies.**—Concerning Liquid Air Companies. Editorial on the number of companies and their claims, promises and offers of stock, with cautions to investors. 2000 w. Eng News—Sept. 14, 1899.

**Compression.**—Compressed and Liquefied Air. Leland L. Summers. A consideration of the application of elementary principles of physics to this subject, and the prospect of increasing the economy of compression. 1800 w. Elec Engng—July 1, 1897.

**Cooling Mines.**—See **MINE VENTILATION—Cooling.**

**Cost.**—The Cost of Liquid Air. Frank Richards. Showing that the cost of liquid air is about 5 cents a gallon as now produced. 1200 w. Am Mach—July 27, 1899.

**Electrical Development.**—Liquid Air as a Factor in Electrical Development. Elihu Thomson in the Boston "Herald." Outlines a system worthy of examination by those interested in electrical development. 1000 w. Elec Eng—July 22, 1897.

**Experimental Study.**—On the Liquefaction of Air by Dynamical Action. J. E. Denton. Experimental study. Ill. 2200 w. Stevens Ind—April, 1899.

**Explosive.**—Liquid Air and Explosives. Frederick H. McGahie. A discussion of the efforts being made to utilize liquid air in explosives, and the limited success thus far obtained. 2400 w. Sci Am Sup—June 3, 1899.

Liquid Air as a Blasting Explosive. J. A. Ewing. Extract from a paper read before the Society of Arts, London, on "Linde's Method of Producing Extreme Cold and Liquefied Air." Refers to its use as an explosive by mixing it with carbon. Ill. 1800 w. Col Guard—March 18, 1898.

Liquid Air as an Explosive. Frederick H. McGahie. Some points of interest in regard to a trial in progress in Europe, in which liquid air is being used at one end of a tunnel being put through the Alps, and the usual explosives at the other end. 1000 w. Sci Am—Sept. 16, 1899.

Liquid Air as an Explosive. An account of experiments at Vienna, with the conclusions. 700 w. U S Cons Rpts., No. 673—March 9, 1900.

**Insulator.**—Liquid Air as an Insulator. Letters from J. A. Fleming and Elihu Thomson discussing the possibilities of usefulness of this agent. 1600 w. Elec Wld—Sept. 18, 1897.

**Joule Effect.**—See **JOULE EFFECT.**

**Latent Heat of Evaporation.**—Latent Heat of Evaporation of Liquid Air. Walter H. Dickerson. Describes investigations, giving results. 1000 w. Compressed Air—Dec., 1899.

**Linde.**—Apparatus for the Production of Very Low Temperatures (Apparat zur Herstellung sehr Niedriger Temperaturen). A paper read before the convention of the German Electrochemical Association by Dr. Linde, describing the latest form of his apparatus for the liquefaction of air, and the fractional distillation of gases. 2000 w. Zeitschr f Elektrochemie—July 5, 1897.

Apparatus for the Production of Low Temperatures (Machine pour l'obtention des Basses Temperatures). An illustrated description of the Linde apparatus by which atmospheric air is frozen. Two articles. 5000 w. Génie Civil—May 15, 22, 1897.

Linde's Liquid Air Machine. Alfred Siebert. How the machine operates to produce liquefaction, etc. 2300 w. Ice & Refrig—Sept., 1900.

Machine for the Production of Very Low Temperatures (Machine zur Erzielung Niedrigster Temperaturen, etc). A communication by Prof. Linde of Munich, giving a full account of his apparatus for producing temperatures below —140 degrees C. and for liquefaction of air. Two articles. 6000 w. Glaser's Annalen—March 15, and April 1, 1897.

Liquid Air (L'Air Liquide). A communication to the French Academy by M. d'Arsonval, relating the results of his experiments with the Linde apparatus. 2500 w. Comptes Rendus—June 13, 1898.

Linde's Method of Producing Extreme Cold and Liquefying Air. J. A. Ewing. Presents a novel process made known by Dr. Carl Linde, of Munich, for attaining extremely low temperatures and for liquefying air, and calls attention to the uses to which this product may be applied. Discussion. Ill. 6800 w. Jour Soc of Arts—March 11, 1898.

Liquefied Air for Industrial Purposes. From "La Nature." Illustrated description of Dr. Linde's apparatus which produces about 28 ounces of liquefied air per hour with an expenditure of 3 h. p. to actuate the pumps. 1000 w. Sci Am Sup—July 2, 1898.

Linde Liquid Air Machine at the University of Michigan. Alfred L. Davenport. Illustrated description of a machine recently added to the scientific apparatus of the university. 700 w. Eng News—March 8, 1900.

The Practical Applications of Liquid Air. Carl Linde. Read before the Soc. of German Naturalists and Physicians at Munich. Translated from the "Zeitschr d. Ver Deutscher Ing." Discusses the possible uses, indicating the limitations. 3000 w. Eng News—April 5, 1900.

**Manufacturing Plant.**—A Plant for the Commercial Manufacture of Liquid Air. Illustrates and describes a plant soon to be put in operation in New York, with an estimated capacity of about 1500 gallons per day. 3000 w. Eng News—June 8, 1899.

**New York Plant.**—The Latest Liquid Air Plant. W. C. Peckham. An illustrated description of the interesting plant of the General Liquid Air and Refrigerating Co., of New York, with account of tests. 2500 w. Sci Am—July 15, 1899.

**Ostergren & Berger.**—A Liquid Air Plant. Illustrates and describes the plant of Ostergren & Berger, New York City, the machinery, process, etc. 2000 w. Ice & Refrig—Jan., 1900.

**Pictet Experiments.**—Prof. Pictet's Experiments With Liquid Air. Illustrated description of experiments with liquid air and the separation into its constituents, by which these gases are obtained in large quantities at low cost. 2200 w. Sci Am—March 31, 1900.

**Portable Power.**—Liquid Air as Portable Power. Frank Richards. Suggesting how liquid air could be used in this manner. 1200 w. Am Mach—Aug. 3, 1899.

**Possibilities.**—The Possibilities of Liquid Air. Elihu Thomson. An exhaustive discussion by a leading authority, of the problems connected with the manufacture, cost, utilization, and mechanical value of liquid air, from the standpoint of the engineer. 4000 w. Eng Mag—May, 1899.

**Power Fallacy.**—Liquid As a New Source of Power—Another Engineering Fallacy. Henry Morton. A criticism of an article in the March number of "McClure's Magazine," showing the statements made to be impossible and misleading. 1800 w. Stevens Ind—April, 1899.

Power from Liquid Air. A criticism of statements credited to Mr. Tripler, and reported in "McClure's Magazine." Also remarks on views of W. C. Peckham. Ill. 3600 w. Power—May, 1899.

**Power Required.**—Liquid Air and the Power Required to Produce It. A. H. Neureuther. Describes the usual methods employed to produce liquid air, and gives a statement relating to the power required, with discussion of the amount of work theoretically possible to get from liquid air. Ill. 2700 w. St Ry Rev—May 15, 1899.

**Power Value.**—The Power Value of Liquid Air. Frank Richards. Discusses briefly what use to make of this product, showing that it is not at present likely to be of much value for power or for refrigeration. 1000 w. Am Mach—May 28, 1898.

**Tripler.**—Experiments with Liquefied Air. Brief description of the work accomplished by Charles E. Tripler, and some experiments with the liquid. Ill. 2000 w. Compressed Air—April, 1898.

Liquid Air. Walter H. Dickerson. Remarks on conditions necessary for reducing gases to the liquid state, with explanation of the process of Charles E. Tripler and description of interesting experiments. 4800 w. Stevens Ind—April, 1898.

Mr. Tripler and Liquid Air. Madison Cooper. An examination of the claims made for the Tripler process, and a discussion of the probable limitations in the application of liquid air to engineering purposes. 2300 w. Mod Mach—May, 1899.

The Commercial Manufacture of Liquid Air. An account of the methods by which liquid air is now manufactured with ordinary commercial apparatus and at a comparatively small cost. Describes apparatus used by Chas. E. Tripler. Also editorial. 4000 w. Eng News—April 14, 1898.

**LIQUID CARBONIC ACID.**

**Mine Fires.**—The Application of Liquefied Carbonic Gas to Underground Fires. George Spencer. Abstract of a paper in Transactions Federated Inst. of Min. Engs. Reports a successful application to a mine fire, and suggests its value in other emergencies. 850 w. Eng & Min Jour—Aug. 5, 1899.

**LIQUID FUEL.**

See also **PETROLEUM.**

Crude Petroleum and Its Products as Fuel. H.

Tweddle. Much information concerning these products and the best methods for burning. Serial. Eng & Min Jour—Oct. 14, 1899.

Liquid Fuel. A discussion of the advantages and disadvantages in connection with liquid fuel. A comparison of cost, with a description of Urquhart's pulverizer, as given in London "Engineering," and related matter of interest concerning methods used in various countries. 4500 w. Locomotive—Dec., 1898.

Liquid Fuel. Sir Marcus Samuel. Briefly considers the nature of petroleum, and the conditions in the production and transportation; the advantages in using it as compared with coal. Discussion. 7000 w. Jour Soc of Arts—March 17, 1899.

Oil Fuel for Steam Generators. A. M. B. Describes apparatus designed to meet the conditions of supplementary service. Ill. 2400 w. Ry Wld—April 7, 1898.

Petroleum as Steam Engine Fuel. J. A. F. Aspinall. Read before the Inst. of Civ. Engs., England. Reviews the advantages and pronounces the only difficulty to be the question of supplying fuel at a reasonable price. 1800 w. Ir Age—July 8, 1897.

Petroleum Steam-Engine Fuel. J. A. F. Aspinall. Read before the Institution of Civil Engineers (England). Reviews the experiments that have been made and the methods of applying the oil, pronouncing it an ideal method of raising steam, the only difficulty being the cost. 1800 w. Am Eng & R R Jour—Oct., 1897.

Problems in the Use of Liquid Fuel. General review of the present state of the art and of recent Government experiments with oil fuel and and appliances for using it. 1700 w. Safety V—Oct., 1896.

Some Disadvantages of Petroleum as a Motive Power. A statement of difficulties met in the use of this fuel as a motive power, and the efficiency obtained. 1700 w. Col Guard—Oct. 13, 1899.

The Utilization of Liquid Fuels (Utilisation des Combustibles Liquides). H. Guérin. A general review of an article by H. Tweddle in the "Engineering and Mining Journal," with original matter. Illustrations and tables. Serial. Génie Civil—May 12, 1900.

**Arlberg Tunnel, Austria.**—Through the Arlberg with Oil Fuel. Describes the arrangements made to guard against the dangers to the men employed on the trains, arising from fumes and smoke. The run from Landeck to Bludenz is described. 1700 w. Engr, Lond—Nov. 18, 1898.

**Burners.**—Oil Fuel Burners. R. I. Clegg. Illustrates and describes three representative types. 2500 w. Horseless Age—Dec. 6, 1899.

The Musker Automatic Liquid Fuel Burner. Illustrated description of an apparatus designed for motor vehicles. 1800 w. Automotor Jour—Sept. 15, 1899.

**Burning Methods.**—Liquid Fuel and Methods of Burning it. Herbert C. Wilson. Abstract of a paper read before the Inst. of Marine Engs., London. General discussion of methods followed by a description of the best means of utilizing the heat of oil fuel for generating steam for machine use. 2500 w. Ry Rev—Aug. 8, 1896.

**California.**—California Crude Petroleum as a Fuel. Ernest H. Denicke. Gives methods of burning oil and results of practical experience. Serial. Min & Sci Pr—Sept. 15, 1900.

**Europe.**—Liquid Fuel in Europe. On the growing use, and the increased production. 600 w. U S Cons Repts, No. 731—May 16, 1900.

**Foundries.**—Fuel Oil for Foundries. Describes and illustrates the application of a system for using oil-fuel, to core-ovens and brass furnaces. 1000 w. Foundry—Nov., 1895.

Oil as a Fuel for Core Ovens. H. Hansen. Paper read before the meeting of the Western Foundrymen's Assn. Discusses a method of baking cores wherein a number of oil fuel fires in the oven are maintained, thus securing a uniformity of product alleged to be unattainable otherwise. 2800 w. Foundry—Feb., 1896.

**Gas Manufacture.**—See **GAS MANUFACTURE—Oil Fuel.**

**Kermode's Apparatus.**—Kermode's Apparatus for Burning Liquid Fuel. Describes and illustrates a system where the oil is first vaporized by being mixed with hot air, which is supplied under pressure for the purpose. 1000 w. Engng—Nov. 17, 1899.

**Larkin Burner.**—See **Pacific Rolling Mills.**

**Lifeboat.**—See **LIFEBOAT—Hydraulic.**

**Locomotive.**—See **Russian Railways; FAST TRAINS—Cromer, England; LOCOMOTIVE—Liquid Fuel.**

**Metallurgy and Glass.**—Applications of Petroleum in Metallurgy and in Glass Manufacture (Applications du Pétrole à la Metallurgie et à l'Industrie du Verre). G. de Krivochapkine. Showing especially the Nobel grate as applied to reverberatory furnaces. 1500 w. Génie Civil—Aug. 25, 1900.

Applications of Petroleum to Metallurgy and the Glass Industry. From "La Génie Civil." Illustrates and describes the Nobel smelting furnace, grate and reverberatory furnace; also the Quarnström portable forge and grate, and their applications. 2200 w. Sci Am Sup—Oct. 20, 1900.

**Pacific Rolling Mills.**—Crude Petroleum for Fuel. George H. Larkin. Report of tests made by the writer, under horizontal return flue tubular boilers at the works of the Pacific Rolling Mills, San Francisco, using the Union Oil Company's standard 23 degree gravity fuel oil from the Santa Paula (Cal.) oil fields, fed through the Larkin oil burner. 1200 w. Jour of Elec—Oct., 1895.

**Russia.**—See also **RUSSIA.**

**Russian Iron Works.**—Liquid Fuel in Russian Iron Works. J. Preiner, in "Stahl und Eisen." Illustrates and describes the methods of burning the fuel, and some idea is given of the expense. Russian petroleum is described, and its extensive use reported. 3000 w. Col Guard—April 27, 1900.

**Russian Metallurgy.**—The Utilization of Liquid Fuels for Metallurgical Purposes in Russia (Verwendung von Flüssigem Brennstoff für Hüttenmännische Zwecke in Russland). J. Preiner. An illustrated account of methods of using naphtha in metallurgical furnaces. 2400 w. Stahl und Eisen—April 15, 1900.

**Russian Railways.**—Oil Stations in Russia. From "Apercu des Chemins de Fer Russes." Illustrated description. 800 w. Ry Age—Sept. 1, 1899.

**Ships.**—Liquid Fuel for Naval Purposes. John R. Edwards. One of a series of lectures delivered at the Naval War College, Newport, R. I. A strong argument setting forth the great advantages of liquid fuel for marine use, and containing suggestions looking toward safety and efficiency in its application to this purpose. 7600 w. Jour Am Soc of Nav Eng—Nov., 1895.

Liquid Fuel. R. R. Wallis. Read before the Northeast Coast Inst. Applies to the use of petroleum residues on board of steamships. 2500 w. Prac Eng—Feb. 19, 1897.

Liquid Fuel Under Marine Boilers (Heizung der Schiffskessel mit Flüssigem Brennstoff). A general statement of the advantage of liquid fuel, and a résumé of the results obtained in actual practice. 2000 w. Glaser's Annalen—March 1, 1897.

Petroleum Fuel for Warships. Alton D. Adams. Presents the great advantages to be derived from petroleum fuel, but considers the present production inadequate and the price prohibitive. 1800 w. Sci Am—Aug. 11, 1900.

See also **MARINE BOILER—Water-Tube.**

**S. S. "Cardium."**—Liquid Fuel Apparatus of S. S. "Cardium." Illustrated description of apparatus and plan. 800 w. Engr, Lond—May 25, 1900.

**Warships.**—See **Ships; MARINE BOILER—Water-Tube.**

**LIVING FORCE.**

**Measurement.**—A Simple Method of Measuring Living Force (Ein Einfaches Verfahren zur Messung Lebendiger Kräfte). H. Heim. The force of a blow of the hammer or other falling mass is permitted to crush a cylinder of lead, the magnitude of the force being computed by the extent of the deformation of the lead. 1800 w. Zeitschr d Ver Deutscher Ing—March 3, 1900.

**LOBED WHEELS.**

**Holditch's.**—A New Method of Deriving Holditch's Interchangeable, Elliptical, Lobed Wheels, Together with a Simple Geometrical Demonstration of Their Rolling Properties. H. W. Rasche.

Illustrated demonstration of method. 1400 w. Am Mach—Feb. 8, 1900.

## LOCK.

See also **CANAL LIFT; DAM; LOCK CONSTRUCTION; LOCK GATES; RIVER REGULATION.**

**Amsterdam Electric.**—See **LOCK GATE—Ymuiden.**

**Columbia River.**—Cascade Locks. Edw. K. Bishop. Interesting description of locks on the Columbia River, rivalling those of Sault Ste. Marie in size, and affecting a territory about double the area of New York State. 2800 w. Sci Am—March 13, 1897.

See also **LOCK GATES.**

**Deepening.**—Deepening a Canal Lock. Brief description of special methods adopted in the modification of the existing locks of the Erie Canal so that they will conform to the increased draft of water secured in other parts of the canal. Ill. 600 w. Eng Rec—April 10, 1897.

**Dunkirk.**—Port of Dunkirk. New Deep-Water Lock. An illustrated account of this lock, which had to be constructed in the immediate neighborhood of existing works on a bed of sand, and under great difficulties. 1800 w. Eng, Lond—May 14, 1897.

**Dutton Pneumatic.**—The Dutton Pneumatic Balance Locks for Canals. Chauncey N. Dutton. Illustrated description of the characteristic features of these locks, and their operation. 8500 w. Jour Fr Inst—April, 1900.

The Proposed Pneumatic Balance Locks for the Erie Canal. Illustrated description, explaining the principles upon which the locks are operated. 1700 w. Sci Am—Feb. 3, 1900.

See also **CANAL—Erie; Great Lakes-Atlantic; New York; New York Commission.**

**Egyptian vs. Modern Pin.**—Ancient Egyptian versus Modern Pin Locks. Illustrates and describes the Egyptian pin lock and the modern Yale lock, showing the improvements made. 1600 w. Sci Am—Sept. 2, 1899.

**Electric Plant.**—See **ELECTRIC PLANT—Sea Lock.**

**Erie Canal.**—See **Deepening; Dutton Pneumatic; CANAL—Erie.**

**Floating Guard.**—The Floating Guard for the Lock of the Wien at Weidlingau-Hadersdorf (Der Schwimmrechen vor der Schleuse der Wienfluss regulirung in Weidlingau-Hadersdorf). Describing and illustrating the floating guard used to intercept floating driftwood and other matter. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 29, 1899.

**Great Kanawha River, W. Va.**—Locks and Dams on the Great Kanawha River, W. Va. Information, with illustrations of work done on this river, showing that the government money has been wisely expended in this case and the results satisfactory. 1800 w. Eng News—Aug. 13, 1896.

See also **DAM—Moveable; RIVER REGULATION.**

**Henrichenburg, Germany.**—The Canal Lift at Henrichenburg (Das Schiffshebewerk bei Henrichenburg). A lift of over 50 feet for canal boats of 600 tons displacement, the weight being counterbalanced by floats and the lifting effected by screws. 2000 w. Schweizerische Bauzeitung—May 1, 1897.

The Lock of the Dortmund-Ems Canal at Henrichenburg. From the "Illustrirte Zeitung." Illustrated description of a lock that overcomes a difference in level of fifty-nine feet. 500 w. Sci Am Sup—June 25, 1898.

The Henrichenburg Canal Lift (Das Schiffshebewerk bei Henrichenburg). An account of the completion of the work. The weight of the tank and water is counterbalanced by the buoyancy of pontoon tanks, and the raising and lowering effected by screws. Boats of 600 tons displacement are raised 50 feet at one lift. 2500 w. Stahl und Eisen—Sept. 1, 1898.

The Heinsrichsburg Canal Lift. Illustrated description of an interesting mechanism designed to overcome a difference in elevation of 52½ ft. in the canal joining the Port of Emden with the Westphalian Coalfield. It is expected that it will be much more economical in working than those depending upon hydraulic presses for balancing power. 1300 w. Eng, Lond—April 17, 1896.

The Lift Lock Near Henrichenburg, Germany. Illustrated description of a lock with a lift of 53 ft., which consists of a tank on five vertical floats in deep pits, the motion being regulated by vertical screws driven by electric motors. 1800 w. Eng Rec—Jan. 13, 1900.

Vertical Lift Lock for Dortmund and Ems Canal, Heinrichenburg, Germany. An illustrated description of a lock possessing several novel features in its construction. It corresponds in size to the proposed lift lock in the Erie Canal at Lockport, N. Y. 1000 w. Eng News—Sept. 3, 1896.

See also **CANAL—Dortmund Ems; ELECTRIC PLANT—Henrichenburg.**

**Hotopp.**—The Hotopp System of Locks for the Elbe-Trave Canal (Die Hotoppschen Betriebseinrichtungen der Schleusen des Elbe-Trave-Kanals). H. Arnold. With plans and sections of the lock and a description of its operation. 2500 w. Zeitschr d Ver Deutscher Ing—May 27, 1899.

The Hotopp Syphon Locks on the Elbe-Trave Canal. Illustrated detailed description of the locks and their operation. 3000 w. Engng—May 4, 1900.

See also **CANAL—Elbe-Erave.**

**Hydraulic Lift.**—Hydraulic Lift Lock on the Trent Canal. Illustrated description of the balanced lift locks at Peterborough, Canada, which consist of two chambers 139 feet long, 33 feet wide, and 8 feet deep, raised and lowered through a distance of 65 feet by means of a hydraulic ram beneath each. 2400 w. Eng Rec—April 29, 1899.

**Oswego Canal, N. Y.**—Lock Reconstruction on the Oswego Canal. Illustrated description of large concrete locks, with limestone facing. 1100 w. Eng Rec—June 25, 1898.

**Pneumatic.**—See **Dutton; Hotopp.**

**Ship Canals.**—Locks and Lock Gates for Ship Canals. Henry Goldmark. A detailed discussion of their construction and operation, with historical review. 7000 w. Jour Assn of Engng Socs—Sept., 1899.

**Special Tools.**—See **TOOL—Canal Lock.**

**Thames.**—A New Thames Lock. Describes the condition of the Thames, the improvements already made and their effects, as well as proposed improvements, etc. 2200 w. Engng—Sept. 10, 1897.

**Ymuiden.**—See **LOCK GATE.**

## LOCK CONSTRUCTION.

**Osage River, Missouri.**—The Construction of Lock No. 1, Osage River, Missouri. F. B. Maltby. Illustrated description of the work and the interesting features of the lock. 2200 w. Eng News—April 28, 1898.

## LOCK GATES.

**Cascades, Columbia River.**—Details of Gates for the Cascades Canal Lock. Drawings showing the details of construction of these great gates. 100 w. Eng News—Oct. 28, 1897.

The Gates of the Cascades Canal Lock, Columbia River, Oregon. Interesting account of the canal built to overcome obstructions in this river, with special illustrated description of the lock and guard-gates. 2500 w. Eng News—Oct. 21, 1897.

See also **LOCK.**

**France.**—New System of Closing Canal Locks (Nouveau Système de Fermeture des Ecluses). M. Mazoyer. An illustrated account of the new locks on the canal from Roanne to Digoin, with especial reference to the lock-gates of unusual depth. 2500 w. 1 plate. Annales des Ponts et Chaussées—2 Trimestre, 1900.

**Rolling Caissons.**—See **CONCRETE—3000-Ton Blocks.**

**Sault Ste. Marie.**—Steel Lock Gates for 800x100 ft. Ship Canal Lock, Sault Ste. Marie, Mich. Additional information, with illustrations, regarding the design and construction of these gates. 3000 w. Eng News—Aug. 6, 1896.

See also **LOCK MACHINERY.**

**Ship Canal.**—See **LOCK.**

**Ymuiden.**—Electric Plant for Operating and Lighting the New Sea Locks at Ymuiden (Electrische Einrichtung zur Bewegung und Beleuchtung der Neuen Seeschleuse zu Ymuiden, Holland). The lock gates are operated by winding-cable mechanism driven by electric motors. 1200 w. Glaser's Annalen—Nov. 1, 1897.

The Electrical Operation of the New Sea Lock Gates at Ymuiden (Electrische Bewegungseinrichtungen der Neuen Seeschleuse zu Ymuiden). A description of the electrical plant, and an account of the manner in which the heavy gates of this new lock in Holland are successfully operated. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 19, 1900.

The Electrical Operation of the Locks of the North Sea Canal between Ymuiden and Amsterdam (Der Elektrische Betrieb der Meerschleuse des Nordseekanales von Ymuiden nach Amsterdam). F. Tischendörfer. A very complete account of the canal locks, with illustrations of the electrical windlasses, capstans and other apparatus by which they are operated. 3500 w. Zeitschr d Ver Deutscher Ing—Sept. 24, 1898.

### LOCK MACHINERY.

**Sault Ste. Marie.**—Machinery for Operating Locks of the St. Mary's Falls Ship-Canal. Illustrated description of the mechanism for opening and closing the gates and for controlling the culverts in this noted canal of the United States. 1100 w. Marine Engng—Oct., 1897.

See also **LOCK GATES.**

### LOCK NUT.

Lock Nuts and Nut Locking Devices. E. H. G. Brewster. Paper read before the Civil and Mechanical Engineers' Society. The first part is a general discussion of the large number of patented lock nut devices which have been placed before the public. The requirements (not few) of a perfect nut locking device and mention of attempts made to meet these requirements. Serial. Engng—May 1, 1896.

**Dickertmann Conical.**—The Dickertmann Conical Lock Nut (Die Konische Sicherheitsmutter, Patent Dickertmann). An ingenious form of lock nut in which the locking is accomplished by forcing a conical projection on the end of the nut into the bolt hole. 1800 w. Glaser's Annalen—Oct. 1, 1898.

**Helicoid.**—The Helicoid Lock Nut. Illustrated description of a locking nut possessing the virtues of locking, and that it can be screwed on and off its bolt with facility. The manufacturing works are illustrated and the operations given in detail. 2200 w. Engng—Feb. 4, 1898.

### LOCKOUT.

See **STRIKE.**

### LOCOMOBILE.

See **STEAM ENGINE—Portable; STEAM VEHICLE.**

### LOCOMOTIVE.

See also **COMPOUND LOCOMOTIVE; ELECTRIC LOCOMOTIVE; RAILWAY; RAILWAY ASSOCIATION—Master Mechanics; Traveling Engineers; ROLLING STOCK.**

Locomotive Progress. A review of recent development and improvement in design. 1800 w. Ry Mas Mech—June, 1899.

Locomotive Development from 1890 to 1900. F. W. Dean. Reviews improvements made, increase in size, materials used, increase in speed, etc. 3800 w. Ry Age—June 15, 1900.

The Locomotive—Recent Practice and the Future. F. W. Dean. Extracts from a paper read before the New England Railroad Club. Review and critical discussion of features of recent design. 3200 w. R R Gaz—Feb. 16, 1900.

**A., T. & S. F. Ry.**—Ten-Wheel Passenger Locomotive; Atchison, Topeka and Santa Fé Ry. Description with dimensions and two-page plate. 1100 w. Eng News—March 3, 1898.

Ten-Wheel Passenger Locomotive—Atchison, Topeka & Santa Fé. Illustrated detailed description with general dimensions. 1200 w. R R Gaz—Oct. 22, 1897.

See also Consolidation.

**American.**—The American Locomotive. Historical sketch of its development since 1829, with photographs of typical engines. 2000 w. Sci Am—July 25, 1896.

The American Locomotive at Home and Abroad. Editorial on the growing export trade in locomotives, with criticism of an article which appeared in London "Engineering." 1300 w. Ry Rev—Nov. 13, 1897.

An Outline of the Development of the American Locomotive. Half-tone reproduction of drawings on exhibition at the Paris Exposition, with descriptive remarks. Serial. Sci Am Sup—June 9, 1900.

The Evolution of the American Locomotive. Herbert T. Walker. An attempt to trace the progress from the machine of ninety years ago to the engine of modern times. Ill. Serial. Sci Am Sup—April 24, 1897.

See also Counterbalancing.

**American, Abroad.**—American Locomotives for Foreign Railways. Detailed information, with illustrations, showing the great extent to which American locomotives are now used, with editorial discussion of the general causes which have led to their export. 6000 w. Eng News—June 15, 1899.

See also Midland; Norris; Port Talbot; Tank.

**American Express.**—American Express Locomotives. Angus Sinclair. Extract from article in "Pall Mall Magazine." Remarks on the changes that follow railroad construction, the early locomotives, the progress and the claim of American locomotives of being less complicated than others. 1800 w. Loc Engng—Oct., 1897.

**American vs. British.**—A Comparison of Three Locomotives—Two American and One English. M. McCabe. The comparison is based on scientific calculations from partially assumed data, and is very favorable to the American types, but strong emphasis is laid upon the necessity of greatly improving the steam locomotive. 900 w. Age of St—Sept. 12, 1896.

English and American Locomotive Building. Charles Rous-Marten. A timely discussion of the causes which have led to the placing of extensive orders in the United States for locomotives for British railways. 4000 w. Eng Mag—July, 1899.

English and American Locomotive Building. Charles Rous-Marten. Mr. Rous-Marten's second paper contains a comparison of the salient differences in design and construction between English and American engines, and numerous views in English and American works. 5000 w. Eng Mag—Aug., 1899.

American Locomotives on British Railways. Charles Rous-Marten. Mr. Rous-Marten's third paper contains the expressions of views and opinions of a number of eminent English authorities upon the design and performance of engines built in England and America. 3000 w. Eng Mag—Sept., 1899.

**Anglo-American.**—An Anglo-American Express Engine. Illustrated description and details of an English built express locomotive approaching closely the American type. 500 w. Ry Wld—Oct., 1896.

**Argentine Republic.**—See also Liquid Fuel, Argentina.

**Articulated.**—An Articulated Locomotive. Illustrated detailed description. The system is the invention of Mr. Haggans, and the locomotives constructed by M. F. Weidknecht, of Paris, are intended for use on light railways, on which steep gradients and very sharp turns have to be encountered. 700 w. Engr, Lond—Oct. 22, 1897.

German Locomotives at the Paris Exhibition. Compound Locomotive for the Royal Bavarian Railways, Constructed by Messrs. Maffei & Co., Munich. A very well illustrated description of an articulated locomotive on the Mallet system. 800 w. 1 plate. Engng—Sept. 7, 1900.

The Mallet Articulated Compound Locomotive. Abstract of a paper by M. A. Mallet in the "Revue Generale des Chemins de Fer," describing the progress in the use of this four-cylinder loco motive, all of whose wheels are drivers, with illustration. 900 w. R R Gaz—Sept. 14, 1900.

**Atlantic Type.**—Atlantic Type Passenger Locomotive. Illustration and dimensions of one of ten locomotives recently built by the Baldwin Locomotive Works for the French State Railways. 300 w. Am Engr & R R Jour—May, 1900.

Atlantic Type Fast Passenger Locomotive. Dimensions, illustration and interesting details of engine on the Pennsylvania R. R., of Class E1, Atlantic Type. 4700 w. Am Engr & R R Jour—June, 1900.

Atlantic Type Locomotive—Class E1, No. 698. Illustrated description with dimensions, of an unusually interesting engine built for the West Jersey and Seashore Div. of the Pennsylvania Railroad. 600 w. R R Gaz—July 7, 1899.

New Atlantic Type Locomotives on the Canadian Pacific. Engraving, description and a brief of the specifications. 600 w. R. R. Gaz—Sept. 15, 1899.

The Atlantic City Flyer—Philadelphia & Reading Railway. H. H. Vaughan. An analysis of the performance of one of the engines of the Atlantic type on the fifty-minute run from Camden to Atlantic City. 1000 w. Am Eng & R R Jour—May, 1899.

The "Atlantic Type" Locomotive in Germany.

General description, translated from an article by Mr. von Borries. Ill. 600 w. R R Gaz—March 17, 1899.

The Atlantic Type and the Wide Firebox. J. Snowden Bell. Calls attention to the special capabilities and advantages of this type of engine in connection with the use of the wide firebox. 2300 w. Am Engr & R R Jour—June, 1899.

See also FAST TRAIN—Atlantic City-Philadelphia.

**Australian.**—See Consolidation.

**Austrian.**—See Consolidation; COMPOUND LOCOMOTIVE.

**Austrian at Paris.**—Austrian Locomotives at the Paris Exhibition. Illustrates and describes the exhibit of the Actien-Gesellschaft der Locomotiv-Fabrik, Wiener-Neustadt. 800 w. Engng—Aug. 17, 1900.

**Axle Bearings.**—See LOCOMOTIVE AXLE-BEARINGS.

**Badminton.**—New Coupled Express Engines on Great Western Railway. Charles Rous-Marten. Briefly reviews the types used for express running by this road, and describes the new engines known as the Badminton class, of which twenty have been built, giving report of runs. 1800 w. Engr, Lond—April 28, 1899.

**Balancing.**—See Counterbalancing.

**Baldwin.**—Early Baldwin Locomotives on the Pennsylvania Railroad. C. H. Caruthers. Description, principal dimensions, and illustrations. 1300 w. Loc Engng—Feb., 1898.

Early Baldwin Locomotives on the Pennsylvania Railroad. Illustrations showing two types built between 1853 and 1856, with information concerning them. 900 w. R R Gaz—May 6, 1898.

Interesting Locomotives from the Baldwin Locomotive Works. Engravings and dimensions. 700 w. Ry Rev—Oct. 31, 1896.

Two Recent Baldwin Locomotives. Engravings, dimensions and other particulars. 800 w. R R Gaz—Dec. 31, 1897.

See also Odd Types; Switch; LOCOMOTIVE FIRE-BOX—Wide; LOCOMOTIVE TEST—Columbia University.

**Baldwin at Paris.**—Baldwin Engines for Paris Exhibition. Described and illustrated by half tones. 400 w. Loc Engng—March, 1900.

**Baldwin for China.**—Locomotives for the Chinese Imperial Railways. Illustrated description of the machines supplied by the Baldwin Locomotive Works of Philadelphia. 1000 w. Engng—Jan. 7, 1898.

**Balt. & Ohio.**—Heavy Passenger Locomotive, Baltimore & Ohio Railway. Drawings of the ten-wheel locomotives in use, with data regarding the work they are doing. 600 w. Ry & Engng Rev—Aug. 13, 1898.

New Equipment on the Baltimore & Ohio Railroad. Dimensions, with photographs of several classes of engines for road named. 2000 w. Am Eng & R R Jour—Nov., 1896.

Some New Ten-Wheelers for the Baltimore and Ohio. Illustration and general dimensions. 500 w. Loc Engng—Nov., 1896.

See also Consolidation.

**B. & O. Ancient.**—Old B. & O. Engines. Illustrations of five curiosities in locomotive practice. 200 w. Loc Engng—April, 1896.

**Barry.**—See Port Talbot, Wales.

**Belgian.**—Express Passenger Locomotive for the Belgian State Railways. Illustrated detailed description, with dimensions. Two-page plate. 1000 w. Engng—Feb. 3, 1899.

Old and New Belgian Express Locomotives. Engravings showing two very different types designed for the same service, with a brief account of the performance of the improved machine. 400 w. Loc Engng—June, 1899.

The Locomotives of the Belgian State Railways (Les Locomotives des Chemins de Fer de l'Etat Belge). M. Horizot. An illustrated description of the engines shown at the Brussels-Tervueren exhibition, giving details and elevations, together with comments on the peculiarities of Belgian locomotives. 8000 w. 3 plates. Rev Gen des Chemins de Fer—Oct., 1898.

**Big Four.**—Eight-Wheel Passenger Locomotives—Cleveland, Cincinnati, Chicago & St. Louis Railway. Illustrated description with principal dimensions. 1000 w. R R Gaz—July 15, 1898.

**Boilers.**—See LOCOMOTIVE BOILERS.

**Borsig Superheater.**—Express Locomotive with Superheater. Illustrates and describes a German locomotive at the Paris Exhibition, with superheater arranged in the smoke box. 700 w. Loc Engng—Oct., 1900.

The Paris Exhibition. Borsig Locomotive, with Superheater. A well illustrated description of a powerful locomotive fitted with a superheater constructed under the Wm. Schmidt patent. 1500 w. 1 plate. Engr, Lond—Sept. 7, 1900.

**Boston & Albany.**—Eight-Wheel Passenger Locomotive—Boston & Albany R. R. Engraving, general dimensions and remarks. 600 w. Am Engr & R R Jour—April, 1900.

Express Passenger Engine, Boston and Albany Railroad. Descriptive specifications are given with indicator diagrams, sectional drawings of cylinder and valve, and comment on the peculiarities and merits of the Fay-Richardson valve. 1000 w. Eng, Lond—June 19, 1896.

**Boston & Maine.**—New Eight-Wheeled Locomotive of the Boston & Maine. A very full description with dimension drawings of details, and indicator cards. 2800 w. R R Gaz—June 19, 1896.

Ten-Wheel Engines for the Boston & Maine. Engraving and descriptive specifications of freight engines recently ordered. 600 w. R R Gaz—Oct. 21, 1898.

**Brighton Ry., Eng.**—Modern Engines of the Brighton Railway. W. B. Paley. The article gives a good idea of the types of engines which an English road finds it necessary to adopt to meet its varied traffic demands. Ill. 2500 w. Ry Wld—March, 1896.

**British.**—Some notable English Engines. Herbert T. Walker. A description with illustrations of five engines of various types used on English railways. A diagram is given showing the comparative boiler heights, from 2 ft. 8 in. above rails in an English engine, to 8 ft. 11¼ in. in No. 999 of the New York Central Railroad. 2700 w. R R Gaz—Nov. 15, 1895.

**British at Paris.**—British Locomotives at the Paris Exhibition. Illustrates two engines to be shown, giving brief notes concerning them. 500 w. R R Gaz—May 18, 1900.

**British, Bogie.**—Engines of the London, Chatham and Dover Railway. W. B. Paley. Illustrated description. This was the first line to use bogie express engines south of London. 1800 w. Ry Wld—Feb., 1897.

**British, Bogie Tank.**—Bogie Tank Engine—London, Tilbury, and Southend Railway. The principal dimensions and weights with description of a powerful engine, with engraving and working drawings of large size. 1300 w. Engr, Lond—Dec. 17, 1897.

**British, 1897.**—New Locomotive Types of 1897. Illustrated description of new types introduced during the year on English railways. 2500 w. Ry Wld—Jan., 1898.

**British, 1898.**—British Locomotives in 1898. Illustrations with descriptions taken from an article by Mr. Charles Rous-Marten. 1800 w. Transport—March 3, 1899.

**British Express.**—A Ten-Wheel Express Locomotive in England. J. P. P. Illustration with dimensions and an account of the line over which the engine runs, with facts of interest. 600 w. R R Gaz—Aug. 18, 1899.

Modern British Express Engines—Their Construction and Work. Charles Rous-Martin. Illustrates and describes various types, giving historical information. 5500 w. R R Gaz—April 8, 1898.

Results of Recent Practical Experience with Express Locomotive Engines. Walter M. Smith. Read before the Inst. of Mech. Engs. (England). Also editorial. An account of extensive experiments with the object of obtaining an idea of the fitness of five classes of engines to perform a given duty. 5800 w. Engr, Lond—Nov. 4, 1898.

Some Nöteworthy Express Locomotives. George Frederick Bird. A brief history of some of the express locomotives of the past and present. Ill. 8000 w. Eng, Lond—Jan. 29, 1897.

The New North British Express Engine. Charles Rous-Marten. Information relating to the new "729" class of locomotives with report of tests of actual working made by the writer. 1600 w. Engr, Lond—July 1, 1898.

**British in America.**—Locomotives Supplied by British Firms to American Railroads. An account of the locomotives made for American roads in the early part of this century is given in part first. Ill. Serial. Engr, Lond—Jan. 21, 1898.

**British Trade.**—The Locomotive Trade of Great Britain. Discusses the position of the trade and the reasons for sending orders abroad. 3500 w. Engr, Lond—Oct. 13, 1899.

**British vs. American.**—See **American vs. British.**

**Brooks.**—Powerful Simple Locomotives for the Great Northern Railway, U. S. A. Illustrations and a description of the interesting details of the design. This article is confined to the boiler and cylinders. General dimensions are given. Built by the Brooks Locomotive Works. 1200 w. Am Eng & R R Jour—Jan., 1898.

Recent Brooks Locomotives—B. R. & G. Ry. and C. R. & N. Co. Illustrated description and interesting comparison of freight engines built for a far western road with those built for an eastern road. 1200 w. Ry & Engng Rev—Dec. 10, 1898.

Great Northern Ten-Wheel Passenger Locomotive Built by Brooks Locomotive Works of Dunkirk, N. Y. Illustrated description and principal dimensions of what is claimed to be the heaviest passenger engine in use. 1800 w. Ry & Engng Rev—Sept. 24, 1898.

Ten-Wheel Passenger Locomotives—Great Northern Railway. Illustrated detailed description with chief dimensions of locomotives built at the Brooks Works, Dunkirk, N. Y. 1500 w. Am Eng & R R Jour—Oct., 1898.

Twelve-Wheel Brooks Locomotive. D., L. & W. Ry. An illustrated detailed description of a powerful freight locomotive, with critical comments. 2500 w. Ry & Engng Rev—Oct. 14, 1899.

Brooks Eight-Wheel Passenger Locomotive—C. & A. Ry. Illustrated detailed description. 1500 w. Ry & Engng Rev—Jan. 20, 1900.

Brooks Ten-Wheel Passenger Locomotive, D., L. & W. Ry. Illustrates one of seven handsome engines recently delivered, noting points of interest. 600 w. Ry & Engng Rev—May 5, 1900.

See also **Consolidation; Corea; Japan; Mexican Central; LOCOMOTIVE TEST.**

**Brooks Convertible, Egypt.**—Brooks Convertible Type Locomotives for Egyptian State Rys. Illustrated descriptions of an engine that can be converted from an Atlantic type having driving wheels 78 in. in diameter into a 10-wheeler having driving wheels either 69 or 60 in. in diameter. 1000 w. Ry & Engng Rev—June 16, 1900.

**Brooks-Monon.**—Brooks-Monon Eight-Whell Express Locomotive. Drawings and specifications of two engines recently delivered to the Chicago, Indianapolis and Louisville Railway. 1200 w. Ry Rev—July 17, 1897.

**Brooks' Twelve-Wheel.**—Brooks' Twelve-Wheelers for the Buffalo, Rochester & Pittsburg. Engraving, elevation and sections with dimensions and description. 700 w. R R Gaz—Sept. 24, 1897.

**Buffalo, Roch. & Pittsburg.**—Heavy Freight Locomotives—Buffalo, Rochester & Pittsburg Railway. Illustration, elevation and sections with descriptive specifications. 600 w. Ry Rev—Oct. 30, 1897.

Twelve-Wheel Pusher Locomotive for the B., R. & P. Ry. Illustrated description of a very large engine to be used in helping coal trains over a grade of 58 ft. to the mile. Gives general dimensions. 300 w. Eng News—Jan. 21, 1897.

Ten-Wheeled Passenger Locomotive, Buffalo, Rochester & Pittsburg Ry. Illustrations, particulars, and general dimensions. 500 w. Eng News—March 23, 1899.

Twelve-Wheel Wide Firebox Freight Locomotive—Buffalo, Rochester & Pittsburg Ry. Illustrations, dimensions and brief description. 600 w. R R Gaz—Oct. 12, 1900.

**"Burlington" Ry.**—New Locomotives of the Chicago, Burlington and Quincy. Description and drawings of new freight locomotives and switches. 1800 w. R R Gaz—March 30, 1900.

**Cail, France.**—Four-Wheel Coupled Locomotive at the Paris Exposition. Illustrated description of an interesting engine, built for drawing heavy loads at a relatively high speed for long distances without stopping. 1000 w. Engng—Aug. 3, 1900.

**Caledonian.**—Caledonian Passenger Express Engines. A full description with measurements and photo-engravings. 450 w. Ry Wld—May, 1896.

A New Express Engine on the Caledonian Railway. Charles Rous-Marten. Particulars of a new express engine of excellent design, the work of J. F. McIntosh. Ill. 2000 w. Engr, Lond—Feb. 25, 1898.

A Once Famous Locomotive. Charles Rous-Marten. An account of the runs of engine 123, of the Caledonian Railway, with its history and recent trial. 3200 w. Engr, Lond—March 31, 1899.

Caledonian Railway Passenger Locomotives. Illustrated detailed description of latest types, with account of some of the performances. Serial. Engng—May 18, 1900.

The "Dunalastair." Brief illustrated description of new express locomotive for the Caledonian Railway. 500 w. Loc Engng—May, 1896.

The New Caledonian Express-Engine "Dunalastair." Charles Rous-Marten. A good example of a modern English engine. The center of boiler is 8-ft. above rails; the driving wheels are 6½-ft. diameter; weight of engine and tender is 87 tons; and a new feature is a very commodious cab, which is an innovation in England. 2500 w. Eng, Lond—Feb. 28, 1896.

**Camel.**—Winans' Camel Engines. M. N. Forney. Illustrated description of some old locomotives long used on the Baltimore & Ohio R. R., noting their interesting features. 4500 w. Am Eng & R R Jour—June, 1898.

**Canadian Pacific.**—See **Atlantic Type.**

**Center of Gravity.**—Advantages of Raising the Center of Gravity of Locomotives. From the "Bulletin of the National Railway Congress," showing the increased safety gained in high engines. 1200 w. Ry Rev—March 28, 1896.

Simple Method of Determining the Center of Gravity of Locomotives. G. R. Henderson. Describes method. Ill. 500 w. Am Engr & R R Jour—Oct., 1899.

**Characteristics.**—Locomotive Characteristics. G. R. Henderson. The object of the article is to determine the conditions under which the maximum amount of work or power can be obtained from any given locomotive, of known proportions, regardless of the fuel economy. 1500 w. Am Eng & R R Jour—June, 1898.

**Chicago & Eastern Illinois.**—Twelve-Wheel Locomotive—Chicago & Eastern Illinois Railroad. Half-tone and side elevation with general dimensions and particulars. 700 w. Loc Engng—March, 1898.

Twelve-Wheel Locomotive for the Chicago & Eastern Illinois. Elevation and principal dimensions. 400 w. R R Gaz—Dec. 24, 1897.

**Chicago & Northwestern.**—Details of Class "D" Passenger Locomotives of the Chicago & Northwestern. A well illustrated description of details. 500 w. R R Gaz—Sept. 21, 1900.

Fast Passenger Locomotives of the Chicago & Northwestern Railway. Illustration and principal dimensions of new eight-wheel locomotives to be used in fast service between Chicago and Omaha. 900 w. R R Gaz—May 26, 1899.

Powerful Eight-Wheel Passenger Locomotives—Chicago & Northwestern Railway. Illustrations and full description of these fast-mail locomotives. 700 w. Am Engr & R R Jour—June, 1899.

Ten-Wheel Freight Engine, Chicago & Northwestern Railway. Illustration, dimensions and other particulars. 750 w. R R Gaz—Oct. 29, 1897.

**Chic., Burlington & Quincy.**—See **Burlington.**

**Chicago Great Western.**—Ten-Wheel Freight Locomotives. Illustration and principal dimensions of engines for the Chicago Great Western Ry. 800 w. Am Engr & R R Jour—Oct., 1899.

**Chic., Rock Island & Pacific.**—See **Rock Island.**

**China.**—Passenger Tank Locomotive; Lung-Wo Railway, China. General dimensions and description of locomotives built for this line, by the Brooks Locomotive works. Ill. 700 w. Eng News—Sept. 9, 1897.

Six Coupled Tank Engines for the Trans-Manchurian Railroad. Illustrated description with dimensions. 700 w. R R Gaz—April 29, 1898.

See also **COMPOUND LOCOMOTIVE; RAILWAY—China.**

**China and Japan.**—American Locomotives for China and Japan. Illustrated description of some new Brooks engines for the orient. 1600 w. Ry Age—Aug. 6, 1897.

**Cleveland, Cincinnati, Chicago & St. Louis.**—See **Big Four.**

**Coal Consumption.**—See **LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST.**

**Coal Mine.**—Colliery Locomotives. W. W. Clayton. From "Trans. of the Institution of Min. Engs." Concerning their use and abuse, and the points that should be watched and what should be avoided in their construction. 2300 w. Mines & Min—Dec., 1899.

The Colliery Locomotive. An illustrated review of the early history of the locomotive engine, which was inseparably connected with collieries. Serial. Ir & Coal Trds Rev—April 6, 1900.

The Use and Abuse of Colliery Locomotives. W. W. Clayton. Read before the Chesterfield and Midland Counties Soc. of Engs. A brief account of the first locomotive used in a colliery, in 1811, with suggestions concerning care and operation. 2800 w. Can Min Rev—Jan. 31, 1900.

See also **COAL MINING MACHINERY; ELECTRIC EQUIPMENT; ELECTRIC LOCOMOTIVE; MINE HAULAGE; MINING MACHINERY.**

**Colombia.**—Six-Coupled Locomotive, Cauca Railway, United States of Colombia. Illustrations, principal dimensions and specifications, with particulars. 700 w. Ry & Engng Rev—Aug. 12, 1899.

**Compound.**—See **COMPOUND LOCOMOTIVE.**

**Consolidation.**—Two Large Consolidation Locomotives. Illustrated detailed description of two large engines, with dimensions. 2200 w. Eng News—May 17, 1900.

See also **LOCOMOTIVE FIREBOX—Wide.**

**Consolidation, A., T. & S. F.**—Consolidation Locomotives. Gives illustrations and chief dimensions of the engines for the Santa Fé Pacific Ry. 400 w. Am Eng & R R Jour—Sept., 1899.

Standard Consolidation Freight Locomotive of the Atchison, Topeka & Santa Fé Railway. Illustrated detailed description of a design of John Player. Serial. Ry & Engng Rev—Jan. 29, 1898.

The Simple and Compound Consolidation Locomotives of the Atchison, Topeka & Santa Fé. An account, with illustrations, of the tandem compound and the simple engines, with data from careful service tests extending over several months. 4400 w. R R Gaz—June 16, 1899.

**Consolidation, Australia.**—Australian Consolidation Engine. Illustrated description. 850 w. Loc Engng—Oct., 1899.

**Consolidation, Austria.**—Consolidation Locomotive, Austrian State Railways. Illustrated description with general dimensions. 500 w. Engr, Lond—May 18, 1900.

**Consolidation, B. & O.**—Heavy Consolidation Engines for the Baltimore & Ohio Railroad. Illustration and general dimensions. 800 w. Loc Engng—Nov., 1896.

**Consolidation, Brooks.**—Brooks Consolidation Engine for the Mexican Central Railway. Illustration, dimensions and general particulars. 500 w. Loc Engng—Dec., 1897.

Brooks Consolidated Locomotives, L. S. & M. S. Ry. Illustration of engine for freight service, with general dimensions. 900 w. Ry & Engng Rev—April 21, 1900.

**Consolidation, Burlington & Missouri River.**—Consolidation Locomotives—Burlington & Missouri River Railroad. Illustrated description of engines for freight service in the Black Hills. 850 w. Am Eng & R R Jour—Sept., 1898.

**Consolidation, C. & O.**—Consolidation Locomotive—Chesapeake & Ohio Railway. A locomotive designed by W. S. Morris, for mountain service, is illustrated and described. 900 w. Ry Mas Mech—Nov., 1898.

Class G-6 Consolidation Locomotive for the Chesapeake & Ohio. Engravings, description and dimensions. 900 w. R R Gaz—Aug. 5, 1898.

**Consolidation. C., C., C. & St. L.**—Consolidation Locomotive—Cleveland, Cincinnati, Chicago & St. Louis. Illustrated detailed description giving dimensions. 700 w. R R Gaz—April 15, 1898.

Heavy Consolidation Locomotive for the Cleveland, Cincinnati, Chicago & St. Louis Railway. Illustrated description with principal dimensions of the largest locomotive so far built for this road. 700 w. R R Gaz—April 28, 1899.

**Consolidation Compound.**—See **COMPOUND LOCOMOTIVE—Consolidation.**

**Consolidation, Cooke.**—Cooke Consolidation Locomotive, L. & N. Ry. Illustrated description with dimensions. 900 w. Ry & Engng Rev—Feb. 3, 1900.

See also **Consolidation, Oregon.**

**Consolidation, Del. & Hudson.**—Consolidation Locomotive for the Delaware & Hudson Canal Co. Illustration and general dimensions. 500 w. Ry & Engng Rev—Aug. 5, 1899.

Consolidation Locomotive for the Delaware & Hudson. Illustration and general dimensions of locomotive lately built by the Dickson Mfg. Co., of Scranton, Pa. 200 w. R R Gaz—Nov. 18, 1898.

Consolidation Pushing Locomotive. Illustrated description of an engine for the D. & H. Co., using fine anthracite coal, and having an exceptionally powerful boiler for the weight. 600 w. Am Engr & R R Jour—Dec., 1899.

Schenectady Consolidation Locomotives for the D. & H. Engraving and descriptive specifications. 350 w. R R Gaz—July 28, 1899.

**Consolidation, Dickson.**—See **Consolidation, A., T. & S. F.**

**Consolidation, Double End.**—Double End Consolidation Locomotive—Dominion Coal Co. Illustrated description of an engine built at the Schenectady Locomotive Works, and sent to Cape Bréton, Nova Scotia. 700 w. Ry & Engng Rev—Nov. 4, 1899.

**Consolidation, Illinois Central.**—The 116-Ton Illinois Central Twelve-Wheel Locomotive. Engravings and descriptive specifications with general remarks. 1000 w. R R Gaz—Sept. 29, 1899.

The Illinois Central's New Locomotive. Illustrated description of a 12-wheeled consolidation engine that up to date is the largest and heaviest locomotive in the United States. 900 w. Ry Age—Sept. 22, 1899.

The Largest Locomotive in the World; Illinois Central R. R. Full illustrated detailed description with two-page plate. 1300 w. Eng News—Oct. 26, 1899.

**Consolidation, Lake Shore.**—Consolidation Freight Locomotives. Illustrated description of one of twenty-five freight locomotives, recently completed for the Lake Shore & Mich. So. Ry. 800 w. Am Engr & R R Jour—Feb., 1900.

New Consolidation Locomotives for the Lake Shore & Michigan Southern. Descriptive specifications, important features and engravings. 800 w. R R Gaz—March 2, 1900.

**Consolidation, Lehigh.**—A Heavy Consolidation for the Lehigh Valley. Dimensions and engravings showing the appearance of the engine, and the details of the boiler. 200 w. R R Gaz—Jan. 13, 1899.

Consolidation Locomotive with Large Drivers for the Lehigh Valley Railroad. Illustrated description of an engine which is a departure from the usual practice. 350 w. R R Gaz—March 10, 1899.

**Consolidation, Long Island.**—Consolidation Locomotive, L. I. R. R. Half-tone view and side, rear and sectional elevations of locomotives constructed for the Long Island Railroad, with dimensions. 500 w. Ry & Engng Rev—Feb. 11, 1899.

**Consolidation, N. Y., O. & W.**—The New York, Ontario & Western Consolidation Engines. A study of the hauling capacity of these engines as compared with certain others, and a table giving particulars of recent consolidation engines. 800 w. R R Gaz—June 15, 1900.

**Consolidation, Oregon.**—Consolidation Locomotives for the Oregon Railroad & Navigation Co. Illustrated description giving dimensions. 600 w. R R Gaz—Feb. 3, 1899.

Cooke Locomotive for the Oregon Short-Line Railway. Illustrated description of improved consolidation locomotives recently built. 500 w. Ry & Engng Rev—Jan. 22, 1898.

Cooke Ten-Wheel Freight Locomotive, Oregon Short-Line. Half-tone view and description. 900 w. Ry & Engng Rev—Sept. 2, 1899.

Consolidation Locomotives for the Oregon Short-Line. Illustrated description, with dimensions. 500 w. R R Gaz—April 20, 1900.

**Consolidation, Pennsylvania.**—Standard Consolidation Freight Locomotives—Pennsylvania Railroad. Illustrated detailed description of the heavy freight engines, classes H5 and H6. 4000 w. Am Engr & R R Jour—June, 1899.

**Consolidation, Pittsburg.**—Great Consolidation Locomotives for the Pittsburg, Bessemer & Lake Erie Railroad. Illustration and general description of the largest and heaviest locomotive yet built. 1100 w. R R Gaz—June 29, 1900.

The Heaviest Locomotive in the World, Pittsburg, Bessemer & Lake Erie R. R. Principal dimensions, with illustration. 500 w. Eng News—June 21, 1900.

The Largest Locomotive in the World. General description with illustrations of the locomotives for the Union Railroad, connecting the works of the Carnegie Co. Also editorial discussion as to the value of monster locomotives. 3000 w. Engr, Lond—Nov. 11, 1898.

The Largest Locomotive Ever Built. Illustrated description of a consolidation locomotive built for the Union R. R. Co., of Pittsburg, Pa., by the Pittsburg Locomotive & Car Works. 1200 w. Eng News—Oct. 27, 1898.

See also **Heavy.**

**Consolidation, Richmond.**—Consolidation Locomotives for the Rio Grande Western Ry. Illustrated detailed description of a large and powerful engine. 1000 w. Eng News—Aug. 30, 1900.

Richmond Consolidation Locomotive, Rio Grande Western Ry. Illustrates and describes heavy locomotives, eight of which have been received and are in service, giving satisfactory results. 1200 w. Ry & Engng Rev—Sept. 1, 1900.

**Consolidation, Rogers.**—A Very Heavy Consolidation Engine for the Illinois Central. Full illustrated description of the 108-ton consolidation locomotive built by the Rogers Locomotive Works, of Paterson, N. J. 1700 w. R R Gaz—Dec. 15, 1899.

Heavy Consolidation Locomotive for the Illinois Central Railroad. A well illustrated description of a 218000-pound locomotive for hauling 3000-ton trains, built by Rogers, at Paterson, N. J. 900 w. Engng—Sept. 14, 1900.

Rogers Locomotive for the Illinois Central. An engine of the consolidation type which is among the largest ever built. Illustration and detail drawings. 2000 w. Ry Age—Dec. 15, 1899.

**Consolidation, Southern.**—Consolidation Freight Locomotive; Southern Ry. Drawings, dimensions and interesting features of heavy engines built by the Richmond Locomotive & Machine Works. 800 w. Eng News—May 5, 1898.

Consolidation Locomotive for Southern Railway. Illustrated description with dimensions. 700 w. Ry & Engng Rev—July 16, 1898.

**Consolidation, Union Pacific.**—Consolidation Locomotives for the Union Pacific. Illustration showing appearance, with a list of the principal dimensions of the simple locomotives. 450 w. R R Gaz—Nov. 18, 1898.

**Cooke.**—Recent Cooke Locomotives. Illustrated description of two recently completed engines having points of interest. 1600 w. Ry & Engng Rev—March 24, 1900.

See also **Consolidation, Cooke; Consolidation, Oregon; Port Talbot.**

**Corea.**—American Locomotives for Corea. Illustration and dimensions of locomotives to be built by the Brooks Locomotive Works. 600 w. Eng News—Feb. 24, 1898.

**Corliss Valves.**—Economical High-Power Locomotives. James Dunlop. Description of application of Corliss valves to a Paris-Orleans locomotive, with general and detail drawings. 1400 w. Eng, Lond—May 15, 1896.

**Counterbalancing.**—A "Balanced" Locomotive? Novoye Vremya. Letter to the editor criticizing an American locomotive, and claiming the design to be inferior in almost every particular to other engines. Gives analysis of forces and expresses general disapproval. Ill. 2800 w. Engng—Dec. 31, 1897.

An Instructive Mechanical Failure. Wilfred Lewis. Illustrated discussion of an alleged improvement in balancing a locomotive driving-wheel. 4500 w. Jour Fr Inst—Aug., 1898.

A New Method of Counterbalancing Locomotives. Describes a system invented by P. Z. Davis. Ill. 800 w. Ry Age—Jan. 26, 1900.

Locomotive Counterbalancing. G. R. Henderson. Deduction and statement of rules with particular reference to the overlooked importance of the proportion of reciprocating weights to balance. 1800 w. Jour Assn of Engng Soc—July, 1896.

Locomotive Counterbalancing. From a committee report presented at the annual convention of the Am. Ry. Mas. Mech's Assn. Epitome of practice as collected by the committee through correspondence. 1000 w. Eng News—July 2, 1896.

Locomotive Counterbalancing and Its Effects. A. H. Angier. Translated from the French as published in the "Revue Generale des Chemins de Fer." A study of the problem for the sake of substituting rational methods for the arbitrary system in actual use as stated by the author. Serial. R R Gaz—Aug. 20, 1897.

The Adaptation of the Locomotive for Safe High Speed Travel, with Special Reference to the Proper Method of Balancing its Reciprocating Parts. William E. Lockwood. On the effects produced by counter-balancing the driving wheels. Also discussion. 4200 w. N Y R R Club—Dec. 21, 1899.

The Destructive Action of Locomotive Driving Wheels. A statement of the evils of overbalancing, and suggestion of means for their reduction. 200 w. Sci Am—May, 1896.

See also **COMPOUND LOCOMOTIVE—Strong Balanced; LOCOMOTIVE TEST—Strong Balanced.**

**Crampton.**—See also **Pennsylvania.**

**Crampton Four-Coupled.**—Four-Coupled Crampton Engines. W. B. Paley. Illustrated account of engines built in 1861 and 1862. They were designed for the London, Chatham & Dover R. R. 700 w. R R Gaz—March 9, 1900.

**Crank Pins.**—See **CRANK PIN—Locomotive.**

**Crewe, Eng.**—The First Engines Built at Crewe. Clement E. Stratton. An account of engines completed in 1842, with interesting information relating to them. 1800 w. Mech Wld—July 7, 1899.

**Culm-Burning.**—Locomotive for Burning Culm—D., L. & W. R. R. With photograph and full dimensions. 500 w. Ry Rev—Aug. 29, 1896.

**Cylinder.**—See **LOCOMOTIVE CYLINDER.**

**Darjeeling.**—See **Himalayan.**

**Defects.**—See **Improvement.**

**Del., Lack. & West.**—See **Brooks; Culm-Burning; Lackawanna; Mogul, Lackawanna.**

**Del. & Hudson.**—See **Consolidation.**

**Denver & Rio Grande.**—Heavy Ten-Wheel Passenger Locomotive—Denver & Rio Grande Railway. Engraving, half-sectional front end view, general dimensions and particulars. 600 w. Ry & Engng Rev—July 29, 1899.

Ten-Wheel Passenger Locomotives for the Denver and Rio Grande R. R. Illustration and principal dimensions. 500 w. R R Gaz—July 28, 1899.

**Design.**—See **LOCOMOTIVE DESIGN.**

**Details.**—See **LOCOMOTIVE DESIGN.**

**Dimensions.**—See **LOCOMOTIVE DESIGN.**

**Double End.**—See **Consolidation, Double End.**

**Double Stack.**—Locomotives with Double Smoke-stack; Toledo, Peoria & Western Ry. Illustration of this device, with a statement of the advantages claimed. 400 w. Eng News—Jan. 27, 1898.

**Double Valves.**—Locomotives with Double Valves and Ports, London & Southwestern Ry. Illustrated description with dimensions and drawings. 500 w. Eng News—Jan. 13, 1898.

See also **LOCOMOTIVE VALVE.**

**Draft Appliances.**—Draft Appliances and Extended Smoke Boxes. Editorial on paper by Snowden Bell, read before the Western Ry. Club, reviewing progress in draft appliances. 1500 w. Loc Engng—Dec., 1899.

Draft Appliances—Ash Pans. F. P. Roesch. Deductions based on a series of experiments extending over a period of ten years, with different engines and coals. Serial. Loc Engng—Nov., 1898.

Draft Appliances of Extension Front. Thomas P. Whelan. Discusses the steaming qualities of engines, as affected by management of the draft appliances. 1800 w. Loc Engng—Aug., 1900.

Draft Appliances. Showing how seriously the work of locomotives is affected by them. 1200 w. Loc Engng—Oct., 1900.

Exhaust and Draft. Arrangements in Locomotives. Synopsis of review of the progress of the past ten years, made by C. H. Quereau. 900 w. Am Engr & R R Jour—Feb., 1900.

See also **Exhaust; LOCOMOTIVE GRATE; LOCOMOTIVE SMOKE BOX; LOCOMOTIVE STACK.**

**Driving Wheel.**—See **Counterbalancing; LOCOMOTIVE DRIVING WHEEL.**

**"Dual Exhaust."**—See **LOCOMOTIVE CYLINDER.**

**Dublin & Kingstown.**—Old Locomotives, Dublin & Kingstown Railway. Illustrated description of the "Jupiter," one of the standard engines of this line, constructed in 1840. 450 w. Engr, Lond—June 24, 1898.

**"Dunalastair."**—See **Caledonian.**

**East Indian Ry.**—Freight Locomotive; East Indian Ry. Dimensions, illustration and description of an English built engine. 1000 w. Eng News—April 12, 1900.

**Economical.**—See **LOCOMOTIVE OPERATION.**

**Education.**—See **EDUCATION—Railway; MECHANICAL ENGINEERING—Railway; RAILWAY ENGINEERING; RAILWAY SCHOOL.**

**Efficiency.**—See also **Weight and Efficiency; LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST.**

**Egypt.**—Locomotives on Egyptian Railways. Information from the report of F. H. Trevithick concerning the American and English locomotives. 2000 w. Ind & Ir—Jan. 26, 1900.

See also **Brooks Convertible.**

**Electric.**—See **ELECTRIC LOCOMOTIVE.**

**Electric Attachment.**—Attachment for Locomotives (Dispositif Applicable aux Locomotives). A description of an electrical attachment for setting the brakes and reversing the engine automatically. 2300 w. Rev Tech—March 10, 1899.

**English.**—See **British.**

**Erie Passenger.**—New Erie Passenger Engine. A description with photograph and sectional drawings. The engine has some novel features in frames and size of steam parts. 500 w. Loc Engng—June, 1896.

**Europe and America.**—Principal Types of Locomotives in Use in Europe and America (Principaux Types de Locomotives Actuellement en Usage en Europe et en Amerique). A list with brief general description of 63 different types of locomotives. Two articles. 5000 w. 1 plate. Génie Civil—May 28, June 4, 1898.

Recent Types of European and American Locomotives. A full page plate containing 63 designs, with description of each and general remarks on the tendency in America and Europe. 8000 w. Eng News—Nov. 10, 1898.

See also **American.**

**Exhaust.**—See also **Draft Appliance.**

**Exhaust and Draft.**—Exhaust and Draft in Locomotives. Portions of the report of Edouard Sauvage, with editorial. Ill. 5500 w. R R Gaz—June 29, 1900.

Exhaust and Draft in Locomotives. From the report of C. H. Quereau. Gives a summary of American practice, with discussion and conclusions. 4300 w. R R Gaz—Jan. 19, 1900.

**Exhaust Jet.**—The Form of the Exhaust Jet in Locomotives. J. F. Deems. Abstract of a paper read before the Western Railway Club. A recital of recent experiences as a member of a committee on proper height, form and arrangement of exhaust jets. 2100 w. Eng News—June 4, 1896.

**Exhaust Nozzle.**—A New Locomotive Exhaust Nozzle. Data regarding tests made at the University of Illinois, of locomotive exhaust nozzles, comparing the action of a new nozzle, designed by Don Sweney, with the Smith triple-expansion nozzle and several round nozzles. 2200 w. R R Gaz—June 16, 1899.

Why Not Try Variable Nozzles? Editorial discussing the advantage of using variable nozzles. 900 w. Loc Engng—April, 1900.

**Exhaust Pipes and Smokestacks.**—Experiments with Locomotive Exhaust Pipes and Smokestacks. An account of some very elaborate experiments made in Germany, in the years 1892 to 1894, to ascertain the effects of different shapes and proportions of exhaust pipes and smokestacks for locomotives. A very elaborate investigation. 4000 w. R R Ga—March 20, 1896.

**Exhaust Tests.**—The Need for Further Tests on Locomotive Exhaust Arrangements. H. H. Vaughan. Urges a continuation of experiments in order to settle the best exhaust arrangements for draft producing purposes. 1600 w. Am Engr & R R Jour—June, 1900.

**F. C. & P. Ry.**—Eight-Wheel Passenger Locomotive, F. C. & P. R. R. Illustrated description, with dimensions. 500 w. Ry & Engng Rev—Feb. 18, 1899.

**Feed-Water Heater.**—A Suggestion for the Improvement of the Locomotive. George S. Strong. Gives the writer's ideas in regard to American practice and its limitations, with a suggestion regarding the use of feed-water heaters for locomotives. 1000 w. R R Gaz—July 22, 1898.

**Finland.**—Richmond Locomotives for Finland. Illustrated description of engines of foreign type built in the United States. 500 w. Loc Engng—Nov., 1898.

Richmond Ten-Wheeled Locomotives—Finland State Railroads. Illustrations and descriptive specifications. 400 w. R R Gaz—July 6, 1900.

Ten-Wheel Passenger Locomotives. Brief illustrated description of one of the ten locomotives built for the Finland State Railways. 350 w. Am Engr & R R Jour—Aug., 1900.

**Firebox.**—See **LOCOMOTIVE FIREBOX.**

**Fireless.**—See **KINETIC MOTOR.**

**Fitchburg Ry.**—Ten-Wheel Passenger Locomotives for the Fitchburg. Engraving and principal dimensions of engine guaranteed to haul a train of 825 tons up a 60-ft. grade 10 miles long, at a speed of 40 miles an hour. 200 w. R R Gaz—Oct. 21, 1898.

**Four-Cylinder Simple.** Four-Cylinder Locomotive. Illustrated detailed description of a fine engine in service on the Glasgow & Southwestern Ry. 600 w. Engng—Aug. 10, 1900.

Glasgow & Southwestern Four-Cylinder Simple Engine. Engraving, half-sectional plan, principal dimensions, and other particulars. 400 w. R R Gaz—Jan. 4, 1898.

**France.**—Express Passenger Locomotive for the French State Railways. General and detailed views, short description and leading particulars. 500 w. Engng—April 21, 1899.

New Express Locomotives (Nouvelles Machine d'Express). M. Desdouits. An illustrated description of the new simple expansion engines with piston valves, constructed for the French State Railways. 5 plates. Serial. Rev Gen de Chemins de Fer—March, 1900.

Single Expansion Engines with Piston Valves—State Railroad of France. M. Desdouits. From "Revue Générale des Chemins der Fer." Abstract giving illustrations and principal dimensions, and a comparison of results with compound engines. 2700 w. R R Gaz—July 13, 1900.

The New Express Locomotives of the French State Railways (Les Nouvelles Machines d'Express du Reseau de l'Etat Français). With illustrations of the four-cylinder compound engines, and of the simple express engines recently put into service. 1800 w. La Rev Tech—Aug. 25, 1898.

See also **Cail; Switzerland; COMPOUND LOCOMOTIVE.**

**France, Northern.**—French Fast Passenger Locomotive. Illustrated detailed description of engine used on the Chemin de Fer du Nord. 600 w. Ry & Engng Rev—Dec. 30, 1899.

See also **COMPOUND LOCOMOTIVE; FAST Train—France, Northern.**

**France, Southern.**—Locomotives for the Southern Railway of France. Considers in some detail the several most advanced types of locomotives that have been brought into service by this company, giving illustrations. 2700 w. Engng—Nov. 10, 1899.

**Friction Losses.**—See **LOCOMOTIVE TEST.**

**Front End.**—See **LOCOMOTIVE SMOKE BOX; LOCOMOTIVE STACK.**

**Fuel Efficiency.**—See also **Weight and Efficiency; LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST.**

**Furness Ry., Eng.**—Goods Engine, Furness Railway. Illustrations showing sections and a general external view of this six-wheeled coupled goods engine, with dimensions. 500 w. Engr, Lond—July 7, 1899.

**Future Development.**—The Future Development of the Locomotive. Maurice Demoulin. From the "Bulletin of the International Railway Congress." Discusses to what extent engines can be made more powerful and less heavy, the present tendencies and the types likely to be developed. 2600 w. R R Gaz—Aug. 12, 1898.

**Geared.**—A Geared Locomotive for Contractors' Use. Illustrated description with table of dimensions. 800 w. Eng News—May 21, 1896.

A Heavy Geared Locomotive. Illustrates a large geared engine recently built for the St. Paul & Tacoula Lumber Co., giving dimensions. 600 w. Eng News—March 9, 1899.

Geared Locomotives on the Mount Tamalpais Railway. Illustrated description of a 30-ton engine of the central shaft class, designed by Charles Heisler, and running on a scenic railway in California. 1300 w. Sci Am—July 16, 1898.

Two New Geared Locomotives. Illustrated detailed description of the Heisler geared locomotive, and the Climax engine, with a discussion of the general question of geared locomotives, and the two classes into which they may be divided. Also editorial. 3800 w. Eng News—Dec. 9, 1897.

**Geared, Heisler.**—Geared Locomotive for the McCloud River Railroad. Briefly describes this Californian road and gives illustrated description of the 60-ton Heisler geared locomotive. 1500 w. Engng—July 20, 1900.

60-Ton Heisler Geared Locomotive: McCloud River R. R., Northern California. Particulars of an engine having three driving trucks, or twelve driving wheels, which has been in service some time. 900 w. Eng News—July 27, 1899.

**German at Paris.**—German Locomotives at the Paris Exhibition. Begins an illustrated description of the exhibit of the Sächsische Maschinenfabrik, of Chemnitz. Serial. Engng—Aug 24, 1900.

German Locomotive Exhibit at Paris (Die Weltausstellung in Paris 1900. Die Deutsche Kollektivausstellung von Locomotiven). A well illustrated general description of the exhibit, with details of some of the locomotives. Serial. 4 plates. Glaser's Annalen—May 15, 1900.

See also **Articulated.**

**German, Veteran.**—Some Veteran Locomotives. Alfred R. Bennett. Illustrates and describes some engines built in 1846 and 1847 in daily work on the Main-Neckar Ry. of Germany. 500 w. Engng—Jan. 12, 1900.

**Glasgow and Southwestern.**—Locomotive for the Glasgow and Southwestern Railway. Illustrated detailed description as exhibited by the specifications in the contract. Serial. Engng—Dec 6, 1895.

See **Four-Cylinder Simple.**

**Grank Trunk Ry.**—New Standard Locomotives—Grank Trunk Railway. Illustration and principal dimensions with brief description. 800 w. Am Eng & R R Jour—April, 1898

Ten-Wheel Passenger Locomotives; Grand Trunk Ry. Illustration, description, and principal dimensions. 500 w. Eng News—July 28, 1898.

Two New Grand Trunk Locomotives. Illustrated description of the 10-wheel passenger engines recently adopted as the standard, and principal dimensions of the new standard mogul freight engines. 700 w. R R Gaz—Feb. 11, 1898.

**Grate.**—See **LOCOMOTIVE GRATE.**

**Great Central, Eng.**—A Single-Wheeled Bogie Express Passenger Engine—Great Central Railway. Drawings and description. 1500 w. R R Gaz—July 27, 1900.

Express Passenger Locomotive for the Great Central Railway. Illustrated detailed description of engine of the four-coupled inside cylinder type, with a four-wheeled bogie at the leading end. 1600 w. Engng—Sept 29, 1899.

**Great Eastern, Eng.**—Express Engine, Great Eastern Railway. Illustrates and describes a powerful type of express locomotives intended particularly for fast seaside traffic. 150 w. Engr, Lond—Oct. 28, 1898.

**Great Eastern, Eng.**—Express Engine, Great Eastern Railway. Charles Rous-Marten. Records results attained during several experimental journeys with these engines. 1800 w. Engr, Lond—Dec. 2, 1898.

**Great Northern, Eng.**—The Latest Great Northern Single-Wheeler. Charles Rous-Marten. Describes a greatly improved engine, the departures from the usual practice being due to H. A. Ivatt, locomotive superintendent of the Great Northern Ry. Ill. 2000 w. Eng, Lond—June 25, 1897.

Heavy Twelve-Wheel Locomotives for the Great Northern. Illustrated detailed description with general dimensions. 1200 w. R R Gaz—Jan. 7, 1897.

106-Ton Twelve-Wheel Locomotive; Great Northern Railway. Illustrates and describes an enormous locomotive and its interesting features. 1200 w. Eng News—April 14, 1898.

Mr. Ivatt's Newest Great Northern Engines. Charles Rous-Marten. An account of runs made with recently built engines and descriptions of the types. Ill. 2600 w. Engr, Lond—March 16, 1900.

The New Great Northern Engines and Their Work. Charle Rous-Marten. Introductory remarks on the changed conditions which make necessary more powerful engines, with information concerning the engines designed by H. A. Ivatt, especially No. 990, giving the results of these journeys illustrative of its working. 3800 w. Engr, Lond—Aug. 26, 1898.

See also **Brooks; Mogul; Rogers.**

**Great Southern & Western, Eng.**—Old Great Southern and Western Railway Locomotives. Eighteen diagram illustrations of some peculiar types with plans and sections of firebox. 800 w. Eng, Lond—Jan. 24, 1896.

**Great Western, Eng.**—Mineral Engine, Great Western Railway, England. An illustrated description of the most powerful goods engine working south of the Thames, with dimensions. 800 w. Engr, Lond—Nov. 5, 1897.

New Express Engine on the Great Western Railway, England. P. J. Cowan. Dimensions and performance of a recent English express locomotive; with photographs. 600 w. Loc Engng—July, 1896.

Passenger Locomotive, Great Western Railway. Illustration and general dimensions. 200 w. Engr, Lond—Oct. 8, 1897.

The Great Western Railway Company's Latest Express Engines. A descriptive account with photographs, dimensions, and some figures of performance. 700 w. Ry Wld—June, 1896.

**Guides.**—See **GUIDES—Lining.**

**Hagens Coupled.**—The Hagens Coupled Locomotive. Description, with illustration, of a 70-ton engine with four coupled axles, for steep gradients and sharp curves. The chief dimensions are given. 600 w. Engng—Oct. 8, 1897.

The Hagens Locomotive Engine (Hagens Locomotive). An illustrated description of a new type of eight-driver locomotive, without trucks and with flexible wheel base. 1500 w. Glaser's Annalen—Feb. 15, 1897.

**Haigh Foundry.**—Locomotives Built at the Old Haigh Foundry. Clement E. Stretton. An account of engines built from 1835 to 1856. 1800 w. Mech Wld—Sept. 15, 1899.

**Hauling Capacity.**—A Diagram for Hauling and Tractive Power of Locomotives. Designed to compare the power of locomotives having different sized cylinders and driving wheels, and to ascertain the effect of changing the dimensions. The construction of the diagram is explained and the formulae used are given. 600 w. Ry Rev—Oct. 10, 1896.

The Hauling Capacity of Locomotives. H. H. Vaughan. Abstract from a paper read before the Northwestern Railway Club. A valuable article, both practical and theoretical. 2700 w. Ry Rev—Jan. 25, 1896.

The Hauling Capacity of Locomotives. H. H. Vaughan. Extracts from a paper presented before the Northwest Ry. Club, explaining the methods of rating locomotive loads adopted on that road. For some time it has been the practice to rate locomotives by actual tons rather than by the number of cars. 2500 w. R R Gaz—March 27, 1896.

The Hauling Capacity of Locomotives. Extracts from discussion on a paper by H. H. Vaughan of this title read before the Northwest Railway Club. 3200 w. Ry Rev—March 28, 1896.

See also **COMPOUND LOCOMOTIVE—Tractive Power; LOCOMOTIVE PERFORMANCE.**

**Hayes' Ten-Wheel.**—Hayes' Ten-Wheel Locomotive. M. N. Forney. Illustrates and describes an engine built for the Baltimore & Ohio R. R. in the fifties. 1200 w. Am Eng & R R Jour—Nov., 1896.

**Headlight.**—See **HEADLIGHT.**

**Heavy.**—Large Locomotives. Editorial on the rapid development that has taken place in locomotive engineering in the last five years. 1600 w. Engr, Lond—Feb. 4, 1898.

The Two Heaviest Locomotives. Editorial comparison of the heaviest American locomotive with the heaviest locomotive in Europe. 700 w. R R Gaz—Nov. 25, 1898.

See also **Consolidation, Illinois Central; Consolidation, Pittsburg; Lake Shore.**

**Hedley's "Puffing Billy."**—Hedley's "Puffing Billy." Historical account of the invention of the first locomotive to haul cars profitably and to do the work expected, with general remarks. 1800 w. Loc Engng—Jan., 1897.

**Heilmann.**—See **ELECTRIC LOCOMOTIVE.**

**Heisler Geared.**—See **Geared Heisler.**

**Helping Cylinders.**—A Locomotive with "Helping Cylinders" at the Paris Exposition. Illustrates and describes a novel engine exhibited by a Munich firm. 800 w. Eng News—Oct. 4, 1900.

**Highland.**—New "Highland" Locomotive. Illustration and brief description of new ten-wheel express engine for Highland Ry., of Scotland; one of the "Castle" class. 300 w. Loc Engng—Sept., 1900.

Ten-Wheeled Express Locomotive for the Highland Railway. An illustrated description of a powerful type of passenger locomotive, built in Glasgow. 500 w. Transport—Sept. 7, 1900.

**High Pressures.**—The Efficiency of High Steam Pressures for Locomotives. Condensed from the report of a Committee of the American Railway Master Mechanics' Assn. Presented at Saratoga meeting. 4800 w. Eng News—June 23, 1898.

The Use of High Steam Pressures in Non-Compound Locomotives. Dugald Drummond. From selected papers of the Institution of Civil Engineers. Describes tests made on the Caledonian Railway, to ascertain what increase of efficiency or economy is derived from raising the boiler pressure in non-compound locomotives. 3400 w. Eng News—June 10, 1897.

See also **LOCOMOTIVE BOILER—Steam Pressure.**

**High Speed.**—American Express Locomotives. Tabulated statement of dimensions and performance of locomotives 599 and 564 in the recent races from New York to Buffalo, and Buffalo to Chicago. 1700 w. Engng—Nov. 22, 1895.

High-Speed Simple Passenger Locomotives. Clement F. Street. Abstract of a paper presented at the March meeting of Western Ry. Club. Details regarding the locomotives used in the United States in high-speed passenger service. 2200 w. Eng News—May 4, 1899.

What Is the Ideal Fast Passenger Engine? S. M. Prince, Jr. Illustrations and descriptive specifications of the Phila. & Reading passenger locomotive No. 218. Also criticism of Columbia and Atlantic types. 1500 w. R R Gaz—June 22, 1900.

Railroad Racing. Editorial. In considering the qualifications of locomotives for high speed performances, the essentials discussed are,—Sufficient adhesion of wheels; adequate steam supply; and driving mechanism. 2200 w. Am Eng & R R Jour—Dec. 12, 1895.

The Evolution of a Fast Engine—How the Reading's High-Speed Passenger Engine with a Single Pair of Drivers Was Developed. The evolution is displayed by photographs of the successive stages, and measurements of the later types. 700 w. Ry Age—May 16, 1896.

Types of High-Speed Locomotives. Editorial discussion with diagram illustrating latest American and English types and a prediction as to probable development. 900 w. Ry Mas Mech—May, 1896.

High Speed Locomotive (Note sur une Locomotive à Grande Vitesse). Ch. Corteil. This locomotive was built to haul 250 ton trains on level roads at a speed of 50 miles per hour. Its principal peculiarity was in the use of a firebox of refractory bricks. 1800 w. 1 plate. Rev Univ des Mines—Nov., 1898.

Some Facts and Fancies Concerning High-Speed Engines. W. F. Cleveland. A letter to the editor objecting to the use of heavy reciprocating parts. 1000 w. Loc Engng—June, 1897.

See also **Thuile; COMPOUND LOCOMOTIVE; FAST TRAIN; LOCOMOTIVE PERFORMANCE.**

**Himalayan Ry.**—Darjeeling-Himalayan Railway Locomotives. Illustrated description of engines employed in climbing steep grades, and taking sharp curves. 800 w. Ind Engng—July 16, 1898.

**History.**—A Link in Early Locomotive History. The share taken in the development by the firm of Messrs. Mather, Dixon & Co., of Liverpool. 1800 w. Engr, Lond—April 14, 1899.

Ancient Locomotive Engines. Herbert T. Walker. Illustrates and describes three early English locomotives. 1500 w. Sci Am—March 18, 1899.

An Old English Locomotive. W. B. Paley. Illustrated description of one of the first class of express passenger locomotives which the great Northern Co. of England had when the line opened in 1852. 700 w. R R Gaz—June 8, 1900.

Pioneer Locomotives in England and America. Alfred Mathews. Descriptive of the earliest experiments in the construction and use of locomotives. Ill. 4200 w. Eng Mag—Feb., 1897.

The First Railroad Engine. The article claims that Edward Entwistle, the man who ran it, is still living in Des Moines, Iowa. Brief account of first trip. 1500 w. Bos Jour of Com—Nov. 28, 1896.

Evolution of the Locomotive. John S. Thurman. History of the locomotive with illustrations showing the advancement. 6800 w. Ry Mag—Jan., 1898.

The Evolution of the Locomotive Engine. William P. Marshall. Extracts from a recent paper before the Institution of Civil Engineers, relating to important changes in the details of English locomotives. 1800 w. R R Gaz—Feb. 24, 1899.

The Evolution of the Locomotive Engine. William P. Marshall. From a paper read before the Inst. of Civ. Engs., London. A record of the leading steps in the evolution of the present locomotive, with notice of further steps now in process of trial. 2300 w. R R Gaz—Dec. 2, 1898.

See also **Baltimore & Ohio; Dublin & Kingstown; German Veteran; Great Southern & Western; Haigh Foundry; Hayes; Hedley's "Puffing Billy"; "Jenny Lind"; London and Southwestern; Norris; Oakland; Odd Styles; Pennsylvania; Phleger; Reading; "Rocket"; South-eastern; Stephenson; Trevithick; RAILWAY.**

**History, Massachusetts.**—Early Locomotive Building in Massachusetts. Herman L. Morse. Review of work of several firms. 2500 w. Loc Engng—Sept., 1900.

**Holden.**—See **Liquid Fuel.**

**Holland.**—Some Holland Locomotives. Brief illustrated description. 300 w. Loc Engng—June, 1900.

**Illinois Central.**—Details of Eight-Wheel Locomotive—Illinois Central Railroad. Illustrated detailed description, with sections, plan and elevations of frames. Serial. Ry Rev—March 13, 1897.

New Eight-Wheel Passenger Locomotives—Illinois Central Railroad. Illustrated detailed description of engines designed by William Renshaw, with dimensions. 1400 w. R R Gaz—Feb. 5, 1897.

New Ten-Wheel Passenger Locomotive—Louisville Division, Illinois Central. Illustrated description with dimensions. 800 w. R R Gaz—July 2, 1897.

Passenger Locomotive for the Illinois Central Railroad. Illustrated description of engine just out of the shops of the Brooks Locomotive Works, which is considered to closely approach the highest development of the eight-wheeled type. 1300 w. Loc Engng—Jan., 1897.

See also **Consolidation; Rogers.**

**Improvements.**—Defects and Improvements in Locomotives. Deals chiefly with economy in fuel consumption. 1700 w. Am Eng & R R Jour—Sept. 1896.

Locomotive Improvement. Editorial review of recent discussions on this subject. 1200 w. Am Eng & R R Jour—Sept., 1897.

**India.**—American and Indian Built Engines. Photographs and description of American locomotives ordered for the Bombay-Baroda and Central India Ry. Also photograph and plan showing details of the first locomotives entirely constructed in India. 1800 w. Ind & East Engr—Nov., 1899.

**Injector.**—See **INJECTOR—Locomotive.**

**Ireland.**—Four-Coupled Express Passenger Locomotive; Great Northern Railway Company (Ireland). Illustrations with brief description. 350 w. Engng —July 6, 1900.

Locomotives for the Waterford, Limerick and Western Railway. Illustrated description of four types of new engines, and tenders, and tank engines designed for work on a line with sharp curves and severe gradients. Dimensions are given. 900 w. Eng, Lond—Aug. 13, 1897.

The Irish Railway and Its Locomotives. G. A. Sekon. Brief historical account of the Great Northern Railway of Ireland, and illustrated description of its modern locomotives. 1600 w. Mech Wld—Dec. 25, 1896.

**Ivatt.**—See Great Northern, Eng.

**Japan.**—Brooks Locomotives for Japan. Illustrated description with dimensions. 800 w. R R Gaz—Feb. 25, 1898.

Locomotive Building in Japan. Engravings illustrating the most recent achievements in the way of locomotive building by the Japanese, with dimensions and details. 1100 w. Sci Am Sup—May 22, 1897.

Locomotive Building in Japan. Facts about this engine which was reported to have been constructed at much less cost than could have been possible in England. 1400 w. Eng, Lond—July 17, 1896.

Locomotives for Japan. Descriptive specification, with engraving, of engines built in Schenectady. 400 w. R R Gaz—Jan. 27, 1899.

Locomotive for Japan Railway Company. General description with illustration. 700 w. Loc Eng—April, 1897.

Railways and Locomotive Building in Japan (Eisenbahnen und Lokomotivbau in Japan). A very fully illustrated article showing the styles and builders of locomotives shipped to Japan from Europe and America since 1871 with an account of those of native make. A most valuable article. 8000 w. Zeitschr d Ver Deutscher Ing—April 24, 1897.

Japanese Locomotives. A supplement sheet containing the illustrations of all the locomotives used on the Japanese railways under the superintendence of Mr. Trevithick, with tabular statement of dimensions. 3200 w. Eng, Lond—March 26, 1897.

See also **Schenectady.**

**"Jenny Lind".**—The Jenny Lind. History of a locomotive of great interest as being in a large measure the forerunner of the standard type of English locomotives. Describes the incidents connected with its building and competitive trial, with illustrations of details. Serial. Eng, Lond—Jan. 10, 1896.

**Johnstone.**—See Mexican Central.

**Krauss Swivel Truck.**—See Rail Wear.

**Lackawanna.**—A New Lackawanna Locomotive. Engraving and dimensions of a new locomotive recently built at the Scranton shops of the Delaware, Lackawanna & Western Railroad. 350 w. Ry Age—Sept. 8, 1899.

Wide Firebox 10-Wheel Passenger Locomotive. Drawings and description of engines built for the D. L. & W. R. R., which are the heaviest passenger locomotives ever built. 900 w. Am Engr & R R Jour—Sept., 1900.

See also **Mogul.**

**Lake Shore.**—Heavy Locomotives for the Lake Shore. Illustrated description of these new engines which are the heaviest yet put in service on this road. 900 w. Ry Age—April 28, 1899.

Ten-Wheel Passenger Locomotive for the Lake Shore & Michigan Southern. Engraving and specification. 700 w. R R Gaz—Jan. 1, 1897.

Ten-Wheel Passenger Locomotives. W. H. Marshall's design for use on the Lake Shore & Michigan Southern Ry. is described and illustrated. 1200 w. Am Engr & R R Jour—Nov., 1899.

The Heaviest Passenger Locomotive Ever Built, L. S. & M. S. Ry. Illustrated description, with dimensions and comments. Also table. 1300 w. Eng News—Nov. 9, 1899.

**Lancashire and Yorkshire.**—A Heavy Express Locomotive for the Lancashire & Yorkshire. J. Pearson Pattinson. Illustrations and dimensions of a powerful engine, with facts concerning it. 900 w. R R Gaz—May 19, 1899.

Express Passenger Engine, Lancashire and Yorkshire Railway. Sections, with principal dimensions of the most powerful inside-cylinder passenger locomotive in England. 1500 w. Engr, Lond—March 17 1899.

**Lehigh.**—Heavy Freight Locomotives for the Lehigh Valley R. R. Illustrated detailed description, giving dimensions. 1000 w. Eng News—July 27, 1899.

Wide Fireboxes and Large Driving Wheels. F. F. Gaines. Illustrates and describes a new design for passenger service on the Lehigh Valley Railroad. 1400 w. Am Engr & R R Jour—Oct., 1900.

**Light Railway.**—Some Types of Light Railway Locomotives. Description, with drawings, of types of locomotives that have been successfully employed in Saxony and Belgium. Tabular statement of dimensions of types enumerated. 1100 w. Ry Wld—Dec., 1896.

See also **Narrow Gauge.**

**Liquid Fuel.**—Burning Oil on Locomotives. C. R. Petrie. Illustrated description of apparatus and method employed on Southern Pacific locomotives. 800 w. Loc Engng—April, 1900.

Oil Burning Locomotives. Kirtland H. Wade. A consideration of the subject of liquid fuel, the vastness of the petroleum product, etc., with supplementary remarks by C. F. Lape. Ill. 3500 w. Ry Mag—July, 1897.

Oil Burning Locomotives. Description of engine in use on the Pacific coast, with sectional drawings of firebox and oil-tank. Oil burning is said to be merely a question of economy not of mechanical success. 700 w. Ry Age—Sept. 11, 1896.

Liquid Fuel Burning—Holden System. Photograph and description of liquid fuel burning locomotive on Great Eastern Railway, England. 400 w. Ry Rev—April 25, 1896.

Locomotives Using Oil for Fuel. Treats of the apparatus used and the mechanical side, from the view of a coal burner engineer. 2200 w. Loc Engng—June, 1900.

Oil Fuel for Locomotives—Los Angeles Terminal Railway. This description is interesting in view of the extreme saving effected over the cost by using California coal. 1000 w. Ry Rev—Jan. 18, 1896.

**Liquid Fuel, Argentina.**—Notes from Argentine Republic. Al Dolf. The notes of chief importance are upon the use of petroleum fuel. 1800 w. Loc Engng—Sept., 1896.

**Liquid Fuel, Russia.**—Petroleum Fuel on the Russian Locomotives (Chauffage au Pétrole des Locomotives des Chemins der Fer Russe). Review of Russian official report, showing large increase in the use of petroleum refuse for locomotive firing. 3500 w. La Rev Tech—April 25, 1897.

See also **LIQUID FUEL—Russian Railways.**

**London & Southwestern.**—Express Passenger Locomotive for the London & Southwestern Railway. Illustrated description and particulars. 700 w. Engng—June 16, 1899.

London & Southwestern Express Locomotive of 1856. Herbert T. Walker. Illustrates and describes an old engine designed by Joseph Beattie. 900 w. R R Gaz—July 29, 1898.

**Logging.**—See Oscillating Cylinders.

**Lubrication.**—See **LUBRICATION.**

**Main Rod Stresses.**—A Method of Calculating the Greatest Stresses in Certain Main Rods When Used on Locomotives. George H. Goodell. Mathematical discussion. 1500 w. R R Gaz—April 16, 1897.

**Mallet.**—See Articulated.

**Manchuria.**—See China.

**Marshall.**—See Lake Shore.

**Mexican Central.**—New Ten-Wheel Freight Locomotives, Class "Q" Mexican Central Railroad. Illustrated detailed description of locomotive designed by F. W. Johnstone. 1600 w. R R Gaz—Dec. 25, 1896.

Special Mountain Freight Engine for the Mexican Central Railway. Illustrated description of the largest engine made at the Brooks Locomotive Works, with its interesting features. 2000 w. R R Gaz—Oct. 29, 1897.

See also **Consolidation, Brooks.**

**Mexico.**—Passenger and Goods Locomotives for the Inter-Oceanic Railway, Mexico. Illustrated detailed descriptions of two powerful engines. 1000 w. Engng—Jan. 13, 1899.

See also **Narrow Gauge.**

**Michigan Central.**—Some Michigan Central Locomotives. Describes engines designed by Robert Miller, one being built by the Schenectady Locomotive Works, and three at the Jackson shops of the Michigan Central. 1760 w. R R Gaz—June 11, 1897.

**Midland at Paris.**—Midland Locomotive at the Paris Exposition. Two-page engraving and views, with principal dimensions and particulars. 700 w. Engng—June 1, 1900.

**Midland, Eng.**—American Locomotives for the Midland Railway. Drawings and dimensions of these engines, with statement of the conditions stipulated. 800 w. Engng—July 7, 1899.

Express Locomotive for the Midland Railway, England. Two-page engraving, with other views, description and dimensions of the most recent type of express passenger engine, designed by S. W. Johnson for service of fast trains on this line. 1500 w. Engng—Oct. 15, 1897.

The Midland's American Engines. Photograph and brief description of these engines, with extracts from a letter by Clement E. Stretton, in the "Leicester (Eng.) Daily Post" concerning the points wherein they differ from English locomotives. 800 w. Transport—May 5, 1899.

**Model.**—How a Model Locomotive Was Made. Illustrated description of a model of a locomotive belonging to the D-2 class of the London, Brighton and South Coast Railway. It was built by J. Bradbury Winter, at Brighton, and the undertaking has occupied nearly thirteen years. The scale is 1 in. to the foot. 3500 w. Eng, Lond—Sept. 17, 1897.

See also **RAILWAY—Models.**

**Mogul.**—See also **COMPOUND LOCOMOTIVE—Consolidation.**

**Mogul, Chicago Great Western.**—New Mogul Locomotives of the Chicago Great Western Railway. Illustrated description, general dimensions, and special equipment of two freight locomotives recently put on this road. 1200 w. R R Gaz—Sept. 23, 1898.

**Mogul, English Great Northern.**—Mogul Locomotive for the Great Northern Railway of England. View and dimensions of an engine to be exhibited by Baldwin Locomotive Works, at the Paris Exhibition. 500 w. R R Gaz—May 18, 1900.

Mogul for the Great Northern Railway. Illustrated description. 400 w. Loc Engng—Nov., 1896.

**Mogul, Grank Trunk.**—See **Grand Trunk.**

**Mogul, Japan.**—Mogul Locomotive for the Imperial Railways of Japan—Rogers Locomotive Company. Engravings showing one of 18 locomotives recently built for this road. The principal dimensions are given. 700 w. R R Gaz—April 9, 1897.

**Mogul, Lackawanna.**—Mogul Locomotives for the Delaware, Lackawanna & Western. General specifications with illustration. 200 w. R R Gaz—Dec. 2, 1898.

**Mogul, N. Y. Central.**—A Mogul Engine for the New York Central. Engraving and specifications. 300 w. R R Gaz—March 30, 1900.

The New York Central Class P Mogul Freight Locomotive. Engravings, general dimensions and interesting data. 900 w. R R Gaz—Sept. 29, 1899.

See also **Mogul, Schenectady.**

**Mogul, Schenectady.**—A Schenectady Mogul for the New York Central. Engraving showing appearance, with dimensions and other particulars. 700 w. R R Gaz—Oct. 28, 1898.

Schenectady Mogul Locomotive, N. Y. C. & H. R. Ry. Illustration and views showing the points of interest of these new freight engines, with particulars. 900 w. Ry & Engng Rev—March 31, 1900.

Schenectady Moguls for the Southern Pacific. Engraving and descriptive specifications. 350 w. R R Gaz—March 31, 1899.

**Mogul, Vandalia.**—Mogul Locomotive—Vandalia Line. Illustrated description, with dimensions. 400 w. Ry Rev—Jan. 9, 1897.

**Motive Power Comparison.**—The Future of Power Development. A comparison of steam, electricity and gas for locomotive engines. 1700 w. Ry Rev—Aug. 22, 1896.

See also **RAILWAY MOTIVE POWER.**

**Mountain.**—See **Himalayan; Mexican Central; Narrow Gauge; Rack Railway.**

**Mountain Express.**—Mountain Express Locomotives (Die Bergschnellzug Lokomotiven). A general discussion of locomotives intended for heavy grades at fair speeds, with especial reference to the engines of the Austro-Hungarian and Italian railways in comparison with those of other countries. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 26, 1897.

**Narrow Gauge.**—Locomotive for 2-ft. Gauge Railway. Sectional drawing and details of principal dimensions. 600 w. Engng—Sept. 11, 1896.

Narrow Gauge and Mountain Locomotives, Bosnia and Herzegovina State Railways. Illustrated description and general information. 2000 w. Eng, Lond—Nov. 6, 1896.

Narrow Gauge Locomotive for the Cauca Railway. Illustrated description of an engine for a South American road, built at the Baldwin Locomotive Works. 1000 w. Am Eng & R R Jour—Dec., 1898.

Narrow Gauge Locomotive. Illustrated description of a narrow gauge, side tank locomotive, one of six constructed for the Sierra Leone Ry. 800 w. Engr, Lond—Jan. 12, 1900.

See also **Light Railway.**

**Narrow Gauge, Mexico.**—Narrow Gauge Locomotives—Interoceanic Railway, Mexico. Photographs and particulars of two designs built at the Schenectady works. 800 w. Am Eng & R R Jour—Oct., 1896.

**Narrow Gauge, Soudan.**—Locomotive for Soudan Expedition Railway. Detailed description of narrow gauge tank locomotive, with engraving and specification. 1200 w. Engr, Lond—Oct. 23, 1896.

Locomotives for the Soudan. Dimensions and details of construction of the essential parts, with illustration. 800 w. Ry Rev—July 24, 1897.

Narrow Gauge Locomotive, Soudan Railway. Illustration and brief description, also showing the method of transporting a gunboat in sections over the narrow gauge Soudan Railway. 200 w. Engr, Lond—Sept. 2, 1898.

**Narrow Gauge Tank.**—Narrow Gauge Tank Locomotives. Illustrated description of a locomotive for the Londonderry and Lough Swilly Ry., of Ireland. 800 w. Engng—Feb. 23, 1900.

**N. J. Central.**—See also **FAST TRAIN.**

**New South Wales.**—Heavy Goods Locomotive for the New South Wales Railways. Illustrated description, with principal dimensions. 1000 w. Engng—Nov. 6, 1896.

**N. Y. Central.**—Fast Express Locomotives for the N. Y. C. & H. R. R. R. Illustrated description, with discussion. 800 w. Eng News—Jan. 14, 1897.

Heavy Ten-Wheel Passenger Locomotives. Illustration and general dimensions of heavy engines for the New York Central. 400 w. Am Eng & R R Jour—Aug., 1899.

**N. Y., Chic. & St. Louis.**—Ten-Wheeled Locomotive—New York, Chicago & St. Louis Railway. Description of construction, with dimensions, and illustrated by sectional drawings of locomotive boiler and details of link motion. 1600 w. Am Eng & R R Jour—May, 1896.

**N. Y., Ont. & Western.**—Eight-Wheel Passenger Locomotives for the New York, Ontario & Western Railway. These engines have a deep, narrow firebox designed for burning bituminous coal. Dimensions and description. 700 w. R R Gaz—April 20, 1900.

**N. Y., Ont. & West. Passenger.**—New York, Ontario & Western Passenger Locomotive. Illustrated brief description with table of dimensions. 800 w. Loc Engng—Feb., 1896.

**1900.**—Locomotives in 1900. M. N. Forney. Comments on problem arising from increase in size and weight. 2000 w. Am Engr & R R Jour—June, 1900.

**Norfolk & Western.**—See **Piston Valves.**

**Norris.**—American Locomotives in England 60 Years Ago. W. H. Lewis. A letter concerning the Norris engines on the Birmingham & Gloucester railway in 1840. 400 w. Loc Engng—Feb., 1900.

Old Norris Freight Engines on the Pennsylvania Railroad. C. H. Carruthers. Illustrated description of engines built in 1854. 1200 w. R R Gaz—May 4, 1900.

**Northeastern, Eng.**—Express Passenger Engine. Northeastern Railway. Engraving, sectional drawings and dimensions of an engine for work of heaviest and fastest description. 700 w. Engr, Lond—March 9, 1900.

Express Passenger Engine, Northeastern Railway. Illustration and dimensions. 700 w. Engg, Lond—Feb. 2, 1900.

New Express Engine for the Northeastern Rail way. Charles Rous-Marten. Describes a new experiment of Mr. Wilson Worsdell of the Northeastern Railway, England. 1500 w. Engr, Lond —Oct. 14, 1896.

Northeastern Engines and Their Work. Charles Rous-Marten. A record of the work that has been done by these English engines, under the personal observation of the writer. Proves them to be highly satisfactory. 3000 w. Engr, Lond —Sept. 24, 1897.

Six-Coupled Express Engines for Northeastern Railway. Charles Rous-Marten. Explains the problem that led to the trial of this new type of locomotive, and describes various runs. Ill. 2500 w. Engr, Lond—July 21, 1899.

Ten-Wheel Express Locomotive for the Northeastern Railway, England. Elevation and plan, with dimensions and description. Also editorial. 1000 w. R R Gaz—Nov. 10, 1899.

The New Express Engines of the Northeastern Railway, England. Brief description with drawings and details. 900 w. R R Gaz—Sept. 11, 1896.

The New Six-Coupled Express Engines for the Northeastern Railway. Charles Rous-Marten. Brief note and photograph of engine already described in issue of July 21. 800 w. Engr, Lond —Sept. 22, 1899.

The Northeastern Railway Company's Latest Express Engines. Description, details and sectional drawings. 850 w. Ry Wld—Sept., 1896.

Ten-Wheel Passenger Locomotive; Northeaster Ry. (England). Illustrated description of a large and heavy engine for hauling fast and heavy passenger trains. 1300 w. Eng News—March 29, 1900.

**"Northwestern Type," U. S.**—"Northwestern Type" Passenger Locomotive. Comparison with standard passenger engines on the N. Y. C. & H. R. R. R. Ill. 1800 w. Am Engr & R R Jour—Oct., 1900.

**Nozzles.**—See **Exhaust Nozzle.**

**Oakland, Cal., Nail Works.**—Peculiar Locomotives. Illustrated description of two old locomotives on the Pacific coast, the property of the Oakland Nail Works. 600 w. Loc Engng—Sept., 1898.

**Oceanic, Compared.**—See **MARINE ENGINE—Oceanic.**

**Odd Styles.**—Odd Styles of Locomotives. D. P. Kellogg. Illustrated description. 400 w. Loc Engng—June, 1900.

**Odd Types.**—Some Odd Locomotives Recently Turned out by the Baldwin Locomotive Works. Illustrations and very brief description of some unusual types for special duties. 500 w. Loc Engng—Oct., 1896.

**Oil Burning.**—See **Liquid Fuel.**

**Oscillating Cylinders.**—A Locomotive with Oscillating Cylinders. Illustrates and describes a curious logging locomotive. 700 w. Sci Am—Dec. 31, 1898.

**Painters' Association.**—See **CAR—Painters' Association; RAILWAY ASSOCIATION.**

**Painting.**—See **LOCOMOTIVE JACKET; PAINTING—Locomotive.**

**Palatinate Railways.**—Coupled Express Locomotive for the Palatinate Railways (Locomotive Express Accouplés des Chemins de Fer du Palatinat). F. Barbier. With plate of sections and details, and computations of tractive power. 2000 w. 1 plate. Génie Civil—May 27, 1899.

**Paris, Lyons & Mediterranean.** The Locomotives of the Paris, Lyons & Mediterranean Railway. Information concerning types of engines constructed by this company, with leading particulars of two new locomotives and illustrations showing their details. 1700 w. Engng—April 15, 1898.

**Passenger.**—Passenger Engines—Retrospect and Prospect. George W. Cushing. Reviews the Chicago & Northwestern system, taking it as an example of western roads. Ill. 1800 w. Ry Mas Mech—June, 1898.

**Pennsylvania.**—Pennsylvania Railroad Class H-6 Locomotives. An outline in detail of the new features of these engines, with drawings and dimensions. 600 w. R R Gaz—July 14, 1899.

Some of the Recent Passenger Locomotives of the Pennsylvania Railroad. Illustrates 10-wheel and 8-wheel locomotives, giving information concerning them. 800 w. R R Gaz—Aug. 10, 1900.

**Pennsylvania Class F 1-A Freight Locomotives.** Illustration and brief description. 250 w. R R Gaz—Sept. 22, 1899.

**Pennsylvania, 1850.**—Fast Passenger Locomotives on the Pennsylvania Railroad in 1850. Illustrates and describes three locomotives of the "Crampton" type. 1300 w. R R Gaz—July 28, 1899.

**Pennsylvania Experimental.**—The Pennsylvania's Class E-2 Experimental Locomotive. Outline drawing and description. 600 w. R R Gaz—July 20, 1900.

**Phil. & Reading.**—See **Reading.**

**Phleger.**—The Phleger Locomotive. C. H. Caruthers. Historical article describing this type as supplied to the Pennsylvania R. R., from 1853 to 1860. 2000 w. Loc Engng—Oct., 1900.

**Piston Valves.**—Norfolk & Western Freight Engines. Illustrated detailed description of the new piston valves used. They were designed by W. H. Lewis and are entirely satisfactory. 400 w. Loc Engng—May, 1900.

Locomotive with Piston Valves—Norfolk & Western Railway. Information concerning a change of a compound to a single-expansion engine attended with interesting and valuable results. Ill. 1500 w. Am Eng & R R Jour—Feb., 1898.

Simple Ten-Wheel Locomotives with Piston Valves—Wisconsin Central Lines. Illustrates and describes passenger and freight locomotives specially interesting because of the application of piston valves. 1000 w. Am Eng & R R Jour—June, 1898.

See also **France; LOCOMOTIVE VALVE—Piston.**

**Pittsburg.**—A Pittsburg Standard Passenger Locomotive. Illustrated description of an engine recently built for the K. C., F. S. & M. Ry. 800 w. Loc Engng—Dec., 1899.

See also **Consolidation; Heavy.**

**Pittsburg & Western.**—New Passenger Locomotives of the Pittsburg & Western Railway. Illustration and principal dimensions. 450 w. R R Gaz —Aug. 4, 1899.

**Pooling.**—Pooling Locomotives and Locomotive Crews. J. F. Deems. Abstract of paper presented at meeting of the Western Railway Club. Explains the system of handling engine crews known as "pooling," with evidence of its worth, based on testimony of those who have tried it. 2800 w. Ry & Engng Rev—Jan. 22, 1898.

Pooling of Locomotives. Jas. S. Martin. Advantages and disadvantages are discussed. 700 w. Loc Engng—Sept., 1899.

Pooling of Locomotives. M. E. Wells. Extracts from a paper presented at Nov. meeting of the W. Ry. Club. Explains the working of the pool, and discusses its advantages. 1600 w. R R Gaz—Dec. 15, 1899.

The Pooling of Engines. A discussion of the advantages and defects of the system in the Western Railway Club. 3000 w. Ry Age—May 28, 1896.

See also **RAILWAY TRANSPORTATION; RAILWAY POOLING.**

**Port Talbot, Wales.**—American Locomotives for the Barry & Port Talbot Railways. Illustrated description of tank engines of English type, with some American features. 1000 w. Engr, Lond—Dec. 8, 1899.

Eight-Coupled Tank Locomotive—Port Talbot Railway & Dock Co. Illustrated description of a locomotive for South Wales. 700 w. Ry & Engng Rev—Nov. 25, 1899.

Mineral Locomotives for the Port Talbot and Barry Railways. Engravings showing the details of the design, and the general arrangement, with description. 1000 w. Engng—April 13, 1900.

See also **Tank.**

**Power and Speed.**—See **LOCOMOTIVE PERFORMANCE—Vauclain.**

**Prairie Type.**—Prairie Type and Wide Firebox Switch Engines. Illustrated description of new types for service on the C. B. & Q. R. R. The Prairie type is regarded as an epoch-making design which will show the possibilities of a moderate widening of grates. The switch engine is believed to be the first wide firebox built for the use of soft coal. 1700 w. Am Engr & R R Jour—April, 1900.

**Progress.**—Locomotive Progress in Ten Years. R. H. Soule. Considers improvements made in design and construction that increase the power and reduce expenses. 1300 w. Ry Age—June 15, 1900.

**Pusher.**—See **Buffalo, Rochester & Pittsburg.**

**Pushing, Consolidation.**—See **Consolidation, Del. & Hudson.**

**Rack Railway, Damascus.**—Damascus Railway Rack Rail Locomotives. Illustrated description. 400 w. Eng, Lond—Jan. 15, 1897.

**Rack Railway, Snowdon.**—Locomotives for the Snowdon Rack Railway. A mountain locomotive, working on a gradient of 1 in 5½. It is of Swiss construction and has many interesting features. 1200 w. Ry Wld—Jan., 1896.

**Rack Railway, Sumatra.**—Sumatra Rack Railway Locomotives. D. L. Graadt van Roggen. Some information of rack railway construction with detailed description of the locomotives. Ill. 3000 w. Engng—Sept. 3, 1897.

**Rail Wear.**—The Action of the Krauss Swivel Truck on Curves (Die Einstellung des Krauss'schen Drehgestelles in Krümmungen). Von Borries. An examination of the unequal rail pressure of swivel trucks upon curves of different radii. 1000 w. Glaser's Annalen—Feb. 15, 1897.

The Movements in Locomotives and their Influence upon the Rails (Die Eigenbewegungen der Lokomotiven und Ihre Einwirkung auf die Geleise). H. von Borries. A paper before the German Railway Society showing the influence of the motions of a locomotive upon the rails; with discussion. 3500 w. Glaser's Annalen—April 1, 1899.

**Reading.**—An Old Reading Engine. C. H. Caruthers. An account of an engine built in 1844 which exploded its boiler just 19 days after being put into service. The cause, as determined by investigations, is given. Ill. 1000 w. R R Gaz—Jan. 6, 1899.

Old Philadelphia and Reading Locomotives. Notes and photographs of some old type locomotives. 400 w. Loc Engng—May, 1896.

**Reading, Rebuilt.**—A Rebuilt Reading Locomotive. Illustrates and describes a Phila. & Reading engine, rebuilt by S. M. Prince, Jr., Supt. of motive power and rolling equipment. The boiler was raised to admit the change of wheels from 68½ to 78 in. in diameter. Wheel center is of cast-steel, and is cast solid. Cylinder fastenings are also novel, being entirely without bolts. 600 w. Loc Engng—Aug., 1900.

**Reciprocating Parts.**—Reduction of the Weight of Reciprocating Parts in Locomotives. Report of a committee of the Amer. Ry. Mas. Mech.'s Assn. The importance of the subject is set forth and material and design are considered as applied to the parts under discussion. 3800 w. Eng News—Aug. 13, 1896.

**Reconstructing.** — Reconstructing Locomotives. Francis R. F. Brown. Notes on the results obtained, showing that the advantages and cost recommend it to careful consideration. 900 w. Am Eng & R R Jour—June, 1898.

**Records.**—In What Manner Can a Close Record be Kept of Condition of Engines, Amount of Work Performed and Manner of Doing It, Together with Manner in Which Work is Done by Engineer and Fireman, Which Will Serve as Record of Character and Qualification for Advancement of Men? Report of committee, with discussion. 2000 w. Trav Eng's Assn—Sept., 1895.

**Records, Illinois Central.**—Locomotive Records of the Illinois Central Railroad. A new method of classifying and charting repairs, showing the relation to mileage made and tabulating the condition of power on any division. 2400 w. R R Gaz—July 10, 1896.

**Repairs.**—How to Put on a New Boiler, Fit Up Spring Hangers, Driving Saddles, etc. Ira A. Moore. Considers the subjects mentioned, giving illustrations. 1100 w. Loc Engng—June, 1898.

Locomotive Repairing Work. A. H. Newsam Smith. Read before the Inst. of Junior Engs. The writer confines himself to two classes of English engines largely used now, giving description of the main features of the work. Serial. Prac Eng—Nov 20, 1896.

See also **LOCOMOTIVE BOILER; LOCOMOTIVE SHOP.**

**Repairs and Renewals.**—Locomotive Repairs and Renewals. R. Price-Williams. Calculations on the average life of a locomotive and the amounts necessary to maintain it in an efficient condition during that period. 1000 w. Engng—May 5, 1899.

**Richmond.**—Richmond Ten-Wheel Passenger Locomotives—Southern Railway. Illustrated description of two very large and heavy passenger engines. 1000 w. Ry & Engng Rev—Feb. 19, 1898.

Richmond Ten-Wheel Freight Locomotives, R., F. & P. Ry. Specifications, illustration, and comment. 600 w. Ry & Engng Rev—May 26, 1900.

See also **Consolidation; Finland; Sweden.**

**Rio Grande Western.**—See **Consolidation, Richmond.**

**"Rocket."**—George Stephenson's Rocket. A historical difficulty explained. Ill. 600 w. Sci Am Sup —March 13, 1897.

The Battle of Rainhill. N. O. Whitney. An interesting account of means of transportation in the district comprising Liverpool and Manchester, Eng., with special reference to the success of George Stephenson's "Rocket." 1800 w. Wis Engr—Jan., 1898.

**Rock Island.**—New Eight-Wheel Locomotive—Chicago, Rock Island & Pacific Ry. Dimensions, with sections and description. 900 w. Ry Rev—Nov. 7, 1896.

New Eight-Wheel Passenger Locomotive, C., R. I. & P. Railway. The engine is designed to give equal service with ten-wheeled engine, with greater economy. Descriptive account with diagrams giving principal dimensions, and drawings of some details. 1000 w. Ry Rev—May 30, 1896.

New Fast Passenger Locomotive, C., R. I. & P. Ry. Dimensions and partial drawings with brief descriptive account. 300 w. Ry Mas Mech —June, 1896.

New Locomotives on the Chicago, Rock Island & Pacific Railway. A half-tone illustration of one of the passenger engines, with dimensions. 400 w. Ry Rev—Oct. 16, 1897.

Ten-Wheel Passenger and Fast Freight Locomotives—Chicago, Rock Island & Pacific Railroad. Data and illustrations in connection with these engines, which represent advanced locomotive design. 2000 w. Ry Rev—June 12, 1897.

Ten-Wheel Passenger Engine for Chicago, Rock Island & Pacific. Illustration and general dimensions. 200 w. Loc Engng—Sept., 1900.

**Rogers.**—A Rogers' 10-Wheeler for the Great Northern. Engraving and descriptive specifications. 2500 w. R R Gaz—April 28, 1899.

Some Recent Rogers Locomotives. Principal specifications, with illustration, of 10-wheel freight locomotives for the Illinois Central R. R. 500 w. R R Gaz—Dec. 2, 1898.

See also **Consolidation.**

**Russian.**—Types of Russian Locomotives. Nicholas Smirnoff. Illustrates and describes the locomotives of the St. Petersburg and Warsaw Railway. 400 w. Loc Engng—March, 1899.

**St. Lawrence & Adirondack.**—Eight-Wheel Passenger Locomotive—St. Lawrence & Adirondack Railroad. Illustrated description with general dimensions. 700 w. R R Gaz—Aug. 27, 1897.

Twelve-Wheel Locomotive; St. Lawrence & Adirondack Ry. Brief description with details of dimensions. 500 w. Eng News—June 18, 1896.

**Santa Fé.**—See **Consolidation, A., T. & S. F.**

**Schenectady.**—A Schenectady 8-Wheeler for the Vandalia Line. Illustration with dimensions. 600 w. R R Gaz—April 28, 1899.

See also **Consolidation; Japan; Michigan Central.**

**Service.**—See **LOCOMOTIVE OPERATION.**

**Slipping.**—The Slipping of Locomotives at High Speeds. C. E. Wolff. A series of careful experiments show that such a slip often takes place. The writer attempts to find some satisfactory explanation. 1000 w. Prac Eng—Dec. 11, 1896.

**Siberia.**—See also **China.**

**Side Rods.**—Cast-Steel Side Rods. Illustrates and describes the practice of the Philadelphia & Reading, as applied to consolidation engines. 500 w. Am Engr & R R Jour—April, 1899.

**Smoke Box.**—See **LOCOMOTIVE SMOKE BOX.**

**Smoke Prevention.**—See **LOCOMOTIVE OPERATION.**

**Soudan.**—See **Narrow Gauge.**

**Southeastern, Eng.**—New Locomotives for the Southeastern Railway, England. J. Pearson Pattinson. Principal dimensions with illustrated description. 500 w. R R Gaz—Nov. 4, 1898.

Southeastern Railway Locomotives. A. E. Kyffin. Describes some of the older types of the various locomotives which came into the possession of this English road. Ill. Serial. Mech Wld—Niv. 12, 1897.

South Eastern Railway Engines; Past and Present. W. B. Paley. Historical review with many photographs of early English engines. Serial. Ry Wld—July, 1896.

**Southern Ry.**—Heavy Locomotives for the Southern Railway. Gives summary of the principal dimensions of 10-wheel passenger locomotives. 1400 w. R R Gaz—July 23, 1897.

Southern Railway Ten-Wheelers. Illustration and general description. 800 w. Loc Engng—April, 1898.

Ten-Wheel Passenger Locomotive; Southern Ry. Describes some of the heaviest locomotives built for passenger service, giving some information relating to speed, a comparison of other heavy engines of the same type, and general dimensions. Ill. 500 w. Eng News—June 16, 1898.

See also **Richmond.**

**Southwestern, Eng.**—Standard Southwestern Locomotives. Illustrated detailed description. 1500 w. Ry Wld—March, 1897.

**Spanish-American Roads.**—Some American Locomotives. Brief note and illustrations of American engines built for Spanish-American roads. 150 w. Eng, Lond—Sept. 4, 1896.

**Speed Indicator.**—See **SPEED INDICATOR.**

**Speed of Rotation.**—Speed of Rotation for Locomotive Engines. William F. M. Goss. On the importance of locomotives being designed with due regard to the performance of the engine under different speeds of rotation. 1400 w. Ry Mag—July, 1897.

**Speed Trials.**—See **High Speed; LOCOMOTIVE PERFORMANCE; FAST TRAINS.**

**Springs and Equalizers.**—Spring and Equalizer Action in Locomotives. A. Von Borries. Extracts from an important work, selected and translated by W. W. Nichols. Deals with the influence of equalizers and springs upon the safety of the progress of a locomotive. 1800 w. R R Gaz—June 10, 1898.

**Stability.**—Theory of the Stability of Locomotives (Théorie de la Stabilité des Locomotives). M. J. Nadal. A mathematical and geometrical analysis of the various movements of a locomotive engine considered as affecting the stability of the whole. 10000 w. Ann des Ponts et Chaussées—Part III., 1897.

**Standardization.**—Diversity of Rolling Stock Details. Recommending extension of standardization to smaller parts, especially of locomotives. 900 w. Loc Engng—July, 1896.

**Staybolts.**—See **STAYBOLT.**

**Steam Jacket.**—The Value of the Steam Jacket on a Locomotive Engine. Prof. T. Hudson Beare and Mr. Bryan Donkin. Report of the Research Committee of the Inst. of Mech. Engs. Description of the experiment and the general results. 2200 w. Eng, Lond—Nov. 6, 1896.

**Stephenson.**—Early Engines of Stephenson and Company. Clement S. Stretton. Historical account, with illustrations and list of engines built from 1824 to 1838. 1200 w. Ry Wld—March, 1897.

**Superheated Water.**—See **KINETIC MOTOR.**

**Superheater.**—See **Borsig Superheater.**

**Sweden.**—Locomotive for Swedish State Railways. Illustration and general dimensions of twenty six-wheel connected side-tank locomotives built at the Richmond Locomotive and Machine Works. 350 w. Ry & Engng Rev—Aug. 5, 1899.

Ten-Wheel Locomotives for Sweden. General dimensions and illustrated description of engines for the Ystad Eslof Ry. 350 w. Am Engr & R R Jour—June, 1900.

**Switch.**—Baldwin Six-Coupled Locomotive—Cambria Steel Co. Illustrates and describes a handsome modern switching locomotive. 500 w. Ry & Engng Rev—Nov. 18, 1899.

See also **Prairie Type; Yard; COMPOUND LOCOMOTIVE.**

**Switzerland and France.**—Locomotive Practice in France and Switzerland. The skill of Swiss engineers in building engines capable of climbing steep grades, etc. Ill. 1000 w. Transport—Oct. 13, 1899.

**Tank.**—American Tank Locomotives for Foreign Railways. Illustrates and describes two types of engines rarely used in American practice. 1400 w. Eng News—Nov. 16, 1899.

Heavy Tank Locomotive for the Madison Incline, Pennsylvania Line. Illustrated description, with dimensions and particulars. 1700 w. Eng News—Nov. 26, 1896.

Locomotive Tank Engines. Illustration and specifications of one of two tank engines built for the Central London Ry. 1800 w. Engr, Lond—Nov. 17, 1899.

The Development of the Tank Locomotive. Arthur E. Kyffin. An illustrated review of various types of tank locomotives, with interesting data. Serial. Mech Wld—June 9, 1899.

See also **American Abroad; American in Great Britain; Bogie Tank; China; Narrow Gauge; Port Talbot.**

**Tank Capacity.**—Tank Capacity of Large Freight Locomotives. Editorial on the water requirements of heavy freight locomotives. 900 w. R R Gaz—Aug. 12, 1898.

**Tank, South Africa.**—Tank Engine for South Africa. Dimensions and illustrated description of one of six engines recently constructed for the Pretoria & Pietersburg Railway. 800 w. Engr, Lond—May 5, 1899.

**Test.**—See **INDICATOR DIAGRAM—Locomotive; LOCOMOTIVE TEST.**

**Thuile.**—A New High Speed Locomotive. From "L Génie Civil." Illustrates and describes a proposed engine capable of maintaining a speed of 72 miles an hour. 800 w. Sci Am Sup—April 1, 1899.

High Speed Locomotive (Thuile System). Illustrated description of an exhibit of Messrs. Schneider & Co., at Paris, designed to haul trains of 100 to 200 tons, at a speed of 75 miles per hour on a level gradient. 600 w. Engng—Sept. 28, 1900.

New Locomotive for Very High Speed (Nouvelle Locomotive à Très Grande Vitesse). F. Barbier. A criticism of the high-speed locomotive design of M. Thuile. 1700 w. Génie Civil—Nov. 5, 1898.

The Thuile Express Locomotive (Locomotive à Grande Vitesse Système Thuile). L. Prevost. Illustrated description of powerful French express locomotive designed to make a speed of 75 miles per hour. 2500 w. 2 plates. Mem Soc Ing Civ de France—Sept., 1900.

See also **High Speed.**

**Thuile and Fouré.**—A Remarkable Locomotive. Illustrated description from the "Bulletin of the International Railway Congress," of a locomotive invented some years ago by Messieurs H. Thuile and Fouré, with a view of attaining far higher speeds than had then been reached. 500 w. Engr, Lond—Sept. 30, 1898.

**Tools.**—See **TOOL—Locomotive Engineer.**

**Tractive Power.**—See **Hauling Capacity; LOCOMOTIVE PERFORMANCE.**

**Trevithick.**—The First Steam Locomotive. From "English Mechanic." Description, with cut, of a practical locomotive antedating George Stephenson's "Rocket" by nearly thirty years. It was designed by Richard Trevithick. 1200 w. Am Eng & R R Jour—Nov. 14, 1895.

**Tunnel.**—A Curious Tunnel Locomotive. Illustrated description of a locomotive designed to work in tunnel headings, having the limited dimensions of 8 ft. 6 in. in width and 7 ft. 6 in. in height above the level of the rails; also to work in the open. 2500 w. Engr, Lond—Dec. 31, 1897.

**Type Distinctions.**—Some Fundamental Distinctions in Locomotive Types. Editorial on the various types, the factors which enter into the selection of a type, and their limits. 1800 w. R R Gaz—Dec. 15, 1899.

**Union Pacific.**—Heavy Ten-Wheel Freight Locomotives for the Union Pacific. Illustrations and dimensions of engines of more than ordinary interest because of their great size. 700 w. R R Gaz—Aug. 25, 1899.

Ten-Wheel Freight Locomotive, Union Pacific Railway. Illustration and general specifications. 600 w. Ry & Engng Rev—Aug. 12, 1899.

See also **LOCOMOTIVE STACK.**

**United States.**—See also **American; FAST TRAIN—United States.**

**U. S. Exports.**—Exports of Locomotives and Some Other Material. Editorial on the growth of our foreign trade in locomotives, giving interesting statistics, and information. 1300 w. R R Gaz—June 17, 1898.

United States Competition in the Locomotive Export Trade. Part first discusses locomotive building, giving extracts from a recent article in the "Engineering News," with comments. Serial. Engr, Lond—Sept. 15, 1899.

**Valve.**—See LOCOMOTIVE VALVE.

**Valve Gear.**—See LOCOMOTIVE VALVE GEAR.

**Vandalia.**—Heavy Passenger Locomotive for the Vandalia Line. Illustration, general dimensions and description, with account of a run made April 21, with a train of five cars. 1000 w. Ry & Engng Rev—May 20, 1899.

See also Mogul; Schenectady; COMPOUND LOCOMOTIVE—Pittsburg.

**Vanderbilt.**—See LOCOMOTIVE FIREBOX—Corrugated.

**Vauclain Compound.**—See COMPOUND LOCOMOTIVE; LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE.

**Wabash.**—New Class "G," Locomotives for the Wabash. Description with dimensions and illustrations of locomotives all of whose important parts are interchangeable. 1000 w. R R Gaz—April 1, 1898.

Wabash Ten-Wheel Freight Engine. Illustrated description of some of the details, with principal dimensions. 600 w. Ry & Engng Rev—May 28, 1898.

Eight-Wheel, Class H, Passenger Locomotive—Wabash Railroad. Principal general dimensions with illustration. 500 w. R R Gaz—March 24, 1899.

**Weight.**—The Detailed Weights of a Locomotive Engine. Gives list of the actual weight of the various parts of a goods engine and tender, V-14 class. 1800 w. Engr, Lond—Feb. 9, 1900.

The Weight of Locomotive Engines. Editorial on the factors that determine the weight. 1500 w. Engr, Lond—Aug. 11, 1899.

**Weight and Efficiency.**—Weight and Efficiency of Locomotives. Ira C. Hubbell. On the efficiency of locomotives as affected by the percentage of weight on drivers to total weight. 1200 w. Ry Age—Oct. 6, 1899.

**Weight Distribution.**—The Distribution of Weight in Locomotives (Die Gewichts-Vertheilung bei Lokomotiven). An analysis of the distribution of weights upon drivers for various arrangements of axles, and discussion of best disposition of equalizing levers; by Inspector Leitzmann. 7000 w. Glaser's Annalen—Nov. 1, 1897.

Distribution of Axle Loads (Das Diagramm der Achsenbelastungen). Diagrams showing the distribution of the weight of a locomotive for a variety of arrangements of axles and equalizing levers. 5000 w. Glaser's Annalen—May 1, 1897.

**Winans.**—See Camel.

**Wisconsin Central.**—See Piston Valves.

**Wood Burning.**—See LOCOMOTIVE STACKS.

**Worsdell.**—See Northeastern, Eng.

**Wrecking.**—See RAILWAY ACCIDENT.

**Yard.**—Yard Locomotive, Central London Railway. Sectional drawings with brief description. 400 w. Engr, Lond—Aug. 8, 1900.

### LOCOMOTIVE ACCIDENT.

See also BOILER EXPLOSION; LOCOMOTIVE EXPLOSION; RAILWAY ACCIDENT.

**Great Northern, Eng.**—The Breakage of a Locomotive Driving Axle on the Great Northern Railway of England. Abstract of a report to the Railway Dept. of the Bd. of Trade. Description of the accident showing that there was a previous crack in the axle, inside the hub, and discussing the methods of testing for such imperfection. The axle within the hub is now made of greater diameter than the remainder, which was not the case in the English engine mentioned. 2100 w. Am Eng & R R Jour—Nov. 14, 1895.

### LOCOMOTIVE ADDRESS.

Address of Mr. J. T. Brooks. A general dissertation upon the way to attain highest excellence in locomotive engineering. 4000 w. Trav Eng Assn—Sept., 1895.

### LOCOMOTIVE ASSOCIATION.

See also RAILWAY ASSOCIATION.

### LOCOMOTIVE AXLE BEARING.

The Busse Adjustable Axle Bearing for Locomotives (Nachstellbares Achslager für Lokomotiven, Bauart Busse). A three part axle box with improved wedge adjustment, especially intended for the journal bearings of main locomotive axles. 1200 w. Glaser's Annalen—Jan. 1, 1898.

### LOCOMOTIVE BOILER.

See also LOCOMOTIVE FIREBOX; LOCOMOTIVE GRATE; LOCOMOTIVE SMOKE BOX.

Locomotive Boilers—Some Points to Be Thought of When Getting Them. H. Wade Hibbard. Discussing recent designs of boilers and boiler-shop methods. Followed by general discussion. 12000 w. N Y R R Club—May 18, 1899.

**Automatic Steam Fountain.**—An Automatically Closing Steam Fountain that Will Close. John A. Hill. Drawings and description of a device to lessen danger to enginemen from escaping steam. The invention is not patented, but given to the public. 1200 w. Loc Engng—June, 1896.

**Bracing.**—Experiments in Boiler Bracing. Francis J. Cole. Investigations into the holding power, at different temperatures, of various styles of locomotive firebox crown stays. Ill. 1800 w. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

**Care.**—Boilers Taking Care of Themselves. How to Wash Out Boilers. Henry J. Raps. Treats of locomotive boilers, their proper care and inspection while in service; how to make heavy repairs, etc. 2400 w. Loc Engng—July, 1897.

**Construction.**—Safety in Locomotive Boiler Construction. Editorial explaining and discussing the differences between radial stay boilers and crown-bar boilers, with general comments. 1200 w. Eng News—July 9, 1896.

**Corrosions and Cracks.**—Corrisions and Cracks in Locomotive Boilers. Translation of an article by M. Desgeans, in the "Revue Générale des Chemins de Fer." Illustrated discussions of defects and the causes. 3300 w. R R Gaz—Nov. 3, 1899.

**Coverings.**—Coverings for Locomotive Boilers. Editorial report of tests being conducted by Charles L. Norton, at the Mass. Inst. of Technology, with statement of facts from reports of tests previously made. 1600 w. R R Gaz—Sept. 30, 1898.

Experiments with Boiler Coverings. Editorial directed to a comparison of mica boiler covering with those of other kinds, in which mica was found superior to any other material. The experiments were carried out in the Mechanical Department of the Canadian Pacific Railway. A diagram showing graphically the results is presented. 1200 w. Can Eng—June, 1896.

Tests of Locomotive Boiler Coverings. Abstracted from a paper by Robert Quayle, presented at the January meeting of the Western Ry. Club, giving a report of tests made on the branch line of the Chicago & Northwestern. 3800 w. R R Gaz—Feb. 17, 1899.

Tests of Locomotive Boiler Coverings. George R. Wallace. A letter commenting on Mr. Quayle's paper which reported tests of locomotive laggings, and indicating the value of the commercial coverings. 1400 w. R R Gaz—March 10, 1899.

See also BOILER; LOCOMOTIVE JACKET.

**Crown Bars.**—Crown Bars for Locomotive Boilers. From "The Locomotive." Deals with the proportion and arrangement of crown bars in locomotive boilers, giving some of the principles that have been found satisfactory in practice. Ill. 2800 w. Prac Eng—Nov. 12, 1897.

**Design.**—How to Lay Out a Locomotive Boiler. Henry J. Raps. Method of laying out a taper course or the frustum of a right cone and its application to the laying out of an elbow. 1200 w. Loc Engng—Nov., 1898.

How to Lay Out a Locomotive Boiler. Henry J. Raps. Method of laying out the throat sheet and upper one-half of connection. Ill. 700 w. Loc Engng—Sept., 1898.

**Distortion of Flue Sheets.**—Distortion of Flue Sheets. Account of some tests indicating that the sectional expander causes great distortion, while the roller expander is free from any such defect. 300 w. Loc Engng—May, 1896.

**Efficiency.**—The Effect of High Rates of Combustion Upon the Efficiency of Locomotive Boilers. W. F. M. Goss. Full text of the original paper, showing decreased economy with increased rates of combustion, with charts, diagrams, description of apparatus and methods used in testing and the entire discussion. 12500 w. N Y R R Club—Sept. 17, 1896.

The Effect of High Rates of Combustion Upon the Efficiency of Locomotive Boilers. W. F. M. Goss. Gives the results of experiments, with tables and charts. The most efficient action is shown to accompany the lowest rates of combustion, and the reasons given. 1700 w. R R Gas—Sept. 18, 1896.

See also **LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST.**

**Explosion.**—See **LOCOMOTIVE EXPLOSION.**

**Flanges.**—Turning Flanges on a Locomotive Boiler. H. D. Van Doorn. An illustrated description of the methods employed. 700 w. Am Mach—Aug. 23, 1900.

**Foaming.**—The Cause of Foaming in Locomotive Boilers. C. Herschel Koyl. Explains many causes of boiler foaming. 2000 w. R R Gas—Oct. 12, 1900.

**Formers.**—Boiler Formers at the Richmond Locomotive and Machine Works. Engravings and table showing method of filing and keeping records of certain locomotive boiler parts. A system devised by Millard F. Cox. 400 w. R R Gas—May 18, 1900.

**Heating Surface.**—Relative Steam-Making Capacity of Firebox and Tube Surface. Letters containing inquiry about a statement in "R. R. Gaz." to the effect that one square foot of firebox heating surface of a locomotive boiler would make as much steam as ten square feet of average tube-heating surface, are replied to at length, and diagrams given. 2700 w. R R Gas—Dec. 4, 1896.

The London "Engineer's" View of the Locomotive Question. A review of the question of heating surfaces, with general tone unfavorable to the efficiency of the American type. 900 w. Engng Mech—Oct., 1896.

**Heat Loss.**—The Loss of Heat from Locomotive Boilers. An account of the most elaborate series of tests ever undertaken to measure the loss of heat under the conditions of service. Also editorial. Abstract of report of tests given at meeting of Western Ry. Club, by Robert Quayle. 5400 w. Eng News—Feb. 23, 1899.

**Heat Transmission.**—Heat Transmission in Locomotive Boilers. William Forsyth. Discusses the materials for heating surfaces and the most advantageous lengths of tubes. 2200 w. Am Engr & R R Jour—Oct., 1899.

**Illinois Central.**—Boiler and Frames—Twelve-Wheel Freight Locomotive. Illustrates and describes these features in a large engine for the Illinois Central R. R. 600 w. Am Engr & R R Jour—Aug., 1900.

**Long Tubes.**—Long Tubes for Locomotive Boilers. Geo. L. Fowler. Letter making a brief review of the state of the art, and giving a short summary of available data on the subject. 1500 w. R R Gas—Sept. 21, 1900.

**Marine.**—Marine Boiler Locomotive, A., T. & S. F. Ry. Illustrates and describes the application of a Scotch marine boiler to a locomotive. The engine is on trial in switching service in the Topeka, Kan.,—yards. 1400 w. Ry & Engng Rev—Feb. 10, 1900.

**Mexican Central Ry.**—Crown and Cross Stays—Mexican Central. Illustrated description of the standard crown and cross stays used on this road. 700 w. R R Gas—Dec. 29, 1899.

**Proportions.**—See **LOCOMOTIVE DESIGN—Dimension Ratios.**

**Repairs.**—How to Make Heavy Repairs on the Locomotive Boiler. Henry J. Raps. Directions and suggestions for quick and efficient work. Ill. 3000 w. Loc Engng—Jan., 1898.

How to Make Heavy Repairs on the Locomotive Boiler. Henry J. Raps. Suggestions for the inspection and repair of boilers. Ill. 2500 w. Loc Engng—Nov.. 1897.

How Not to Make Heavy Repairs on Locomotive Boilers. Henry J. Raps. Discusses the causes of injury, and the importance of proper care of a boiler. 2500 w. Loc Engng—Aug., 1897.

How to Make Light Repairs on the Locomotive Boiler. Henry J. Raps. Suggestions for repairs and care. Ill. 2300 w. Loc Engng—Sept., 1897.

How to Make Light Repairs on the Locomotive Boiler. Henry J. Raps. Suggestions and directions for repairing and caring for boilers. 2800 w. Loc Engng—Oct., 1897.

See also **LOCOMOTIVE; LOCOMOTIVE SHOP; STAYBOLT—Breaker.**

**Ribbed Tubes.**—See **Servé Ribbed Tubes.**

**Scale.**—See **BOILER SCALE—Locomotive.**

**Servé Ribbed Tube.**—Increase of Heating Surface in Locomotives. C. W. Whitney. Communication urging the great economy of fuel to be expected from the use of the Servé internally ribbed tube. 2500 w. Ry Rev—April 25, 1896.

Ribbed Tubes for Locomotives. Editorial review of European practice and experience. 1600 w. Ry Rev—April 25 1896.

**Staybolts.**—See **STAYBOLT.**

**Steam Pressure.**—The Limits of Steam Pressure in Locomotives. G. R. Henderson. Outlines the probable limit of steam pressure in locomotives, and some of the difficulties in reaching and using such pressures. 1500 w. Am Eng & R R Jour—Dec., 1897.

See also **LOCOMOTIVE—High Pressures.**

**Steel Specifications.**—Steel for Boilers and Fireboxes. T. L. Condron. The material for this paper has been collected from the motive power departments of several railroads, a few of the locomotive works and steel manufacturers. Specifications of the Am. Ry. Mas. Mech.'s Assn. for boiler and firebox steel are also given. 2800 w. Jour W Soc of Engs—Oct., 1896.

**Supports.**—Supporting Rear Ends of Locomotive Boilers. Discussion of methods used, considering the best plan is to support the boiler by the mud ring, or by the mud ring and by lateral plate plate braces. Ill. 700 w. Am Engr & R R Jour—March, 1900.

**Testing.**—A Scheme for Testing Locomotive Boilers in Fast Express Service in Comparatively Short Runs. Howard H. Maxfield. The scheme described is the result of a series of tests of engines on the fast express service between Jersey City and Philadelphia, dealing only with the boiler part of the locomotive. 3800 w. Stevens Ind—Oct., 1898.

See also **LOCOMOTIVE TEST.**

**Tubes.**—Locomotive Boilers and Tubes. Conclusion of the discussion in the International Ry. Congress. 1400 w. Ry Rev—Aug. 29, 1896.

Locomotive Boilers and Tubes. Extract from report by Ed. Sauvage at the last meeting of the International Railway Congress. It is practically a condensed statement of the report. 1000 w. Safety V—Nov., 1896.

Locomotive Boiler Tubes. Francis J. Cole, in "The Boiler Maker." Gives specifications and tests for locomotive boiler tubes, and the requirements of prominent railroads. 1500 w. Prac Engr—Aug. 11, 1899.

See also **Long Tubes.**

**Tube Surface Efficiency.**—The Efficiency of Tube Surface in Locomotive Boilers (Dir Wirksamkeit der Heizrohre in Lokomotiv Kesseln). A theoretical discussion of this important subject, with valuable experimental data for tubes of various lengths under different conditions. 7500 w. Zeitschr d Ver Deutscher Ing—Sept. 18, 1897.

**Water Tube.**—A New Water Tube Locomotive Boiler. Suggestions of Sweney Munson, a locomotive engineer on the Lehigh Valley R. R., with illustrations and dimensions. 700 w. Ry Mas Mech—Oct., 1897.

A Water Tube Locomotive Boiler. An illustration from the C., M. & St. P. Ry. General description of construction with sectional drawings. 900 w. Ry Rev—Oct. 17, 1896.

## LOCOMOTIVE BUILDING.

See **LOCOMOTIVE CONSTRUCTION; LOCOMOTIVE ERECTION.**

## LOCOMOTIVE CAR.

See also **CAR—Automotor; Steam Motor;**

**Adams.**—A Forgotten Chapter in Railway History. G. A. Sekon. The discussion of combined locomotive and railway carriage construction, giving cuts of two designs planned by W. B. Adams, about 1848. 2300 w. Mech Wld, Lond—March 20, 1896.

**Inspection.**—Locomotive Saloon for the London & Southwestern Railway. Illustrated description of a novel inspection engine, combining a locomotive and saloon. 500 w. Engr, Lond—Sept. 28, 1900.

**New England R. R.**—Locomotive Car on the New England Railroad. Describes a combination car and locomotive, giving illustration of the locomotive. 800 w. Ry Rev—Oct. 16, 1897.

## LOCOMOTIVE CONSTRUCTION.

See also **LOCOMOTIVE—Reconstruction; Repairs;**

See also LOCOMOTIVE DESIGN; LOCOMOTIVE ERECTION; LOCOMOTIVE FRAME.

Amount and Distribution of Work in Building a Locomotive. Editorial discussion of an article by T. R. Browne, which is considered to contain much valuable information. 1700 w. Am Eng & R R Jour—May, 1899.

Building a Locomotive. An illustrated account of the building of this machine, mentioning the different branches of the work. 2000 w. Loc Engng—Jan., 1898.

The Construction of a Modern Locomotive. Part first is introductory to a series of articles dealing with the modern methods of construction of a machine capable of the higher speed, greater train load, and other requirements made necessary by close competition. Ill. Serial. Am Eng & R R Jour—March, 1898.

The Construction of a Modern Locomotive. William O. Webber. Descriptive. 2300 w. Tradesman—Feb. 1, 1897.

**Cast Steel.**—Cast Steel in Locomotive Building. An abstract of papers and discussion at the Nov. meeting of the New England R. R. Club. 4500 w. R R Gaz—Dec. 18, 1896.

Cast Steel in Locomotive Building. Extract from paper by Mr. Barba read before the New England Ry. Club, showing the adaptation of steel to this work. 1300 w. Am Mfr & Ir Wld—Dec. 25, 1896.

Cast Steel in Locomotive Construction. J. E. Sague. Extract from a paper read before the New England Ry. Club. Reasons which have led to the wide substitution of steel for cast and wrought iron. 2000 w. Ry Rev—Dec. 26, 1896.

**Frames.**—See LOCOMOTIVE FRAME; MACHINE TOOL—Grinding and Milling.

**Germany.**—Locomotive Building in Germany. Historical review and summary of important points in modern practice. 2000 w. Eng, Lond—Aug. 21, 1896.

**Japan.**—See also LOCOMOTIVE.

**Lining of Parts.**—Lining of Shoes and Wedges. W. D. Chamberlin. An illustrated article giving details of a method for this work. 2500 w. Loc Engng—Feb., 1900.

**Oil Welding.**—Welding Locomotive Frames in Place with Oil. D. P. Kellogg. Illustrated description of a system in use at the Southern Pacific shops. 1500 w. Loc Engng—June, 1900.

**Repairs.**—See LOCOMOTIVE; LOCOMOTIVE BOILER.

## LOCOMOTIVE CYLINDER.

Various Locomotive Cylinders. Clement E. Stretton. Consideration of locomotives with one, two, three and four cylinders. 1300 w. Mech Wld—Oct. 15, 1897.

**Clearance.**—Large Cylinder Clearance Spaces. Editorial aiming to show that practice which is unquestionably good for stationary engines may be entirely wrong for locomotives. 1000 w. Loc Engng—July, 1897.

**Cleveland.**—A New Locomotive Cylinder. A description of the cylinder arrangement invented by W. F. and E. W. Cleveland, now on trial on the Intercolonial Railway of Canada. Also editorial. 900 w. R R Gaz—Aug. 5, 1898.

**Dual Exhaust.**—Locomotive Improvement. Leonard J. Todd. Presents the advantages of the "dual exhaust" cylinder and claims a saving of 10 per cent. could be had. 3000 w. Eng, Lond—May 28, 1897.

**Fastenings.**—Best Fastenings for Locomotive Cylinders. Supplementary report by J. E. Sague constituting an additional discussion of this subject. Ill. 2000 w. Ry & Engng Rev—Oct. 8, 1898.

Best Form of Fastenings for Locomotive Cylinders. From a report presented at the 1898 convention of the Am. Ry. Master Mechs. Assn. Ill. 2500 w. Ry & Engng Rev—July 30, 1898.

**Helping.**—See LOCOMOTIVE—Helping Cylinders.

**Long-Stroke.**—Long-Stroke Cylinders and Piston Valves. George W. Cushing. Facts showing advances made and what has influenced the progress. Ill. 2500 w. Ry Mas Mech—Feb., 1898.

**Oscillating.**—See LOCOMOTIVE.

**Proportions.**—Locomotive Cylinder Proportions. G. R. Henderson. A discussion of this subject, giving the opinion that the weight on drivers should be proportioned to maximum rates of grades, while the steam-making capacity should be proportioned to the average resistance and schedule speed. 3200 w. Am Eng & R R Jour—Dec., 1898.

## LOCOMOTIVE DESIGN.

See also LOCOMOTIVE CONSTRUCTION; LOCOMOTIVE SPECIFICATIONS.

An Important Feature of Locomotive Design. Editorial discussion of improvements needed to provide for fast passenger schedules. Gives Prof. Goss's conclusions regarding larger driving wheels and suggests lines along which to seek improvement. 2000 w. Ry Rev—Jan. 16, 1897.

General Principles Governing Locomotive Design. H. Wade Hibbard. Considers the general principles concerned in operation and repair, with less important and exterior influences. 4000 w. Sib Jour of Engng—June, 1898.

Locomotive Design. Francis J. Cole. On the determination of the proper working stress of materials. Serial. Am Eng & R R Jour—April, 1898.

Locomotive Design. E. H. McHenry. Chart of locomotive horse-power, with discussion of the curves of various engines. 1700 w. R R Gaz—April 13, 1900.

Recent Improvements in Design and Construction of Locomotives. The latest practice in boiler construction is given special attention. Serial. R R Gaz—Feb. 7, 1896.

Some Questions in Locomotive Design. William G. Raymond. A study of a diagram of locomotive horse-power curves, and the questions brought out. 2000 w. R R Gaz—March 30, 1900.

Two Locomotive Designs. Drawings and description of two designs of advanced practice, one a heavy freight engine, the other a heavy passenger locomotive. 1300 w. R R Gaz—Oct. 27, 1899.

**Boiler.**—See Dimension Ratios; LOCOMOTIVE BOILER—Design.

**Details.**—Locomotive Details—Boston & Maine Railroad. O. H. R. The details of which dimension drawings are given, are the rocking grate, oil cup for eccentric strap, brick arch and exhaust damper. 450 w. Loc Engng—May, 1896.

The Modern Locomotive. William Rowland. Paper read before the Liverpool Univ. College Engng. Soc. Calculations and considerations determining details in the design of locomotives. Serial. Prac Eng—Feb. 14, 1896.

Unnecessary Labor in Locomotive Details. P. M. Hammett. Extracts from paper read at meeting of the New England R. R. Club. Examines the principles of design wih a view to securing economical results, and the conditions of shop practice. 1400 w. R R Gaz—April 8, 1898.

**Dimensions.**—Notes on the Determination of the Principal Dimensions of Locomotives (Considérations Relatives à la Determination des Dimensions Principales des Locomotives.) A comparison of the relations between speed, tractive power, train resistance and engine power, based on actual performances. 2500 w. Génie Civil—Feb. 5, 1898.

**Dimension Ratios.**—Ratio of Heating Surface, Grate Area, and Cylinder Volume. Angus Sinclair. A table giving the leading particulars concerning 25 of the latest built locomotives, with discussion of the proportions which produce the most economical locomotive for different kinds of service. 2300 w. Loc Eng—April, 1897.

Ratio of Grate Area, Heating Area and Cylinder Volume. From the report of the committee of the American Railway Master Mechanics' Assn. The proper ratio for freight and passenger engines. The plan followed is stated, with deductions and calculations. Diagrams. 2200 w. R R. Gaz—July 9, 1897.

Relations Between Boilers, Cylinders and Weight on Driving Wheels of Locomotives. Maurice Demoulin. From the "Bulletin of the International Railway Congress." The first number is concerned chiefly with discussion of the ratio of grate and heating surface, to adhesive weight in various typical European and American locomotives, of which data are given in tabular form. Some space is given to forced draft, fuel, and the contrasting preference for power and economy respectively in American and European practice. Serial. Ry Rev—June 13, 1896.

The Proportions of Locomotive Boilers. Editorial criticism of the investigations on the proper ratio of heating surface and grate area to cylinder volume for passenger and freight engines, made by the committee of the American Ry. Mas. Mech. Assn. 1600 w. Eng, Lond—Aug. 20, 1897.

**Express.**—A Few Facts and Opinions on the Design of Express Locomotives. Notes on the London meeting of the International Congress, cited to show prevailing ignorance of American practice. 1500 w. Am Eng & R R Jour—Oct., 1896.

**Improvement.**—A Suggestion for Improvement in Locomotive Design. R. A. Smart. Concerning the use of a lighter valve and yoke. 900 w. Ry Age—June 15, 1900.

**Mogul.**—Design for Mogul Locomotive with Wide Fire Box. D. R. Sweney. Presents plan of engine as an attempt to supply a larger grate with as few experimental details as possible. 1000 w. Am Engr & R R Jour—Oct., 1900.

**Stresses.**—Locomotive Design—The Working Stress of Materials. Francis J. Cole. A study of driving axles, considering their size and the stresses. 2800 w. Am Eng & R R Jour—June, 1898.

Locomotive Design—The Working Stress of Materials. Francis J. Cole. The present article discusses piston rods. Ill. 1800 w. Am Eng & R R Jour—Nov., 1898.

The Working Stress of Materials Used in British Locomotive Construction. F. W. Jennings. Read before the Northeast Coast Inst. of Engs. & Shipbuilders. An investigation of the stresses usually allowed on some of the more important parts of the locomotive. 3500 w. Engng—Nov. 10, 1899.

**Technical Schools.**—See EDUCATION—Railway; MECHANICAL ENGINEERING—Railway; RAILWAY SCHOOL.

**Weight of Parts.**—Consideration of Weight of Parts in Locomotive Design. W. H. Marshall. Outlines where savings can be effected and to what extent they may be carried. 1800 w. Am Eng & R R Jour—June, 1900.

### LOCOMOTIVE DRIVING WHEEL.

Is It Good Practice to Use Blank Drivers on Locomotives? L. E. Molineux. Paper before N. Y. R. R. Club, strongly favoring flanges on all drivers, claiming fewer derailments, easier replacement and movement of cripples, greater strength and tractive power, more mileage and minor advantages. Discussion in accord with the paper. 9400 w. N Y R R Club—May 21, 1896.

**Cast Steel.**—Cast Steel Driving Wheel Centers. Illustrations and descriptions of changes in design, reproduced from working drawings of wheels in regular service. 900 w. Ry & Engng Rev—June 18, 1898.

Cast Steel Driving Wheels. Illustrations of various designs and information concerning them. Am Engr & R R Jour—Feb., 1900.

**Flange Wear.**—Prevention of Wear of Driving Wheel Flanges. Describes the arrangements adopted by different roads for overcoming this trouble, especially describing the practice on the D., L. & W. R. R., which has been successful in stopping the flange wear. 2500 w. Am Engr & R R Jour—May, 1900.

**Large.**—Larger Driving Wheels. High Speed in Freight Service has led to a reduction in the number of wheels and an enlargement in diameter on freight locomotives. 1000 w. R R Car Jour—Jan., 1897.

Leverage of the Locomotive Driving Wheel. Illustrated and reasoned out by means of diagrams. 1800 w. Loc Engng—Sept., 1899.

**Shoes and Wedges.**—Fitting Up Driving Shoes and Wedges. Ira A. Moore. Directions for the work with illustrations. 2200 w. Loc Engng—Feb., 1898.

### LOCOMOTIVE ECCENTRICS.

An Improvement in Locomotive Eccentrics. Illustrated description of an improved style of split eccentric used by the Brooks Locomotive Works. 450 w. Am Engr & R R Jour—March, 1900.

### LOCOMOTIVE ERECTION.

See also ERECTING SHOP; LOCOMOTIVE CONSTRUCTION; LOCOMOTIVE FRAME.

**Driving Shoes and Wedges.**—See LOCOMOTIVE DRIVING WHEEL—Shoes and Wedges.

**Epernay, France.**—Rapid Mounting of a Locomotive. From "La Nature." Describes the mounting of a high-speed freight engine in 66 hours in the shops of Epernay. Ill. 600 w. Sci Am Sup—Dec. 31, 1898.

The Erection of a Locomotive in 66 Hours (Montage de Locomotive Exécuté en 66 Heures). Describing this rapid piece of erection work in the Epernay works of the Eastern Railway of France. Several views are given showing successive stages of the work. 1000 w. Génie Civil—Oct. 1, 1898.

**France.**—Rapid Locomotive Erection in France. Illustrations and information on the quick erection of a locomotive in one of the shops of the Eastern of France Railway. 900 w. Engng—Sept. 1, 1899.

### LOCOMOTIVE EXHIBITION.

**Budapest, 1896.**—See also RAILWAY EXHIBITION—Budapest, 1896.

**1896.**—Railway Exhibits at Berlin, Budapest and Nuremberg, 1896 (Die Eisenbahn-Fahrbetriebsmittel auf den Ausstellungen zu Berlin, Budapest und Nürnberg, 1896). A critical examination, by H. von Littrow, of the locomotives exhibited with illustrations of details. 10000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Vereines—Feb. 5, 1897.

**Nuremberg.**—Locomotives at the Nuremberg Exhibition (Die Lokomotiven auf der II. Bayrischen Landesausstellung in Nürnberg, 1896). Description with numerous details of the important compound and other locomotives of the leading German builders. 2 articles. 20000 w. Zeitschr d Vereines Deutscher Ingenieure—Jan. 23 & Feb. 13, 1897.

**Nuremberg, 1896.**—The Locomotives Exhibited at the Second Bavarian Exposition in Nuremberg, 1896. A brief description of the eight locomotives exhibited, taken from a pamphlet on the subject by Eugene Brückmann. 2300 w. R R Gaz—Nov. 26, 1897.

**Paris, 1900.**—Locomotive Engines at the Paris Exposition. Describes some of the noteworthy features of the exhibit. 3800 w. Engr, Lond—June 8, 1900.

Locomotive Exhibits at the Paris Exposition. Charles Rous-Marten. An expert review of the leading exhibits, showing the principal tendencies of modern practice. Serial. Part I. 3000 w. Engng Mag—Sept., 1900.

Locomotive Exhibits at Vincennes. Charles Rous-Marten. A general review of the exhibits. 2200 w. Engr, Lond—Sept. 14, 1900.

See also LOCOMOTIVE—Austrian at Paris; British at Paris; German at Paris; Midland at Paris.

### LOCOMOTIVE EXPLOSION.

**Bridgeport, Ala.**—Boiler Explosion at Bridgeport, Ala. Brief illustrated acount of an unexplained locomotive boiler explosion on the N., C., & St. L. Ry. 150 w. R R Gaz—April 24, 1896.

**High Pressure vs. Faulty Inspection.**—Does High Steam Pressure Increase the Danger of Boiler Explosions? Editorial arguing that faulty inspection and not high pressure is the dangerous element. 1400 w. Loc Engng—May, 1896.

**Madison, Wis.**—A Locomotive Boiler Explosion. Illustration and account of the wreck of locomotive No. 249, of the Chicago and Northwestern Ry., due to the explosion of its boiler, at Madison, Wis. 1000 w. Wis Engr—Jan. 1898.

**Oil Scale.**—Low Water and Burned Fire Boxes. Oil scale, formed below the water line and causing overheating there, is ascribed as the true cause of many explosions attributed to low water. 1100 w. Ry Mas Mech—Aug., 1896.

**Prescott, Arizona.**—Explosion of a Mountain Locomotive at Prescott, Arizona. Engravings showing the complete destruction, with brief description. 800 w. Sci Am—Oct. 8, 1898.

### LOCOMOTIVE FIREBOX.

See also LOCOMOTIVE BOILER; LOCOMOTIVE GRATE.

Locomotive Firebox Design. R. P. C. Sanderson. Personal experiences which have brought the subject before the writer's notice, with search for causes and knowledge gained. 3000 w. R R Gaz—June 11, 1897.

**Belpaire.**—The Fireboxes of Locomotive Engines. A discussion of the difficulties of the internal firebox and the defects of ordinary methods of staying, with favorable mention of the Belpaire firebox. 1700 w. Eng, Lond—May 8, 1896.

**Corrugated.**—A Locomotive Boiler With Corrugated Furnace. Sectional views showing the construction of a locomotive running in freight service on the New York Central. 600 w. Eng News—Aug. 24, 1899.

Corrugated Firebox Sheets for Locomotive Boilers. R. J. O'Neil. From the "Boiler Maker." Illustrates the method of cupping firebox sheets used by the Chicago & Alton Ry. 600 w. Eng News—July 13, 1899.

**Cupped Sheets.**—Cupped Firebox Sheets for Locomotives—Chicago, Rock Island & Pacific Ry. An application of the method of Joseph Cour, aiming at greater flexibility of the firebox sheet and getting the stay-bolt ends less exposed to the fire. 1100 w. Ry Mas Mech—Sept., 1897.

**Docteur.**—The Docteur Brick-Lined Firebox. This locomotive boiler with copper sheet and tubes is used on a Belgian railway, with very satisfactory results. The new brick-lined firebox saved 33 1-3 per cent. in fuel. 1700 w. Am Eng & R R Jour—Nov., 1895.

The Docteur System of Fireboxes with Fire-Brick Walls. From a paper by M. Docteur published in the "Revue Universelle des Mines." The paper is well illustrated and the results of the experiments are given in detail. A saving of from 10 to 12 per cent. in fuel is claimed. 2400 w. Am Eng, Car Build & R R Jour—March, 1896.

**Mason-Work.**—Locomotive Boiler with Mason-Work Firebox. A. Socher. Translated from the "Organ für die Fortschritte des Eisenbahnwesens," describing the construction and service experience and indicating the special advantages to be expected. 1800 w. Am Eng & R R Jour—May, 1896.

**Mogul.**—See **LOCOMOTIVE DESIGN.**

**Rational.**—Rational Firebox Passenger Locomotive, C. & N. W. Ry. Illustration with description and comments. 1400 w. Ry & Engng Rev—July 28, 1900.

**Staybolt.**—See **STAYBOLT.**

**Tests, P. & R. Ry.**—Tests on Wide and Narrow Fireboxes. H. H. Vaughn. Illustrated account of the tests made by the Philadelphia & Reading Railway. 1800 w. Am Eng & R R Jour—April, 1899.

**Wide.**—A Locomotive Study. Edward Grafstrom. Illustrates a novel adaptation of the wide firebox to a fast passenger engine of the American type. Offered as a suggestion. 700 w. Am Engr & R R Jour—May, 1900.

A New Baldwin Locomotive for the Lehigh Valley Railroad. Sectional drawings and details of new wide firebox engine for Lehigh Valley Ry. 500 w. R R Gaz—Oct. 9, 1896.

Problems the Wide Firebox Solves? J. S. S. Fulton. On the merits of large grates. 1500 w. Am Engr & R R Jour—Aug., 1900.

The Wide Firebox as a Standard. J. Snowden Bell. Reason why it should be standard for all types of engines. 2400 w. Am Engr & R R Jour—June, 1900.

Wide Firebox Consolidation Locomotives. Illustration and chief dimensions of locomotives for the Delaware & Hudson Co., for burning anthracite coal. 700 w. Am Engr & R R Jour—Aug., 1899.

Wider Fireboxes. William Forsyth. A discussion of grate area and its relation to cylinder volume. 2000 w. Am Engs & R R Jour—Nov., 1899.

Wide Fireboxes for Locomotives. A discussion of the papers on "Wide Firebox Locomotive Boilers," read before the Western Railway Club. 3500 w. Eng News—Dec. 12, 1895.

See also **LOCOMOTIVE—Atlantic Type; Buffalo, Rochester & Pittsburg; Lackawanna; Lehigh; Prairie Type.**

**Wootten.**—How Large Can Grate Area Be Made Advantageously? Editorial discussing the action of the Erie Railway Co. in employing engines with Wootten fireboxes over the main line of their system. 1400 w. Loc Engng—March, 1898.

The Wootten Boiler. S. H. Vauclain. Considers the origin, evolution, and advantages for high speed, for greater horse-power, for inferior fuel. General discussion and illustrations. 920 w. N Y R R Club—April 20, 1899.

## LOCOMOTIVE FRAME.

See also **LOCOMOTIVE CONSTRUCTION; LOCOMOTIVE ERECTION.**

Fitting Pedestal Binders and Setting Frames. Ira A. Moore. Showing how back frames may be properly lined and squared up when they have been taken down to allow boiler repairs. 2000 w. Loc Engng—April, 1898.

**Construction.**—See **LOCOMOTIVE CONSTRUCTION; MACHINE TOOL—Grinding and Milling.**

**European.**—European Locomotive Frames. Robert Grimshaw. Illustrated description of frames used in European locomotive practice. 1000 w. Ry Mag—Feb., 1897.

**Illinois Central.**—See **LOCOMOTIVE BOILER.**

## LOCOMOTIVE FRONT END.

See **LOCOMOTIVE SMOKE BOX; LOCOMOTIVE STACK.**

## LOCOMOTIVE GRATE.

See also **LOCOMOTIVE BOILER; LOCOMOTIVE FIREBOX.**

Locomotive Grates. Condensed report of the committee of the Am. Ry. Mas. Mech. Assn. Ill. 5500 w. Ry Rev—Sept. 4, 1897.

Locomotive Grates. M. N. Forney. A discussion of grate areas and description of grate designed by the writer, but which has never been practically tested, with consideration of the question of combustion. Ill. 3300 w. Am Eng & R R Jour—Oct., 1898.

**Anthracite.**—Grate for Burning Fine Anthracite Coal—Delaware, Lackawanna and Western Railroad. Illustrated description of grate for burning hard coal on engines. Designed by David Brown. 500 w. Am Eng & R R Jour—Dec., 1896.

Locomotive Grates for Anthracite Coal. Circular of inquiry issued by a committee of the Mas. Mech. Assn. which shows very plainly the points in practice which at present are demanding the attention of designers and operators of locomotives. 1800 w. Ry Mas Mech—March, 1896.

Locomotive Grates for Anthracite Coal. From the report of the committee of the Am. Ry. Master Mech. Assn. Discusses water tubes, tubes with filling pieces, tubes with shaker fingers, shaking grates, and transverse shaking grates. 2800 w. R R Gaz—July 23, 1897.

**Ash Pans and Dampers.**—Grates, Ash Pans and Dampers for Anthracite and Bituminous Coal Locomotives. Illustrates and explains the practice of the Pennsylvania Railroad. 900 w. Am Eng & R R Jour—Feb., 1899.

**Coke Burning.**—Grates for Coke Burning. Information from J. S. Turner concerning coke burning on locomotives. Ill. 900 w. Am Engr and R R Jour—Feb., 1900.

**Combustion.**—Locomotive Grates. A discussion of the nature of combustion and the effects upon it of the environment of the fire. 2500 w. Am Eng & R R Jour—May, 1896.

**Culm Burning.**—See **LOCOMOTIVE.**

**Draft Appliances.**—See also **LOCOMOTIVE.**

**Heating Surface.**—Grate Areas and Heating Surfaces. Editorial, questioning some of the opinions entertained upon this subject, particularly the view that high rates of combustion are necessarily accompanied by imperfect combustion, although the fact is admitted that forcing the combustion in ordinary types of locomotive furnaces generally results in rapid diminution of efficiency. 1600 w. Ry Mas Mech—Jan., 1896.

**Liquid Fuel.**—See **LOCOMOTIVE.**

## LOCOMOTIVE HEADLIGHT.

See **HEADLIGHT.**

## LOCOMOTIVE HOUSE.

See also **LOCOMOTIVE SHOP.**

Description of a Locomotive Depot for the Accomodation of 180 Engines and Tenders. W. G. Scott. Paper read before the Liverpool Engng. Soc. The shed contains 30 lines of rails, each holding six engines. The principal features are briefly described. 1600 w. Am Eng & R R Jour—Dec. 12, 1895.

## LOCOMOTIVE INSPECTION.

Plans for the Systematic Investigation of Locomotives (Ueber die Aufstellung von Plänen für die Regelmässigen Untersuchungen der Lokomotiven). With a number of tables and a graphical scheme for the distribution of inspection throughout the year. 2000 w. Glaser's Annalen—Oct. 1, 1899.

## LOCOMOTIVE JACKET.

See also **LOCOMOTIVE BOILER—Coverings.**

**Painted vs. Planished.**—Painted and Planished Locomotive Boiler Jackets. Committee report comparing first cost and maintenance expense. The figures and comment are generally favorable to painted jackets, but no conclusions are presented. 500 w. Cent Ry Club—Sept., 1896.

Painted or Planished Iron Jackets for Locomotives. E. E. Russell Tratman. A paper before the New York Ry. Club, giving the experience and practice of a number of roads, showing that painted iron is not only cheaper in first cost, but that it has a longer life than planished iron. 1800 w. R R Gaz—Nov. 22, 1895.

See also **PAINTING—Locomotive.**

**Pattern.**—See **PATTERN—Gusset Sheet, Locomotive Jacket.**

**LOCOMOTIVE MAINTENANCE.**

Treatment of Locomotives by Enginemen. L. D. Westfall calls attention to some points where a little care will save wear and repair costs, and the economy of fuel, oil, etc. 1600 w. Ry Mag—Jan., 1897.

**LOCOMOTIVE OPERATION.**

See **LOCOMOTIVE—Efficiency; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE TEST; RAILWAY OPERATION.**

Could Not the Locomotive Service of the Country be Improved if the Furnishing of Feed Water and Coal was in the Hands of the Locomotive Department? Report of committee. Gives summary of replies from twenty-one members, to questions contained in a circular letter prepared by the committee, and relating to the subject named, with brief discussion. 5000 w. Trav Engs Assn—Sept., 1895.

Economical Locomotive Firing. K. P. Alexander. Abstract of paper prepared for the St. Louis Ry. Club. Suggestions to promote economy, advising a traveling engineer competent to instruct the firemen. 900 w. Ry & Engng Rev—July 8, 1899.

Economic Locomotive Management. George H. Baker. Part first deals with coal as the means of heat, and, therefore, the source of a locomotive's power. Reviews the origin of coal and the varieties. 2200 w. Baker's Ry Mag—Nov., 1896.

Locomotive Service. J. H. McConnell. An interesting paper on the growth, economy in operating, hauling capacity, and work of locomotives. The author thinks the engines should be loaded more heavily. 2000 w. Pro W Ry Club—Dec., 1895.

The Economical Driving and Firing of the Locomotive Engine. R. M. Deeley. Deals with the various points that effect the economical working of the locomotive engine, as much depends on the methods of firing and working adopted. 4700 w. Eng, Lond—Sept. 10, 1897.

The Economical Handling of Locomotives. Eugene McAuliffe. Observation and experience of the writer, with suggestions for lessening the cost of operation of locomotives. 1200 w. Loc Engng—March, 1898.

What Effect Has the Proper or Improper Manipulation of the Throttle, Cut-Off and Boiler Feed on the Coal Consumption? A short but interesting paper on the subject named, followed by a still more interesting discussion. 8000 w. Trav Eng Assn—Sept., 1895.

**Distribution.**—Some Principles Governing the Proper Distribution of Locomotives in Economical Railway Operation. E. M. Herr. Notes the points to be studied to secure the proper distribution of power. 1500 w. Am Engr & R R Jour—June, 1899.

**Double Heading.**—Double Heading. C. B. Conger. Discussion of this practice, which has become common in these days of heavy trains. 1600 w. Loc Engng—May, 1900.

**Economical.**—Economical Locomotives. G. W. Rhodes. Extracts from an address at a recent meeting of the St. Louis Railway Club, on the economical locomotive and its relation to the track. 1300 w. Am Eng & R R Jour—March, 1898.

**Economical Speed.**—Economics of Freight Locomotive Operation. G. R. Henderson. Gives data which point to the conclusion that ten miles is the most economical speed on parts of the road not level, but that on level stretches the speed can be varied. 1800 w. Am Engr & R R Jour—June, 1899.

**Forcing Loss.**—Fuel Loss Due to Forcing Locomotives. Editorial review of Prof. Goss's paper read before the New York Railway Club in Sept., with diagrams. 1400 w. R R Gaz—Oct. 16, 1896.

**Fuel Economy.**—Fuel Economy Resulting from a Study of Indicator Cards. W. E. Symons. From a discussion of the report: To What Extent Do Draft Appliances, Valves and Valve-Setting and Cylinder Packing Influence Economy of Fuel, presented at the Atlanta meeting of the Southern and Southwestern Railway Club. 900 w. R R Gaz—Dec. 29, 1899.

Fuel Saving on the Wabash. An account of the methods adopted which have resulted in great saving. 1500 w. R R Gaz—Jan. 20. 1899.

See also Economical; **LOCOMOTIVE PERFORMANCE—Efficiency.**

**Reversing.**—To Reverse or Not? M. E. On the different opinions held regarding the advisability of reversing the engine in time of danger. 1400 w. R R Gaz—Dec. 31, 1897.

**Smoke Prevention.**—Burning Bituminous Coal Without Smoke on the Southern Pacific System. J. Snowden Bell furnishes notes concerning the results obtained by the methods in use. Detail drawings of the mechanical features contributing to the results are given. 1800 w. R R Gaz—April 27, 1900.

Burning Soft Coal without Smoke. Angus Sinclair. Describes the practice on the Burlington, Cedar Rapids & Northern Railway which secured smokeless locomotive firing, and greatly lessened the fuel expense. Ill. 5000 w. Loc Engng—Dec., 1898.

How Can the Traveling Engineer Assist in Preventing the Unnecessary Emission of Black Smoke? Brief but interesting paper with extended discussion. 4500 w. Trav Eng Assn—Sept., 1895.

Smokeless Firing with Bituminous Coal on Passenger Locomotives. A copy of the instructions issued to engine men and firemen on the Cincinnati, New Orleans & Texas Pacific Ry. and accounts of other efforts being made to avoid smoke. 1000 w. Eng News—Aug. 31, 1899.

Smokeless Firing with Bituminous Coal on Passenger Trains. W. J. Murphy. Gives a copy of the instructions for firing passenger locomotives on the Queen & Crescent to prevent smoke. Ill. 1100 w. Loc Engng—Aug., 1899.

The Reduction of the Smoke Nuisance in Locomotive and Other Boilers (Verminderung der Rauchplage bei Lokomotiv und Anderen Kesselfeurungen). A paper read before the German Railway Society with especial reference to the Langer and Marcotty steam jet system for improving combustion in locomotive boilers. 6000 w. Glaser's Annalen—Nov. 1, 1898.

See also **SMOKE PREVENTION.**

**LOCOMOTIVE PERFORMANCE.**

See also **LOCOMOTIVE OPERATION; LOCOMOTIVE RATING; LOCOMOTIVE TEST; RAILWAY OPERATION.**

Locomotive Service. J. H. McConnell. A paper read before the Western Railway Club, on working efficiency, tonnage rates, performance and cost, with suggestions for improvements. 2000 w. R R Gaz—Jan. 10, 1896.

The Performance and Design of Locomotives. A. von Borries. Extracts from an important work, "Die Eisenbahn Technik der Gegenwart," selected and translated by W. W. Nichols. Part first is a study of the resistance to motion, and the performance of locomotives. Serial. R R Gaz—Jan. 14, 1898.

What One of the Large Locomotives Is Doing. Showing what is being done by a large engine and demonstrating the economy of large engines where there is load enough to warrant their use. Ill. 300 w. Loc Engng—Oct., 1900.

**Atlantic Type.**—See **LOCOMOTIVE.**

**Characteristics.**—See **LOCOMOTIVE.**

**Cleveland in Canada.**—Performance of the Cleveland Locomotive. Describes an experiment tried on the Intercolonial Ry. of Canada, applying a system of dual exhaust. 1000 w. Am Engr & R R Jour—May, 1900.

**Compound.**—Performance of Compound Locomotives. Tabular statement of the principal points of interest in a number of simple and compound engines relative to long service and fuel consumption. 500 w. R R Gaz—Dec. 13, 1895.

**Compound vs. Simple.**—Comparative Coal Consumption of Simple and Compound Locomotives. Observations and records taken on the La Crosse Division of the Chicago, Milwaukee & St. Paul R. R. 400 w. R R Gaz—Feb. 10, 1899.

Service Record of the Richmond Compound. W. R. Trigg. A table showing the comparative performances of simple and compound locomotives. The compound type saved 25.5 per cent. of coal, and 7.9 per cent. in repairs. 350 w. R R Gaz—Nov. 22, 1895.

**Efficiency.**—Efficiency of Coal Consumption in Railway Practice. Herbert Wallis. Extract from the president's address at the meeting of the Canadian Soc. of Civ. Engs. Some facts about fuel in its relation to locomotive steam practice, especially coal. Serial. Can Eng—March, 1897.

See also High Speed; LOCOMOTIVE—Weight and Efficiency; LOCOMOTIVE OPERATION; LOCOMOTIVE TEST.

**Efficiency and Capacity.**—Locomotive Efficiency and Capacity. C. A. Seley. Discusses the advance in capacity, and how brought about, and the compound non-condensing principle as applied to locomotives. Serial. Loc Engng—Nov., 1898.

**England.**—A Run on the Northeastern Railway. Charles Rous-Marten. An account of a run with one of the new locomotives recently built for this road, showing a highly creditable performance. 1500 w. Engr, Lond—Feb. 23, 1900.

**France.**—Diagrams of Runs by French Engines. Representing in graphic form the performances of two different classes of French engines described in the articles by Charles Rous-Marten. 200 w. Engr, Lond—Jan. 20, 1899.

**Heavy vs. Medium.**—Comparative Performance of Heavy and Medium Weight Locomotives. F. F. Gaines. An account of the performance of engines in mountain pushing service on the Lehigh Valley R. R. 700 w. Am Engr & R R Jour—June, 1900.

**High Speed.**—Does Increase of Train Speed Entail Increase of Fuel Consumption? Editorial giving evidence that engines hauling very fast trains burn less coal per car mile than those hauling slower trains. 1000 w. Loc Engng—Oct., 1899.

The Efficiency of Modern High-Speed Locomotives (Die Leistungen Moderner Schnellzuglocomotiven). Rolf Sanzin. With diagrams of efficiency curves plotted from actual results with various engines and trains. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 28, 1900.

**Long Run.**—A Long Locomotive Run. Locomotive performance made between Evanston, Wyo., and Omaha, Neb., on the Union Pacific, Aug. 3, and 4, 1897. Official figures. 900 w. R R Gaz—Oct. 22, 1897.

Locomotive Mileage; Increased by Long Runs. From a paper by C. W. Eckerson before the St. Louis Ry. Club. The writer believes there is an economy to be obtained by increasing the runs of engines and presents arguments. 2400 w. Ry Rev—Jan. 9, 1897.

**Pennsylvania Ry.**—Some Pennsylvania Locomotives and Fast Runs. A detailed description with speed diagram and profile of road from Jersey City to Philadelphia. Average speed 57, 60 miles per hour. Full details are given of the locomotive performance. 900 w. Ry Age—Jan. 10, 1896.

**Reports.**—Uniform Reports of Locomotive Performances—Authorized Standard Forms. George W. Cushing. Suggestions as to the form in which to make a locomotive report so that it can be compared intelligently with that of other locomotives. 1200 w. Loc Engng—March, 1896.

**Valve Gear.**—See LOCOMOTIVE VALVE GEAR—High Speed.

**Variable Load.**—Some Speculations About the Economy of Locomotives Under a Variable Load. Formulae, table and diagrams from Prof. R. C. Carpenter's paper before the A. I. E. E. 1200 w. R R Gaz—Oct. 2, 1896.

**Vauclain.**—Some Questions of Locomotive Performance. Summary of editorial in the "Engineer," London, with reply from Mr. Vauclain. 3000 w. R R Gaz—March 19, 1897.

The Performance of the Vauclain Compound Locomotive. Extract from discussion by S. M. Vauclain, at the meeting of the St. Louis Ry. Club, showing that the results obtained by R. A. Smart, in the laboratory of Purdue Univ. were actually what takes place in service with this type of locomotive. 2300 w. R R Gaz—Dec. 30, 1898.

Power and Speed of Locomotives. G. R. Henderson. Discussion of this subject, with diagrams. 600 w. R R Gas—Jan. 27, 1899.

The Relation Between Power and Speed of Locomotives. Editorial on recent views presented by Prof. Smart and Mr. Vauclain. 800 w. R R Gaz—Jan. 13, 1899.

Running a Vauclain Compound. C. G. Herman. Describes what the writer considers the best method of handling this type of locomotive. 1600 w. Loc Engng—April, 1899.

**Waste Haulage.**—Waste Haulage. Editorial giving an account of locomotive performance on the London & South-Western Ry., and discussing economy in haulage. 2000 w. Engr, Lond—Feb. 2, 1900.

## LOCOMOTIVE PISTON.

American Locomotive Pistons. From the report of a committee of the Amer. Ry. Mas. Mech.'s Assn. Illustrated description of various forms used in American locomotive practice. 1800 w. Am Mach—Oct. 29, 1896.

## LOCOMOTIVE RATING.

See also LOCOMOTIVE PERFORMANCE; RAILWAY OPERATION.

How Can Traveling Engineers Improve the Service in Rating Engines' Tonnage versus Number of Cars Hauled per Train? Communication by P. H. Stack, with discussion. Describes method of rating engines on the Union Pacific. Followed by a letter from General Inspector John H. Harris, also discussed at length, giving an account of the method of rating on the Denver and Rio Grande R. R. 5800 w. Trav Engs' Assn—Sept., 1895.

Locomotive Rating and Fuel. Tracy Lyon. Abstract of a paper read before the Western Railway Club. An exposition of the latest practice with an account of the very practical method employed on the Chicago Great Western Railway. 2700 w. Ry Rev—May 30, 1896.

Recent Developments in Rating Locomotive Performances. An abstract of a paper read before the Western Ry. Club by Mr. Tracy Lyon is given. The paper is divided under several headings, and under the same headings the practice of other railways is given for the purpose of comparison. 4500 w. Eng News—Jan. 7, 1897.

The Mathematics of the Performance Sheet. George S. Hodgins. Discusses the imperfections of these records and suggests that the element of time be included, producing as the term of work done the "ton-mile per hour." 2300 w. Ry Mas Mech—Sept., 1897.

Tonnage Rating. L. R. Pomeroy. Deals with the methods of rating locomotives and the possibilities of reducing their relative consumption of coal. Also discussion. 15500 w. N Y R R Club—Jan. 20, 1898.

Would the Rating of Engines by Tons, Instead of by Cars, Decrease Train Delays and Increase the Efficiency of the Power, and What Is the Best Method of Equalizing the Difference Between Empties and Loads? Report of committee followed by discussion. The committee sent out a series of questions, and report the answers received. 10000 w. Trav Engs' Assn Rept—Sept., 1896.

**Canadian Pacific.**—Train Tonnage for Locomotives. Relating to the system recently put into effect on the Ontario & Quebec Div. of the Canadian Pacific Railway. 600 w. Ry Age—Jan. 13, 1899.

**Car Mile.**—The Adjusted Car Mile as a Basis for Engine Performance. An account of tests made by the Pennsylvania lines west of Pittsburg, to determine the resistance of cars in freight trains, and investigating the practicability of applying an adjustment to the car mile measurement of engine performance. 1400 w. R R Gas—June 4, 1897.

**Mexican Central Ry.**—Locomotive Rating on the Mexican Central. Describes the system in use for keeping a record of the tractive power. 1300 w. R R Gaz—June 15, 1900.

**Speed.**—The Economy of Speed. F. P. Roesch. Discusses methods of rating engines and their maintenance. 1600 w. Loc Engng—July, 1900.

**Ton Miles.**—The Ton Miles Per Hour. George S. Hodgins. Discusses the unsatisfactory method of appraising the performance of a locomotive by giving its number of car miles, and the more accurate method of using the ton mile. 1600 w. Loc Engng—May, 1899.

Ton Mileage for Motive Power Statistics. C. H. Quereau. Discussing whether the tonnage of the engine should be included in the ton mileage. 3000 w. R R Gaz—Aug. 31, 1900.

**Ton Mile vs. Engine Mile.**—The Ton Mile and Engine Mile in Locomotive Statistics. W. H. Marshall. Showing that changed conditions have destroyed the value of engine mile records, and made them misleading when employed as a basis for calculating the cost of engine service, and discussing items entering into locomotive expenses. 3000 w. Am Eng & R R Jour—June, 1898.

**Tonnage.**—Some Observations on the Tonnage Rating of Engines. C. C. Riley. Extracts from a paper prepared for the July meeting of the Cent. Assn. of R. R. Officers. Discusses the lack of uniformity, the real object of tonnage rating, and the ideal method of engine rating. 3000 w. R R Gas—July 20, 1900.

Tonnage Rating. Abstract of the report of Committee on "Recent Developments in the Tonnage System of Rating Locomotive Performance," as presented at meeting of Western Ry. Club. 4500 w. R R Gas—Dec. 18, 1896.

Tonnage Rating of Locomotives. Discussion before the Northwest Railway Club, showing testing and rating methods adopted by various roads, and the advantages of rating locomotives by the weight rather than by number of cars. 1900 w. R R Gas—March 20, 1896.

Tonnage Rating of Locomotives. The method of determining the capacity of locomotives of the Southern Pacific. 1700 w. Ry Age—May 21, 1897.

Tonnage Rating for Locomotives. Reports the tests made on the Peoria & Eastern Div. of the C., C., C. & St. L. Ry., to determine the maximum number of tons that could be hauled in each direction up all the ruling grades. 1500 w. R R Gas—Feb. 17, 1899.

### LOCOMOTIVE SHOP.

See also **LOCOMOTIVE WORKS.**

**Organization.**—How Can Shop Organization Be Made More Effective? L. L. Smith. Describes the present organization of a locomotive shop, and discusses economies. Abstract of paper read before the Western Railway Club. 2000 w. Am Eng & R R Jour—Nov., 1897.

See also **WORKS MANAGEMENT.**

**Reading, Pa.**—Extensive Locomotive Repair Shops, Philadelphia & Reading Ry. Illustrated description of new shops to be built at Reading, Pa., with a capacity of 100 locomotives. 2300 w. Ry & Engng Rev—May 19, 1900.

The New Locomotive Repair Shops of the Philadelphia & Reading R. R., at Reading, Pa. Illustrated description, with two-page plate, of this large and complete plant. 3000 w. Eng News—May 24, 1900.

**Zürich.**—The New Engine Houses of the Swiss Northeastern Railroad at Zürich (Die Neue Locomotiv-Remisenanlage der Schweiz. Nordostbahn in Zürich). E. Egger. An illustrated account of this locomotive house and repair shop. 1600 w. Schweiz Bauzeitung—April 7, 1900.

### LOCOMOTIVE SMOKE BOX.

See also **LOCOMOTIVE—Draft Appliances; LOCOMOTIVE STACK.**

**Short.**—Short Smoke Boxes for Locomotives. Discussion of the present tendency in design, stating the advantages of short fronts, and describing the arrangements devised by different makers. Ill. 2200 w. Am Eng & R R Jour—Dec., 1898.

Turner's New Short "Front End." Presents its advantages. Ill. 800 w. Am Engr & R R Jour—June, 1900.

Extended Front Ends. A symposium of correspondence, tending to show that the device was a gradual development for which individual credit would be hard to apportion. With editorial. 2200 w. Loc Engng—June, 1896.

The Original Extension Front. Letter from A. M. Waitt, master car builder of the L. S. & M. S. Railroad, describing and illustrating his original spark arresting device and its early reception. 850 w. Loc Engng—May, 1896.

### LOCOMOTIVE SPECIFICATION.

**China.**—See **RAILWAY—China.**

**Ireland.**—Specifications of a Four-Wheel Coupled Passenger Engine—Great Northern Railway, Ireland. A copy of the specification in full, with working drawing. 4200 w. Engr, Lond—Jan. 20, 1899.

### LOCOMOTIVE SPEED.

See **FAST TRAINS; RAILWAY OPERATION.**

A Chapter on Locomotive Stacks. A series of drawings showing the variety of designs of stacks covering the experience of the Union Pacific Ry. from 1864 to the present time. 600 w. Am Eng & R R Jour—May, 1899.

Smokestacks and Front Ends for Locomotives Burning Lignite and Wood Fuel. Illustrated description of stacks used on the Union Pacific, made necessary by the kind of fuel used. 1800 w. Eng News—March 4, 1897.

**Double.**—See **LOCOMOTIVE—Double Stack.**

### LOCOMOTIVE TENDER.

Locomotive Tenders. William Forsyth. A discussion of the tenders on English and American locomotives, and the improvements made in modern American designs. 2200 w. Am Engr & R R Jour—Feb., 1900.

### LOCOMOTIVE TEST.

See also **INDICATOR DIAGRAM—Locomotive; LOCOMOTIVE PERFORMANCE; LABORATORY—Railway Testing.**

Test of a Four-Cylinder Compound Locomotive—Eastern Railroad of France. M. Salomon, in the "Revue Générale de Chemins des Fer." Descriptions of the tests, and of the engines tested. 1800 w. R R Gas—Nov. 12, 1897.

**Acceptance.**—Acceptance Tests for Locomotives. Communications considering the advantages of such tests. Also editorial. 2900 w. R R Gas—Oct. 10, 1900.

**Balanced.**—See **Strong Balanced.**

**Baldwin.**—Tests of a Baldwin Locomotive on the Louisville & Nashville. An account of interesting service tests made by members of the graduating class of Rose Polytechnic Inst., under the direction of F. C. Wagner. 2000 w. R R Gas—Aug. 12, 1898.

See also **LOCOMOTIVE VALVE—Friction Tests.**

**Boiler.**—See **LOCOMOTIVE BOILER—Testing.**

**British in France.**—Trials of English Locomotives. Report of the trials of two English locomotives that were invited to remain in France after the closing of the Paris Exhibition of 1899, to run trial trips. The leading dimensions are given, also editorial. 2800 w. Engr, Lond—Nov. 19, 1897.

**Brooks.**—Tests of the New 10-Wheel Locomotives of the Great Northern. An account of tests giving general results and sample indicator diagrams taken. 1200 w. R R Gas—Oct. 14, 1898.

**Chicago & Northwestern Ry.**—Chicago & Northwestern Locomotive Testing Plant. Illustrated detailed description. 1300 w. R R Gas—April 10, 1896.

The Northwestern's Locomotive Testing Machine. A device for testing the efficiency of engines after coming from the shop, employed by the Chicago & Northwestern R. R. 1200 w. Loc Engng—Jan., 1896.

**Columbia University.**—The New Testing Locomotive at Columbia University. Herbert T. Wade. Illustrated description of the full size passenger locomotive, the gift of the Baldwin Locomotive Works, of Philadelphia. 1300 w. Sci Am—April 15, 1899.

**Competitive.**—Competitive Tests of Locomotives. M. N. F. Discusses the methods of testing, or the conditions under which tests are made, and claims that a test which is not competitive proves very little. Suggests that competitive tests be made under the direction of a committee of the Master Mechanics Assn., the object being to ascertain what kind of a locomotive is best adapted for a certain kind of traffic. 3300 w. Am Eng & R R Jour—June, 1898.

**Compound.**—Experiments on a Compound Locomotive. Summarized translation by Bryan Donkin, from "Revue Générale des Chemins de Fer." Dynamometric experiments on a four-cylinder express compound locomotive on the Paris, Lyons & Mediterranean Railway, made by M. Privat in 1895. 1800 w. Engng—June 18, 1897.

The Performance of a Four-Cylinder Compound Locomotive. Richard A. Smart. A paper presented before the St. Louis Railway Club. A record of tests for the purpose of investigating the cylinder performance of the compound locomotive at high speeds. Ill. 1600 w. Pamphlet, St. Louis Ry Club.

**Compound vs. Simple.**—Comparative Test of a Compound Locomotive and a Simple Locomotive on the Central Railroad of New Jersey. Russell E. Taylor, Charles C. Kenyon, Edward D. Mathey. Tabulated details of construction, description of tests, and tabulated data resulting therefrom, with account of instruments employed, methods, and numerous diagrams. 3000 w. Stevens Ind—July, 1895.

**England.**—Trials of An Express Locomotive. William Adams and William Frank Pettigrew. Abstract minute of Pro. of Inst. of Civ. Engrs. Giving the results of five tests of an English locomotive, with indicator diagrams and charting showing speed, boiler pressure, vacuum and air pressure, smoke box temperature and indicated horse power. 1700 w. Ind & Ir—July 17, 1896.

**English.**—Tests of English Express Locomotives. Discusses points brought out by a series of trials of different types of express locomotives. Also editorial on train resistance, lessons drawn from the results given. 2700 w. R R Gaz—Sept. 15, 1899.

**Friction Losses.**—The Determination of the Friction Losses of Locomotives. W. F. M. Goss. Extract from an article published in the Purdue University "Exponent." Gives data seeming to show a loss in draw-bar pull due to engine friction of about 500 pounds, or about 67 horse-power, with the locomotive running at 50 miles per hour. 2000 w. R R Gaz—June 9, 1899.

**Illinois Central.**—Locomotive Road Tests—Illinois Central Railroad. Reports investigations made by the students of the Mech. Engng. Dept. of the Univ. of Illinois, of the operations of the locomotives of that road. Ill. 2400 w. R R Gaz—June 17, 1898.

**Purdue University.**—New Experimental Locomotive "Schenectady No. 2," Purdue University. Illustrated detailed description with editorial. 2500 w. R R Gaz—Dec. 17, 1897.

Performance of the Purdue Locomotive "Schenectady." W. F. M. Goss. Read at meeting of W. Ry. Club. A full reprint. The tests bring out some very interesting relations of speed to power and are summarized in an argument for large drivers. 2700 w. R R Gaz—June 5, 1896.

See also **Friction Losses; Strong Balanced.**

**Road.**—Locomotive Road Tests. W. H. Lewis. An interesting series of tests to ascertain the relation between the fuel consumption and the work performed. 2000 w. Am Engr & R R Jour—Dec., 1899.

Road Tests of Locomotives. Gaetano Lanza. How to obtain the objects sought in making tests, the methods used, and matters important in securing accuracy. General discussion. 10500 w. Cent Ry Club—Sept., 1900.

Some Deductions from Road Tests of Locomotives. R. P. C. Sanderson. Calls 'attention to some of the causes which may seriously affect the results of road tests and lead to erroneous conclusions. Discussion. 10000 w. N Y R R Club—Sept. 21, 1899.

See also **Illinois Central.**

**Strong Balanced.**—Test of the Strong Balanced Locomotive at Purdue University. Abstract of the report of W. F. M. Goss, with discussion of the practice and principles. 3800 w. Sci Am Sup—Aug. 21, 1897.

The Balanced Locomotive. Report of tests at Purdue University of a locomotive without driving wheel counterbalance. Ill. 3500 w. Ry Age—July 30, 1897.

The Purdue Tests of Strong's Balanced Locomotive. George S. Strong. A letter to the editor giving reasons for holding opinions differing from those expressed in a recent editorial in this paper. 1500 w. R R Gaz—Aug. 13, 1897.

See also **COMPOUND LOCOMOTIVE.**

## LOCOMOTIVE TRUCK.

See **CAR TRUCK; TRUCK.**

## LOCOMOTIVE VALVE.

See also **LOCOMOTIVE VALVE GEAR.**

**Allen.**—An Improved Allen Valve. Illustrations and description of improved Allen valve brought out by the Richmond Locomotive Works with indicator diagrams showing effect of the change. 700 w. Loc Engng—Sept., 1899.

The Allen Valve for Locomotives. C. H. Quereau. Presents the objections and advantages of this double-ported valve. 2200 w. Trans Am Soc of Mech Engs—May, 1899.

The Richmond Double-Ported Valves. Features of the valve and diagrams showing comparative results of its use, with description and arguments for its use as given by Mr. Mellin. 600 w. R R Gaz—Aug. 18, 1899.

See also **Compound.**

**Balanced.**—Balanced Slide Valves for Locomotives. Editorial comment on the extensive use of this valve in America and its scant favor in England, with some explanatory reasons. 1100 w. Eng, Lond—Jan. 22, 1897.

Note on Balanced Slide Valves (Note sur les Tiroirs Equilibrés). M. Troisier. Devoted especially to the valves used on the locomotives of the Eastern Railway of France, and also describing other systems used in England and the United States. Gives methods of computing the proper area to be relieved of pressure. 5000 w. Rev de Mécanique—Feb., 1896.

The Application of Balanced Valves to Locomotives (Die Anwendung der Entlasteten Schieber bei Locomotiven). August Birk. Describing the various methods of relieving the pressure from locomotive slide valves, in British, French and American practice. 2000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—April, 1898.

**Compound.**—Improved Arrangement of Reducing and Intercepting Valves—Rogers Compound Locomotives. Illustrated description of the latest form as applied to five compound locomotives now in service in Jamaica and four in Chile. 700 w. R R Gaz—July 23, 1897.

Intercepting and Reducing Valves of the Rogers Compound Locomotive. The description is detailed and illustrated by sections. They are used on a passenger locomotive built for Chile. 1200 w. R R Gas—Nov. 22, 1895.

The Schenectady Locomotive Works—Intercepting and Separate Exhaust Valves for Compound Locomotives. Sectional views with description of valve designed by A. J. Pitkin and J. E. Sague. The form illustrated is the standard construction for their compound locomotives. 1200 w. Loc Engng—Jan., 1898.

The Schenectady Intercepting and Exhaust Valves. Engravings, with description of the intercepting compound locomotives, as designed by Mr. Pitkin and Mr. Sague for the Northern Pacific twelve-wheeler. 1000 w. R R Gaz—March 26, 1897.

Two Improvements in Compound Locomotives. Illustrates and describes the improvement in the Allen valve and in by-pass valves for low-pressure cylinders. 1700 w. Am Eng & R R Jour—Sept., 1899.

See also **Allen; Intercepting.**

**Double.**—See **Allen; LOCOMOTIVE—Double Valve.**

**Fay Richardson.**—See **LOCOMOTIVE—Boston and Albany.**

**Friction Tests.**—Friction Test of a Locomotive Slide Valve. Frank C. Wagner. Describes tests made at the Rose Polytechnic Inst. 900 w. Trans Am Soc of Mech Engs, No. 848—Dec., 1899.

See also **LOCOMOTIVE TEST—Baldwin.**

**Intercepting.**—Intercepting Valve for Compound Locomotives. Illustrates and describes the intercepting valve for the Cooke compound, the object of which is to convert an engine from a compound to a simple, and to permit the engine to run simple for any length of time. 700 w. Loc Engng—Dec., 1898.

Intercepting Valve of the Pittsburg Compound Locomotive. R. Atkinson. Special drawings showing valve with simple and compound positions, with description. 1000 w. Loc Engng—Oct., 1899.

Some Engineering Designs, as Shown in Intercepting Valves for Locomotives. Illustrates and describes several designs. 1200 w. Am Mach—Feb. 24, 1898.

The Intercepting Valve of the Schenectady Compound. C. R. Petrie. Describes this valve and explains its use and operation. 2200 w. Loc Engng—Aug., 1899.

See also **Compound.**

**Large vs. Small.**—Large vs. Small Locomotive Valves. Discusses the results of tests carried out on the Chicago & Northwestern locomotive testing plant for the purpose of showing the comparative values of small and large ports on the proportion of the mean effective pressure to the boiler pressure. 1000 w. Am Eng & R R Jour—Oct., 1897.

**Model.**—An Adjustable Valve Model. Illustrates and describes a locomotive valve model that can be adjusted to the exact size of the valve motion of most any ordinary locomotive. 2200 w. Ry & Engng Rev—July 15, 1899.

**Piston.**—Piston Valves. W. Reviews the experience gained in developing the piston valve as used in locomotive engineering, showing that it may or may not be as well balanced as a slide valve. 1100 w. R R Gaz—June 10, 1898.

Piston Valves for Locomotives. F. M. Whyte. On the application of piston valves to locomotives, the use of packing rings, effect on balancing, etc. Ill. 2700 w. Am Engr & R R Jour—June, 1899.

See also **LOCOMOTIVE—Piston Valve; LOCOMOTIVE CYLINDER—Long Stroke.**

**Schenectady.**—See **Compound; Intercepting.**

**Setting.**—Setting Valves of Locomotives. Fred B. Rogers. Description of method. 1200 w. Am Mach—July, 1896.

**LOCOMOTIVE VALVE GEAR.**

See also **LOCOMOTIVE VALVE; VALVE GEAR.**

**Compound.**—Hand Starting Valve for Compound Locomotive (Neuer Wechselkolben mit Handbewegung für Verbund-Lokomotiven). Von Borries' improved starting valve enables the engineer to convert the locomotive from compound to simple, and vice versa, at will. 1000 w. 1 plate. Glaser's Annalen—Dec. 1, 1897.

Valve Gear for Four-Cylinder Compound Locomotives (Steuerung für Verbund-Lokomotiven mit Vier Dampfcylindern). A description of the Von Borries system, in which a single modified Walschaert gear serves for each pair of cylinders. 800 w. Glaser's Annalen—Oct. 1, 1900.

**Corliss.**—Corliss Valve Gear for Locomotive Engines. M. E. Polonceau. Notes and summarized translation from "Les Annuales des Mines." The writer has made use of a system of four Corliss valves for locomotives. This system is explained and its advantages stated. 2000 w. Engng—Feb. 26, 1897.

**Electric Attachment.**—See **LOCOMOTIVE.**

**High Speed.**—Notes on the Effect of Ports and Valve Gears on the Performance of High Speed Locomotives. R. A. Smart. Shows the importance of careful attention to the design and construction of valve gears and ports, and the effect on the capacity of the locomotive at high speeds. 800 w. Am Engr & R R Jour—June, 1899.

**Link Motion.**—The Locomotive Link Motion. F. A. Halsey. Part first discusses the applicability of the link motion to locomotive conditions and compares the stationary and shifting link motions, etc. Serial. Am Mach—Aug. 26, 1897.

**Mistakes.**—Mistakes in Designing Valve Motion. H. Rolfe. Enumerates disadvantages met, and points needing correction. Serial. Loc Engng—Jan., 1900.

**Spain.**—A Special Valve Gear (Une Distribution Speciale). M. F. Panoux. A description with valve diagrams, of a locomotive cut-off valve gear used on the Northern Railway of Spain. The cut-off valve, riding on the main slide valve, is operated from a point on the link. 2500 w. 1 plate. Rev Gen des Chemins de Fer—April, 1899.

**Von Borries.**—See **Compound.**

**LOCOMOTIVE WORKS.**

**Derby, Eng.**—The Midland Railway Company's Locomotive Works at Derby. A very well illustrated description of works originating in 1844 and now covering 166 acres of ground, of which 44 acres are occupied by buildings. 12000 w. Eng, Lond—Dec. 13, 1895.

The Midland Railway Locomotive Works. An illustrated description of these important English works at Derby, and the tools in use, with related matter of interest. 5400 w. Engng—July 22, 1898.

**Erecting Shop.**—See **ERECTING SHOP—H. K. Porter Co.**

**Hartmann, South Russia.**—Lugansk and the Hartmann Machine Company's Locomotive Works. Illustrated description of a model locomotive factory. 2200 w. Engr, Lond—July 6, 1900.

**Horwich, Eng.**—The Horwich Locomotive Works of the Lancashire & Yorkshire Railway, England. William Forsyth. General plan and brief description of the principal departments of these English shops, which are the largest locomotive repair shops in the world. 1500 w. Am Eng & R R Jour—June, 1898.

**Russia.**—The New Russian Locomotive Works. Photographs and description of some of the tools for the Sormovo Co., about to engage in locomotive building at Nijni Novgorod, Russia. 600 w. Mach—Nov., 1896.

See also **Hartmann.**

**Schenectady.**—Some of the Interesting Features of the Schenectady Locomotive Works. Illustrations with description. 2500 w. Mach, N. Y.—Aug., 1900.

**LODGING HOUSE.**

**Mills.**—See **HOTEL; MECHANICAL PLANT.**

**LOGARITHMS.**

Graphical Logarithmic Tables (Graphische Logarithmentafeln). A discussion of the advantages of substituting logarithmic scales in the form of tables for the usual numerical tables. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—May 7, 1897.

The Use of Logarithms. C. K. Jackson. Gives instructions in the use and application of logarithms in abbreviating arithmetical and algebraic operations. Serial. Am Mach—March 19, 1896.

**LOOM.**

See **TEXTILE MACHINERY.**

**"LOOP THE LOOPS."**

See **CENTRIFUGAL RAILWAY.**

**LOW TEMPERATURE.**

See **LIQUEFACTION; LIQUID AIR; REFRIGERATION.**

**LUBRICATION.**

See also **BEARINGS; FRICTION; STEAM ENGINES—Friction and Lubrication.**

A Few Suggestions on the Use and Abuse of Lubricants. C. Going. On the waste due to the use of automatic oiling devices, and to needless use of fluid lubricants, the materials used, etc. 1200 w. Marine Engng—July, 1900.

A Study of Lubrication (Etude sur le Graissage). E. Maglin. Discussing the chemical and physical laws of lubrication, with illustrated descriptions of a variety of devices for testing lubricants. Two articles. 8000 w. Rev de Mécanique—July, Oct., 1897.

Friction and Lubricating Oils. C. A. Collett. The laws of friction are discussed in Part I. A succeeding article will discuss in detail the various kinds of lubricating oils. 1300 w. Am Elect'n—Dec., 1896.

Lubrication. From the "Engineer's Mag." Discusses the various oils and other products used for this purpose, and means of testing. 2500 w. Mech Wld—Oct. 14, 1898.

Lubrication from an Engineer's Point of View. William M. Davis. Reviews some of the laws relating to friction, and discusses the value of oils used, and the conditions affecting lubrication. 1500 w. Sci Mach—July 1, 1898.

Notes on Liquid Lubricants. Henry E. Cutts. Some points on the selection of oils and their application. 1200 w. Marine Engng—April, 1897.

Oil Used for Lubrication. Discusses various lubricants and calls attention to some practical methods of testing oils and oil mixtures. 3000 w. Mach, Lond—Jan. 15, 1899.

On the Theory of Lubrication and the Determination of the Thickness of the Film of Oil in Journal Bearings. F. L. O. Wadsworth. Brief review of a paper on this subject by Prof. Osborne Reynolds, published in the "Transactions of the Royal Society," with additional notes from experiments and study by the writer. Ill. Serial. Jour Fr Inst—Dec., 1897.

Practical Experience in the Use of Lubricants (Erfahrungen über die Praktische Verwendung der Schmiermittel in der Technik). Dr. Koller. Discussing the effects of temperature, composition and conditions of use upon the effective lubrication. 2500 w. Glaser's Annalen—Nov. 15, 1897.

The Effective Lubrication of Journals. F. W. Graham Snook. Shows by actual test that the most common method is extremely inefficient, and results in great preventable loss of mechanical efficiency, and suggests means of avoiding this loss. Ill. 4500 w. Eng Mag—May, 1900.

The "Oiliness" of Lubricating Oils. An argument, quoting from various authors, and favoring capillarity and adhesiveness as factors of efficient lubrication. 4000 w. Engr, Lond—June 22, 1900.

**Air.**—Air as a Lubricant. Herman S. Heichert. From the "Rose Technic." Describes experiments being made at the Worcester Polytechnic Inst., with a machine designed by Albert Kingsbury. Ill. 1000 w. Eng News—March 8, 1900.

Experiment with an Air Lubricated Journal. Albert Kingsbury. Describes an apparatus for exhibiting the action of fluid lubricants in cylindrical bearings, with a statement of results of a large number of tests made at various speeds, measuring the pressures in the lubricant, thickness of the film of lubricant, and the friction. Ill. 6000 w. Jour Am Soc of Nav Engs—May, 1897.

Experiments with an Air Lubricated Journal. Albert Kingsbury. Describes the apparatus used and gives experimental results. Ill. 5000 w. Jour of Worcester Poly Inst—March, 1900.

**Automatic.**—A Continuous Automatic Lubricator (Graisseur Automoteur Continue). A Report upon the improved lubricator designed by M. Barré. A continuous circulation of oil is maintained by an automatic pumping device. 3500 w. Bull de la Société d'Encour—Jan., 1898.

**Automatic, Locomotive.**—Automatic Lubricators for Locomotives. Abstract of paper by Mr. Parker, recently read before the Northwest Ry. Club, with editorial account of experiments on the St. Paul & Duluth R. R. 2700 w. Ry Rev—Nov. 7, 1896.

Automatic Oiling. Illustrated description of the Wilson-Whiting-Davis system. 800 w. R R Gaz—Jan. 3, 1896.

**Automobiles and Cycles.**—The Lubrication of Motor Vehicles and Cycles. Information from a pamphlet written by J. Veitch Wilson. 1400 w. Auto Jour—May 17, 1900.

**Car.**—Car Lubrication. A. M. Knapp. Causes of hot box delays and suggestions for avoiding them. 1500 w. R R Car Jour—Nov., 1896.

Lubrication and Hot Boxes. H. B. Hodges. A discussion of car journal lubrication and the prevention of hot boxes. 4500 w. R R Gaz—June 15, 1900.

Lubrication of Car Journals. Explains some of the causes of hot journals, illustrating the wear, with suggestions for the operation and care of cars. 1800 w. R R Gaz—March 23, 1900.

Lubrication. George L. Fowler. Lubricants and the ways of applying them are discussed. A brief review of what is known on the subject, and a few suggestions as to the considerations that should have weight in making selection of lubricants and bearing metals to be used on cars. 4000 w. Baker's Ry Mag—Nov., 1896.

Lubrication. George L. Fowler. A few suggestions as to the considerations that should have weight in making a selection of lubricants and bearing metals to be used on cars. 3800 w. Ry Mag—Sept., 1897.

Lubrication of Freight and Passenger Equipment. Discussion at the November meeting. 3300 w. Cent Ry Club—Nov., 1899.

See also **CAR BEARINGS; HOT BOX.**

**Car and Locomotive.**—Car and Locomotive Lubrication. Discussion of the paper presented by George W. Cushing. 10700 w. Pro West Ry Club—April, 1897.

Lubrication. A topical discussion by H. B. Hodges, Gen. Charles Miller, A. M. Waitt, and many others. 1700 w. N Y R R Club—Jan. 18, 1900.

Packing and Lubrication. A copy of the general instructions recently put in force on the New York Central & Hudson Riv. R. R. 2800 w. R R Gaz—Jan. 26, 1900.

**Car and Locomotive, Prussia.**—A New Lubricant for Railway Axles. Gives some phenomenal comparative figures from tests on the Prussian State Railways, but no hint as to the composition. 800 w. Eng, Lond—June 19, 1896.

**Crank Pins.**—Improved Lubrication of Crank Pins. E. O. Hefford. Brief illustrated description of a device found to give excellent results in practice. 500 w. Prac Eng—Oct. 1, 1897.

**Cylinder.**—Concerning Cylinder Oil. W. H. Wakeman. Some points on the quality and quantity of oil to secure the best results. 1200 w. Am Mach—March 9, 1899.

Cylinder Lubrication. Considers the points governing the quantity of oil necessary for the perfect lubrication of steam cylinders, and how to get the best results. Serial. Power—May, 1898.

The Lubricating of Engine Cylinders. Considers the principal causes of cutting and grooving. 1400 w. Bos Jour of Com—July 23, 1898.

See also **Locomotive Cylinder; Slide Valve and Cylinder.**

**Driving Journals.**—Lubrication of Driving Journals. B. Discusses the best method of introducing oil to bearings. 1200 w. Am Eng & R R Jour—March, 1898.

**Gas Industry.**—Lubrication in the Gas Business. O. M. Gregory. Read at meeting of the Pacific Coast Gas Assn. Brief talk on the use of lubricants and kinds best suited to the gas business. 1800 w. Am Gas Lgt Jour—Aug. 15, 1898.

**Graphite.**—See **GRAPHITE—Lubrication.**

**Locomotive.**—Economy in Engine Oil. Abstract of discussion at the April meeting of the New England R. R. Club. 2000 w. R R Gaz—May 21, 1897.

See also **Automatic; Car and Locomotive; Driving Journals; Sight Feed.**

**Locomotive Cylinders.**—Lubrication of Locomotive Cylinders. Brief discussion of practice and results, with suggestions. 1300 w. Am Eng & R R Jour—June, 1897.

Oiling Cylinders. Clinton B. Conger. Reviews past methods, and changes made in oiling valves and cylinders of locomotives, giving facts and observations from the writer's experience. 1800 w. Loc Engng—May, 1897.

See also **Slide Valve and Cylinder.**

**Marine Engines.**—The Bearings of the Marine Engine. John Dewrance. Read before the Inst. of Marine Engs. An explanation of the way oil enables a bearing to support its load, and a discussion of the modifications in design of marine engine bearings consequent upon a right understanding of the principles of lubrication. 1600 w. Engng—Jan. 1, 1897.

**Mineral Oil.**—See also **MARINE BOILER—Mineral Oil Lubricant.**

**Oil Film.**—A Determination of the Specific Resistance and Temperature Coefficient of Oil in Thin Films, and the Application of These Results to the Measurement of the Thickness of the Oil Film in Journal Boxes. F. L. O. Wadsworth. Gives results of investigations. 4500 w. Phys Rev—Aug., 1897.

**Oil Slings.**—See **OIL SLINGS.**

**Plumbago.**—See **PLUMBAGO—Lubricator.**

**Railway.**—See **Car; Car and Locomotive; Locomotive.**

**Railway Curves.**—See **RAILWAY CURVE—Lubrication.**

**Sight Feed.**—The Proper Operation of, Care and Instructions Concerning Sight Feed Lubricators. Report of Committee of Traveling Engs. Assn., on the modern and advanced styles of double and triple feed lubricators, with discussion following. 10000 w. Trav Engs' Assn Rept—Sept., 1896.

**Slide Valve and Cylinder.**—Slide Valve and Cylinder Lubrication. Editorial discussion of this subject, calling attention to defects, and a consideration of the devices in use. 1800 w. Ry Rev—May 15, 1897.

**Superficial Tension.**—Superficial Tension and Lubrication. R. M. Deeley. The phenomena arising from superficial tension are studied in so far as they concern lubricating problems. 6300 w. Engr, Lond—Feb. 12, 1897.

**Testing.**—A New Method for Testing Lubricants. Paul MacGahan. Description of a method by means of which original and useful results were obtained during the course of an investigation made in the mechanical laboratory of Columbia University on the various lubricants used for electrical machinery. 900 w. Elec Wld—May 30, 1896.

Determination of the Value of Lubricants, Especially Spindle Oil, by a New Oil Tester (Wertbestimmung von Schmierölen, besonders von Spindelölen, mit Einem Neuen Oelprüfer). Dr. Sigmund Kapff. A loaded spindle is rotated by an electric motor, and the electric power required is used to measure the value of the lubricant. 3500 w. Zeitschr d Ver Deutscher Ing—May 14, 1893.

Lubrication and the Testing of Oil. G. W. Bissell. Discusses the judicious selection and application of the lubricants. Part first deals largely with the properties. 2200 w. St Ry Rev—Oct. 15, 1898.

Sampling and Testing Lubricating Oils and Fats in the Workshop. Instructions for ascertaining whether a lubricating oil or fat is pure or not, and, if not, what is the nature of the adulterating body. Serial. Engr, Lond—July 15, 1898.

Testing Lubricating Oils. W. E. Crane. Cheap device for this purpose described and illustrated. 500 w. Am Mach—May 21, 1896.

The Testing of Lubricating Oils (Die Prüfung der Maschinen-Schmieröle). Carl Volk. Showing the great reduction in friction by using suitable lubricants, and dealing with methods of testing for viscosity and the detection of impurities. 1600 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 24, 1898.

See also **VISCOSIMETER.**

**Testing, Charlottenburg.**—Notes from the Oil Testing Department (Aus der Abtheilung für Oelprüfung). A number of brief notes by Dr. Holde, in charge of the department of testing lubricants at the Royal testing laboratory at Charlottenburg. Questions of viscosity, gravity and inflammability are discussed. 4000 w. Mitt aus den Kgl Tech Versuchsanstalt—Part II., 1898.

**Theory.**—The Theory of the Lubrication of Plain Parallel Surfaces. R. M. Deeley and C. E. Wolff. An important paper reprinted from the "Transactions of the Royal Society," with nine tables of constants. 3000 w. Eng, Lond—Jan. 10, 1896.

**Viscosimeter.**—See **VISCOSIMETER.**

### LUMBER INDUSTRY.

See also **TIMBER.**

**California Redwood.**—Machinery and Power Applications in the Lumber Industry. William Adams. This well illlustrated article gives a graphic description of the methods and machinery used in the redwood forest belt of California. The trees handled are very large and the wood somewhat brittle, so great care is requisite in felling and subsequent operations. The method of loading the logs by a cableway is also described. 3500 w. Eng Mag—Jan., 1899.

**Oregon.**—Modern Logging in the Northwestern States. Edward K. Bishop. Describing the improved methods of yarding and hauling logs in an Oregon logging camp. Ill. 8200 w. Eng Mag—April, 1897.

## M

### MACADAM.,

See **PAVEMENT; ROAD; ROAD CONSTRUCTION.**

### MACHINE.

See also **MACHINERY; MACHINE TOOL; MACHINE SHOP.**

**Efficiency.**—Negative Efficiency. F. A. Halsey. Showing that the possible range of efficiency in machines must be set down to be from minus infinity to plus one. 1000 w. Am Mach—Nov. 12, 1896.

**Kinematics.**—What is a Machine? (Was ist eine Maschine?) P. K. V. Englemeyer. A discussion of the meaning and scope of the word "machine" from the kinematic standpoint, giving the critical definitions of various authorities. 2500 w. Zeitschr d Ver Deutscher Ing—Oct. 22, 1898.

See also **KINEMATICS.**

**Standard.**—Improvements in Standard Machines. Payson Burleigh. The author points out that a large number of so-called improvements upon standard machines are not improvements, and that their purpose is simply to aid in sales, the machines being in many cases no better, and in some cases not so good for the additions. 2400 w. Age of St—July 4, 1896.

### MACHINE DESIGN.

See also **MACHINERY; MACHINE TOOL; STEAM ENGINE DESIGN.**

Hints on Machine Design. Charles L. Griffin. An excellent practical article. Young draughtsmen will do well to read these hints. 700 w. Am Mach—Feb. 13, 1896.

Notes on Machine Design (Betrachtungen über die Maschinen und den Maschinenbau). Ernst A. Brauer. An address before the technical high school at Karlsruhe, discussing the relation of the engineer and his education to his work, especially relating to the department of machine design. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 27, 1900.

Notes on Machine Designing. John H. Barr. In this paper the engineering elements and the commercial elements that must be taken into account in designing machinery, are considered together and the necessary compromises between them. 1400 w. Engs' Year Book, Univ of Minn., 1896.

Some Barriers to Progress in Machine Design. Charles Hotchkiss. A talk about designers and their relations to the business and the office of the work in which they may be engaged. 2500 w. Am Mach—April 29, 1897.

The Genesis of Machine Design, with Applications. W. H. Sargent. An illustrated article presenting some suggestions showing the influence of natural forms, and discussing shop designing. 2300 w. Mach, N. Y.—March, 1900.

**English vs. Continental.**—English Practice in Machine Design (Aus der Praxis des Maschinenbaues der Engländer). An interesting review of the differences between English and Continental practices, by an Austrian engineer resident in England. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—April 16, 1897.

**Graphic Interpolation.**—The Application of Graphic Interpolation in Machine Design. Adolph S. Ostreicher. Describes a method showing how tables can be directly completed without involving the design of each size individually nor sacrificing correctness. Ill. 1100 w. Engr, Lond—Oct. 28, 1898.

**Gravity.**—Economy in Design—Employment of Gravity. W. H. Booth. Calls attention to the advantages secured by utilizing the law of gravity. 1500 w. Am Mach—Jan. 25, 1900.

### MACHINERY.

See also **MACHINE; MACHINE SHOP; MACHINE TOOL; STEAM ENGINE.**

A Comparison Between Hand and Machine Work (Comparaison du Travail à la Main et du Travail à la Machine). M. E. Levasseur. An exhaustive examination of the influence of machinery upon industry, with numerous historical and official references. Serial. Bull de la Soc d'Encour—Feb. 28, 1900.

**American in Great Britain.**—American Machinery in the United Kingdom. Interesting information from a British engineer concerning the amount of American machinery used and its value, the conditions of labor in the United Kingdom and related matter. 2500 w. U S Cons Repts, No. 535—Sept. 22, 1899.

The Outlook for American Machinery in Great Britain. A summary of recent inquiries among a number of representative dealers and manufacturers in Great Britain. 2700 w. Mach, N. Y.—Aug., 1897.

**Automatic.**—The Designing of Automatic Machinery. Hanson Robinson. Read at meeting of the Baltimore Chapter of the Assn. of Am. Draftsmen. Discusses the questions that should be considered before beginning the designing of labor-saving machines. 1700 w. Am Mach—Feb. 16, 1899.

**Cuba.**—Machinery for Cuba. Raphael S. Payne. Some points on the revival of industries and trade and the needs that will soon become pressing. 1700 w. Mfrs Rec—Dec. 16, 1898.

**Defects.**—Defects in Machinery. Editorial on facts given in report of Mr. Longridge to the Engine, Boiler, and Employers' Liability Insurance Co., Limited, concerning the engine and machine details which give most trouble from failure. 1400 w. Engng—Sept. 29, 1899.

**Geneva Exposition.**—Machinery at the Geneva Exposition (Les Machines a l'Exposition de Genève). An editorial notice of the machine exhibits, including boilers, engines, hydraulic motors and machine tools. 6000 w. La Rev Tech—Nov. 10, 1896.

**German at Paris.**—The Paris Exposition of 1900 (Die Weltausstellung in Paris, 1900). A very well illustrated account of some of the principal German exhibits in Machinery Hall, including the Carl Flohr traveling crane, a Borsig engine, a Siemens-Halske dynamo and machine tools. 8000 w. 3 plates. Zeitschr d Ver Deutscher Ing—April 14, 1900.

**Interchangeable Parts.**—See **INTERCHANGEABILITY.**

**Labor.**—A Comparison of Hand and Machine Production. Editorial on results of the investigation by the U. S. Dept. of Labor, relating to the relative productive power of hand and machine labor. 1500 w. Eng News—Oct. 5, 1899.

Attitude of Workmen Toward Labor-Saving Machinery. On the unjust and cruel treatment of inventors of such machines in early times, and the opposition that still exisits, although it is clearly shown that they are a benefit to the workmen. 1500 w. Bos Jour of Com—March 11, 1899.

Automatic Machinery the Secret of Cheap Production. Hiram S. Maxim. Compare the cost of hand work with that of automatic machinery, especially in the cases of gun and bicycle making, and claims the automatic machines benefit labor as well as effect cheap production. 4500 w. Eng Mag—Jan., 1898.

Does Machinery Displace Labor? C. Wood Davis. Discusses the official statements of Carroll D. Wright, and the effect of machinery on labor, thinking the question worthy of serious consideration. 6500 w. Forum—July, 1898.

Hand and Machine Labor. The first of a series of articles based on the report of the Commissioner of Labor of the United States, concerning the effect of the use of machinery upon labor and cost of production, on wages, etc. Serial. Engng—Jan. 26, 1900.

Labor-Saving Machinery. Thomas L. Wilkinson. A discussion of labor-saving machinery in reference to the displacement and expansion of labor, showing it to be mutually beneficial to labor and capital. 2500 w. Min Ind & Rev—Jan. 6, 1898.

Men and Machinery. Starr Hoyt Nichols. Tending to show that the effect of machinery instead of injuring workmen and lessening their opportunities, is really the deliverer of mankind from evil and poverty, and tends to the general welfare. 3000 w. N Am Rev—May, 1898.

Machinery—Labor-Saving, Labor-Creating or Labor-Killing? Alberta A. Field. An argument against ideas advanced in a work by J. Howard Moore, of Chicago, entitled "Better World Philosophy." 2500 w. Sci Am Sup—April 14, 1900.

National Differences in Labor-Handling Methods. Hiram S. Maxim. The eastern portion of Europe is compared with the western and the western with the United States, the progress being from high individual skill and small production to highly improved tools and large production. Personal experiences in various parts of Europe are given. 8000 w. Eng Mag—Dec., 1897.

Is There Work Enough for All? William T. Harris. The article deals with the needed readjustment of vocations, due to mechanical invention and changed conditions. 4400 w. Forum—April, 1898.

See also **TRADE UNION; WORKS MANAGEMENT.**

**Naval Warfare.**—See **WARSHIP—Machinery.**

**Repairing.**—Machinery Repairing. F. A. Farnsworth. Gives suggestions for tempering, case-hardening, etc. Ill. 1000 w. Engr, U S A—July 1, 1899.

**Shock Prevention.**—Shock Prevention in Machinery. W. H. Atherton. The various methods of preventing shock formerly used and now in use are briefly set forth, with some general remarks on each method. 2200 w. Mech Wld—Oct. 23, 1896.

**Swiss Trade.**—The Swiss Machinery Trade in 1897. H. L. G. Reports a very flourishing condition. 600 w. Am Mach—Sept. 29, 1898.

**MACHINE SHOP.**

See also **ENGINE WORKS; FACTORY; MACHINERY; MACHINE TOOL; WORKS MANAGEMENT.**

Cost Keeping—Some Large Air Hoists—A Right-Angle Coupling—A Rack Cutter—The Centers of Arbors. S. T. Freeland. Brief consideration of subjects named. 2600 w. Am Mach—Nov. 12, 1896.

Some Features of a Modern Shop—Casting Storage, Stock Room, Points About Scraping. S. T. Freeland. Illustrated description of some features in a Cincinnati shop. 2000 w. Am Mach—Nov. 26, 1896.

Tool Room Equipped from the Scrap Pile—Substitute for Chalk—Book of Blueprints—Belt Diagram. S. T. Freeland. Practical hints upon topics named in title. 2000 w. Am Mach—Sept. 24, 1896.

**American.**—A Modern American Shop. Description of some of the machines and operations seen during a recent visit to the works of the Mossberg & Granville Manufacturing Company. Ill. 1800 w. Mach, N. Y.—Sept., 1897.

**Arthur Company, N. Y.**—Some Interesting Notes Taken in the Shops of the Arthur Company, New York. Illustrated description of interesting tools and appliances, and of model work. 2000 w. Mach, N. Y.—Jan., 1900.

**Austria.**—A "Fin-de-Siecle" Machine Shop. Fred. Bathurst. Describes and illustrates machines in a fine shop in Austria. Serial. Elec Rev, Lond—Aug. 18, 1899.

**Basement Floors.**—Basement Floors for Machine Shops. Jno. E. Sweet. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

**Bethlehem Steel Company.**—The Shops of the Bethlehem Steel Company. Illustrations and descriptions of some of the notable tools used for machining the forgings. 2000 w. Mach, N. Y.—Nov., 1899.

**Bridge.**—See **MACHINE TOOL.**

**British.**—Some Special Features Seen in British Workshops. John E. Sweet. A very interesting account given by a keen observer and closing with a warm tribute to the genius of Peter William Willans, whose death was a loss to the entire world. 2500 w. Mach—Feb., 1896.

**Brussels, Bollinckx.**—A Belgian Engine Shop. F. J. M. An account of the establishment of H. Bollinckx, of Brussels, Belgium. Ill. 1100 w. Am Mach—Oct. 14, 1897.

**Bullard, Bridgeport, Conn.**—Enlarged Plant of the Bullard Machine Tool Co.—Striking Examples of Jig Work. Illustrated description of interesting features in this shop at Bridgeport, Conn., its fittings, methods, etc. 2800 w. Mach, N. Y.—May, 1900.

**Chemnitz, Germany.**—A Notable German Tool Shop. F. J. M. Illustrated description of the shops of J. E. Reinecker, Chemnitz, Germany, and the methods employed there. 2500 w. Am Mach—Nov. 3, 1898.

**Cincinnati.**—Cincinnati Milling Machine Co.'s Shops. E. M. Chace. Illustrated detailed description of these shops and their management. 2300 w. Mach, N. Y.—Sept., 1900.

Some Points of Practice Seen in the Shops of the Cincinnati Milling Machine Co. F. J. M. Describes an index worm-wheel testing machine, an arrangement of overhead rail for lathes, arrangement of rail and hoist for drill-presses, graduating machine, and machine for marking figures. Ill. 2500 w. Am Mach—March 16, 1899.

**Compressed Air.**—See also **COMPRESSED AIR—Machine Shops.**

**Electric Driving.**—See **ELECTRIC DRIVING.**

**Electric Machinery.**—Electrical Machine Shop Practice. James F. Hobart. The first of a series of articles giving a description of shop practice as exemplified in the construction of electrical machinery. Serial. Elec Eng—June 23, 1897.

**Electric Works.**—See also **ELECTRIC WORKS.**

**Electric Works, Norwich, Eng.**—Gothic Works, Norwich, England. Illustrated description. 1700 w. Engr, Lond—June 8, 1900.

**Garvin, New York.**—One of the Modern Shops. Illustrated description of the new shops of the Garvin Machine Co., at Spring and Varick streets, New York. 1300 w. Mach, N. Y.—July, 1897.

**General Electric, Schenectady.**—The Most Perfect Machine Shop. S. D. V. Burr. Illustrated detailed description of Building No. 16 of the Schenectady Works of the General Electric Co. 4000 w. Ir Age—Jan. 4, 1900.

**German.**—German Workshops. Impressions of the writer with comments. 1600 w. Mach, N. Y.—Sept., 1897.

**Gisholt, Madison, Wis.**—The New Works of the Gisholt Machine Company. Illustrated detailed description of recently built works. 1000 w. Am Mach—April 12, 1900.

**Hendey Machine Co.**—The Shops and Manufacturing Methods of the Hendey Machine Company. Illustrated detailed description of shops located at Torrington, Conn. 5400 w. Mach, N. Y.—Oct., 1900.

**Lamson, Springfield, Vt.**—See **LATHE—Turret.**

**Landis Tool Co.**—The Shops of Landis Tool Company. Illustrated description. Serial. Am Mach—May 25, 1899.

**Lane & Bodley, Cincinnati.**—Some Considerations Affecting the Location and Design of Machine Shops. Concerning the new shops of the Lane & Bodley Co., of Cincinnati, Ohio. 1500 w. Am Mach—Sept. 28, 1899.

**Leeds, Eng.**—An English Engineering Shop and Some of Its Products. F. J. M. Describes the shop of Joshua Buckton & Co., of Leeds, and the work done there, giving illustrations of machines. 2700 w. Am Mach—Nov. 4, 1897.

**Lodge & Shipley, Cincinnati.**—New Shops of the Lodge & Shipley Machine Tool Company. Illustrates and describes five new shops in Cincinnati. 800 w. Am Mach—April 19, 1900.

**Loewe, Berlin.**—A Modern Machine Works (Eine Moderne Maschinenfabrik). A description of the new works of Ludwig Loewe & Co., in Berlin, with many illustrations. 4000 w. Zeitschr d Ver Deutscher Ing—Sept. 30, 1899.

Some Methods and Characteristics of a Berlin Tool Shop. Illustrated description of details of shop practice at the works of Ldw. Loewe & Co. Serial. Am Mach—Sept. 6, 1900.

The New Workshops of Ludw. Loewe & Co., in Berlin. Historical and descriptive account. Ill. Serial. Am Mach—Sept. 28, 1899.

See also **MACHINE TOOL.**

**Manchester.**—Some Notes from an English Shop. James Vose. Illustrated description of the works of Meldrum Bros., Manchester, Eng., with the methods and tools in use. 3000 w. Mach, N. Y. —Sept., 1897.

Some Points of Practice from a Manchester Shop. F. J. M. The points illustrated and described were gathered from the establishment of Hans Renold, of Manchester, Eng. The principal business is the manufacture of transmission chains. 2500 w. Am Mach—Feb. 23, 1899.

**Milan, Italy.**—The Shops and Products of Brioschi Finzi & Co., Milan, Italy. Illustrated description of five shops, the chief products being electric generators and motors. 900 w. Am Mach—Aug. 17, 1899.

**North Chelmsford, Mass.**—Observations in an Old Shop. Shop of the Silver and Gay Co., North Chelmsford, Mass. One of the pioneer shops of this country, established in 1832. Differences between tools of sixty years ago and those of present date are noted. Ill. 1100 w. Mach—Feb., 1896.

**Old.**—Some Recollections of Machine Shops in the Early Forties. Washington Jones. These reminiscences will be interesting to all mechanical engineers, especially so to the older members of the profession who have lived to see the enormous progress made since the period named. 1700 w. Am Mach—Nov. 14, 1895.

**Oerlikon.**—Maschinenfabrik Oerlikon. Detailed description. 2500 w. Engng—Oct. 20, 1899.

**Prague.**—A Modern Machine Shop (Eine Moderne Maschinenbauwerkstätte). Prof. Theobald Demuth. An illustrated account of the new shop of Kolben & Co., at Prag-Visocan. Nearly all the machine tools are driven by independent motors; electric cranes are used, and all the arrangements are of the most recent types. 3500 w. Zeitschr d Ver Deutscher Ing—Oct. 23, 1897.

**Ranelagh, Ipswich.**—The Ranelagh Works, Ipswich. Illustrated description of fine English shops and their equipment. 3500 w. Engng—Feb. 9, 1900.

**Rearrangement.**—Locating Tools in a Reconstructed Shop. A description of the location of tools and the appliances for handling and machining the various parts of engines. 1100 w. Am Mach—March 1, 1900.

**Saw-Tooth Roof.**—See **ROOF—Saw-Tooth; WEAVE SHED.**

**Saxony.**—A Model Saxon Shop. Illustrated description of the shops of J. E. Reinecker, Gablenz-Chemnitz (Saxony). 1200 w. Mach, N. Y.—Nov., 1897.

**Shafting.**—See **POWER TRANSMISSION; SHAFTING—Tables.**

**Spacing Hole Table.**—See **DIVIDING WHEEL; INDEX PLATE.**

**Stockholm, Atlas.**—The New Atlas Works, Stockholm. Illustrated detailed description. 2000 w. Am Mach—Nov. 30, 1899.

**Toledo, Ohio.**—Shops of Baker Brothers, Toledo, Ohio. Illustrated detailed description of new works made necessary by growing business. 1200 w. Am Mach—Dec. 14, 1899.

**United States at Paris.**—See **PARIS EXPOSITION—U. S. Machinery Building.**

**Wells, Greenfield, Mass.**—Shops of Wells Brothers, Greenfield, Mass. Interesting views and brief description of an establishment for the manufacture of taps and dies and screw-cutting appliances. 500 w. Am Mach—May 3, 1900.

**Young Mechanics.**—Shop Talks with the Young Mechanics. W. H. Van Dervoort. The first of a series of talks aiming to present some points relating to tools and their correct and efficient use. Part first deals with the hammer and cold chisel. Ill. Serial. Mach, N. Y.—Jan., 1898.

See also **EDUCATION.**

**MACHINE TOOL.**

See also **BORING; DRILL; GEAR CUTTING; LATHE; MACHINE; MACHINERY; MACHINE SHOP; MILLING MACHINE; PLANER.**

A Tap-Threading Lathe, Threading Tool and a Grooving Fixture. Illustrated description of tools. 1000 w. Am Mach—Jan. 4, 1900.

Criticisms on the General Construction of Machine Tools. A. R. Bellamy. Read before the Manchester (Eng.) Assn. of Engs. 4500 w. Am Mach—July 5, 1900.

Machine Tools (Les Machines-Outils). G. Richard. Elaborately illustrated articles upon improvements in machine tools since 1895; especially devoted to American lathes and milling machinery. Four articles. 28000 w. Revue de Mécanique—Feb., Apr., June, Oct., 1897.

Machine Tools. J. Richards. Part first consists of general remarks introductory to a review and criticism of the practice. 2200 w. Am Mach—April 27, 1899.

Machine Tools from Another Point of View. J. W. Gardner. Reference is made to a paper presented by William Forsythe on this subject, and a discussion of the way to get any reliable information of the efficiency of machine tools, with statement of the conditions existing in railroad shops. 1800 w. Ry Mas Mech—Oct., 1897.

Milling Spirals in the Lathe.—Tools for Grooving Cams in the Drill Press. A. H. Cleaves. Illustrated description of practices of value. 1500 w. Am Mach—Jan. 27, 1898.

**Amateurs'.**—Some Amateurs' Machine Tools in England. F. J. M. Illustrates and describes tools built for the use of amateur mechanics by the firm of G. Birch & Co., England. 2100 w. Am Mach—April 27, 1899.

**American.**—American Machine Tools Criticised by an English Engineer. H. Austin. Letter to the editor calling attention to imperfection in American tools. Also editorial comment. 1400 w. Am Mach—March 25, 1897.

American Machine Tools. Editorial comment on the higher perfection of light machine tools made in America. 1600 w. Engng—Dec. 18, 1896.

American Machine Tools. Information concerning shop practice, with illustrated detailed descriptions of many of the tools. Serial. Engr, Lond—Feb. 16, 1900.

American Machine Tools and Other Products as Seen Through Foreign Eyes. Substance of an interview with Herr Von Meyenburg, a Swiss engineer, with editorial. Claims that American tools are better, but machines inferior. 2800 w. Am Mach—March 4, 1897.

**American-German vs. British.**—Machine Tools, with Special Reference to American and German Practice as Compared with English. Arthur Greenwood. Read before the Engng. Conference of the Inst. of Civ. Engs., England. Discusses the tools under four classes—planing machines, lathes, milling machines and automatic. Discussion. 3800 w. Engr, Lond—April 23, 1899.

**American vs. British.**—English and American Machine Tools. T. Wood Meakin. Points in which, in the opinion of an English engineer, American tools might be better adapted to the needs of English shops. 2400 w. Mod Mach—April, 1899.

English and American Machine Tools. Editorial on the work done by American automatic machine tools, and the serious nature of American competition in this line. 1800 w. Engr, Lond—Dec. 2, 1898.

British and American Machine Tools. Part first is a comparison of the conditions surrounding the trade. Serial. Engr, Lond—Oct. 27, 1899.

English and American Machine Tools. Extracts from a discussion in the London "Engineer" as to the relative merits of British and American tools. 5500 w. Ir Age—Jan. 26, 1899.

Machine Tools. Ewart C. Amos. Abstracted from a paper read before the Soc. of Engs. Considers the distinctive features of modern tools and compares British and American tools. 3300 w. Mech Wld—April 21, 1899.

See also **ENGINEERING COMPETITION.**

**Balancing Apparatus.**—See **TESTING.**

**Band Saws.**—Band Saws for Metal Work. Translated and condensed from "Zeitschrift des Vereines Deutscher Ingenieure," by Gus C. Henning. Illustrates and describes forms of band saws used in some of the most famous shops, and presents the features of current practice with these tools. 3800 w. Am Mach—Nov. 5, 1896.

See also **BAND SAWING.**

**Bending Yokes.**—Machine for Bending Drawbar Yokes. Illustrated description. 400 w. Loc Engng—Feb., 1897.

**Bicycle.**—The Machine Tools at the Fourth Cycle Salon (Les Machines-Outils au quatrième Salon du Cycle). An illustrated description of bicycle tools, mostly of American design. 2500 w. La Revue Technique—Dec. 25, 1896.

See also **BICYCLE MANUFACTURE.**

**Boring.**—See also **BORING.**

**Boring, Milling and Tapping.**—A New Device for Boring, Milling and Tapping (Ein Neues Verfahren zu Bohren, zu Fräsen, und mit Gewinde zu Versehen). E. Capitaine. Describing and illustrating an improved portable tool arranged to be clamped to work in any part of the shop, thus avoiding the handling of heavy pieces. 2000 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 1898.

**Bridge Shops.**—Notable New Bridge-Shop Machines. Illustrated description of modern tools and the power application used. 2800 w. Bridges—May, 1899.

**British.**—Machine Tools. Editorial on the development of the automatic tool in England, sure to follow the present dispute in the engineering trade. 1300 w. Engr, Lond—Oct. 8, 1897.

Machine Tools in the Future. A tool-maker discusses the attitude of buyer to seller in England, making suggestions and aiming to influence buyers to depend on home manufacture. 1500 w. Engr, Lond—Dec. 17, 1897.

See also **American vs. British.**

**Chips.**—The Making of Chips. Tecumseh Swift. Suggests a line of investigation of metals. 1600 w. Am Mach—Feb. 4, 1897.

See also **CHIPS.**

**Compressed Air.**—See **COMPRESSED AIR—Machine Tools.**

**Construction and Manipulation.**—Machine Tools—Their Construction and Manipulation. W. H. Van Dervoort. Aims to bring out clearly the principal points of construction and methods of operation. Ill. Serial. Mach, N. Y.—Aug., 1899.

**Copy Work.**—Copy Work. A dissertation on standard guides for controlling cutters. 2000 w. Eng, Lond—Oct. 9, 1896.

**Design.**—Speeds and Feeds of Machine Tools. C. C. Stutz. Suggestions for machine tool designers, with explanation of a simple and quick method for obtaining a geometrical progression of speeds and feeds in machine drives. Ill. 3500 w. Mach, N. Y.—May, 1899.

See also **MACHINE DESIGN.**

**Drill.**—See also **DRILL.**

**D-Drills and Wood Reamers.**—D-Drills and Wood Reamers. John Randol. Illustrated description of tools which have almost disappeared from modern machine shops, but have acquired great importance in the production of built-up guns. 2300 w. Am Mach—Jan. 14, 1897.

**Drill Feeds and Epicyclic Gearing.**—Novel Examples of Drill Feeds and Epicyclic Gearing. Illustrated description. 1700 w. Mach, N. Y.—Feb., 1900.

**Drilling and Tapping.**—Drilling and Tapping Machine. A. H. Cleaves. Illustrated detailed description. 800 w. Am Mach—Dec. 22, 1898.

**Drill Jigs.**—Hints on the Design of Drill Jigs and and Milling Fixtures. E. H. Dodge. 1400 w. Am Mach—Sept. 6, 1900.

See also **DRILL JIG.**

**Electric Driving.**—See **Trieste Arsenal; ELECTRIC DRIVING.**

**Engine Bed and Cylinder.**—Bed and Cylinder Tools—"Straight Line" Engine Shop, Syracuse. Herman Landro. Illustrated description both of shop and tools employed in the manufacture of the "straight line" engine. 2000 w. Am Mach—April 30, 1896.

Engine Bed and Cylinder Tools. Herman Landro. Illustrated description of an ingenious adaptation. 1700 w. Am Mach—Jan. 2, 1896.

**Error Limits.**—Specification of Error Limits for Machine Tool Construction. A. A. Fuller. Discusses the importance of specifying the quality of workmanship. 1800 w. Am Mach—Sept. 16, 1897.

**French.**—See **Paris Exposition.**

**Gear Cutting.**—See also **GEAR CUTTING.**

**Geneva Stop.**—Three Modifications of the Geneva Stop. Illustrated description of three modifications of the device used in watches to prevent over-winding which have been recently applied by Hugo Bilgram to various automatic machines. 1500 w. Am Mach—June 30, 1896.

**Grinding.**—See also **GRINDING.**

**Grinding and Milling.**—Grinding Machines and Milling Machines for Locomotive Frames (Schleifmaschine und Lokomotivrahmen Fräsmaschine). Giving illustrations of the tools made by Collet & Eglehard, of Offenbach a|M, and notable chiefly by the closeness with which they have followed American models. 5000 w. Zeitschr d Ver Deutscher Ing—June 5, 1897.

**Hydraulic.**—Liquid Operated Machine Tools. F. Thornely. Illustrated description of a hydraulic vertical planer, and of a proposed water motor system. 400 w. Am Mach—March 15, 1900.

Liquid Operated Machine Tools. H. A. Coombs. A review of patents showing what has been accomplished in this line. 2500 w. Am Mach—Feb. 1, 1900.

See also **HYDRAULIC MACHINERY.**

**Lathe.**—See **LATHE.**

**Leipzig Exhibition, 1897.**—Machine Tools at the Leipzig Exhibition 1897 (Werkzeugmaschinen in der Gewerbeausstellung zu Leipzig, 1897). Hermann Fischer. The first installment of a description of recent German machine tools. The Chemnitz makers have followed American models closely. Serial. Zeitschr d Ver Deutscher Ing—July 17, 1897.

**Loewe, Berlin.**—The Loewe Machine Tools at the Berlin Exhibition (Les Machines-Outils Loewe à l'Exposition de Berlin). Description, with excellent illustrations, of some of the copies of American machine tools. 3500 w. Révue Technique—Nov. 10, 1896.

See also **MACHINE SHOP.**

**Manchester.**—Some Manchester Tools. James Vose. Photographs and particulars of several machine tools built by Messrs. Beyer, Peacock & Co., Limited, which have attracted attention by reason of their efficiency. 1000 w. Am Mach—Aug. 31, 1899.

**Metal Resistance.**—See **Work.**

**Micrometer Testing.**—Testing Machine Tools with the Micrometer Caliper. Theodore H. Miller. Presents a few of the many ways that the micrometer caliper can be applied for the purpose of making tests of the accuracy of machine tools. Ill. 1200 w. Mach—April 21, 1898.

See also **CALIPER; MICROMETER'S GAUGE.**

**Milling Machine.**—See **MILLING MACHINE.**

**Navy Yard, Brooklyn.**—Machine Tools to Be Installed in the New Building at New York Navy Yard. A complete list. 800 w. Am Mach—July 20, 1899.

**Newton, Philadelphia.**—Some American Machine Tools. Illustrations and descriptions of machines built by the Newton Machine Tool Works of Philadelphia. 2000 w. Eng, Lond—Jan. 15, 1897.

**Paris Exposition.**—Machinery at the Universal Exposition of 1900 (Les Machines à l'Exposition Universelle de 1900). B. de Priène. A discussion of recent progress in machine tool design, urging a full exhibit of French tools at Paris in 1900. 2000 w. La Revue Technique—October 10, 1897.

Machine Tools at the Paris Exposition (Die Weltausstellung in Paris, 1900, Werkzeugmaschinen). Hermann Fischer. A general review of the machine tool exhibits at the Exposition. Serial. Zeitschr de Ver Deutscher Ing—July 7, 1900.

Paris Exhibition. Machine Tools. Part first gives an illustrated description of the exhibit of Smith & Coventry, Limited. Serial. Engr, Lond—Aug. 24, 1900.

**Pipe Cutters.**—Inside Pipe Cutters. E. J. Prindle. Illustrated description of various forms of this tool. 1700 w. Loc Engng—May, 1897.

**Planer.**—See **PLANER.**

**Power Consumption.**—Electrical Tests of Power Required by Machines for Working Structural Steel, at the Pencoyd Iron Works. Tests of machines operated by individual motors, and of machines operated by motor and line shaft. 1200 w. Am Mach—May 21, 1896.

Electrical Tests of Power Required by Metal-Working Machinery at the Navy Yard, Washington, D. C. O. G. Dodge. Tests of vertical boring machines and planing machines. 900 w. Am Mach—Oct. 8, 1896.

Power Required for Driving a Pipe-Threading Machine, a Boring Bar and a Roll-Turning Lathe. J. S. Cox. A record of tests of pipe threading machines made to ascertain the power required for cutting off, and for cutting threads on different sizes of pipes. 250 w. Am Mach—May 7, 1896.

The Horse-Power of Machine Tools. C. H. Benjamin. A summary of the results of many tests to determine the power required to drive machine tools and shafting. 1500 w. Mach, N. Y.—March, 1899.

The Productive Capacity of Machine Tools (La Production des Machines-Outils). MM. Huillier & Fremont. A valuable paper, giving the results of dynamometric tests upon various tools, showing the power required for the production of a given result. 8000 w. Bull de la Soc d'Encour—April, 1899.

See also **ELECTRIC DRIVING.**

**Press and Slotter.**—Two Valuable Shop Tools.—L. & N. Ry. Illustrated description of a 25-ton hydraulic press, and a drill-press link-slotter used in the Louisville shops of this road. 1400 w. Ry Mas Mach—May, 1897.

**Punching and Shearing.**—Punching and Shearing Machines. From "Revue Industrielle." Illustrated description of a combined punching and shearing machine, and a simple shearing tool for profiled iron and steel. 1000 w. Sci Am Sup—July 10, 1897.

**Railway Shop.**—See **RAILWAY SHOP.**

**Reconstruction.**—In the Shops. Illustrated description of the reconstruction of old machines for the performance of special work. 600 w. Ry Age—May 7, 1897.

**Screw-Swaging.**—Some Forms of Screw-Swaging Machines. Illustrated description of the machines and of their operation. 900 w. Ir Age—Nov. 26, 1896.

**Solder.**—Accurate Work on Lathe and Planer by Use of Solder. A. H. Cleaves. Illustrated description of methods. 1000 w. Am Mach—Dec. 31, 1896.

**Spain.**—Machine Tool Trade in Spain. J. H. Ball. Relates the conditions in Spain, and gives practical points on trade. 1700 w. Am Mach—Sept. 27, 1900.

**Stanley Show, London.**—Machine Tools at the Stanley Show. Illustrated account of such machines as were shown for the first time. 5700 w. Engng—Nov. 24, 1899.

Some Machine Tools at the Stanley Show. Illustrates and describes a variety of automatic machines exhibited. 6000 w. Engr, Lond—Nov. 17, 1899.

**Steel Working.**—The Working of Steel (Ueber Stahlwechsel). Hermann Fischer. Discussing especially modern machine tools for the rapid production of duplicate work in steel with sketches of details from the practice of various countries. 7500 w. Zeitschr d Ver Deutscher Ing—June 26, 1897.

**Swedish.**—A Swedish Worm Wheel Cutting Machine and a Swedish Lathe. John E. Sweet. Illustrates and describes an interesting machine for cutting accurate worm gears of any size and pitch. 900 w. Am Mach—March 10, 1898.

**Templates.**—A New Method of Boring, Milling, and Tapping Machine Frames by Use of Templates. E. Capitaine. From the "Zeitschrift des Vereines Deutscher Ingenieure." Illustrates and describes a special portable tool. 2000 w. Ir Age—Jan. 26, 1899.

**Trieste Arsenal.**—Electrically Driven Machine Tools for Naval Construction. Illustrated description of a number of portable tools recently introduced into the arsenal of the Austrian Lloyd's at Trieste. 500 w. Engng—Sept. 4, 1896.

**Turret Head.**—See **LATHE—Turret.**

**Universal.**—Universal Boring, Drilling and Milling Machine. Illustrated description of a piece of heavy-tool construction recently supplied by Bement, Miles & Co. to the Bethlehem Iron Co. 1000 w. Am Mach—May 6, 1897.

**Valuation.**—The Valuation of Machine Tools. Editorial on the methods of estimating the value of machine shop equipment. 1000 w. Am Mach—Sept. 30, 1897.

**Work.**—The Resistance of Metals to Machining (Die Grösse der Widerstände gegen das Abheben von Metallspänen). An investigation into the resistance of metals to planing, boring, turning, etc., based upon experimental data, for use in determining the proportions of machine tools. 5000 w. Zeitschr d Ver Deutscher Ing—May 1, 1897.

The Work of Machine Tools. An abridged translation of a paper contributed to the "Bulletin de la Société d'Encouragement pour l'Industrie Nationale." An account of investigations of Messrs. F. Hillier and Ch. Frémont. 2500 w. Engr, Lond—Nov. 17, 1899.

See also **METAL WORKING.**

**MACHINE TOOL WORKS.**

**Coventry, Eng.**—Herbert's Machine-Tool Works. Describes and illustrates these well-planned works, designed for the production of machine tools. 2800 w. Engng—Dec. 30, 1898.

**Niles.**—The Niles Tool Works. History with illustrated detailed description of the present works in Cincinnati, O. 2500 w. Ir Age—March 24, 1898.

**MACHINE WORK.**

**War Material.**—Illustrations of Machine Shop Work on War Material. Many illustrations with brief notes. Describes the Buffington-Crozier disappearing gun carriage, breech-loading rifled mortars, etc. 1800 w. Am Mach—May 5, 1898.

**MACHINE WORKS.**

See **ELECTRIC WORKS; ENGINE WORKS; LOCOMOTIVE WORKS; MACHINE SHOP; MACHINE TOOL WORKS.**

**MADAGASCAR.**

The Economic Conditions of Madagascar. A statement of prevailing conditions, public works, trade, productions, etc. 2500 w. Bd of Trd Jour—Aug., 1897.

The Trading Ports of Madagascar. Information concerning the principal trading ports of the island, communication by steamer, etc. 2000 w. Bd of Trd Jour—May, 1898.

Ways of Communication and Means of Transport on Madagascar (Madagascar. Voies de Communications et Moyens de Transport). J. J. Marie. A report of a committee of the Société des Ingenieurs Civils de France, with critical comments by the "Moniteur Industriel." Serial. 2 parts. 10000 w. Moniteur Industriel—June 9, 16, 1900.

Ways of Communication and Methods of Transportation in Madagascar (Commission des Etudes Coloniales. Voies de Communication et Moyens de Transport à Madagascar). J. J. Marie. A general review of present systems on the island and proposed improvements, with maps. 10000 w. 1 plate. Mem d l Soc d Ing Civils de France—No. 9, 1900.

**Engineering.**—Engineering in Madagascar. A brief account of the exploring operations of an expedition, the difficulties, accidents and delays. 1700 w. Eng, Lond—Aug. 27, 1897.

Engineering Work in Madagascar (Les Travaux du Génie a Madagascar). Col. Fix. Giving an interesting account of the engineering work planned and partly executed by the French military engineers. Two articles. 5000 w. Revue Technique—June 10, 25, 1897.

**Public Works.**—Public Works in Madagascar (Les Travaux Public à Madagascar). A. Dumas. A full account of the highway, railway, and harbor improvements initiated by the French Government; with map of the railway from Tamatave to Tananarive. 8000 w. 1 plate. Génie Civil—Feb. 24, 1900.

**MAGNALIUM.**

See also **ALUMINUM ALLOY.**

Magnalium. Translated from "Neueste Erfindungen und Erfahrungen." An interesting description of a new alloy, composed of aluminum and magnesium. 1800 w. Ir Age—Aug. 23, 1900.

**MAGNESITE.**

The Magnesite Industry. Solon J. Vlasto. Concerning the production and uses. Ill. 1200 w. Eng & Min Jour—March 10, 1900.

### MAGNESIUM.

**Constructive Material.**—Magnesium as a Constructive Material. R. H. Thurston. The author regards magnesium as a possible rival of aluminum in alloys for use in the arts, and gives reasons for this opinion. 2700 w. Mach—May, 1896.

### MAGNET.

See also **ELECTROMAGNET; ELECTRO-PHYSICS; MAGNETIC; MAGNETISM.**

**Steel Works.**—See **ELECTROMAGNET.**

### MAGNETIC CONCENTRATION.

See **MAGNETIC SEPARATION.**

### MAGNETIC FIELD.

See also **ELECTROMAGNET; ELECTRO-PHYSICS; MAGNETIC FLUX.**

Principles of the Magnetic Field. Frederick Bedell. A study of the magnetic circuit, giving particular attention to its action in connection with alternating currents, as given in the first number. Serial. Elec Pow—March, 1896.

**Bipolar Dynamo.**—The Magnetic Field of a Bipolar Generator (Das Magnetfeld einer Zweipoligen Dynamo-Maschine). Dr. H. Hess. The distribution of the lines of force is very well shown by reproductions of iron-filing patterns, and the difference in action between a dynamo and a motor explained. 1500 w. Elektrotech Zeitschr—Nov. 17, 1898.

**Coils.**—On the Magnetic Fields of Coils. W. H. Everett. Proof of necessary formulae and some examples of their use. 2500 w. Elec Eng, Lond—Jan. 8, 1897.

See also **Rectangular Coil.**

**Hollow Cylinder Interior.**—The Magnetic Field in the Interior of a Hollow Cylinder Traversed by a Current (Sur le Champ Magnétique à l'Interieur d'un Cylindre Creux Parcouru par un Courant). W. de Nikolaieve. A short communication to the French Academy showing the author's demonstration of the existence of a magnetic couple in the interior of a tubular current. 600 w. Comptes Rendus—July 24, 1899.

**Longitudinal Current.**—On the Magnetic Field Due to a Current in a Wire Placed Parallel to the Axis of a Cylinder of Iron. G. F. C. Searle. An account of investigations made considering first the case of a cylinder of infinite radius. Serial. Elect'n, Lond—Jan. 28, 1898.

**Measurement.**—Apparatus for Measuring Magnetic Fields (Apparat zur Messung Magnetischer Felder). Dr. Bruger. A flat spiral of bismuth is used, the change of resistance becomes a measure of the magnetic strength. 800 w. Elektrotech Zeitschr—Jan. 20, 1898.

New Method of Measuring the Intensity of Magnetic Fields (Nouvelle Méthode pour la Mesure de l'Intensité des Champs Magnétiques). M. E. Bouty. A liquid conductor is used in connection with the Lippman capillary electrometer. 1200 w. Comptes Rendus—Jan. 17, 1898.

See also **ELECTRIC MEASUREMENT.**

**Plane.**—The Magnetic Force at Any Point in a Plane Due to Electric Currents. Alexander Russell. An interesting graphical method, easily applied in practice with perfectly satisfactory results. 800 w. Elect'n—Nov. 8, 1895.

**Rectangular Coil.**—The Magnetic Field of a Rectangular Coil. G. M. Minchin. Showing how to calculate practically the component of magnetic force parallel to the axis of a coil of any dimensions at any point in space, and also the value of the potential due to any flat rectangular coil. 2200 w. Elect'n—Nov. 8, 1895.

**Rigidity Increment.**—The Magnetic Increment of Rigidity in Strong Fields. Howard D. Day. Treats of the increase of resistance to torque, produced by magnetization of twisted wires of various diameters, when the magnetic field increases to many times the amount needed to bring out the ordinary magnetic saturation. 2500 w. Am Jour of Sci—June, 1897.

**Rotary.**—On Oscillatory and Rotary Magnetic Fields, and the Theory of the Single-Phase Motor. Michael B. Field. An investigation of the analysis and synthesis of various forms of magnetic fields, with the view of arriving at a satisfactory standpoint from which to attack the theory of the single-phase motor and to develop an approximate method for calculating the same. Serial. Elec Rev, Lond—Feb. 10, 1899.

The Rotating Magnetic Field. Henry H. Norris. The discussion is confined to the primary circuits and the magnetomotive forces and consequent magnetic induction produced therein. 2000 w. Sib Jour of Engng—Dec., 1898.

### MAGNETIC FLUX.

See also **ELECTROMAGNET; ELECTRO-PHYSICS; MAGNETIC FIELD.**

**Cathode Rays.**—Application of Cathode Rays to the Study of Variable Magnetic Flux (Application des Rayons Cathodiques à l'Etude des Flux Variables). M. Aliamet. An illustrated description of Prof. Angström's method of studying changes in a magnetic field by means of its effects upon a cathode discharge. 1000 w. Electricien—May 5, 1900.

See also **CATHODE RAYS.**

**Dynamo Design.**—See **DYNAMO DESIGN—Magnetic Flux.**

### MAGNETIC INDUCTION.

See also **HYSTERESIS.**

On an Approximate Linear Relation between Coercive Force and Maximum Cyclic Intensity in Iron and Steel. Edwin J. Houston and A. E. Kennelly. Results pointing to the existence of such relation. 900 w. Elec Wld—Nov. 16, 1895.

**Coefficients.**—On the Induction Coefficients of Hard Steel Magnets. B. O. Peirce. A short account of the way in which deflecting magnets were made, with tables giving approximate knowledge of the induction coefficients of various makes. 2000 w. Am Jour of Sci—Nov., 1896.

**Curve.**—A Proposal for Uniformity in the Arrangement of Induction Curves (Vorschläge zur Einheitlichen Darstellung von Induktionskurven). Dr. H. Kath. Suggesting the desirability of a uniform system, and advocating that of Siemens & Halske. 600 w. Elektrotech Zeitschr—June 23, 1898.

See also **DYNAMO—Characteristic; HYSTERESIS.**

**Short Soft Iron.**—Induction in Short Soft Iron Magnets. H. O. Eurich. A short summary of results obtained in a series of experiments at the electrical laboratory of the Yorkshire College, Leeds. 600 w. Elec Rev, Lond—Aug. 6, 1897.

### MAGNETIC OBSERVATORY.

See also **MAGNETIC SURVEYING; MAGNETISM—Terrestrial.**

**Electric Tramways.**—The Disturbance of Magnetic Observatories by Electric Railways (Ueber die Störungen Magnetischer Observatorien durch Electrische Bahnen). W. v. Bezold. Refers especially to the experience of the magnetic observatory at Potsdam, and shows that the permissible distance for electric railways is too close, also that position as well as distance should be considered. 2000 w. Elektrotech Zeitschr—June 16, 1898.

The Influence of Stray Currents from Electric Tramways Upon Magnetic Observatories (Untersuchungen des Einflusses der Vagabundirenden Ströme Elektrischer Strassenbahnen auf Erdmagnetische Messungen). J. Edler. A very full account of the investigations at the Potsdam observatory, with reproductions of the photographic records. 5000 w. Elektrotech Zeitschr—March 8, 1900.

The Influence of Vagrant Currents from Electric Tramways Upon Magnetic Observatories. J. Edler. Abstract translation from "Elektrotechnische Zeitschrift." An account of the investigations at the Potsdam observatory. Ill. 2000 w. Elect'n, Lond—April 20, 1900.

The Interference of Overhead Trolley Wires with the Work of Magnetic Observatories (Verhinderung einer Magnetischen Beeinflussung von Observatorien durch Benachbarte Elektrische Bahnen mit Oberirdischer Stromzuführung). S. Wächter. Referring especially to the action of the trolley lines in Strasburg, Alsace, upon the instruments in the observatory of the university. 1800 w. Elektrotech Zeitschr—Sept. 14, 1899.

See also **MAGNETISM—International Conference.**

**Toronto.**—The Toronto Magnetic Observatory. R. F. Stupart. An account of the establishment of the magnetic observatory in Canada, the buildings used, especially the one recently built. This building was made necessary as the observations at the Toronto observatory were seriously impaired by the trolley system. The greatest care was taken in its construction. 3000 w. Ter Mag—Dec., 1898.

Toronto Magnetic Observatory. The history of the establishment, and report of the troubles arising from recent electric light circuits, electric cars, iron-frame buildings, etc. 1400 w. Can Eng—March, 1898.

**MAGNETIC ORE.**

See also **IRON ORE.**

**Instruments for Discovering.**—See **MAGNETIC PROSPECTING.**

**MAGNETIC PERMEABILITY.**

See **MAGNETIC TESTING; MAGNETISM.**

**MAGNETIC PROSPECTING.**

**Sweden.**—Magnetic Methods of Prospecting in Sweden. From a report on the mining industry in Sweden, 1897, by Prof. Nordenström, of the Stockholm School of Mines. The instruments described have been utilized in all the mining districts and yielded valuable results, not only for iron, but also zinc, copper, nickel, and cobalt when mingled with magnetic minerals. 2400 w. Col Guard—Dec. 24, 1897.

Magnetic Surveying for Iron Ores. G. Nordenström. A discussion of the various methods of exploring for iron ores by use of the magnetic needle. The Thalén and Tiberg instruments especially are described. 2000 w. Elec Engr, Lond—Sept. 2, 1898.

Magnetic Methods of Prospecting for Iron Ores in Sweden. From a report on the mining industry of Sweden, 1897, by Prof. Nordenström, describing the instruments employed and the methods of using them. Ill. 2800 w. Mines & Min—Nov., 1898.

The Use of Magnetic Instruments for Discovering Magnetic Ore Deposits. G. Nordenström. On the use of these instruments in Sweden, showing the advantages and usefulness to be beyond question. Ill. 2000 w. Ir Age—April 13, 1899.

**MAGNETIC SEPARATION.**

See also **IRON MANUFACTURE—Concentration; Roasting.**

Notes on the Magnetization and Concentration of Iron Ore. William B. Phillips. Results obtained, with detailed description. 10500 w. Trans Am Inst of Min Engs—Nov., 1895.

Some Forms of Magnetic Separators, and Their Application to Different Ores. H. C. McNeill. Read before the British Iron and Steel Inst. Illustrates and describes some of the principal magnetic concentration plants of Sweden. 6000 w. Col Guard—Aug. 18, 1899.

The Development of the Magnetic Separator (Die Entwicklung der Magnetischen Aufbereitung). E. Langguth. A review of the history of early attempts to separate minerals by magnetism, and a discussion of the later methods applied in practice. 1800 w. Zeitschr f Elektrochemie—Dec. 7, 1899.

The Magnetic Concentration of Iron Ores (Elektromagnetische Aufbereitung der Eisenerze). A general review of the progress made in Germany and America. 3500 w. Stahl und Eisen—March 15, 1897.

The Magnetic Separation of Minerals (Triage Magnétique des Minerais). F. Schiff. A general discussion of the various methods which have been devised for the separation of minerals by the use of intense magnetic fields. 1 plate. 2000 w. Génie Civil—Jan. 14, 1899.

The Magnetic Separation of Non-Magnetic Material. H. A. J. Wilkens and H. B. C. Nitze. The object of the paper is to set forth the substance of previous statements, made orally at the Atlanta and Pittsburg meetings of A. I. M. E., embodying therewith additional information gained since that time, and a brief illustrated description of the method and means of the separation. 8400 w. Trans Am Inst of Min Engs—Sept., 1896.

The Principle of Electromagnetic Separation (Das Elektromagnetische Aufbereitungsprinzip). E. Langguth. A theoretical discussion. 3300 w. Zeitschr f Elektrochemie—April 5, 1900.

**Ball-Norton.**—The Magnetic Separation of Iron Ore. Clinton M. Ball. Derivation of a formulae for calculating richness of magnetites; description of the Ball-Norton Magnetic Separator, with some results of its working. 6000 w. Trans Am Inst of Min Engs—Nov., 1895.

**Edison.**—Edison Has Found How to Extract Iron Ore by Magnetism. An account of Edison's experiments, and the apparatus for separating iron ore from sand. 1400 w. Min Ind & Rev—March 18, 1897.

Edison's Revolution in Iron Mining. Theodore Waters. Illustrated description of the new application of electricity. 8500 w. McClure's Mag—Nov., 1897.

Magnetic Ore Separation at Edison, New Jersey, U. S. A. This interesting plant is illustrated and described, and information relating to its working is given. 3200 w. Engng—Nov. 12, 1897.

The Edison Iron Ore Concentrating Works at the Ogden Mines, Edison, N. J. Particulars of the works, methods and machinery. 1800 w. Eng News—Nov. 11, 1897.

See also **IRON MINE.**

**Folkmar Ore.**—The Magnetic Concentration of the Folkmar Red Iron Ore (Magnetische Concentration der Folkmarer Rotheisensteine). Stefan Farbaky. A discussion of the possibility of concentrating this large body of ore by the Wetherill process, with estimate of cost, etc. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 26, 1898.

**Groendal-Dellwik.**—The Groendal-Dellwik Process for the Concentration of Iron Ore. Dr. Leo, in "Stahl und Eisen." An account of the favorable results with a large deposit of lean magnetite in Finland, by the use of this process. 1600 w. Am Mfr & Ir Wld—April 28, 1899.

The Magnetic Concentration of Iron Ores (Magnetische Anreicherung von Eisenerzen). Dr. Leo. A description of the Gröndal-Dellwik process of magnetization and magnetic concentration as operated at Pitkäranta in Finland. 1500 w. Stahl und Eisen—March 15, 1899.

**New Zealand.**—See **IRON MANUFACTURE.**

**North Carolina.**—Southern Magnetites and Magnetic Separation. Harvey S. Chase. Some results of experiments at the Cranberry Mines, N. C. Also representative analyses of N. C. and Tenn. iron ores. 2000 w. Trans Am Inst of Min Engs—Nov., 1895.

**Sweden.**—The Preparation of Phosphoretted Magnetite at Lulea, Sweden (Die Aufbereitung Phosphorreicher Magnetite in Lulea). The magnetic ore is separated from the apatite after crushing, by means of electro-magnetic separators. 1200 w. Zeitschr d Ver Deutscher Ing—Nov. 13, 1897.

See also **PHOSPHATE—Magnetic Iron Ore.**

**Wetherill.**—Concentration of Low-Grade Iron Ores. William B. Phillips. An account of difficulties encountered with this class of material, experiments and investigations. A future article will give an account of experiments with the Wetherill concentrating process. Serial. Eng & Min Jour—July 25, 1896.

Magnetic Preparation of Ores. M. Smits. From a paper prepared for the International Congress at Paris. An illustrated description of the Wetherill process. 1700 w. Col Guard—July 27, 1900.

The Mine Hill Ore Deposits in New Jersey and the Wetherill Concentrating Plant. J. P. Wetherill. History of the working of the ores of Sussex County, New Jersey, with description of plant, and account of suits against the company. Ill. Serial. Eng & Min Jour—July 17, 1897.

The Wetherill Magnetic Concentrating Process. H. B. C. Nitze. A process for separating various mineral and chemical substances, of such feeble magnetic permeability, that they have been heretofore generally considered as non-magnetic, from one another and from such accompaniments as are absolutely inert, by means of powerful and specially devised electro-magnets. Ill. 3800 w. Jour Fr Inst—April, 1897.

See also **Folkmar Ore.**

**MAGNETIC SHIELDING.**

Applications of Electromagnetic Screens (Applications des Ecrans Electromagnetiques). A discussion of the effects of screens of magnetic metals in various applications, showing the agreement of practical results with those indicated by theory. Two articles. 2500 w. Electricien—Oct. 8, 15, 1898.

Applications of Electromagnetic and Mechanical Shield Action (Anwendungen Elektromagnetischer und Mechanischer Schirmwirkung). H. du Bois. A mathematical discussion, with illustrations showing the shielding effect of various devices as indicated by iron filing figures. 3500 w. Elektrotech Zeitschr—June 16, 1898.

On Magnetic Shielding. H. du Bois. Part first is somewhat introductory, explaining what has been accomplished, and the need of a fuller treatment of the subject. Gives also the theory of spherical and cylindrical bi-lamellar sheaths. Serial. Elect'n, Lond—Dec. 10, 1897.

The Shielding Action of Iron Tubes (Ueber die Schirmwirkung von Eisenröhren). C. Feldmann and J. Herzog. A comparison between calculations and observations for tubes of various diameters and thicknesses. 1800 w. Elektrotech Zeitschr—Oct. 18, 1900.

**Conductors.**—Electromagnetic Phenomena in Connection with the Shielding, Exercised by Iron. of a Magnetic Field from One or More Conductors. James Russell. Gives experiments performed by the writer, with summary of conclusions drawn. 3300 w. Elect'n—Nov. 12, 1897.

Shielded Conductors. W. A. Price. Discusses some of the problems brought out by Mr. Mordey's paper on "Dynamos.' Ill. Serial. Elec Rev, Lond—Jan. 14, 1898.

The Magnetic Shielding of Conductors of Electricity. Ernest Wilson. Describes experiments made by the author, with the object of getting a practical demonstration of the disturbances to be dealt with under different conditions. 1600 w. Elect'n, Lond—Dec. 17, 1897.

**MAGNETIC SURVEYING.**

Magnetic Observations in Geological Mapping. Henry Lloyd Smyth. The results of experience in tracing magnetic rocks by means of the disturbances produced in the magnetic instruments used. The rocks mapped were the pre-Cambrian rocks, particularly the iron-bearing formations of Algonkian or Huronian age. 21400 k. Trans Am Inst of Min Engs—Dec., 1896.

The Engineering Value of Magnetic Surveys. William S. Aldrich. Abstract of paper presented at the annual meeting. Matters of interest and importance relating to the bearing of magnetic observations on engineering development. 1000 w. Jour Assn of Engng Soc—May, 1897.

**Atmospheric Influence.**—Atmospheric Influences on Magnetic Survey of Mines. H. W. Halbaum. Recounts a remarkable experience that can only be explained by the theory of atmospheric influence. 4000 w. Col Guard—Sept. 4, 1896.

**Iron Ores.**—See **MAGNETIC PROSPECTING.**

**MAGNETIC TESTING.**

See also **ELECTRIC MEASUREMENT; ELECTRIC TESTING; HYSTERESIS; MAGNETISM.**

Method of Testing the Magnetic Properties of Iron Used in the Manufacture of Electrical Apparatus. George Moffat. Remarks on the importance and usual methods, with description of instrument designed by the writer. 600 w. Am Mach—July 15, 1897.

**Ayrton-Mather.**—An Apparatus for Testing the Magnetic Permeability and Hysteresis of Iron. Illustrated description of apparatus exhibited by Professors Ayrton and Mather at the Royal Society Soirée, June 10. 900 w. Elec Wld—Aug. 29, 1896.

The Ayrton-Mather Portable Field Tester. Illustrates and describes an apparatus consisting of a search-coil and a ballistic galvanometer, and claiming to obtain angular deflections to 800 degrees. 700 w. Elec Wld & Engr—Feb. 10, 1900.

**D'Arsonval Galvanometer.**—The Reliability of Magnetic Tests Made with a d'Arsonval Ballistic Galvanometer. Samuel Sheldon and Townsend Cocks. Investigations which lead to the conclusion that the results are to be relied upon when the galvanometer is properly manipulated. 1000 w. Elec Wld—June 18, 1898.

**Du Bois.**—Investigations with the du Bois Magnetic Balance (Untersuchungen über die du Bois'sche Magnetische Waage). By means of the Du Bois balance the magnetic properties of various irons or steels may be precisely investigated, and graphical curves constructed from the results. 8500 w. Elektrotech Zeitschr—April 8, 1897.

**Ewing.**—A Magnetic Balance for Workshop Tests of Permeability. J. A. Ewing. Read before the Inst. of Elec. Engs., London. Describes an instrument the use of which requires no knowledge of electrical testing, and which gives useful information in an easy way. 1800 w. Elec, N. Y.—May 25, 1898.

Ewing's Magnetic Balance for Workshop Use (Ewing's Magnetische Waage für den Gebrauch in der Werkstätte). The methods of calibrating and applying the balance in practical work is discussed. 2000 w. Elektrotech Zeitschr—May 26, 1898.

Magnetic Tester for Sheet Iron. An apparatus devised by Professor Ewing is described, also the operation of testing. 1000 w. Sci Am Sup—Feb. 15, 1896.

Professor Ewing's Permeability Bridge. A magnetic invention for measuring permeability. The principle of action is to compare the sample to be tested, step by step with a standard bar, the B-H curve of which has been previously determined once for all. 1100 w. Elect'n—May 8, 1896.

Some Recent Developments in Magnetic Testing. Professor Ewing. Describes a special procedure in the ballistic test of bars. The object is to eliminate the error due to the magnetic resistance of the yoke in tests made with bars and yokes. 1400 w. Elect'n—Nov. 20, 1896.

**Hysteresis.**—See **HYSTERESIS.**

**Kath.**—The Kath Industrial Permeameter (Pérmeametre Industriel du Dr. Hubert Kath). MM. Allamet and Brunswick. The instrument is based upon that of Marcel-Deprez, and enables permeability to be determined within the limit required by practice. 2000 w. L'Electricien—Sept. 17, 1898.

**Knowles-Putnam.**—Design, Construction and Test of a Special Type of Permeameter. R. R. Knowles and F. W. Putnam. Sketch of the instrument, with illustration. 1400 w. Jour Worcester Poly Inst—July, 1899.

**Koepsel.**—Experiments with Koepsel's Apparatus for the Determination of the Magnetic Properties of Iron (Untersuchungen über den Koepsel'schen Apparat zur Bestimmung der Magnetischen Eigenschaften des Eisens). Dr. E. Orlich. An account of elaborate investigations made at the Reichsanstalt. The apparatus is a sort of reversal of the d'Arsonval galvanometer. 3000 w. Elektrotech Zeitschr—May 12, 1898.

**Poole.**—A Permeameter for Shop Service. Cecil P. Poole. Gives a design for a permeability testing machine which was found to be thoroughly satisfactory under trying conditions of shop practice. 900 w. Am Elect'n—Sept., 1899.

**heet Iron.**—Magnetic Tests of Sheet Iron (Die Magnetische Prüfung von Eisenblech). I. Epstein. An account of tests by practical and accurate methods, with tables, diagrams and illustrations. 2500 w. Elektrotech Zeitschr—April 19, 1900.

Investigations of Sheet Iron (Untersuchungen von Eisenblechen). W. Röhr. A detailed account of experimental tests of the magnetic properties of sheet-iron plates, with tables of data and results. The experiments were made both with direct and alternating currents. 3000 w. Eletrotech Zeitschr—Oct. 27, 1898.

See also **Ewing.**

See also **MAGNETISM.**

**Siemens-Halske.**—A New Magnetic Device of Messrs. Siemens & Halske (Ein Neuer Magnetisirungs-Apparat der Firma Siemens & Halske). Dr. H. Kath. A fully illustrated account of a new device for measuring the magnetic character of iron. 3500 w. Elektrotech Zeitschr—June 23, 1898.

The Siemens & Halske Magnetic Testing Apparatus. Dr. Hubert Kath. An abstract in English of the above paper. 1400 w. Elec Wld—July 30, 1898.

**Treat-Esterline.**—A New Magnetic Testing Apparatus. Robert B. Treat and J. Walter Esterline. Illustrated description of apparatus designed and constructed by the authors, at the laboratories of Purdue University, Lafayette, Ind. 1300 w. Elec Wld—Dec. 11, 1897.

**MAGNETIC UNITS.**

See **ELECTRIC UNITS.**

**MAGNETISM.**

See also **ELECTROMAGNET; ELECTRO-PHYSICS; HYSTERESIS; MAGNETIC.**

Magnetism. Forée Bain. Suggestions gained by practical observations. 1800 w. W Elect'n—Oct. 8, 1898.

Magnetism for Engineers. An article written for the benefit of engineers, who do not see things in the same light as the pure scientist, in an endeavor to elucidate some of those conceptions of the scientific mind which are a frequent cause of bewilderment to the electrical engineer. 3800 w. Elec Rev, Lond—March 26, 1897.

The Relation of Magnetism to Electricity. Charles R. Gibson. A review of investigations, describing experiments. Ill. 3500 w. Elec, Lond—Oct. 27, 1899.

Twenty-Five Years' Developments in Magnetism.

Andrew Jamieson. Historical Review. 2000 w. Elec Rev, Lond—Nov. 12, 1897.

**Chemical Action.**—See **ELECTRO-CHEMISTRY—Magnetism.**

**Constant vs. Variable.**—On the Difference Between Constant and Variable Magnetisation (Ueber den Unterschied Zwischen Stetiger und Unstetiger Magnetisirung). E. Gumlich and Erich Schmidt. A contribution from the National Laboratory in Berlin, giving the results of experiments, with tables. 1800 w. Elektrotech Zeitschr—March 22, 1900.

**Cosmical.**—Cosmical Magnetism and Electricity. Arthur Edgar Cotterell. An examination of magnetic phases, giving illustrative charts. 900 w. Elec Rev, Lond—Aug. 25, 1899.

See also **Terrestrial; ELECTRIC CURRENT—Earth.**

**Dynamo Materials.**—Magnetic Materials for Dynamos. Curves illustrating the present position of the chief magnetic materials in the three great classes of forgings, steel castings and armature stampings, with explanations. 1200 w. Elect'n—Sept. 17, 1897.

The Magnetic Elements of Dynamo Construction. J. Warren. A study of the laws of magnetism in their bearing on dynamo design. 2 parts. 1100 w. Elec, Lond—Dec. 23 and 30, 1898.

**Earth.**—See **Cosmical; Terrestrial; ELECTRIC CURRENT—Earth.**

**Electrolytic Iron, Nickel and Cobalt.**—On the Magnetic Behavior of Electrolytic Iron, Nickel and Cobalt. W. Leick. Abstract from "Wied. Ann." Investigations of the magnetic behavior of these metals, giving their susceptibility and intensity of magnetization in absolute measure. 3500 w. Elect'n—Sept. 18, 1896.

**Ewing Lecture.**—Magnetism. J. A. Ewing. The "James Forrest" lecture, delivered at the Inst. of Civ. Engs., London. Part first is mostly a historical review of the developments and applications and early discoveries. Serial. Elect'n, Lond—April 28, 1899.

**Ferro-Manganese.**—The Magnetic Properties of Iron Filings as Affected by Ferro-Manganese. Ernest Wilson. Describes methods of experimenting and results obtained. 1100 w. Elect'n, Lond—Oct. 5, 1900.

**Heat Effect.**—A New Method of Investigating the Variations of the Magnetic Qualities of Iron with Temperature. F. H. Pitcher. Abstract of paper read at the Toronto meeting of the British Assn. Describes the method and apparatus used. 2000 w. Elec Wld—Aug. 28, 1897.

Effects of Prolonged Heating on the Magnetic Properties of Iron. S. R. Roget. Read before the Royal Society. Reports results of experiments carried out in the laboratory of Cambridge University, investigating an extended range of temperature. 1300 w. Elect'n, Lond—June 3, 1898.

The Influence of Heating Upon the Magnetic Properties of Low Steel Plates (Der Einfluss des Ausglühens auf die Magnetischen Eigenschaften von Flusseisenbleche). Hans Kamps. A detailed account of the results of tests, with tables and graphical diagrams, devoting especial attention to the effects of red heat upon hysteresis and remanence. Two articles. 5000 w. Stahl und Eisen—Dec. 1, 15, 1899.

The Influence of Heat Treatment Upon the Magnetic Properties of Hardened Steel. Dr. K. E. Guthe. Abstract of a paper presented at meeting of Am. Inst. of Elec. Engs. A contribution to knowledge of the dependence of magnetic properties upon the percentage of carbon present and the character of the heating. A report of careful investigations. 2500 w. Elec Wld—March 27, 1897.

The Influence of Heat Treatment upon the Magnetic Properties of Steel and Iron. Dr. K. E. Guthe. Full paper with discussion and correspondence. A contribution to knowledge of the dependence of magnetic properties on the percentage of carbon present and the character of the heating. 8000 w. Trans Am Inst of Elec Engs—March, 1897.

See also **Temperature Coefficient.**

**Interference Methods.**—An Application of Interference Methods to a Study of the Changes Produced in Metals by Magnetization. J. S. Stevens. Investigations with tabulated results and explanation. 1500 w. Phys Rev—July, 1898.

**International Conference.**—Presidential Address before the International Magnetic Conference. A. W. Rücker. Abstract, with editorial. Protests against the interference of terrestrial observations caused by proximity of electric tramways, and discusses other subjects of interest to the association. 5000 w. Elect'n, Lond—Sept. 16, 1898.

**Iron.**—Magnetization of Iron. Ernest Wilson. A lecture delivered before the Engng. Soc. King's College, London. The time rate of growth of magnetisation of iron, and its importance to the electrical engineer. 2000 w. Engng—Feb. 21, 1896.

See also **Iron and Steel; Wrought Iron; MAGNETIC TESTING.**

**Iron and Steel.**—Magnetic Permeability or Iron and Steel. Max Osterberg. The principal object of the article is to call attention to the great value of thorough chemical analysis, of a perfect knowledge of the amount of temper a particular piece of iron or steel has undergone. 1700 w. Sch of Mines Quar—Jan., 1896.

Magnetic Properties of Iron and Steel. J. A. Kingdon. From the London "Electrical Review." The effect of temperature. 1200 w. Elec Wld—Jan. 25, 1896.

The Ferromagnetic Properties of Iron and Steel. J. A. Fleming. A lecture delivered to the Sheffield Society of Engineers and Metallurgists. A review of the chief facts concerning ferromagnetism, with explanations. Serial. Elect'n, Lond—Oct. 22, 1897.

The Magnetic Properties of Iron and Steel. Brief abstracts of two papers by J. A. Ewing and H. F. Parshall. Read before the Inst. of Civ. Engs. The practical importance in relation to the manufacture of dynamos and transformers is referred to, and a permeability tester is described. 1000 w. Engng—May 29, 1896.

**Iron Wires.**—The Effects of Tension and Quality of the Metal upon the Changes in Length Produced in Iron Wires by Magnetization. Byron B. Brackett. Reports investigations made, describing apparatus used and general method of working, giving results and conclusions. 6500 w. Phys Rev—Nov.-Dec., 1897.

**Leakage.**—A Discussion of the Conditions of Leakage in Electric Machines (Ein Beitrag zur Beurtheilung der Streuung Elektrischer Maschinen). A. Rothert. A mathematical discussion of magnetic leakage in generators and motors. 5000 w. Elektrotech Zeitschr—May 26, 1898.

**Light Action.**—The Action of Light on Magnetism. Joseph Hall Hart. An account of experimental investigations, with conclusions drawn from the results obtained. 2800 w. Am Jour of Sci—July, 1900.

**Liquid Oxygen.**—See **ELECTRO-PHYSICS.**

**Meteoric.**—Meteoric Magnetism. J. Warren. An explanation of the periodic fall of meteoric stones, and tending to show that the planetary system is the center of an enormous magnetic field. 1800 w. Elec, Lond—May, 1898.

**Molecular Rotation.**—Magnetism and Molecular Rotation. Lord Kelvin. Paper, editorial and correspondence. 4500 w. Elect'n, Lond—Aug. 4, 1899.

**Nickel Steel.**—Investigations into the Magnetic Properties of Nickel Steel (Recherches sur les Propriétés Magnétiques des Aciers au Nickel). A paper by M. Eugene Dumont giving the magnetic permeability of various alloys at different temperatures. 1000 w. Comptes Rendus—March 7, 1898.

On the Position of the Points of Magnetic Transformation of Nickel Steels. L. Dumas, in "Comptes Rendus." An account of investigations carried on at the Impley Works. 700 w. Metallographist—Jan., 1900.

The Magnetic Properties of Nickel Steel. Edward P. Buffett. Tests described were undertaken in the hope of attaining a definite conclusion. The general theory involved; apparatus; data and calculations, experiments, etc. 3200 w. Stevens Ind—Jan., 1896.

See also **NICKEL STEEL.**

**Phenomena Conceptions.**—Useful Conceptions about Magnetic Phenomena (Hülfsvorstellungen bei Magnetischen Erscheinungen). A discussion of the phenomena of hysteresis, remanence, permeability, etc., from the metallurgist's standpoint, and their relation to various kinds of material. 6000 w. Stahl und Eisen—April 15, 1897.

**Researches.**—Magnetic Researches (Magnetische Untersuchungen). Dr. Erich Schmidt. A general review of the fundamental notions of magnetism and magnetic phenomena, with explanations and definitions especially intended to inform the general engineer. Serial. Zeitschr f Elektrochemie —Nov. 3, 1898.

**Residual and Permanent.**—"Residual" and "Permanent" Magnetism. J. Warren. An explanation of the writer's use of these terms, with a table giving residual magnetism results, obtained in some experiments. 700 w. Elec, Lond—Jan. 13, 1899.

**Sheet Iron.**—The Effect of the Fibrous Structure of Sheet Iron on the Changes in Length Accompanying its Magnetization. Edward Rhoades. Introductory remarks and description of experiments having for their object the determination of the effect which the grain exerts on the magnetic changes in length and in the magnetization. 4300 w. Phys Rev—Aug., 1898.

See also **MAGNETIC TESTING.**

**Shielding.**—See **MAGNETIC SHIELDING.**

**Ships.**—See also **Terrestrial; COMPASS—Ships' Magnetism.**

**Silicon Effect.**—The Effect of Silicon on the Magnetic Permeability of Cast Iron. F. C. Caldwell. Results of tests made upon castings poured from a small cupola, the variation in silicon being obtained by the addition of silvery iron. 500 w. Elec Wld—Dec. 10, 1898.

**Steel.**—Steel for Magnets (Sur les Aciers à Aimants). A communication to the French Academy by M. Osmond, giving the results of investigations as to the influence of the chemical composition of steel upon its suitability for permanent magnets. 1000 w. Comptes Rendus—June 19, 1899.

Steels for Magnets. F. Osmond. From "Comptes Rendus." An account of investigations carried on in the Sorbonne Laboratory of General Chemistry. 600 w. Metallographist—Jan., 1900.

The Specific Magnetic Limits of Permanent Steel Magnets (Ueber den Specifischen Grenzmagnetismus Permanenter Stahlmagnete). An account of experimental investigations as to the influence of temperature and vibration upon the magnetic limits of steel. Two articles. 9000 w. Elektrotech Zeitschr—Aug. 12, 19, 1897.

See also **Iron and Steel.**

## MAGNETIC TESTING.

**Steel Seasoned.**—On the Properties of Seasoned Magnets Made of Self-Hardening Steel. B. O. Peirce. Records experiments made, and conclusions drawn, and states the disadvantages of self-hardening steel. 1800 w. Am Jour of Sci—May, 1898.

**Steel, Tempered.**—The Magnetic Properties of Tempered Steels. A condensed translation of an article by Mme. Sklodowska Curie, in the "Bulletin de la Société d'Encouragement pour l'Industrie," giving an account of her numerous systematic experiments. Ill. 2000 w. Elec Rev, Lond—Jan. 13, 1899.

The Magnetic Properties of Tempefed Steel (Propriétés Magnétiques des Aciers Trempés). Mme. Sklodowska Curie. With carefully plotted curves of the results of a number of experiments with different steels, showing the important influence of the presence of small proportions of other ingredients. Steels containing tungsten or molybdenum developed the highest coercive force. 1200 w. Comptes Rendus—Dec. 27, 1897.

The Magnetic Properties of Tempered Steel (Propriétés Magnétiques des Aciers Trempés). Mme. Sklodowska Curie. A very valuable paper upon the influence of tempering and of composition upon the capacity of steel for permanent magnets. 25000 w. Bull de la Société d'Encour—Jan., 1898.

**Steinmetz Coefficients.**—See **HYSTERESIS.**.

**Susceptibility.**—On the Susceptibility of Diamagnetic and Weakly Magnetic Substances. Albert P. Wills. Describes a method for the determination of the susceptibility of bodies in which it is extremely small, and giving the actual results obtained from experiments upon a number of substances. 3700 w. Phys Rev—April, 1898.

**Temperature Coefficients.**—On the Temperature Coefficients of Certain Seasoned Hard Steel Magnets. Arthur Durward. Reports a series of experiments on a large number of glass-hard magnets made of different kinds of steel and carefully seasoned. Tabulated results. 2000 w. Am Jour of Sci—April, 1898.

**Temperature Variations.**—See **Heat Effect.**

**Terrestrial.**—Comparison and Reduction of Magnetic Observations. Report of a British Assn. Committee. Complete data as to the non-cyclic effects in the selected "quiet" days at Kew during the last six years. 4400 w. Elect'n—Oct. 23, 1896.

Modern Investigations in Terrestrial Magnetism and Currents (Ueber Neuere Forschungen auf dem Gebiete des Erdmagnetismus und der Erdstrome). Dr. Weinstein. A discussion of recent observations on terrestrial magnetism in Germany, with diagrams of the horizontal elements between 1884, 1887. 2000 w. Elektrotech Zeitschr—Nov. 24, 1898.

Recent Researches in Terrestrial Magnetism. A. W. Rücker. The "Rede Lecture" delivered in the Senate House, Cambridge, Eng. Presents some of the theories and speculations which are now attracting the attention of those interested in this science. Serial. Nature—Dec. 16, 1897.

Terrestrial Magnetism. A. E. Cotterell. A discussion as to whether the earth is really a huge magnet, or merely the recipient of an ethereal line of force. Serial. Elec Rev, Lond—Sept. 9, 1898.

Terrestrial Magnetism, and the Deviations of the Compasses of Iron Ships. John E. Davies. A review of investigations and progress in the study of terrestrial magnetism and its distribution, and of the deviations of a ship's compass. Ill. 5700 w. Wis Engr—May, 1899.

The Earth a Great Magnet. J. A. Fleming. Abstract of a lecture delivered to the workingmen of Liverpool on the occasion of the meeting of the British Assn. in that city. 1600 w. Elec—Oct. 14, 1896.

See also **Cosmical; ELECTRIC CURRENT—Earth; MAGNETIC OBSERVATORY; MAGNETIC SURVEY.**

**Theory.**—On the Effect of Removing the Ends of a Magnet. Joseph F. Smith. Experiments made to ascertain the effect of cutting from the ends of a wide, thin magnet strips whose width is small compared with their length. 600 w. W Elec—Dec. 5, 1896.

The Graphical Representation of Magnetic Theories. Harold N. Allen. The object of the paper is to insist on the distinction between Faraday's theory of magnetism, and the older theory—which assumes the existence of magnetic fluids covering the ends of the magnet—still often made use of, because mathematically simpler, and at the same time to consider some points in the induction theory itself. Different aspects of the theory are illustrated by diagrams, and the discussion is on mathematical as well as physical lines. 2000 w. Phys Rev—May-June, 1896.

The Modern Theory of Magnetism (Die Moderne Theorie des Magnetismus). Dr. H. Du Bois. A discussion by the aid of quaternions, of Hopkinson's theory, read before the Mathematical Assn. at Düsseldorf. 8000 w. Elektrotech Zeitschr—Nov. 24, 1898.

See also **ELECTRO-PHYSICS.**

**Watches.**—Observations on Magnetized Watches. William T. Lewis. Gives illustrated description of a demagnetizer being constructed by the writer; also explains the usual method of detecting magnetism in a watch and of overcoming it. 1500 w. Jour Fr Inst—Jan., 1897.

**Wrought Iron.**—The Magnetic Properties of Annealed Wrought Iron Manufactured from the Iron Sand of New Zealand. Ernest Wilson. Describes the product, difficulties in reducing, and method of experiment, giving results. 800 w. Elect'n—Sept. 17, 1897.

## MAGNETITE.

See also **IRON ORE.**

**North Carolina.**—See **IRON GEOLOGY—North Carolina.**

## MAGNETO-OPTICS.

See **ELECTRO-PHYSICS—Magneto-Optics.**

## MAINTENANCE OF WAY.

See **RAILWAY; PERMANENT WAY—Maintenance; RAILWAY ORGANIZATION; TRACK.**

## MALACHITE.

See **COPPER GEOLOGY.**

## MALAY STATES.

Engineering in the Malay States. Information regarding the present conditions and future prospects of engineering in this new field. 1800 w. Engng—March 4, 1898.

## MALLEABLE CAST IRON.

See **MALLEABLE IRON.**

**MALLEABLE IRON.**

See also **FURNACE—Reverberatory.**

Malleable Cast Iron. George Parker Royston. An account of the investigations carried out by the author on the manufacture of malleable cast iron. 3400 w. Prac Engng—May 28, 1897.

Malleable Cast Iron. Outlines the process, giving something of the history of the industry. 3000 w. Eng & Min Jour—Sept. 8, 1900.

Malleable Cast Iron. George C. Davis. Read before the Philadelphia Foundrymen's Assn. Gives its early history in the United States. 5500 w. Ir Age—Oct. 13, 1898.

Malleable Furnace Practice and Annealing. Notes on the prevailing practice in malleable work. 3800 w. Ir Trd Rev—Sept. 28, 1899.

Physical Characteristics of Malleable Cast Iron. Erastus C. Wheeler. Considers the influence of heat conditions, chemical composition, annealing, test bars, etc. Serial. Ir Age—Nov. 9, 1899.

**Annealing.**—Annealing Malleable Cast Iron. George C. Davis. Read at meeting of the Foundrymen's Assn. Experiments and results are presented, and the paper is discussed by Richard Moldenke. 2500 w. Foundry—May, 1900.

Annealing Malleable Cast Iron. George C. Davis. Prepared for the Foundrymen's Assn. Also discussion by Dr. Richard Moldenke. On the changes resulting from annealing, with experiments. 3000 w. Ir Trd Rev—March 8, 1900.

See also **ANNEALING.**

**Basic Furnace.**—The Basic Furnace for Malleable Iron. E. C. Wheeler. A discussion of facts relating to the malleable industry, and the possibilities of the basic furnace. 3800 w. Foundry—Aug., 1899.

**Boyden Experiments.**—The Record of Seth Boyden's Experiments on Malleable Cast Iron. The first publication of Boyden's original manuscript. 10-000 w. Ir Age—Oct. 13, 1898.

**Car Construction.**—See **CAR—Malleable Iron.**

**Castings, Railway Use.**—Malleable Castings as Factors in the Reduction of Operating Expenses. The economy expected is in the reduction of weight and of repairs. 800 w. Ry Mas Mech—Aug., 1896.

**Composition and Strength.**—The Chemical Composition and the Strength of Malleable Iron. A. Ledebur, in "Stahl und Eisen." Review of two works by Baron Jüptner von Jonstorff on his investigations of this subject, with reference to the experiments of Mr. Webster, of America. 1500 w. Ir & Coal Trds Rev—May 15, 1896.

**Impurities.**—Malleable Cast Iron. Erastus C. Wheeler. Deals with the effects of impurities found in pig iron. Serial. Ir Age—Feb. 16, 1899.

**Tests.**—See also **STEEL CASTINGS.**

**United States History.**—Development of the Malleable Iron Industry in the United States. George C. Davis. Gives an historical account of this industry since 1835. 8400 w. Ir Trd Rev—Feb. 9, 1899.

Malleable Cast Iron—Its History in the United States. George C. Davis. Reviews the practice in earlier times, the difficulties encountered, some of the earlier foundries, etc. Ill. Serial. Jour Fr Inst—Aug., 1899.

**MANCHESTER.**

**Mechanical Works.**—See **MECHANICAL WORKS.**

**MANCHURIA.**

See **CHINA; JAPAN; SIBERIA.**

**MANDREL.**

Expansion Mandrel for Piston Rings. George R. Martin. Illustrated description. 300 w. Am Mach—Oct. 4, 1900.

The Everlasting Mandrel Question—Expanding Boring Tools. C. O. Griffin. Illustrated description of a system of boring tools and some remarks on mandrels. 1000 w. Am Mach—Aug. 13, 1896.

**MANGANESE.**

See also **MINERAL REGION.**

Some Sources of Manganese Ore Supply. An account of the deposits in the Caucasus, Brazil, and Cuba, with the characteristics, methods of treating, cost of production, transportation, etc. 4800 w. Ir & Coal Trds Rev—April 7, 1899.

**Algiers.**—The Rar-el-Maden Mine of Manganiferous Iron (La Mine de Fer Manganésifère de Rar-el-Maden). E. Dietz. An account of the mine near Oran, Algiers, from which a valuable spiegeleisen ore is obtained. 2000 w. Rev Univ des Mines—Aug., 1899.

**Blast Furnace.**—The Reduction of Manganese in Blast Furnaces. Frans Büttgenbach. Translated from "La Revue Universelle des Mines, de la Metallurgie," etc. Estimates of the quantity of manganese that will enter into pig iron. 2300 w. Col Guard—Dec. 27, 1895.

**Brazil.**—Manganese Mining in Brazil. Information concerning the deposits now being worked, and the manner of working. 1000 w. Eng & Min Jour—Aug. 19, 1899.

The Manganese Deposits of Bahia and Minas, Brazil. John C. Branner. An account of these deposits, and illlustrated description of the mines and method of ore cleaning. 3500 w. Trans Am Inst of Min Engs—Sept., 1899.

The Manganese Mines of Brazil (Les Mines de Manganese au Bresil). Daniel Bellet. A general review of the deposits in Brazil, with data of costs of mining and transport. 2000 w. Rev Tech—April 25, 1899.

The Manganese Ores of Brazil (Les Manganéses du Brésil). Miguel Ribeiro Lisboa. A very full account of the location of these ores, their composition, method of mining, and exploitation. 1 plate. 9000 w. Rev Univeselle des Mines—Oct., 1898.

The Manganese Ores of Brazil. Herbert Kilburn Scott. Read before the Iron and Steel Inst. Describes the position and geology of the deposits, and gives a brief outline of the history of manganese mining, and other information of interest. 5700 w. Col Guard—May 18, 1900.

**Caucasus.**—Development of the Managanese Ore Trade in the Caucasus. Great increase over 1893, but reduction in prices and causes. Transportation difficulties, etc. 800 w. Bd of Trd Jour—Nov., 1895.

Development of the Manganese Ore Trade in the Caucasus. Showing that the miners are selling ore at a loss to themselves. 800 w. Ir & Coal Trds Rev—Nov. 29, 1895.

The Manganese Ore Industry of the Caucasus. Frank Drake. Mainly descriptive of the manganese district of Chiaturi, the location and topography, the deposits and their characteristics, methods and cost of mining, etc. Ill. 3600 w. Trans Am Inst of Min Engs—June, 1898.

The Manganese Ore Industry of the Trans-Caucasus. From a consular report by Consul Stevens of Batoum. Reports the industry in a deplorable condition. 900 w. Col Guard—May 6, 1898.

The Manganese Ore Trade of Russia. Solon J. Vlasto. An account of the manganese ore industry in the Caucasus. 1400 w. Eng & Min Jour—Sept. 22, 1900.

See also **Russia.**

**Cebolla River.**—Iron and Manganese. Arthur Lakes. Illustrated description of the great Cebolla River deposits. The location, geology, topography and development of the greatest beds of iron and manganese known in the world. 2400 w. Col Eng—July, 1896.

**Colombia.**—Railroad Building and Manganese Mining in Colombia. Eduardo J. Chibas. Describing the methods and experiences of the Caribbean Manganese Co., in the Department of Panama. Ill. 3000 w. Eng Mag—Dec., 1896.

The Manganese Deposits of the Department of Panama, Republic of Columbia. Eduardo J. Chibas. Gives location, history, character of the ore, geological features, etc., with suggestions as to the origin. Ill. 4300 w. Trans Am Inst of Min Engs—March, 1897.

**Covadonga.**—The Covadonga Manganese District and Its Mines. J. A. Jones. Brief account of the discovery, situation, mode of occurrence, workings, cost of extraction, quantity, etc. 2800 w. Inst of Min & Met, Lond—Vol. III., Pt. II., 1896.

**Cuba.**—See **IRON MINE; MINERAL REGION.**

**Georgia.**—The Manganese Ores of Georgia. William M. Brewer. A mining and shipping industry that has been in operation for over half a century. The system of working is described. 2000 w. Tradesman—Jan. 1, 1897.

**Huelva, Spain.**—The Manganese Mines of Huelva. Carlos Sundheim. Describes locality and deposits and gives analyses and amount exported. 800 w. Am Mfr & Ir Wld—Feb. 12, 1897.

The Manganese Deposits of Huelva. Frank

Johnson. Description of deposits. 3200 w. Inst of Min & Met, Lond—Vol. III., Pt. II., 1896.

**India.**—Indian Manganese. Description of ore with analysis of manganese ore from Gosalpur, Jabalpur District, containing 54.66 per cent. of manganese. 800 w. Chem Trd Jour—Nov. 2, 1895.

**Iron.**—Manganese in Cast Iron and Some Experiments Thereon. Guy R. Johnson. Read before American Foundrymen's Association. Presents results of some physical tests suggesting commercial use for high manganese iron, especially for brake shoes. 2200 w. Foundry—Sept., 1898.

Manganese in Iron Ores and Pig Iron. R. R. Tatlock and R. T. Thomson. Read before the West of Scotland Iron and Steel Inst. Gives tabulated results of investigations of the different ores of commerce and the conclusions reached. 2000 w. Col Guard—Jan. 20, 1899.

See also **CAST IRON; FOUNDRY IRON; IRON ALLOY.**

**Iron Ore.**—See Iron; **IRON ORE ANALYSIS—Manganese.**

**Limonite, Amazon.**—A Peculiar Manganese Ore of the Amazon District (Ein Eigenthümliches Manganerz des Amazonas-Gebietes). Dr. F. Katzer. Describing a peculiar nodular form of limonite, which is associated with psilomelane and pyrolusite, and which occurs in the Amazon valley in sufficient quantity to be of commercial value. 8000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 22, 1898.

**Limonite, Dutch Guiana.**—Note on Limonite Pseudomorphs from Dutch Guiana. R. W. Raymond. Description and analysis of specimens of peculiar pseudomorphs of limonite after pyrite, found in the auriferous deposits of the Saramacca district. 1700 w. Trans Am Inst of Min Engs—Feb., 1898.

**New Brunswick.**—Manganese Mining in New Brunswick. Describes the deposits of bog manganese, and the method of treatment necessary to make it useful for commercial purposes. 1800 w. U S Cons Repts—March 24, 1898.

**Open Hearth Process.**—See **OPEN HEARTH PROCESS—Manganese.**

**Panama.**—See Colombia.

**Related Metals.**—Manganese and Related Metals. J. Ohly. Information concerning manganese and its properties is given in part first. Serial. Min Rept—Oct. 19, 1899.

**Russia.**—The Manganese Industry in Southern Russia (Ueber die Mangan-Eisen Industrie in Südrussland). F. W. Lürmann. A brief account of the various works, and statistics of their product from 1893 to 1896. 1800 w. Stahl und Eisen—Oct. 15, 1899.

See also **Caucasus.**

**Spain.**—Manganese and Manganiferous Ore in Spain. Reginald W. Barrington. Brief accounts of the districts producing the largest quantities during 1895, with analysis of the ore. 400 w. Am Mfr & Ir Wld—June 19, 1896.

The Manganese Ore Deposits of Northern Spain, with Notes on Some Other Sources of Supply. Jeremiah Head. Extract from a paper giving particulars of a journey made four years ago in Northern Spain. Tabulated cost of working at the Asturiana mine and results of analysis of the ores; with interesting information. 1800 w. Ir & Coal Trds Rev—Sept. 4, 1896.

**See also Huelva, Spain.**

**Trans-Caucasus.**—See **Caucasus.**

**Virginia.**—Manganese Mining. C. H. Vannier. Discusses the valuable properties of manganese, and gives an illustrated account of the Crimora mines in Virginia. 1100 w. Mod Mach—Sept., 1900.

Some of the Manganese Deposits of the Valley of Virginia. Charles Catlett. Describes the ores and the various deposits. 1800 w. Eng & Min Jour—Aug. 7, 1897.

**"MANJAK."**

The Use of "Manjak" in the Manufacture of Coal Gas. Jos. Harger Pye. Remarks on the natural bituminous pitch which in the Barbados is known by the name of "Manjak." General characteristics and results obtained from its use. 1100 w. Jour Gas Lgt—April 20, 1897.

**Barbados.**—Occurrence and Mining "Manjak" in Barbados, West Indies. Walter Merivale. Read at meeting of the North of England Inst. of Min. & Mech. Engs., at Newcastle-upon-Tyne. Abstract. "Manjak" is one of the bitumens. Its manner of deposit is described. 1000 w. Ir & Coal Trds Rev—Feb. 18, 1898.

**MANOMETER.**

See also **PRESSURE GAUGE.**

**Fallis.**—Notes on Lead Smelting and Gold and Silver Refining. Malvern W. Iles. Illustrated description of a manometer devised by M. S. Fallis, in which the pressure is balanced by gravity. 1800 w. Eng & Min Jour—June 30, 1900.

**Registering.**—Differential Manometer with Photographic Registering Device (Ueber Differential-Manometer mit Photographischer Registrier-Vorrichtung). Paul Fuchs. Illustrated description of a photographic registering device, adapted for use with pressure gauges, thermostats, gas composimeters, etc. 2500 w. 1 plate. Gesundheits Ingenieur—Jan. 15, 1900.

**MANTEL.**

**Masonry.**—Mantels. A Mason. The building of masonry mantels is considered. The necessity of following a drawing exactly and intelligently, etc. 1700 w. Brickbuilder—May, 1896.

**MANTLE.**

**Incandescent Gas Lighting.**—See **INCANDESCENT GAS LIGHTING—Mantle.**

**MANUFACTURER.**

**U. S. Association.**—Annual Report of the President of the National Association of Manufacturers. Theodore C. Search. An interesting account of the year's work, discussing legislative measures, shipping, Nicaragua Canal, Paris Exposition, trade marks, international freight and transportation, etc. 12500 w. Nat Assn of Mfrs, Form 816—Jan., 1899.

**MANUFACTURING.**

See also **ENGINEERING COMPETITION; INDUSTRY.**

**British vs. American.**—British versus American Manufactured Productions. Editorial comment on the increase of American productions, the advantages possessed by Americans, and the effect upon British mechanical industries. 1800 w. Ir & Coal Trds Rev—June 11, 1897.

**China.**—See also **RAILWAY PROJECT.**

**Distribution.**—The Distribution of Manufacturing Industries. Calls attention to changes in progress due to modern inventions and the spread of civilization, carrying manufacturing industries all over the world, tending to bring together the factory and the raw material and diminishing local advantages. 1700 w. Eng News—Feb. 10, 1898.

**Germany.**—German Manufactures. Raphael-Georges Levy. Translated from "Revue des Deux Mondes." A study of the recent progress, and the relation of German industry to the United States. 2500 w. Chau—May, 1898.

See also **ENGINEERING COMPETITION; GERMANY.**

**Massachusetts.**—Manufacturers in Massachusetts. Industrial statistics. 1200 w. Bradstreet's—Nov. 30, 1895.

Ninth Report of the Annual Statistics of Manufactures in Massachusetts. Summary and abstract. 1000 w. Bull of Dept of Labor—March, 1896.

**Pennsylvania, 1866.**—See **MINE—Pennsylvania, 1866.**

**Sociological Effect.**—The Influence of Manufactures on Wealth and Popular Intelligence. Extract from an address of Governor Lippett, of Rhode Island, showing the importance of manufactures to a community. 1500 w. Mfrs Rec—June 19, 1896.

**United States.**—The Causes of the Development of American Industry (Die Ursachen der Entwickelung der Industrie in Amerika). Karl Wittgenstein. An important address before the Society of Austrian Engineers showing the great development of American industries, and attributing it to the great liberty permitted, as well as to ease of communication. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 9, 1898.

**U. S. Distribution.**—Distribution of Manufacturing in the United States. Cyrus C. Adams. Showing some of the causes that have determined the location and distribution of manufacturing industries. 8000 w. Chau—Sept., 1898.

**United States Efficiency.**—The Concentration of Industry and Machinery in the United States. E. Levasseur. Extract from one of the chapters of a work now in press. Directs attention to the part which the spirit of invention and the characteristics of the laboring classes have taken in this development, and considers the attitude of the laboring classes and of the entrepreneur to the problems which this transformation has called forth. 6000 w. An Am Acad—March, 1897.

See also **MACHINERY—Labor.**

**MAP.**

See also **MINE SURVEYING; PANTOGRAPH.**

**Coal Mine.**—Coal Mine Maps. L. C. Morganroth. An account of the systematizing of the maps of a large company. 1900 w. Eng & Min Jour—Sept 29, 1900.

**Protractor.**—See **PROTRACTOR.**

**MARBLE.**

See also **BUILDING MATERIAL; MARBLE QUARRY; STONE.**

**Architecture.**—Marble Work. George H. Blagrove. The uses of marble in its relation to architecture are briefly discussed. 3000 w. Can Arch—Dec., 1898.

**Artificial.**—Artificial Marble in Sicily. Information concerning the manufacture of artificial black marble. 800 w. Cons Repts—March 26, 1898.

**1894 and 1895.**—See **STONE INDUSTRY.**

**Italy.**—The Marble Mountains of Italy. Vernon Lee. Descriptive. 1500 w. Stone—Sept., 1898.

**Onyx.**—See **ONYX.**

**MARBLE QUARRY.**

See also **QUARRY.**

**Euboea, Greece.**—Modern Working of the Old Euboean Marble Quarries. Illustrations with a summary of W. Brindley's account of the location and nature of the quarries, and reference to the traditions of the island. 1200 w. Stone—Aug., 1899.

**Georgia.**—Georgia Marbles. William M. Brewer. The writer refers to several quarries and illustrates three of them. 600 w. Tradesman—March 15, 1896.

Some Georgia Marble Quarries. An illustrated article. This gray marble is quarried entirely by channeling machines, gadders, etc., and no explosive is used. The deposit is at least 200 ft. thick. 900 w. Eng & Min Jour—Nov. 30, 1895.

**Laas, Tyrol.**—The Marble of Laas (Der Laaser Marmor). Heinrich Lenz. An illustrated description of a Tyrolese marble quarry and methods of working it. The marble is particularly adapted for artistic purposes. Serial. 2 parts. 3500 w. Wiener Bauindustrie Zeitung—July 26, Aug. 2, 1900.

**Vermont.**—The Vermont Marble Hills. From N. Y. "Post." Historical account of the quarries near Rutland and the progress of the marble industry. 2000 w. Stone—Jan., 1897.

See also **QUARRY RAILWAY.**

**MARGARINE.**

**Monsted's Factory.**—Monsted's Margarine Factory, Southall. Illustrated description of ammonia condensers used in this establishment. 800 w. Eng, Lond—Sept. 18, 1896.

**MARIENBURG.**

**Restoration.**—See **ARCHITECTURE—Teutonic Order.**

**MARINE ACCIDENT.**

See **BOILER EXPLOSION; MARINE ENGINE; NAVIGATION; WRECK.**

**MARINE BOILER.**

See also **BOILER; MARINE ENGINE; STEAMSHIP; WARSHIP; WATER-TUBE BOILER.**

The Development of the Marine Boiler. J. M. Dewar. A paper which takes the ground that the present form of marine boiler is doomed to extinction and that the water-tube boiler is the coming type. Serial. Prac Eng—Nov. 29, 1895.

The Naval Boiler of the Future. Considers what ought to be the characteristics of the ruling type, and how far any one of several boilers is likely to comply with these conditions. Serial. Engr, Lond—April 14, 1899.

**Accident.**—See **BOILER ACCIDENT; BOILER EXPLOSION.**

**Babcock & Wilcox.**—Boilers for Big Ships. On the design of Babcock & Wilcox steam generators that are being installed in nine modern freighters of the Great Lakes, with reports of test made by U. S. Navy Bureau of Steam Engineering. 1800 w. Marine Rev—Feb. 8, 1900.

See also **"Shelldrake"; Water Tube; WATER-TUBE BOILER.**

**Belleville.**—Defects Experienced in Belleville Boilers in the British Navy. An Admiralty statement as to the chief defects which have been experienced in the working of these boilers. 1000 w. Eng News—Sept. 20, 1900.

The Belleville Boilers on H. M. S. "Sharpshooter." A. Dodgson. Brief description of the trials, tabulated data, and abstract of maneuvering trials. 400 w. Engng—March 6, 1896.

The Belleville Boiler and Its Evaporative Efficiency. Evaporation results as taken from records of performance on the Russian Volunteer steamship "Kherson." Mean evaporation per lb. of coal burned was 8.88 lbs. Welsh coal of only average quality was used. 900 w. Eng, Lond—Nov. 8, 1895.

Working Results with Belleville Boilers in Twin S. S. "Kherson." G. Gretchin. Abstract of "Notes" communicated to the Inst. of Engs. & Shipbuilders in Scotland, with editorial. A record of personal experience and observation. 5300 w. Engr, Lond—April 1, 1898.

See also **British Navy; ARMORED CRUISER—"Terrible" Trials; CRUISER—"Kherson"; MARINE ENGINE—"Diadem"; "Kherson"; MECHANICAL ENGINEERING—Great Britain, 1897.**

**Bent-Tube.**—Practical Data Relating to the Building of Bent-Tube Boilers. John Platt. A general description of the plan adopted in laying out and building one of these boilers. Ill. 3500 w. Jour Am Soc of Nav Engs—Feb., 1900.

**Blenchynden.**—Boiler of the Steam Yacht "Scud." Illustrated description of a Blenchynden boiler placed on this yacht. 900 w. Eng, Lond—Sept. 4, 1896.

**British Navy.**—Belleville Boilers. Editorial on the debate in the House of Commons, and the Admiralty Memorandum Respecting Water-Tube Boilers in H. M. Ships. 4500 w. Engng—July 20, 1900.

Mr. Goschen's Memorandum on Water-Tube Boilers. A statement dealing with ships fitted with Belleville boilers, or with boilers of large tube types. 7500 w. Engr, Lond—July 20, 1900.

The Making and Testing of Several Types of Marine Boilers (Ausführung und Erprobung einiger Schiffskesseltypen). H. Görris. A review of the subject, with particular reference to tests and experiments made on boilers of British naval vessels. Illustrations and tables. Serial. 2 parts. 9000 w. Zeitschr d Ver Deutscher Ing—June 30, July 7, 1900.

Water-Tube Boilers in Warships. Tabulated lists of the principal types used, or to be used, in warships, with remarks. 900 w. Engr, Lond—July 13, 1900.

Navy Boilers. Editorial continuing the discussion of the Admiralty Memorandum as to the form of boiler for British warships. 3500 w. Engng—July 27, 1900.

See also **Belleville.**

**"Chicago."**—See also **Nickel Steel Scotch.**

**Compound.**—Compound Marine Boilers. N. Soliani. Paper read before the Inst. of Naval Architects. An able argument setting forth the advantages of this type for marine service, more particularly for the merchant marine. 1400 w. Engng—April 3, 1896.

**Cruisers.**—On the Boiler Arrangement of Certain Recent Cruisers. F. T. Marshall. Comparison of systems used and description of arrangements adopted in recent vessels of the cruiser class. Ill. 5300 w. Engng—Aug. 11, 1899.

**Cylindrical Formulae.**—Formulae for the Strength of Seams, Stays and Braces for Cylindrical Boilers. A. B. Canaga. Marine cylindrical boilers are the ones considered. Diagrams. 2800 w. Jour Am Soc of Nav Engs—May, 1896.

**Engel Water Tube.**—Test of the Engel Marine Water Tube Boiler. Herbert G. Geer. Illustrates the general arrangement and gives account of test. 900 w. Power—July, 1897.

**Explosions.**—See **BOILER EXPLOSION.**

**Express.**—Express Boilers in War Vessels. Information concerning the number of vessels being fitted with boilers of the Yarrow type, especially by the Dutch Government. 1500 w. Engr, Lond—May 26, 1899.

**Freight Steamers.**—See **MARINE ENGINE—Freight.**

**French Navy.**—See **Water-Tube.**

**German Navy.**—Tests of Water-Tube Boilers in the

German Navy (Versuche in der Deutschen Kriegsmarine mit Wasserrohrkesseln). Giving results of tests of a variety of boilers made at Stettin during the past year including the Thornycroft, Dürr, Belleville and Niclausse types. Two articles. 3000 w. Zeitschr d Ver Deutscher Ingenieure—Sept. 11, 18, 1897.

**High Pressures.**—High Pressures at Sea with Some Consideration of Types of Boilers. W. R. Cummins. From a paper read at the Northeast Coast Inst. of Engs. & Shipbuilders, in Sunderland, England. Considers the theoretical economy of steam, and the type of boiler best suited to the new conditions. Serial. Marine Engng—March, 1898.

Marine Boilers, Particularly in Reference to Efficiency of Combustion and Higher Steam Pressures. J. R. Fothergill. Read before the Northeast Coast Inst. of Engineers and Shipbuilders, in Cardiff. A discussion of the needs and difficulties, and the demand for increased pressure, with the objections, and general discussion of the subject. 8800 w. Jour Am Soc of Naval Engs—Nov., 1896.

Efficiency of Combustion and Higher Steam Pressure in Marine Boilers. J. R. Fothergill. Read at meeting of Northeast Coast Inst. of Engs. and Shipbuilders, Cardiff. Discussion of the present type of boiler, and related questions. 2800 w. Steamship—Aug., 1896.

Marine Boilers, Particularly in Reference to Efficiency of Combustion and Higher Steam Pressures. Abstract of a paper read before the Northeast Coast Inst. of Engineers and Shipbuilders. Steam pressure of 250 to 280 lbs. being deemed probable in the near future, the author proceeds to discuss the points in boiler construction requiring attention, besides mere ability to withstand these pressures when adopted. 2400 w. Ind & Ir—June 26, 1896.

See also **MARINE ENGINE.**

**"Kherson."**—See **Belleville.**

**Locomotive.**—Note on the Construction of Locomotive Boilers for Vessels (Ein Beitrag zur Konstruktion der Schiffs-Lokomotivkessel). Discussing especially details of fire box construction in adapting the locomotive boiler to marine use. 3500 w. Zeitschr d Ver Deutscher Ingenieure—Sept. 11, 1897.

**"Lorna Doone."**—The Water-Tube Boiler in Passenger Steamers. The application of this type of boiler to the "Lorna Doone," a pleasure steamer. 1500 w. Engr, Lond—May 26, 1899.

**Maintenance.**—Care of the Modern Marine Boiler. T. W. Kincaidy. A practical paper. 500 w. Am Mach—Feb. 6, 1896.

Engine Room Practice. E. P. Gould. Special reference is made to the care of boilers. 1800 w. Marine Rev—Feb. 8, 1900.

The Maintenance and Repair of Marine Boilers. J. F. Walliker. Paper read before the Northeast Coast Inst. of Engs. & Shipbuilders. Discusses not only the topics named in title but also design and manufacture. 1800 w. Prac Eng—July 10, 1896.

**Mineral Lubricant Oil.**—Mineral Oil in Marine Boilers. Editorial. A general review of the present status of practice with reference to the effect upon marine boilers of mineral oils used in the lubrication of engine cylinders. 3000 w. Engng—May 22, 1896.

**Miyabara.**—The Miyabara Water-Tube Boiler. Illustrates and describes a water-tube boiler designed by the constructor officer of the Imperial Japanese Navy. 700 w. Engr, Lond—Aug. 19, 1898.

**Nickel-Steel Scotch.**—New Scotch Boilers for U. S. S. "Chicago." Illustration and brief description of one of the four Scotch boilers. It is the first nickel-steel boiler built in the United States. 1200 w. Marine Engng—May, 1897.

**Niclausse.**—The Niclausse Water-Tube Boiler. Mark Robinson. Read before the British Assn. Refers briefly to the four types of water-tube boilers already in use, and describes new one named. 4200 w. Engr, Lond—Sept. 22, 1899.

Trials of the Niclausse Safety Water-Tube Boiler. Jay M. Whitham. Illustrated description, dimensions of boiler, manner of testing, object and results. Also discussion. 6300 w. Jour Am Soc of Nav Engs—Feb., 1898.

See also **British Navy; Water Tube.**

**"Orlando."**—Water-Tube Boilers, S. S. "Orlando." A report recently issued by the British Board of Trade showing this type of boiler quite unsuited for use with sea water. Also editorial discussing the constructional failures of these boilers. 4000 w. Engr, Lond—June 9, 1899.

**"Pelorus."**—Water-Tube Boilers for H. M. S. "Pelorus." Drawings of boilers and engines, with description. The small-tube boiler was adopted for the first time in cruisers, and results of trials are given. 1400 w. Engng—March 19, 1897.

**"Powerful."**—See **ARMORED CRUISER.**

**Salt Water.**—See **FEED WATER—Salt Water.**

**"Sheldrake."**—Babcock & Wilcox Water-Tube Boilers in H. M. S. "Sheldrake." Particulars regarding the installation and tests. Ill. 2400 w. Steamship—May, 1899.

The Boiler Trials of the "Sheldrake." An illustrated description of the new boilers and report of the trials, which gave very satisfactory results. 1200 w. Engr, Lond—Aug. 11, 1899.

**Torpedo Boats.**—Boilers for Torpedo Boats (Les Chaudières des Torpilleurs). A comparison between locomotive and water-tube boilers, with especial reference to the circular of the French Minister of Marine, regarding the requirements for the French service. 2000 w. Le Yacht—July 15, 1899.

**Torpedo-Boat Destroyer.**—Water-Tube Boilers, H. M. S. Salamander. Describes a new water-tube boiler made for this English torpedo-destroyer. 1300 w. Engr, Lond—Dec. 3, 1897.

**Tug Boats.**—Type of Fire Tube Boiler Adapted for Tug-Boat Service. Discusses the poor designs of boilers in use in tug-boats, and gives illustrated description of a single-ended Scotch boiler to carry 125 lbs. steam pressure. 800 w. Marine Engng—Oct., 1899.

**U. S. Navy.**—Causes for the Adoption of Water-Tube Boilers in the U. S. Navy. George W. Melville. Considers the decision of the United States Government to use nothing but water-tube boilers a step in advance, giving reasons for opinions. 4500 w. Soc of Nav Archts & Marine Engs. No. 2—Nov., 1899.

The Status of the Water-Tube Boiler in the American Marine. W. M. McFarland. With comparative description of the leading types now in approved use, and a discussion of the policy of the United States Navy. The delay in introducing water-tube boilers was due to prudence in making innovations while the new navy was being created; not to ignorance or lack of appreciation. 5000 w. Eng Mag—Dec., 1897.

**Water Tube.**—Fragmentary Remarks on the Water-Tube Boiler in Marine Work. William Burlingham. Discusses various types used in different countries, the sources of trouble, the reasons for their use, etc., etc. Ill. 300 w. Marine Engng—Jan., 1899.

Naval Boilers. Editorial discussion of the defects of the water-tube boiler, but advocating it for marine use. 1800 w. Engr, Lond—March 9, 1900.

Navy Boilers. Editorial on the merits of water-tube boilers, especially the Belleville, and support of Mr. Durston, with criticism of the Scotch boiler. 1700 w. Eng, Lond—April 16, 1897.

Some Advantages of Water-Tube Marine Boilers. George R. Bale. States the good features of these boilers and the advantages which have led to their almost exclusive adoption in warships, and their probable adoption by the merchant-marine. 3500 w. Prac Engr—Feb. 3, 1899.

Tubulous Boilers in the French Navy. John K. Robison. From the "Jour. of the Amer. Soc. of Naval Eng." A general discussion of this class of marine boilers which shows that some of their advantages are yet offset by grave defects. The three principal types discussed are the "Belleville," the "D'Allest," and the "Niclausse"; but something is also said of the Thornycroft, Normand and Lagrafel boilers. The first three named are regarded as the only ones having any chance of superseding the Scotch boilers. Serial. Engng—Nov. 1, 1895.

Use of Water-Tube Boilers in the Mercantile Marine. Albert Edward Seaton. Discusses the advantages, enduring power, cost, design, etc., and gives tabulated statements, particulars of the different kinds of boilers, their weights, etc. 8400 w. Jour Am Soc of Nav Engs—Nov., 1897.

Water-Tube Boilers a Necessity.—A War Lesson. J. K. Robison. Discusses the conditions of the late war, and what is required to properly meet them. Considers the particulars of design in water-tube boilers required for efficiency. 5000 w. Jour Am Soc of Nav Engs—Nov., 1898.

Water-Tube Boilers. Maudslay, Sons and Field. Review and criticism of a paper written by Asst. Eng. Robison, of the U. S. Navy, and published in the "Journal of the Am. Soc. of Naval Engs." The paper purported to give results from personal observations in France, which results are disputed in this review, and the paper, as a whole, is severely criticised. 4300 w. Engng—Dec. 13, 1895.

Water-Tube Boilers. J. D'Allest. Criticism of a communication to "Engineering," by Messrs. Maudslay, Sons and Field, called out by a paper of John K. Robison, U. S. N., purporting to give conclusions derived from personal observations of water-tube boilers in the French Marine. 1800 w. Engng—Jan. 3, 1896.

Water-Tube Boilers. Correspondence—Critical discussion of recent experiments, by engineer G. Gretchin, of the Russian Volunteer Fleet, Charles Bellens, of Paris, F. Strickland, and John Thorn, M. I. N. A. Interesting points are brought out in this running debate. 2200 w. Engng—Jan. 17, 1896.

Water-Tube Boilers. J. Alvah Scott. A discussion of Mr. Darwin Almy's paper on this subject in the Feb. number, considering the elements that tend to shorten the life of water-tube boilers and the precautions necessary for their care, etc., both in the torpedo-boat boiler and for commercial service. 5400 w. Jour Am Soc of Naval Engs—Aug., 1898.

Water-Tube Boilers. Liquid Fuel. Extracts from the Year Book of the Office of Naval Intelligence giving information on the subjects named. 2500 w. Am Eng & R R Jour—Feb., 1897.

Water-Tube Boilers in Marine Service. I. W. Chubb. Brief discussion of the advantages and disadvantages of water-tube boilers. 1800 w. Prac Engr—Oct. 20, 1899.

Water-Tube Boilers in High-Speed Ocean Steamers. P. Sigaudy. Paper submitted at the International Congress of Naval Architects and Marine Engineers. Claiming that the next important step in ocean steam navigation will be the adoption of the water-tube boiler. 1500 w. Steamship—Aug., 1897.

Water-Tube Boilers in Warships. C. C. P. Fitzgerald. Read before the Inst. of Naval Arch'ts. A comparison of some of the general features of water-tube boilers with those of Scotch boilers which they are to supersede. 5000 w. Engng—April 9, 1897.

See also **British Navy; German Navy; U. S. Navy;** and under names of makers and ships; **GUNBOAT—"Annapolis" Trial; WATER-TUBE BOILER.**

**Yarrow.**—A Tale of a Yarrow Boiler. Illustrated description of the condition of a boiler on a minor vessel of the American navy, after a service of some months on the Cuban blockade. It had been in use thirteen months. 1400 w. Locomotive—March, 1899.

Some Experiments Having Reference to the Durability of Water-Tube Boilers. A. F. Yarrow. Read at meeting of the Inst. of Naval Archts., England. Results of experiments recently carried out to ascertain the comparative merits of nickel steel tubes and tubes of mild steel. Ill. 2500 w. Engr, Lond—July 21, 1899.

See also **Express.**

**"Zenith City."**—The Water-Tube Boilers of the Steamer "Zenith City." This steamer is equipped with water-tube boilers, and is claimed to be carrying a ton of freight at a higher rate of speed, and with less consumption of coal than any other steamers on the lakes. Illustrated description. 1300 w. Eng—Dec. 7, 1895.

### MARINE CONGRESS.

**Brussels, 1898.**—The Transactions of the VII Maritime Congress in Brussels, 1898 (Ueber die Verhandlungen des VII Schiffahrts-Congresses in Brussel, 1898). A. Schromm. A general review of the subjects discussed, with numerous illustrations of harbor improvement works, etc. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 3, 1899.

**Paris. 1898.**—The Congress of the Technical Maritime Association (Congres de l'Association Technique Maritime). M. Hachebet. A general report of the convention recently held at Paris, with brief abstracts of the more important papers presented. 1500 w. Génie Civil—April 2, 1898.

**Paris, 1900.**—International Marine Congress at Paris. The programme of the Congress to be held during the exposition of 1900. 900 w. U S Cons Repts, No. 654—Feb. 14, 1900.

### MARINE ENGINE.

See also **ARMORED CRUISER; BATTLESHIP; CRUISER; GUNBOAT; MARINE BOILER; MARINE ENGINEERING; MONITOR; SHIP PROPULSION; STEAM BOAT; STEAM ENGINE; STEAMSHIP; TORPEDO BOAT; TORPEDO BOAT DESTROYER; WARSHIP.**

Engines Afloat. Part first considers bilge pumps and the means of locating and remedying difficulties. Serial. Prac Engr—April 21, 1899.

Marine Engines (Les Machines Marines). L. E. Bertin. A very full review of modern marine engine practice, both merchant and naval, with many illustrations and diagrams. 18000 w. Bull de la Soc d'Encour—Oct., 1899.

Marine-Engine Design of To-Day. Henry M. Rounthwaite. A paper read at the Inst. of Junior Engs. A general review of the present features of marine design, both for merchant vessels and military purposes, but principally related to merchant service. 4000 w. Eng's Gaz—Sept., 1896.

Modern Improvements in Marine Engine Practice. Editorial on paper by Messrs. A. J. Durston, and J. T. Milton, reviewing recent improvements and commenting on future prospects. 2200 w. Eng News—Aug. 5, 1897.

The Evolution of the Marine Engine. Osborne Atwater Day. Brief review of progress in engines of ocean-going vessels. 1600 w. Yale Sci M—Dec., 1897.

**"Aberdeen."**—Engines and Boilers of the S. S. "Aberdeen." Illustrated description. 700 w. Engr, Lond—March 27, 1896.

**Accident.**—See also **TORPEDO-BOAT DESTROYER.**

**"America Maru."**—The S. S. "America Maru." Illustrated description of the triple-expansion engines. 1000 w. Engr, Lond—Oct. 27, 1899.

**Armored Cruiser.**—See **"Chanzy"; "Noord Brabant"; U. S. Armored Cruiser; ARMORED CRUISER.**

**Auxiliary.**—See **AUXILIARY ENGINE.**

**Balancing.**—Balancing of Vertical Marine Engines. Discussed in an Elementary Manner. J. Macfarlane Gray. Read before the Inst. of Marine Engs., London, Eng. Ill. Serial. Marine Engng—Sept., 1900.

Graphic Method of Balancing Marine Engines. J. Macfarlane Gray. Description of method, with remarks. 1200 w. Engng—April 13, 1900.

High-Speed Marine Engines (Schiffsmaschinen mit Hoher Kolbengeschwindigkeit). A paper by Inspector Eikenradt before the German Society of Mechanical Engineers, discussing especially the methods of counterbalancing in order to diminish vibration at high speeds. Two articles. 4500 w. Glaser's Annalen—July 1, 15, 1898.

On Balancing of Steam Engines. Otto Schlick. Read before the Inst. of Naval Archts. Discusses the method of finding the balance for a four-crank engine. 2200 w. Engng—April 20, 1900.

Studies upon Counterbalancing Marine Engines (Aleuni Studi sul Bilanciamento delle Macchine a Vapore Marine). A. Perroni. An elaborate mathematical paper, illustrated with diagrams. 11000 w. Rivista Marittima—Dec., 1898.

The Balancing of Engines, with Special Reference to Marine Work. W. E. Dalby. Read before the British Inst. of Naval Archts. Explains and illustrates a semi-graphical method of treating balancing problems in a direct and simple manner. Also discusses the proper treatment of the connecting rod. Ill. Serial. Engng—April 21, 1899.

The Balancing of Multiple-Cylinder Marine Engines (Ausbalanzirung Mehrcylindriger Schiffskraftmaschinen). The full text of the judicial opinion of the Imperial Court upon the limitations of the Schlick system of balancing engines and reducing vibration, in the case of the Vulcan works against Schichau. An interesting and important review of the work of Taylor, Yarrow, Schlick, and others. 5000 w. Zeitschr d Ver Deutscher Ing—Sept. 17, 1898.

The Littlejohn Perfectly Balanced Engine. Illustrated description. 2000 w. Am Ship—April 15, 1897.

The Taylor Method of Balancing Marine Engines (Das Taylorsche Verfahren zur Ausbalansirung der Schiffsmaschinen). C. Fränzel. A review of the method originally given by D. W. Taylor in the "Jour. Am. Soc. Naval Engineers," for determining the crank angles and distribution of forces to produce a minimum vibration. 4000 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 1898.

The Vibrations of Ships, their Causes and Means of Reduction (Schiffsschwingungen, ihre Ursachen und Kritik der Mittel zu ihrer Verminderung). Herr Berling. A general review of the results of investigations made with the Schlick recording apparatus, together with a discussion of the nature of the vibrations, and of the Taylor-Schlick method of balancing engines. Two articles. 2 plates. 10000 w. Zeitschr d Ver Deutscher Ing—Aug. 19, 26, 1899.

The Vibration of Vessels and the Balancing of Marine Engines (Des Vibrations des Navires et de l'Equilibre des Machines Marines). M. Haas. A very valuable and complete mathematical and practical discussion of the nature of vibrations in ships and the extent and manner to which they may be diminished by counterbalancing. Two articles. 10000 w. Rev de Mécanique—April, June, 1898.

The Yarrow-Schlick-Tweedy System of Balancing Engines. Several illustrations showing the results attained in the twin-screw steamship "Avon," and in others, by the adoption of this system, with explanations. 1300 w. Engng—Dec. 17, 1897.

Vibrations of Steamships and Methods of Balancing Marine Engines. C. H. Peabody. Considers the cause of vibration to be due to the coincidence of the time of revolution of the engine to the natural time of vibration of the hull. Serial. Marine Engng—Feb., 1899.

See also **Vibrations.**

**Battleships.**—See "Brennus"; "Goliath"; "Maine"; "Ocean"; "Oregon"; "Texas"; U. S. Battleships; BATTLESHIP.

**Bearings.**—See LUBRICATION—Marine Engines.

**"Brennus."**—The Engines of the French Battleship "Brennus." Camille Roche. Abbreviated description from the "Revue de Mécanique," with illustrations. Serial. Engr, Lond—April 1, 1898.

**British.**—See also SHIPBUILDING—British.

**British Cruisers.**—See "Diadem"; "Hermes"; "Proserpine" and "Psyche"; CRUISER.

**British Warship.**—Recent Trials of the Machinery of British Warships. Albert John Durston and Henry John Oram. An account of the recent extensive developments in marine engineering practice in the Royal Navy, with record of particulars and results obtained from the machinery of warships. 6500 w. Jour Am Soc of Nav Engs—May, 1899.

**"Bullfinch" Disaster.**—See TORPEDO-BOAT DESTROYER—"Bullfinch" Disaster.

**Care.**—On Taking Charge of a Marine Engine. A. B. Willitts. Presents the leading points to be looked after in taking charge of marine machinery, aiming to aid engineers suddenly called upon. 4500 w. Engr, N. Y.—June 15, 1898.

**Central Power Plant.**—Central Power Plants on Board Ship vs. Distribution of Power. William S. Aldrich. Considers the advantages of having all the power required, developed in a single plant. Discusses steam, compressed air, water pressure and electricity. 3500 w. Jour Am Soc of Nav Engs—Feb., 1898.

**"Chanzy."**—Engines of the French Armored Cruiser "Chanzy." Principal dimensions and brief illustrated description. 500 w. Engng—Sept. 16, 1898.

**"Chebucto," Compound.**—Engines of the Ferry Steamer "Chebucto." Illustrated description of the driving-engines and other machinery. 700 w. Engr, Lond—May 20, 1898.

**"Cheerful" and "Mermaid."**—Triple-Expansion Engines of H. M. SS. "Cheerful" and "Mermaid." Brief description and illustrations. 350 w. Engr, Lond—July 21, 1899.

**"Chicago."**—New Horizontal Engines for U. S. Cruiser "Chicago." Illustrated description of the new machinery with which the vessel is to be fitted. 1500 w. Marine Engng—April, 1897.

**Continuous Record.**—A Method of Determining a Continuous Record of the Performance of a Marine Engine. W. F. Durand. Discusses the desirability of continuous records and considers the elements involved in them and the ways and means of obtaining them. 500 w. Jour Am Soc of Nav Engs—Feb., 1897.

**Corrosion.**—Unusual Corrosion of Marine Machinery. Hector Maccoll. Paper read before the Inst. of Mech. Engs. A short description of an instance where the action of corrosion was so widespread, so rapid, and so powerful as to be somewhat interesting to engineers. 1600 w. Engng—July 31, 1896.

**Cruisers.**—See "Chicago"; "Diadem"; "Friesland"; "Hermes"; "Proserpine" and "Psyche"; CRUISER.

**Design.**—Marine Engine Designs. William Burlingham. Aims to call attention to facts that ought to be observed in the design of marine engines, especially such as engineering works rarely discuss. Serial. Mach, N. Y.—June, 1897.

**"Deutschland."**—Engines and Boilers of the "Deutschland." Illustrated description. 400 w. Sci Am Sup—May 26, 1900.

**"Diadem."**—Boilers and Engines of H. M. S. "Diadem." Engraving of engines and drawings showing most of the fittings of the boilers, with brief description. 500 w. Engr, Lond—Nov. 11, 1898.

**"Diana."**—The Engines of H. M. S. "Diana." Illustrated description. 1000 w. Engng—Oct. 30, 1896.

**Dimensions.**—Dimensions of Small Marine Engines and Boilers. J. G. A. Meyer. Directions for designing, which, it is claimed, will give good results in most cases, and possibly, not bad results under any circumstances. 1300 w. Am Mach—Sept. 3, 1896.

**Economics.**—See SHIP PROPULSION.

**Efficiency.**—From Furnace to Propeller—A History of the Energy Losses Which Occur on the Way. Edmund Leavenworth. Traces the losses, showing that only about 7.26 per cent. is utilized, and urging engineers to work for the decrease of losses. 3300 w. Marine Engng—July, 1899.

Mechanical Efficiencies of Marine Engines. Bernhard A. Sinn. Explains what is meant by the term, and the ways of finding it. 1200 w. Mech Wld—Nov. 5, 1897.

**Freight Steamships.**—Twenty Years of Progress in Cargo-Boat Machinery. J. F. Walliker. Read before the Inst. of Marine Engs., at Stratford. Discusses the subject of boilers principally, referring briefly to other machinery. 3000 w. Prac Engr—March 9, 1900.

**"Friesland."**—The Machinery of the Dutch Cruiser "Friesland." The particular feature is the use of water-tube steam generators in combination with boilers of the ordinary cylindrical type. Ill. 700 w. Engng—July 1, 1898.

**"General Baquedano."**—The Engines of the Corvette "General Baquedano." Magnus Sandison. Illustrated description of the propelling engines, which possess some novel features. The vessel being a training ship, it was desirable that it be able to steam economically at low speeds. 1800 w. Engr, Lond—April 13, 1900.

**"Germanic."**—New Engines of the White Star Liner "Germanic." Illustrated detailed description. 1200 w. Eng, Lond—July 17, 1896.

**"Goliath."**—The Engines of H. M. S. "Goliath." Illustrated description. 800 w. Engr, Lond—Feb. 24, 1899.

**Governor.**—See GOVERNOR—Marine Engine.

**Great Lakes.**—The Machinery of Vessels on the Great Lakes and a Synopsis of Rules Compiled by the Great Lakes Register. John N. Coffin. An outline of some of the results which have been developed in compiling the Great Lakes Register. 4800 w. Jour Assn of Engng Socs—Nov., 1898.

**"Hermes" Trials.**—The Trials of H. M. S. "Hermes." An account of the interesting series of steam trials just completed, which gave important data bearing upon high steam pressures. 1800 w. Engng—June 9, 1899.

**High Pressure.**—High Pressure Marine Engines. Editorial on some of the difficulties to be met in using high pressures. 1600 w. Engr, Lond—Aug. 5, 1898.

High Pressures for Marine Engines. W. R. Cummins. Read before the Northeast Coast Inst. of Engs. & Shipbuilders. The writer recapitulates the arguments of a former paper as to the economy to be expected from increase of pressure, and touches upon the commercial aspect of the question; considers the type of boiler that will best suit the new conditions, and makes some suggestions as to the design of an engine most suitable for this increased pressure. Serial. Prac Engr—April 30, 1897.

**History.**—See **United States History.**

**"Inchmona."**—The Five-Crank Engines of the S. S. "Inchmona." General description with two-page illustration. 2200 w. Eng, Lond—Sept. 11, 1896.

**Indicating.**—See **INDICATOR—Marine Engines.**

**Inglis.**—See **Paddle Steamer "Paris"; MARINE ENGINE WORKS.**

**"Ivernia."**—The Quadruple-Expansion Engines of the Cunard Liner "Ivernia." Illustrated description. 800 w. Engng—Oct. 5, 1900.

**"Josephine."**—Triple-Expansion Engine of Yacht "Josephine." Description with end elevation, side elevation and plan, showing all the principal features of the design. 300 w. Am Mach—March 26, 1896.

**"Kherson."**—The Machinery of the S. S. "Kherson." Illustrated description. 2500 w. Engng—Dec. 25, 1896.

**Launch.**—The Design and Construction of Small Steam-Launch Engines. Part first considers the requirements of launch machinery, the present tendency in engine design, etc. Serial. Mech Wld—May 27, 1898.

See also **BOAT; LAUNCH.**

**Lining.**—Lining a Vertical Marine Engine. James V. Trenton. Directions with diagrams. 1000 w. Sta Eng—April, 1897.

**"Maine."**—Machinery of the "Maine." One of the three new battleships to be built is to be called the "Maine." It is to be of the same general plan as the "Alabama," and this article notes the changes which are to be made in the machinery. 1000 w. Bos Jour of Com—Oct. 1, 1898.

The Naval Steam Engine—Its Graphics and Economics Illustrated. Robert H. Thurston. A study relating to the machinery of the U. S. S. "Maine," and the general efficiency. 2500 w. Marine Engng—May, 1900.

**"Merida," Breakdown.**—Breakdown of the "Merida's" Engines. Illustrated description of one of the most complete wreckages of a marine engine on record. 1000 w. Eng—June 20, 1896.

**"Minneapolis."**—See **AUXILIARY ENGINE—Steam Consumption.**

**Modern Type.**—Modern Type of Vertical-Inverted Triple-Expansion Marine Engine. Illustrated description of a type which is being used on small vessels. 400 w. Marine Engng—Sept., 1896.

**"Noord Brabant."**—Triple-Expansion Engines of the Dutch Armored Cruiser "Noord Brabant" (Machines à Triple-Expansion du Croiseur Cuirassé Hollandais le "Noord Brabant"). M. Hachelet. A full illustrated description of these 10000 h. p. engines, with general remarks on the Yarrow boilers and the cruiser herself. 1 plate. 3500 w. Génie Civil—May 12, 1900.

Triple-Expansion Engines of the Dutch Cruiser "Noord Brabant." Illustrated details of the engines and machinery. 1600 w. Engr, Lond—Dec. 8, 1899.

**"Northwest" and "North Land."**—See **STEAMSHIP.**

**"Ocean."**—Engines of H. M. First-Class Battleship "Ocean." Illustrations and description of engines of the triple-expansion type, steam being supplied by Belleville boilers. 900 w. Engr, Lond—Dec. 1, 1899.

**"Oceanic."**—American Freight Locomotives and the Engines of the "Oceanic"—A Comparison of Horse Power. An interesting comparison of marine engines and locomotive horse power, with illustrations. 1800 w. Sci Am—March 31, 1900.

**"Oregon."**—The Performance of the "Oregon's" Engines on Their Great Run of 15000 Knots. A letter from C. N. Offley, published in the "N. Y. Sun." An interesting account of the trip. 2300 w. Sci Am Sup—Aug. 27, 1898.

**Paddle.**—See also **"Princess of Wales"; MARINE ENGINE WORKS—Inglis; STEAMBOAT.**

**Paddle Steamer "Paris."**—Inglis's Triple-Expansion Paddle-Wheel Engines. Illustrated description of the engines for the paddle-steamer "Paris," built for the River Plate Co. 1500 w. Engng—April 30, 1897.

**"Pennsylvania."**—Test of the Machinery of the Minnesota Steamship Company's Steamer "Pennsylvania." B. C. Bryan and W. W. White. Illustration and general description of the vessel and its equipment, with accounts of the tests for determining the adaptability of underfed stokers and the economic results. 4500 w. Jour Am Soc of Nav Engs—Aug., 1899.

See also **MECHANICAL STOKING.**

**"Princess of Wales."**—Engines of the Paddle-Steamer "Princess of Wales." Illustrated description. 500 w. Engs' Gaz—Oct., 1896.

**"Proserpine" and "Psyche."**—Machinery of H. M. SS. "Proserpine" and "Psyche" as Illustrative of the Work Done at Keyham, Particularly with Reference to the Practical Training of Engineer Students. Read at Inst. of Mech. Engs., England. An illustrated detailed description. 3000 w. Engng—Aug. 18, 1899.

The Engines of British Cruisers (Machines de Croiseurs Anglais). With illustrations and descriptions of the engines of the "Proserpine" and the "Psyche." 1200 w. Rev Tech—Nov. 10, 1899.

**Quadruple Expansion.**—Quadruple Expansion Engines for Lake Service. Walter Miller. Economy secured by the adoption of high steam pressures, and quadruple expansion on the lake marine since 1855. Discussion. 6000 w. Jour Assn of Engng Soc—Jan., 1896.

**Racing.**—The Prevention of Racing in Marine Engines. L. Harlan. Describes invention of J. S. Yabsley, of Yokohama, to effect by electrical means the closing and opening of a throttle valve, which regulates the supply of steam to the engines. Ill. 1200 w. Elec Rev, Lond—Feb. 26, 1897.

**Regulations.**—Machinery Rules. Editorial upon the divergencies in the requirements of the various bodies which approve engines and boilers for ships, and a review of a paper recently read by Mr. John Key, at a meeting of the British Assn. at Ipswich, in which a uniform factor of safety for boilers and machinery for ships is advocated. 700 w. Eng's Gaz—Dec., 1895.

**Repairs.**—Marine Engine Repairs Discussed in a thoroughly Practical Way. J. Kyles. From a paper read before the Inst. of Engs. and Shipbuilders of Hong Kong. Details are discussed and general suggestions given. 4800 w. Marine Engng—July, 1898.

Marine Engine Repairs. J. Kyles. Read at meeting of the Inst. of Engs. and Shipbuilders of Hong Kong. Notes on a few of the most important engine repairs. 5000 w. Steamship—June, 1898.

The Discovery and Repairs of a Break in the Intermediate Steam Chest of the Port-Engine on the U. S. S. "Philadelphia." W. N. Little. Illustrated description. 1400 w. Power—Oct., 1896.

**Revenue Cutter.**—Machinery for the New Revenue Cutter to be Stationed at New York. Illustrations showing the designs of the engines and boilers of the boat known officially as No. 6, now being built at Baltimore. 700 w. Marine Engng—Oct., 1898.

Machinery of U. S. Revenue Cutters Nos. 4 and 5 for the Great Lakes. Brief illustrated description. 350 w. Am Mach—April 15, 1897.

**Rotary vs. Reciprocating.**—See **STEAM TURBINE.**

**"St. Paul" and "St. Louis."**—Steam Plants of the "St. Paul" and "St. Louis." Illustrated detailed description. 2500 w. Power—Feb., 1896.

The Engines of the "St. Louis" and "St. Paul." Illustrated description. 1200 w. Sci Am—July 18, 1896.

**"Santo Antonio."**—Boiler and Engines of the "Santo Antonio." Illustrated detailed description. 1400 w. Engng—Feb. 28, 1896.

**Shafts.**—See **CRANK SHAFT; SHAFT.**

**Speed Controlling Device.**—Speed Control of Modern Steamers. M. L. Wood. Extract from paper presented to the U. S. Naval Inst. Describes and illustrates a device for controlling speed and direction of the engines of a steamer directly from the bridge or pilot house instead of from the engine platform, and states advantages claimed for the method. 1900 w. Am Eng & R R Jour —Aug., 1896.

See also **SHIP TELEGRAPH.**

**Steel Tests.**—See **STEEL TEST—Marine Engines.**

**"Texas."**—Contract Trial of the Machinery of the "Texas." T. W. Kinkaid. Complete description with numerous illustrations of machinery, etc., and tabulated data resulting from the tests. 3800 w. Jour Am Soc of Nav Engs—Feb., 1896.

In the Engine Room of the "Texas." Kenneth McAlpine. From the "N. Y. Evening Sun." Interesting description of the work in the engine-room during the engagement with Cervera's fleet. 1600 w. Am Mach—Aug. 25, 1898..

**Thrust-Blocks.**—Experiments on Thrust-Block Friction. F. von Kodolitsch. Read before the British Inst. of Naval Architects. Describes and illustrates the construction of the thrust-block and gives an account of experiments carried out to ascertain what percentage of the indicated horse power is lost by friction. 1000 w. Engng—July 28, 1899.

**Torpedo-Boat.**—The Machinery of the New Torpedo-Boats and Torpedo-Boat Destroyers. Describes the machinery of the 12 new torpedo-boats and 19 torpedo-boat destroyers as given in the official circular to bidders. 1400 w. Eng News—Aug. 4, 1898.

**Torpedo-Boat Destroyers.**—Engines of Torpedo-Boat Destroyers "Salmon" and "Snapper." Illustrated description. 900 w. Engng—Oct. 23, 1896.

The Engines of H. M. SS. "Swordfish" and "Spitfire." Illustrated description of engines fitted into two torpedo-boat destroyers. Presents some novel features in the arrangement of valves. 1600 w. Engng—Jan. 15, 1897.

The Machinery of Vessels of the Destroyer Type. Brief review of the problem of fast ocean traveling, and of the engines of torpedo-boat destroyers. Serial. Mech Wld—Oct. 22, 1897.

See also **Torpedo-Boats; TORPEDO-BOAT DESTROYER.**

**Tugboat "Clyde."**—See **MARINE ENGINE WORKS —Inglis.**

**Turning Moments.**—On the Uniformity of Turning Moments of Marine Engines. Dr. Lorenz. Read before the Inst. of Naval Archts. Arguing that the balance of the reciprocating masses agrees well with the conditions for the most uniform possible diagram of turning moments, and is necessary for attaining a good uniformity of the angular velocity of the crank shaft. 1500 w. Engng —April 20, 1900.

**"Ultonia."**—Engines of the S. S. "Ultonia." Two-page plate, with description. 1300 w. Engng—March 3, 1899.

**U. S. Armored Cruiser.**—Machinery for the United States Navy Armored Cruisers. G. W. Melville. A brief comparison of the merits and demerits of the preliminary designs. Also editorial. 3400 w. Engr, Lond—Aug. 3, 1900.

**U. S. Battleships.**—Machinery in the United States Navy. Illustrations and specifications for the main engines of the new battleships Nos. 10, 11 and 12, as taken from Commodore Melville's report. Also editorial. 2500 w. Engr, Lond—Feb. 3, 1899.

**United States History.**—Reminiscences of Early Marine Steam Engine Construction and Steam Navigation in the United States of America from 1807 to 1850. Charles H. Haswell. Read at meeting of the Inst. of Naval Archts., London. Historical account of types used and general progress in construction and design. 3300 w. Engr, Lond—April 1, 1898.

Reminiscences of Early Marine Steam Engine Construction and Steam Navigation in the United States of America, from 1807 to 1850. Charles H. Haswell. Read at meeting of Inst. of Naval Archts., March 31, 1898. 3000 w. Jour Am Soc of Nav Engs—Nov., 1898.

Reminiscences of Early Marine Steam Engine Construction and Steam Navigation in the United States of America, from 1807 to 1850 (Continued). Chas. H. Haswell. A continuation of a former paper in order to make the record as complete as possible. 1400 w. Jour Am Soc of Nav Engs —May, 1899.

**U. S. Naval Material.**—Material for Naval Machinery. A copy of the specifications issued by the Bureau of Steam Engineering of the Navy Dept., for the inspection of material for use in the construction of machinery for the U. S. Navy. 4800 w. Ir Age—Dec. 8, 1898.

**Vibrations.**—Analysis of the Inertia Forces of the Moving Parts of an Engine. John H. MacAlpine. The object of this investigation was to deduce, by harmonic analysis, simple and useful expressions for some of the periodic functions connected with the ordinary connecting-rod engine. They are published now because of their importance in explaining the occurrence in steamships of vibrations of shorter period than that of the revolution of the engine. Serial. Engng —Oct. 22, 1897.

The Prevention of Vibrations of Steamships. John H. MacAlpine. The object of the paper is to show how, by mechanical means, the vertical transverse vibrations of the periods higher than the first may be almost entirely prevented. 5800 w. Engng—Feb. 19, 1897.

Steamship Vibrations, with Records of Recent Observations. W. F. Durand. Part first discusses unbalanced reciprocating parts, unbalanced cranks, and unbalanced pressure on the guides. 3000 w. Marine Engng—June, 1897.

Method of Securing an Autographic Record of Steamship Vibrations. W. F. Durand. Describes instrument for automatically recording vibrations and explains its principles. Ill. 1600 w. Marine Engng—Sept., 1897.

See also **Balancing.**

**Warship.**—With the Machinery of a Warship During Action. B. S. Notes on the conditions of the engine room during an engagement, showing that there is room for improvement in the arrangement of machinery. 1600 w. Prac Engr—Dec. 9, 1898.

See also **Armored Cruiser; Battleship; British Navy; Cruiser; Torpedo-Boat Destroyer; United States; WARSHIP.**

**Weights.**—Estimated Weights of Marine Machinery. George R. McDermott. Abstract of paper read at meeting of the Society of Naval Architects and Marine Engineers. Gives the result of investigations made regarding methods for determining the weights of machinery of steamships. 2300 w. Sib Jour of Engng—Dec., 1897.

**Wells.**—Wells Engine in B. S. Renwick's Yacht. Illustrated description. 800 w. Shipbuilder—March 26, 1896.

**Works.**—See **MARINE ENGINE WORKS.**

**Yacht.**—See also **"Josephine"; LAUNCH; STEAM YACHT.**

**Yacht, Compound.**—A Compound Yacht Engine. Illustrated description. 600 w. Am Mach—July 23, 1896.

**"Zenta."**—See **CRUISER.**

**MARINE ENGINEER.**

**Society Meeting.**—See **NAVAL ARCHITECT.**

**Qualifications.**—Marine Engineers' Qualifications. Brief extracts from letters from practical men of various classes on the subject of marine engineers' training. 1600 w. Engng—Nov. 27, 1896.

**MARINE ENGINEERING.**

See also **MARINE ENGINE; NAVAL ARCHITECTURE; NAVAL ENGINEERING; SHIPBUILDING; SHIP PROPULSION; SHIP RESISTANCE; STEAM ENGINEERING.**

A Retrospect and the Outlook on Marine Engineering. Waldon Fawcett. A review of the development, presenting many facts of interest. 3000 w. Ir Age—March 29, 1900.

Marine Engineering. Written for the purpose of giving to young men intending to become seagoing engineers an idea of the conditions and work in this occupation. Serial. Lord's Mag—Oct., 1896.

Notes on the Estimation of the Power of Steamships at Sea and of Feed and Circulating Water at Sea. Nisbet Sinclair. Read before the Inst. of Engs. & Shipbuilders in Scotland. Part first discusses sea power and shows the importance of proper instruments and being able to furnish data of performances. Also begins the discussion of feed- and circulating-water. Serial. Ind & Ir—April 30, 1897.

Object Lessons. A. B. Willitts. On the installation of piping on steamships, and a peculiar condition of the propellor shaft of the "Helena," which was ruptured. Ill. 1500 w. Jour Am Soc of Nav Engs—Nov., 1899.

The Progress of Marine Engineering. Albert J. Durston. Read at International Congress of Naval Architects and Marine Engineers. A review of the history and progress in the Royal Navy and Mercantile Marine from the foundation of the Institution of Naval Architects to the present date. Serial. Engng—July 9, 1897.

**B. A. Address.**—British Association: Mechanical Science Section. William White. Review of progress made in steam navigation; the causes of advance in speed of steamships, and length of voyages; also considers the prospects for further advance. 11000 w. Engr, Lond—Sept. 15, 1899.

**British.**—See **SHIPBUILDING.**

**British Navy.**—Admiralty Engineering. Considers in detail some of the aspects of engineering practice of the British Admiralty. Serial. Engr, Lond—March 30, 1900.

**Cylindrical Boilers.**—See **MARINE BOILER—Cylindrical.**

**1899.**—See **SHIPBUILDING.**

**Glasgow University.**—Schools of Marine Engineering and Naval Architecture. George Crouse Cook. An illustrated account of the courses and conditions at Glasgow University, written by an American student. 2500 w. Marine Engng—Aug., 1900.

**History.**—Fifty Years of Advance in Marine Engineering. Ridgely Hunt. Showing the increase, since 1840, in horse power, steam pressure, tonnage, speed, etc. Ill. 4500 w. Eng Mag—Sept., 1897.

**Power Formulæ.**—The Admiralty Coefficient with Facts Gleaned from Torpedo-Boat Steam Trials. William A. Fairburn. Shows that as the speed of vessels increases, the flaws in all power formulae become more pronounced, and discusses their value. 4000 w. Marine Rev—Nov. 9, 1899.

Fundamental Corrections on the "Admiralty Formulas." Robert Mansel. The position is taken that either Newton was wrong in the enunciation of his scholium to the third law of motion, or that the variable Admiralty constants are a misapprehension. In pursuance of the subject mathematical methods are employed. 3000 w. Eng, Lond—Sept. 4, 1896.

See also **SHIP PROPULSION; SHIP RESISTANCE.**

**Research.**—Marine Engineering Research. An argument in favor of such researches by scientific societies, and an account of researches upon Howden's system of forced draught. The assertion is made that the whole question of marine engineering, testing and trial has assumed, during the last few months, a national importance of the most pressing nature. 1600 w. Engng—Nov. 22, 1895.

**Speed.**—See also **TORPEDO-BOAT.**

**Thames.**—See **SHIPBUILDING.**

**United Kingdom.**—See **SHIPBUILDING—British.**

**Vibration.**—See **MARINE ENGINE.**

### MARINE ENGINE WORKS.

**Inglis.**—The Jubilee of Messrs. A. and J. Inglis. A review of the work of this firm, with illustrations of the paddle engines of the old tugboat "Clyde," built 47 years ago and still doing duty. 2300 w. Engng—July 30, 1897.

**Paisley, Scotland.**—Messrs. Bow, McLachlan & Company's Thistle Works, Paisley. Illustrated description of one of the most important English marine engineering establishments. 3600 w. Eng, Lond—Nov. 1, 1895.

### MARINE RAILWAY.

See also **ELECTRIC TRAMWAY—Brighton-Rottingdean.**

**Newark Bay.**—Great Marine Railway. Splendid New Crandall-designed dry-dock at the Townsend & Downey shipyard, in New York harbor. A description, with illustration, of marine railway and shipyard on Shooter's Island, Newark Bay. 900 w. Naut Gaz—Sept. 20, 1900.

### MARL.

See also **CLAY.**

**Alabama.**—See **PHOSPHATE.**

### MARSH.

**Bay of Fundy.**—The Tidal Marshes of the Bay of Fundy. Describes the action of the tides which have formed the salt marshes of New Brunswick and Nova Scotia. 2000 w. Eng News—Dec. 30, 1897.

### MASON.

Criticism on "Code of Practice of the Chicago Masons' and Builders' Association." Dankmar Adler. An open letter to Chicago mason builders with a copy of code. 3300 w. In Arch—Feb., 1897.

### MASONIC TEMPLE.

**Montgomery, Ala.**—Masonic Temple, Montgomery, Ala. Illustrated description. 800 w. So Arch—May, 1896.

### MASONRY.

See also **ARCH; ARCHITECTURE; BRICKWORK; BUILDING CONSTRUCTION; CEMENT; CONCRETE; DAM; STONE.**

Ancient and Modern Masonry. Brief accounts of various constructions, with illustrations. Ill. 900 w. Ill Car & Build—Feb. 26, 1897.

Masonry. Discusses the nature and properties of the stones employed, the various ways in which they are combined in building construction, and the importance of sound jointing. Ill Car & Build—Aug. 26, 1898.

Masonry. George S. Morison. Briefly discusses materials used in construction, and the special suitability of masonry for works that are to endure. Gives a general outline and reviews the principles that must be followed to secure good results. Ill. 10800 w. Jour W Soc of Engs—Dec., 1896.

Masonry. Harvey Flint. Read at meeting of the Arch. Assn., England. A lecture on practical stonework, exterior and interior. 5800 w. Arch, Lond—March 13, 1896.

Practical Masonry and Stone-Cutting. E. W. Hind. In this series of articles the artist proposes illustrating and explaining practical methods by which the stone-cutter may obtain the necessary moulds, etc., required to ascertain the correct shape and size of each piece which belongs to the more intricate problems. Part first deals with arches in circular walls; or, circle on circle simplified. Serial. Ill Car & Build—Dec. 25, 1896.

The Present Status of Engineering Knowledge Respecting Masonry Construction. David Molitor. Considers earth pressure theories, retaining walls, fixed arches, three-hinged arches, concrete and iron arches, and concrete. Ill. 12400 w. Jour Assn of Engng Socs—Jan., 1900.

**Ashlar.**—Broken Ashlar Masonry. W. W. Beach. Illustrations and discussion of the possibilities of this form of masonry. 1400 w. Technograph, No. XI.

The Face-Bonding of Broken Ashlar. Clarence A. Martin. Suggestions in drawing, building and inspecting certain kinds of stone walls, giving some of the principles that have governed the best work. 900 w. Am Arch—Feb. 11, 1899.

See also **BUILDING CONSTRUCTION.**

**Bridges.**—See **ARCH; BRIDGE ANCHORAGE; BRIDGE FOUNDATION; VIADUCT—Seine.**

**Cement Injection.**—The Injection of Cement, by Means of Compressed Air, into Masonry Structures (Note sur l'Emploi d'Injection de Ciment à l'Air Comprimé dans les Maconneries, Terrains de Fondations, etc). M. Caméré. An illustrated description of an apparatus and the method used for preventing cracks in masonry, with results of experiments. 1500 w. Ann d Ponts et Chaussées—1st quarter, 1900.

**Cherbourg Dike.**—See **HARBOR.**

**Chimney.**—Tests of Masonry for Chimney Construction (Prüfung von Schornsteinmauerwerk). M. Gary. A report of tests made at the government testing laboratory at Charlottenburg, with many illustrations, diagrams and tables. 6000 w. Mitt aus den Kgl Tech Versuchsanstalt—Part II., 1899.

See also **CHIMNEY.**

**Concrete Railway.**—Railroad Concrete Masonry. W. A. Rogers. Describes the qualities of concrete and the practice followed in its use by the writer. Serial. R R Gaz—June 15, 1900.

**Hydrostatic Pressure.**—The Internal Hydrostatic Pressure in Masonry, with Especial Reference to Masonry Dams. Arnold Emil Broenniman and Harry Hurson Ross. Gives a series of experiments, describing apparatus used and method of testing, showing that water pressure is transmitted through ordinary stones, and through dams and how it may effect the stability, and gives some of the possible means of reducing or eliminating the effect. Ill. 13000 w. Jour of Soc of W Engs—Aug., 1897.

**Metal Joints.**—Masonry Construction with Cast Metallic Joints (Maçonneries avec Joints Métalliques Coulés). H. Tavernier. A study of the construction of poured metallic joints for use with masonry arches for the control of the line of pressure. Experiments with the trial arch at Saint Chamond are discussed. 16000 w. 1 plate. Ann des Ponts et Chaussées—3 Trimestre, 1899.

**Pueblo.**—Pueblo Masonry. Cosmos Mindeleff, in the "Sixteenth Annual Report of the Bureau of American Ethnology." Describes the methods of construction. 1100 w. Stone—June, 1898.

Pueblo Masonry. Cosmos Mindeloff. Describes the characteristics of this masonry. 1500 w. Ill Car & Build—Aug. 26, 1898.

See also **ARCHITECTURE.**

**Seine Viaduct.**—See **VIADUCT—Seine.**

**Trapezoidal Formula.**—Methods of Applying the Trapezoidal Formula to Computations of Stability (Diverses Manières d'Appliquer la Règle du Trapéze au Calcul de la Stabilité). Maurice Lévy. Particularly devoted to the application of the method to the determination of the stability of masonry dams, especially against sliding. 2500 w. Ann des Ponts et Chaussées—4 Trimestre, 1897.

See also **DAM.**

**Waterproofing.**—Waterproofing Tunnel Masonry. A statement of the methods adopted for the New York rapid-transit tunnels, involving the use of felts and asphalt, brick and asphalt, or asphaltic concrete. 1400 w. Eng Rec—Oct. 28, 1899.

**Water-Works Plants.**—Masonry for Water-Works Plants. Charles A. Hague. On the care needed in building a watertight wall, and the faulty methods used. 2200 w. Fire & Water—Sept. 29, 1900.

## MASTER CAR BUILDERS.

See **CAR; CAR CONSTRUCTION; CAR COUPLER; RAILWAY ASSOCIATION.**

## MASTER MECHANICS.

**Railway.**—See **LOCOMOTIVE; LOCOMOTIVE CONSTRUCTION; RAILWAY ASSOCIATION.**

## MATCH WORKS.

**Diamond Company, England.**—The Works of the Diamond Match Company, Limited. Illustrated detailed description. Serial. Engr, Lond—July 7, 1899.

## MATERIALS.

**Chemistry.**—See **CHEMISTRY—Materials of Engineering.**

## MATERIALS' STRENGTH.

See also **BEAM; BUCKLING; COLUMN; ELASTICITY; TESTING;** and under specific materials.

Moments of Resistance and Core-Sections for Given Laws of Deformation (Widerstandsmomente und Kernfiguren bei Beliebigem Formänderungsgesetz). Fr. Engesser. A discussion, based upon Hooke's law of the proportionality of strain to stress, with formulas and tables for the computation of moments and sections. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 20, 1898.

On the Permanent Deformation and Rupture of Metals (Sur les Deformations Permanentes et la Rupture des Metaux). M. G. A. Faurie. An examination of the phenomena of nodality in metals under tension tests. 1000 w. Comptes Rendus—Jan. 31, 1898.

**Bending and Drop Tests.**—The Influence of Testing upon the Resistance to Bending at Lower Temperatures (Einfluss des Prüfungsverfahrens auf das Ergebniss der Biegeproben bei Niederen Wärmegraden). A review of Prof. Rudeloff's tests at the Charlottenburg laboratory. Both bending and drop tests were made. 4500 w. Stahl und Eisen—Sept. 1, 1897.

**Bridge Members.**—Recent Tests of Bridge Members. J. E. Greiner. Discusses a number of tension tests on bridge members, other than eye-bars, made by the author. These tests are in a channel outside of the usual run, and the results obtained furnish information of interest and value. Ill. 6000 w. Pro Am Soc of Civ Engs—May, 1897.

**Buckling.**—See **BUCKLING.**

**Cast Iron.**—Tests of the "Work Ability" and the Elasticity of Cast Iron of High Tensile Strength (Versuche über das Arbeitsvermögen und die Elastizität von Gusseisen mit Hoher Zugfestigkeit). C. Bach. Tests to determine the mechanical work per cubic centimeter performed by the pulling apart of the test pieces. 1400 w. Zeitschr d Ver Deutscher Ing—March 31, 1900.

**Charlottenburg Tests.**—The Results of Tests for Rupture (Ueber Ergebnisse von Zerreissversuchen). A discussion by Herr Knaudt, of some elongation and rupture tests made at the Charlottenburg laboratory, with a rejoinder by Prof. Martens. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 25, 1897.

**Compression Tests.**—The Resistance of Bars to Compressive Forces (Résistance des Barres Soumises à des Efforts de Compression). M. Dupuy. A record and discussion of a large number of official tests of steel bars, with tables and diagrams. The Klein Elasticimeter was used. 2500 w. Two plates. Ann des Ponts et Chaussées—Pt. I., 1897.

**Cylinders.**—Strength of Thick Hollow Cylinders. John H. Cooper. The work and results of many well-known writers arranged to exhibit the practical quality necessary to have if work is to be done. 2300 w. Prac Eng—March 26, 1897.

Strength of Thick, Hollow Cylinders. John H. Cooper. A comparison of the work and results of many writers, with data of actual performance. Serial. Mach—March, 1897.

The Expansion of Thick Cylinders Under Bursting Pressure—Pressing on Thick and Thin Disks. J. H. Dunbar. Illustrated description of experiments made to note the change in shape likely to take place in the hubs of cast-iron wheels when pressed on by hydraulic presses. 1000 w. Am Mach—Dec. 7, 1899.

**Deformation.**—Permanent Deformation of Metals. From a paper entitled "Phénomènes qui accompagnent la déformation permanente des métaux," by Commander Hartmann, written for the Paris International Congress on Mining and Metallurgy. 2400 w. Col Guard—Sept. 7, 1900.

The Law of the Deformation of the Industrial Metals (Loi des Déformations des Metaux Industriels). Marcel Brillouin. A mathematical discussion of deformations, based on the crystalline structure of the material, and including the time element, and the influence of shocks. 1200 w. Comptes Rendus—Jan. 24, 1898.

The Permanent Deformations of Metals (Sur les Déformations Permanentes des Métaux). M. Faurie. The existing formulas are re-derived by a new method of investigation, using chains with links composed of different metals. 1200 w. Comptes Rendus—June 28, 1897.

**Diagrams.**—Resistance Diagrams of Sections (Widerstandsbild von Querschnitten). Karl Oertling. Graphical and analytical methods for calculating the resistance of different cross-sections. 3500 w. 1 plate. Oest Monatschr f d Oeff Baudienst—Aug., 1900.

See also **Yield Point.**

**Eccentric Loading.**—Cases of Eccentric Loading. G. A. Goodenough. Discusses cases arising in practice, investigating the stresses. 3500 w. Tech, No. 14—1899-1900.

**Elasticity.**—See **ELASTICITY.**

**Fatigue.**—Note Upon Actual and Computed Fatigue (Note sur les Fatigues Réelles et les Fatigues Calculées). M. Mesnager. An account of a series of tests made upon two girder bridges on the Orleans railway. The observed deformations agreed fairly with the computations. 8000 w. 3 plates. Ann des Ponts et Chaussées—2 Trimestre, 1899.

See also **ELASTICITY; PLUMBING.**

**Formulæ and Data.**—Recent Changes in Formulae and Data Used in Determining the Strength of Materials. F. E. Kidder. The more recent formulae and unit loads and strains at present most commonly used by structural engineers and architects. 1800 w. Arch & Build—Aug. 15, 1896.

**Grooved Plates.**—See **PLATE.**

**Iron.**—See **Yield Point; IRON.**

**Laboratory.**—See **Spanish Laboratory; Yorkshire College; LABORATORY.**

**Main-Shafts and Crosshead-Pins.**—Safe Stresses for Stationary English Main-Shafts and Crosshead-Pins as Deduced from the Records of Experience. Henry Hess. Records of experience giving data on the failures of various parts, with deductions. 600 w. Am Mach—April 8, 1897.

**Marine Engine Steel.**—See **STEEL TEST—Marine Engines.**

**Moment of Inertia.**—See **MOMENT OF INERTIA.**

**Pine.**—See **PINE.**

**Plates.**—Moduli of Elasticity for Compound Stress. W. Hendrick Hatt. Deals with the behavior of flat plates on flexure. 2000 w. Pro of Purdue Soc of Civ Engs—1897.

See also **PLATE.**

**Repeated Stresses.**—Repeated Stresses. Jerome Sondericker. Also discussion by James E. Howard. Presents tests and gives a general discussion of the results obtained up to date. Investigations are given for the determination of the elastic changes resulting from the repeated stresses, and the influence of such changes in causing fracture; and the influence of form, flaws, and the local condition generally in causing fracture. Ill. 6000 w. Tech Quar—March, 1899.

**Rings and Tubes.**—Computation of External Pressure on Rings and Tubes (Berechnung des Zulässigen Aussendruckes bei Ringen und Röhren). Dr. P. Forchheimer. Deriving mathematical formulae, and showing the reinforcing effect which may be expected from stiffening rings. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—July 21, 1899.

**Ring Stresses.**—Ring Stresses and Tension Strength (Ringspannungen und Zugfestigkeit). M. Grübler. An examination of the relation between the tension resistance and the stresses in a ring, with especial reference to the researches of Professor Bach. 6000 w. Zeitschr d Ver Deutscher Ing—Sept. 1, 1900.

Stresses and Deflections in Circular Rings under Various Conditions of Loading. Claude W. L. Filkins and Edwin J. Fort. A mathematical investigation with formulae and diagrams. Previous literature of the subject is referred to. 4300 w. Trans Assn of Civil Engs of Cornell Univ—June, 1896.

**Rupture.**—Deformation and Conditions of Rupture (Déformations et Conditions de la Rupture). Harel de la Noé. A mathematical examination of the behavior of solid bodies under stresses beyond the elastic limit, based upon the experiments of Commandant Hartmann. 8000 w. Ann des Ponts et Chaussées—2 Trimestre, 1900.

**Sheet Iron.**—The Results of Rupture Tests (Ueber Ergebnisse von Zerreissversuchen). Giving diagrams and tables of comparative tests made upon the same material in different laboratories. Sheet iron tests were made at Charlottenburg, Münich, Zürich and Essen. 3000 w. Stahl und Eisen—Aug. 1, 1897.

**Shock Elasticity.**—An Example of Elasticity and Tenacity Under Sudden Blows (Eine Aufgabe aus der Stosselastizität und-Festigkeit). F. Leitzmann. A mathematical discussion of the shock elasticity of steel, based on the bending of wheel axles in railroad practice. Serial. Zeitschr d Ver Deutscher Ing—March 31, 1900.

**Spanish Laboratory.**—The Madrid Engineering Laboratory (Le Laboratoire du Matérial du Génie à Madrid). M. Mesnager. A short account of a military engineering laboratory at Madrid, for testing materials, etc., with plan, abstracted from a report of the director, Col. J. Marva y Mayer. 500 w. Ann d Ponts et Chaussées—1st quarter, 1900.

**Steel.**—See Yield Point; **IRON STEEL.**

**Strains.**—On the Changes Produced in Soft Metals by Permanent Strain. Albert Campbell. Results of experiments to determine to what extent the properties of soft wires are affected by permanent strain, carried out on materials of widely different constitution. 2500 w. Engng—April 9, 1897.

**Stress.**—The Conditions of Stress (Ueber Spannungszustände). Dr. Holzmüller. A mathematical discussion based both upon the Newtonian and the logarithmic treatment, a number of cases being examined; especial attention is given to thick, hollow cylinders subjected to internal pressure. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 6, 1898.

**Temperature Influence.**—The Influence of Temperature Upon the Strength of Metals (Influence de la Temperature sur les Propriété Résistantes des Metaux). A translation into French by M. S. Jordon, of Prof. Ledebur's experiments made at the Charlottenburg testing laboratory. 18000 w. Bull de la Soc d'Encour—Aug., 1899.

**Thermal Condition.**—See **TESTING.**

**Thick Masses.**—The Resistance of Thick Masses (Sur le Résistance des Massifs Epais). A note to the French Academy by M. Ribière, discussing the diminution of resistance to pressure in the interior of thick masses of material. 1200 w. Comptes Rendus—April 25, 1898.

**Timber.**—See also **BEAM; PINE; TIMBER; WOOD.**

**Wöhler's Laws.**—On Wöhler's Laws. J. Gilchrist. Discusses the theory of the cause of fracture, reporting experimental investigations and giving the writer's conclusions. 5400 w. Engr, Lond—Aug. 31, 1900.

**Yield Point.**—The Yield Point of Iron and Steel. Thomas Gray. Describes the diagrams of a few tests bearing on the peculiar behavior of iron and steel as they pass through the yield point. 1600 w. Trans Am Soc of Mech Engs, Vol. XVIII—May, 1897.

**Yorkshire College Laboratory.**—The Engineering Department of the Yorkshire College, Leeds. Experiments made in the laboratory are described and illustrated. They include tests of cast iron columns, wire rope, hooks, eye-bars, aluminum, and brick arches. 2400 w. Engng—Sept. 11, 1896.

**Z-Bar Stresses.**—The Stresses in the Edges of Z-Bars (Die Randspannungen in Z-Eisen). H. Rosskothen. A paper before the West Prussian branch of the Verein Deutscher Ingenieure, containing a mathematical discussion of the subject, with diagrams. 2500 w. Zeitschr d Ver Deutscher Ing—Aug. 4, 1900.

### MATHEMATICS.

See also **PHYSICS.**

Integral Curves. W. F. Durand. A brief presentation of the more important properties. 3000 w. Sibley Jour of Engng—Jan., 1897.

The Relation of Technology to Mathematics (Die Beziehungen der Technik zur Mathematik). An address delivered by Prof. Stodola, of Zürich, at the International Mathematical Congress, 1897. The growing relation of theoretical computations to practical work is well shown by various examples in recent practice. 4000 w. Zeitschr d Ver Deutscher Ing—Oct. 30, 1897.

**Fourth Degree Equations.**—Practical Solution of Fourth Degree Equations. George B. Grant. The process described is one of simple substitution in formulae involving much work, which however is of a simple character. 600 w. Am Mach—Aug. 20, 1896.

**Mechanical Trades.**—Mathematics in the Mechanical Trades. J. S. Plaskett. Read at Univ. of Toronto. Shows the advantage of a mathematical training and outlines a course that should be given. Ill. 2800 w. Can Engr—Jan., 1900.

**Technology.**—The Relation between Technology and Mathematics (Ueber die Beziehungen der Technik zur Mathematik). An address by Prof. A. Stodola before the International Mathematical Congress of 1897, at Zürich. 3500 w. Schweizer Bauzeit—Sept. 4, 1897.

**J. J. Thomson's B. A. Address, 1896.**—See **PHYSICS.**

### MATTE.

See **COPPER METALLURGY; SMELTING; SMELTING WORKS.**

### MATTER.

See **CHEMISTRY; ELECTRO-PHYSICS; MECHANICS; PHYSICS.**

### MAUSOLEUM.

**Somerton Hills, Philadelphia.**—The Somerton Hills Mausoleum. Illustrated description of a receiving vault having an unusual arrangement of double walls and roofs to obtain good circulation of the air. 1100 w. Eng Rec—Dec. 30, 1899.

### MEASUREMENT.

See also **COMPUTER; DECIMAL SYSTEM; GAUGE; PLANIMETER; SURVEYING; WEIGHTS AND MEASURES.**

**Area.**—See **AREA.**

**Scale Division.**—On the Determination of the Division Errors of a Straight Scale. Harold Jacoby. Gill's method, an improvement on Hansen's and Lorentzen's formula are both explained and discussed. A modification of Gill's method, by the author, follows, whereby accuracy within 1-50000 inch is obtained, and the non-periodic errors of a screw are determined without assumption of any law of error. 3400 w. Am Jour of Sci—May, 1896.

**Steel Tape.**—Details of a Series of Precise Measurements with Steel Tapes (Ueber eine Anreihevorrichtung für Genauere Messungen mit dem Stahlbande). An account of a series of experimental measurements to determine the probable error and limit of precision of steel tape measurements. An excellent paper with useful practical details. 8500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 12, 1897.

### MECHANICAL ARTS.

**Progress.**—The Progress in the Mechanical Arts in Three-Quarters of a Century. Coleman Sellers. An address delivered at the National Export Exposition on the occasion of the celebration of the 75th anniversary of the Franklin Inst. 7200 w. Jour Fr Inst—Jan., 1900.

### MECHANICAL CONNECTIONS.

See also **CLUTCH; GEAR; POWER TRANSMISSION; ETC.**

Mechanical Connections. Francis B. Crocker. The following connections are considered: chain and sprocket wheel; magnetic belting; shafting; shaft couplings; friction clutches; magnetic clutches; pulleys; toothed friction; and other gearing. 4800 w. Elec Pow—March 1, 1896.

Mechanical Connections between Engines and Dynamos. Francis B. Crocker. Lecture delivered before the Henry Electrical Club. Direct coupling, belting, shafting, rope driving and other apparatus are considered. 7000 w. Elec Pow—Feb., 1896.

### MECHANICAL DESIGN.

**Natural Forms.**—Influence of Natural Forms on Mechanical Design. W. H. Sargent. Notes some of the forms in nature that have been applied to mechanics. Ill. 600 w. Am Mach—Sept. 29, 1898.

### MECHANICAL DRAFT.

See also **BOILER; BLOWER; COMBUSTION; FAN; MARINE ENGINE; STEAM GENERATION; SMOKE PREVENTION.**

A New Method of Forced Draught. Nelson Foley. Read before the Inst. of Naval Archts., at the Newcastle-on-Tyne meeting. Describes a system where the fire bars themselves are used as a means of forcing the air into the fire. Ill. 800 w. Engng—July 21, 1899.

Increasing the Draught of Furnaces. From "Uhlands Technische Rundschau." Reviews the methods for increasing the draught of a chimney shaft, and briefly discusses which is preferable. 1500 w. Col Guard—Feb. 4, 1898.

Mechanical Draft. Walter B. Snow. The first of a series of articles of interest to all who have to do with steam generating plants. Serial. Mach, N. Y.—Aug., 1897.

Mechanical Draft for Steam Boilers. W. B. Snow. Presents the economical advantages of mechanical draft, showing it is capable of reducing losses, decreasing the first cost of a steam generating plant, and reducing the fuel expense. 4000 w. Sib Jour of Engng—June, 1898.

The Advantages of Mechanical Draft. Walter B. Snow. Presents the general economic advantages, and those relating to the convenience and operation, showing the saving by considering a typical plant. Ill. 3000 w. Am Elect'n—June, 1898.

Mechanical Draft. Henry B. Prather. Gives a review of the most important systems, and emphasizes the importance of giving proper attention to the firing of the boilers. 4500 w. Jour Assn of Engng Socs—July, 1899.

On "Comparison of Mechanical Draughts." John Thom. A paper read before the Inst. of Engs. and Shipbuilders in Scotland. Recounts observations made during voyages in ships each using a different system of mechanical draught with conclusions arrived at. The four systems discussed and compared are (1) the Howden system; (2) the British admiralty system; (3) the Ellis and Eaves system, and (4) the closed ash pit system. The paper is based upon careful notes taken during these voyages. 4000 w. Eng's Gaz—Feb., 1896.

The Substitution of Mechanical Appliances for Chimney Draft (Der Ersatz der Dampfschornsteine durch Mechanische Zugmittel). R. Schenkel. With illustrations of numerous devices for producing mechanical draft in steam boiler plants, mainly taken from American practice. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 14, 1899.

**Beekman Automatic.**—Beekman Automatic Forced Draft Apparatus. Describes a system of furnishing forced draft to steam boiler furnaces by means of one or more fans driven by engines. 1800 w. Mas St Fit—Dec., 1896.

**Boiler Efficiency.**—The Influence of Mechanical Draft Upon the Ultimate Efficiency of Steam Boilers. Walter B. Snow. A brief description of the apparatus and methods employed is given, and the factors on which the efficiency depends are discussed, showing beneficial results. Ill. 4500 w. Jour Assn of Engng Socs—Dec., 1899.

Influence of Mechanical Draft on Ultimate Efficiency of Steam Boilers. Extract from a work prepared by Walter B. Snow, and published by the B. F. Sturtevant Co., of Boston. Considers the influence from a commercial standpoint, as measured by its aggregate first cost, and the consequent fixed charges thereon. 2000 w. Ir Age—Jan. 27, 1898.

Mechanical Draft and Boiler Efficiency. Extracts from a paper by Walter B. Snow showing a saving in first cost and in operating expenses, and increased efficiency of the plant. 1400 w. Ir Trd Rev—Aug. 10, 1899.

The Influence of Mechanical Draft Upon the Ultimate Efficiency of Steam Boilers. Walter B. Snow. Describes the apparatus employed in the production of mechanical draft, shows the economy in first cost in part first. Ill. Serial. Heat & Ven—June, 1899.

**Cost.**—The Cost of Mechanical Draft Plant. Walter B. Snow. Discusses the primary cost of the plant and the fixed charges as compared with those incident in the employment of a chimney. 1800 w. Ir Age—Dec. 1, 1898.

**Electric Stations.**—The Economical Aspects of Mechanical Draft with Special Reference to Central Stations. Walter B. Snow. Presents the conveniences and advantages claimed for mechanical draft, and its importance to central station managers. 1800 w. R R Gaz—Sept. 2, 1898.

**Fuel Efficiency.**—The Efficiency of Fuel with Mechanical Draft. Walter B. Snow. Points out the economy secured and possible quantitative advantages. 1500 w. Power—March, 1899.

**Locomotive.**—See **LOCOMOTIVE—Draft Appliances; LOCOMOTIVE OPERATION.**

**Marine Boilers.**—Limits to the Use of Forced Draft for Marine Boilers. Walter M. McFarland. A discussion of naval study and experiment in economy of space and evaporation, showing the advantages and limitations of forced draft in marine service. 4000 w. Eng Mag—April, 1900.

See also **MARINE BOILER; MARINE ENGINE.**

**"Meldrum."**—An English System of Forced Draft. James Vose. Illustrated description of the "Meldrum" dust fuel and forced draft furnace for steam boilers. 1400 w. Mach—Oct., 1896.

The "Meldrum" System of Forced Draught. Describes and illustrates this system, of ash pit steam jets and states the advantages that accrue from its adoption. 1500 w. Ry Wld—Dec., 1897.

**Prat.**—Improved System of Mechanical Draft for Furnaces (Nouveau Procédé de Tirage Mécanique des Foyers). The Prat system uses a blast of air from a fan blower to induce a current in a larger vertical aspirator connected to the boiler flue. Excellent results are obtained at small cost. 3000 w. Génie Civil—Jan. 29, 1898.

**Suction.**—Suction Draught for Marine Boilers. Matthew Paul. Abstract of a paper read before the Inst. of Engs. and Shipbuilders in Scotland. The results of tests and experience are given. It was claimed that in safety of boilers under high rates of steaming, economy of coal, ease and simplicity of working and structural arrangements, suction draught had distinct advantage over forced draught. 2800 w. Eng, Lond—Feb. 5, 1897.

### MECHANICAL ENGINEER.

See also **ENGINEERING SOCIETY.**

**Address.**—American Society of Mechanical Engineers—Annual Address of the President, 1898. C. W. Hunt. A discussion of engineering practice, industrial progress, and the work of an engineer, with its effect on mind, character and life. 5400 w. Trans Am Soc of Mech Engs, No. 807—Nov., 1898.

**Education.**—See **EDUCATION.**

**Estimating.**—See **ESTIMATING.**

**Institution Home.**—The Institution of Mechanical Engineers. A brief historical sketch of the British Society, with an illustrated description of the new building in London. 2800 w. Engng—May 19, 1899.

**Worcester Poly. Inst. Alumni.**—See **EDUCATION—Admission Requirements.**

### MECHANICAL ENGINEERING.

See also **ENGINEERING; MECHANICAL ENGINEER; MECHANICS.**

A Few Phases in the Rise and Development of the Science of Mechanics. L. Y. Schermerhorn. A summary of the advances of mechanics. 7200 w. Pro of Engs' Club of Phila—March, 1899.

Topical Discussions and Notes of Experience. William Sangster, W. F. M. Goss and John H. Cooper. Read before the A. S. M. E. Topics discussed were clamp-fits, power to drive disk fans, effect on fire on machinery, and how to locate a steam-engine condenser. Further elucidation of these subjects was requested. 1400 w. Trans Am Inst of Mech Engs, Vol. XVI—1896.

**American-German.**—See **German vs. American.**

**B. A. Address.**—The British Association. Address to the Mechanical Science section. Sir Alexander R. Binnie, President of Section. A historical review of mechanical science. Serial. Engng—Sept. 7, 1900.

**British, 1896.**—Mechanical Engineering. Review of the year in Great Britain; reports the interest to have centered in the Belleville boiler and the motor car. The article is largely confined to the prospects of the motor car and review of locomotive and marine engineering progress. 4000 w. Eng, Lond—Jan. 1, 1897.

**British, 1897.**—Mechanical Engineering. Editorial review from the English standpoint, dealing with motor cars, railroading, refrigerating machinery, etc. 7000 w. Engr, Lond—Jan. 7, 1898.

**British, 1898.**—Mechanical Engineering. The annual editorial review of this branch reports a very uneventful year and gives some of the reasons. 5200 w. Engr, Lond—Jan. 6, 1899.

**Budapest Exposition.**—See **Nuremberg and Budapest Expositions.**

**China.**—Openings for Mechanical Engineers in China. Lord Charles Beresford. Read at meeting of British Inst. of Mech. Engs. Considers openings under the heads of: 1. Railways and electrical engineering. 2. Mining and allied works. 3. Manufacturers. Also discussion. 7800 w. Engng—Dec. 1, 1899.

**Decimal Index.**—See **INDEX—Decimal.**

**Education.**—See **EDUCATION.**

**Electrical.**—See **ELECTRICAL ENGINEERING—Mechanical.**

**Europe.**—The Present Status of Machine Construction (Ueber die Heutige Bedeutung des Maschinenbaues). P. Zwianer. An address delivered at the fiftieth anniversary of the Austrian Society of Engineers, reviewing the development of mechanical engineering in Europe during the latter half of the century. 5000 w. Zeitschr d Oester Ing u Arch Ver—April 7, 1899.

**European Notes.**—See **STEAMSHIP—Old vs. New.**

**German vs. American.**—Germanisms and Americanisms in Technical Methods (Teutonismus und Amerikanismus in der Technik). The first portion of an interesting comparison of the methods of the two nationalities. This article considers the present German practice as the result of three influences, i. e., the old "handwerk," modern "book learning" and an admixture of English methods. 1400 w. Deutsche Zeitschrift für Elektrotechnik—Oct. 15, 1896.

Has the German Mechanical Industry Anything to Learn from the American (Kann die Deutsche Maschinenindustrie von der Amerikanischen Lernen)? H. Unger. A paper before the Verein Deutscher Maschinen-Ingenieure, discussing American competition in Germany and giving illustrated descriptions of American machine tools. Serial. Glaser's Annalen—July 1, 1900.

See also **ENGINEERING COMPETITION.**

**Idiosyncrasy.**—Idiosyncrasy in Mechanical Engineering. Editorial discussion calling attention to the fact that peculiarities of design are due to individual or national idiosyncrasies. 2200 w. Engr, Lond—Nov. 5, 1897.

**Index.**—See **INDEX—Decimal.**

**Minnesota University Shops.**—The New Mechanical Engineering Shops of the University of Minnesota. J. J. Flather. Description with plans. 700 w. Engs' Year Book, Univ of Minn—1900.

**Nuremberg and Budapest Expositions.**—Progress in the Domain of Mechanical Technology (Fortschritte im Gebiete der Mechanischen Technologie). A review, by Prof. Kick, of some recent advances in various lines, as shown in the expositions at Nuremberg and Budapest. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—July 30, 1897.

**Paris Exposition.**—Mechanical Engineering Exhibits at the Paris Exposition. Illustrates and describes some of the interesting exhibits, with comments. 3600 w. Eng News—Aug. 16, 1900.

**Railway.**—Railway Mechanical Engineering. H. Wade Hibbard. A plea for greater attention to locomotive mechanical engineering in our technical schools. 4300 w. Engineers' Year Book, Univ of Minn—1896.

See also **EDUCATION—Railway; RAILWAY SCHOOL.**

**Shipbuilding.**—See **SHIPBUILDING—Mechanical Engineering.**

**Sketches and Photographs.**—The Lens and Pencil in Mechanical Engineering. A. B. Willits. Discusses the advantage of graphically representing details in machinery, the use of curves and sketches, the use of photographs, etc. Ill. 2500 w. Jour Am Soc of Nav Engs—Aug., 1899.

**MECHANICAL HANDLING.**

See also **COAL HANDLING; COKE HANDLING; CONVEYOR; DOCK; HARBOR; IRON ORE HANDLING; OVERHEAD TRAMRAIL.**

Mechanical Transport Appliances in Engineering Work. A. J. S. B. Little. A review of the means which reduce greatly the cost of engineering undertakings, either constructive or manufacturing, urging greater attention to their introduction and extension. The illustrations supplement the text by showing many instances of conveyor installations all over the world. 3000 w. Eng Mag—Dec., 1899.

Mechanical Transport in Mining and Engineering Works. A. J. S. B. Little. Mr. Little's second paper is devoted to many forms of labor-saving appliances in connection with ore-handling and metallurgical processes. 3500 w. Eng Mag—Jan., 1900.

**American Apparatus.**—Mechanical Handling of Ore and Coal (Mechanische Handhabung von Erzen und Kohlen). H. Frahm. A long illustrated article giving an account of American methods and apparatus for conveying and handling ore and coal. Serial. Stahl und Eisen—May 15, 1900.

**Ashtabula, Ohio.**—Ore Hoisting and Conveying Machinery at Ashtabula, Ohio. Illustrated description. 800 w. Eng News—Aug. 20, 1896.

**Brown Machinery.**—The Brown Hoisting and Conveying Machinery (Die Brownschen Hebe- und Fördervorrichtungen). Axel Sahlin. A paper before the Eisenhüttenleute, describing this well-known American system of conveying materials. 3500 w. Zeitschr d Ver Deutscher Ing—July 9, 1898.

The Brown Hoisting and Conveying Machines. Axel Sahlin. Paper read before a special meeting of the Düsseldorf branch of the Verein Deutsche Eisenhüttenleute. Introductory remarks on the conditions that have enabled the United States to compete with Europe in the iron and steel industry, followed by illustrated description of the Brown machines. 5800 w. Engng—July 8, 1898.

**Bulky Material.**—Storage and Handling Devices for Material in Bulk (Lager und Transportanlagen für Massengüter). M. Buhle. A discussion of the various forms of conveyors, elevators, and similar devices for handling grain, coal and similar articles, especially in connection with harbor warehouses and storage buildings. Serial. Zeitschr d Ver Deutscher Ing—Jan. 28, 1899.

**Coal.**—See **COAL HANDLING.**

**Coal and Iron-Ore.**—Appliances for Handling and Storing Coal and Iron-Ore (Technische Hülfsmittel zur Beförderung und Lagerung von Kohlen und Eisenerzen). M. Buhle. With descriptions of numerous forms of conveyors and other handling devices of Continental, English, and American origin. Serial. Zeitschr d Ver Deutscher Ing—Oct. 14, 1899.

**Coke.**—See **COKE HANDLING.**

**Cranes.**—Overhead Cranes for Handling Material in Bulk (Hochbahnkrane zum Umladen und Aufstapeln von Massengütern). H. Ernst. Especially discussing the various forms of overhead conveyors for handling material in loading and unloading vessels, as extensively used in the United States. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 27, 1900.

See also **CONVEYOR; CRANE.**

**Fuel.**—See also **GAS MANUFACTURE; GAS PRODUCER—Fuel Handling.**

**Furnace Covers.**—See **OVERHEAD TRAMRAIL.**

**Gas Works.**—Unloading, Distribution, and Reloading of Materials in Gas Works. Mr. Meiklejohn. Read before the Midland Assn. of Gas Managers, at Birmingham, Eng. Description of the most useful forms of the New Conveyor Company's plant at Smethwick. Ill. 2000 w. Jour Gas Lgt—Nov. 2, 1897.

See also **COAL HANDLING; COKE HANDLING; GAS MANUFACTURE.**

**Grain.**—See also **GRAIN ELEVATOR; GRAIN HANDLING.**

**Grain Elevator.**—Travelling Elevator for Unloading Vessels (Fahrbarer Schiffs-Elevator). Description and illustration of elevators as arranged in Budapest, to travel on tracks along the quay. 2000 w. Zeitschr d Oesterr Ing u Arch Vereines—Jan. 1, 1897.

See also **GRAIN ELEVATOR.**

**Grain, Europe.**—Grain Storage Warehouses (Ueber Speicher und Umschlags-Einrichtungen). Paul Kortz. Two articles containing the substance of a report of Herr Anton Rischer, City Inspector of Vienna, after an inspection of the various systems of grain handling and storage in various European cities prior to local improvements. Two articles. 10000 w. Zeitschr Oesterr Ing u Arch Ver—Nov. 27, Dec. 4, 1896.

**Grain Suction Pipes.**—Duckham's Pneumatic Grain Elevator. Illustrated description of system in use on the Danube. 1000 w. Engng—Jan. 29, 1897.

The Application of Suction Pipes to the Handling of grain at Milwall Docks, England. Description, with illustrations of the appliances. Taken from paper of Frederick Eliot Duckham, as published in "Trans. of Inst. of Civ. Engs." 2400 w. Eng News—Nov. 19, 1896.

Pneumatic Machinery for Loading and Discharging Grain Cargoes. Frederic Eliot-Duckham. Read at meeting of Inst. of Naval Archt's., London. Reviews the increase in trade and the changed conditions making improvements important, and gives illustrated description of pneumatic elevators now in successful operation. 1700 w. Engr, Lond—April 8, 1898.

See also **GRAIN ELEVATOR—Pneumatic.**

**Great Lakes Docks.**—Cargo Handling Machinery at Lake Erie Ports. Waldon Fawcett. Illustrates and describes the latest machinery for transferring coal and ore from vessel to car or from car to vessel. 4000 w. Am Mfr & Ir Wld—July 27, 1899.

Dock Equipment for the Rapid Handling of Coal and Ore on the Great American Lakes. Arthur C. Johnston. Illustrates and describes the special types of machinery built for the purpose of insuring quick dispatch in loading and unloading the ore and coal. 4500 w. Jour Assn of Engng Socs—Jan., 1900.

See also **COAL HANDLING; DOCK; IRON ORE HANDLING; GREAT LAKES.**

**Hulett Ore Unloader.**—The Hulett Automatic Ore Unloader. Waldon Fawcett. Illustrated detailed description of the machine and its operation. 2500 w. Ir Age—April 5, 1900.

**Link Belt Co.**—The Design of Elevating and Conveying Machinery. J. V. E. Schaefer. Illustrated description of machinery for the handling of material by means of elevators and conveyors, as shown in the designs used by the Link Belt Machinery Co., of Chicago. 4500 w. Technograph, No. 12—1897-8.

**Sfax, Tunis.**—A Phosphate Transporter at Sfax. An illustrated description of a mechanical transporting plant which carries phosphate from stores and wagons to vessels at Sfax, Tunisia. 1100 w. Sci Am—Sept. 29, 1900.

Temperley Transporting Plant at Sfax. Illustrates and describes an interesting plant recently constructed for handling phosphates. 1400 w. Engng—May 11, 1900.

**Steamship Cargoes.**—The Discharging and Reloading of Large Steamers. William Henry Hunter. Read before the Engineering Conference of the British Inst. of Civ. Engs. Describes briefly the methods of working now in use at the Manchester docks of the Manchester Ship Canal. 2000 w. Engng—June 9, 1899.

See also **Great Lakes Docks; DOCK; HARBOR.**

**Temperley Transporter.**—See **Sfax, Tunis.**

## MECHANICAL MOVEMENT.

See **KINEMATICS.**

## MECHANICAL PLANT.

See also **ELECTRIC PLANT; HEATING; HEATING AND VENTILATION; POWER PLANT; STEAM PLANT; VENTILATION.**

**Apartment House.**—Mechanical Features of the Lenox Apartments, Buffalo, N. Y. The building contains 49 apartments, and is supplied with heat, light and power, and with cold brine circulated through pipes to refrigerating boxes in the kitchens. 1800 w. Eng Rec—Jan. 1, 1898.

The Mechanical Plant of a Large Apartment House. Illustrated description of the heating, ventilating, lighting, refrigerating and elevator plant in a 13-story, 150x75 ft. apartment house in New York. 3500 w. Eng Rec—Oct. 27, 1900.

**Buildings.**—Light, Heat and Power in Buildings. Alton D. Adams. Presents the advantages of a combined plant. Serial. Archts' & Builds' Mag—Oct., 1900.

**Capitol, Washington.**—Heating, Lighting and Ventilating the Capitol. W. L. Crounse. Illustrated description. 2500 w. Safety V—Feb., 1896.

**Country Residence.**—"The Breakers," Newport, R. I. Heating, lighting and elevator running machinery in the country seat of Mr. Cornelius Vanderbilt. 1500 w. Safety V—Feb., 1896.

**Department Buildings, Washington.**—The State, War, and Navy Department Building, Washington. G. W. Baird. Illustrates and describes the mechanical features of an office-building covering an area of 565x342 feet, and costing $10,300,000. 3000 w. Eng Rec—Feb. 18, 1899.

**Department Store.**—The Mechanical Features of the Siegel-Cooper Department Store. The first part is an illustrated description of the ventilating apparatus in the great Siegel-Cooper store, New York. Serial. Eng Rec—Oct. 3, 1896.

**Department Store, Berlin.**—The Technical Arrangements at the Wertheim Stores at Berlin (Die Technischen Einrichtungen des Warenhauses der Firma A. Wertheim zu Berlin). A general description of the mechanical installation of a great department store, including power plant, electric lighting, elevators, etc., etc. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—July 2, 1898.

**Efficiency.**—The Efficient Use of Steam and Labor in Isolated Plants. Percival R. Moses. A comparison of the various elements of cost in isolated plants and a study of the relation which they bear to the efficiency of the whole. 2500 w. Eng Mag—Oct., 1898.

**Garden City, N. Y.**—Heating and Lighting Plant. An Interesting Central. Illustrated description of the arrangements for heating and lighting a group of buildings at Garden City, Long Island, N. Y. 1600 w. Eng Rec—Feb. 6, 1897.

**Hotel Mills.**—The Sanitary Equipment and Power Plant of a Modern Lodging House. Illustrated detailed description of these features in Mills Hotel No. 1, New York City. 2800 w. Sci Am Sup—Aug. 11, 1900.

**Hotel Touraine, Boston.**—Mechanical Features of the Hotel Touraine. Describes the general arrangement of rooms, electric wiring, and plumbing of a new Boston hotel. Ill. 2400 w. Eng Rec—Nov. 6, 1897.

**Large Buildings.**—Mechanical Plants of Large Buildings. Dankmar Adler. Reviews the requirements for the satisfying of which mechanical appliances and apparatus are essential, the great improvements made in recent years, the educational development of the expert engineer, etc. with discussion. 8500 w. Jour W Soc of Engs—April, 1898.

Modern Practice in the Engineering Plants of Large Buildings. William H. Bryan. Extract from an address delivered before the St. Louis Chapter of the Am. Inst. of Archt's. An outline of the writer's views as to what is good practice. 2000 w. Am Arch—Dec. 24, 1898.

See also **Office Building.**

**Library, Chicago.**—Tests of Boilers, Engines, Elevators, and Ventilating Plant, Chicago Public Library. Interesting portions of the report of George H. Barrus, who was retained by the board of directors to make a complete test. An important article, showing results that led to many improvements. Ill. 3500 w. Eng Rec—Aug. 6, 1898.

**Milwaukee City Hall.**—See **ELECTRIC PLANT—City Hall, Milwaukee.**

**Municipal Buildings.**—See also **MUNICIPAL BUILDINGS—Toronto.**

**Office Buildings.**—The Mechanical Plant of a Modern Commercial Building. William H. Bryan. A discussion of the mechanical, steam, and electrical plants of such buildings. Ill. 15800 w. Trans of Am Soc of Mech Engs, No. 801—Nov., 1898.

See also **Large Building; TALL BUILDING—New York Gerken.**

**Office Building, New York.**—Heating and Lighting of the Woodbridge Building, New York City. Illustrated detailed description. 2000 w. Eng Rec—June 5, 1897.

The Machinery of a Great Office Building. F. E. R. Illustrates and describes the elevators, engines, generators and heating system of the Park Row Building, in New York. 3400 w. Mach, N. Y.—April, 1899.

The Mechanical Plant of the Exchange Court Building, New York. Illustrated detailed description of the plant for heating, lighting and power purposes in a twelve-story office building. 2500 w. Eng Rec—Sept. 9, 1899.

The Mechanical Plant of the Park Row Building, New York. Describes the engine, boiler, dynamo, elevator, ventilating and heating plant in a building 390 feet high and having 8 acres of floor surface. Many of the features are novel. Ill. 3000 w. Eng Rec—July 1, 1899.

**Office Building, Syracuse, N. Y.**—Heating and Lighting of the University Block, Syracuse, N. Y. Illustrated description of the plant of an 11-story office building, for heating and lighting service. 3500 w. Eng Rec—Feb. 25, 1899.

**Produce Exchange, N. Y.**—The New York Produce Exchange. Description of machinery and appliances in the building. 1700 w. Safety V—Dec., 1895.

**Railway Station, Boston.**—Mechanical Plant of the Boston Southern Terminal Station. Illustrated description of a large plant for electric and refrigerating purposes, containing many novel features. 4200 w. Eng Rec—March 18, 1899.

The Isolated Plant of the New Boston Railway Terminal. H. W. Weller. Illustrated description of the power plant for the heat, light and ventilation, the operation of elevators, supply of hot and cold water, making ice, pumping, electro-pneumatic switching, and signaling. 6600 w. Elec Wld & Elec Eng—March 11, 1899.

The Mechanical Equipment of the New South Station, Boston, Mass. Walter C. Kerr. The various sections are described by those who designed them or were connected with the work. A full illustrated description of engineering appliances. 25800 w. Trans Am Soc of Mech Engs, No. 849—Dec., 1899.

See also **RAILWAY TERMINAL—Boston.**

**Railway Station, Columbus.**—Heating and Lighting Plant of the Columbus, O., Union Depot. Illustrated detailed description. The Webster steam-heating system is used, which involves the extreme use of the vacuum principle. 2300 w. Eng Rec—Nov. 20, 1897.

**Railway Station, N. Y.**—The Heating and Lighting Equipment of the Grand Central Station, New York. Illustrated description of the plant. 1200 w. Elec Wld—Oct. 1, 1898.

**Railway Station, Providence.**—Arrangement and Ventilation of the Providence Union Station. This station, one of the largest in the United States, is the result of 20 years' study. It comprises several detached buildings heated from a central plant, and its mechanical plant is illustrated. 2000 w. Eng Rec—Nov. 12, 1898.

**Residence.**—Some Engineering Features of a Philadelphia Residence. Illustrates an unusually complete ventilating and heating system and electric lighting plant. 3500 w. Eng Rec—June 17, 1899.

**University of Illinois.**—The Central Heating, Lighting and Power Plant. L. P. Breckenridge. Describes and illustrates the new plant for the buildings of the Univ. of Illinois. 1200 w. Technograph, No. 12—1897-8.

**University, Ohio.**—The Heating, Ventilating and Power System of Ohio State University. A. E. Hitchcock. A satisfactory solution of heating widely separated buildings, and for supplying power at any point, at small cost. Ill. 1500 w. Heat & Ven—Nov. 15, 1898.

### MECHANICAL STOKING.

See also **BOILER; COMBUSTION; FIRING; FURNACE; GRATE; SMOKE PREVENTION.**

Experiments with Automatic Mechanical Stokers. J. M. Whitham. Read before A. S. M. E. Mechanical stoking and stokers are discussed and their advantages stated, and experimental data, from tests of several kinds, are tabulated. 3800 w. Trans Am Soc of Mech Engs—Vol. XVII., 1896.

Machine Firing. Edward Bennis. Review of attempts in the direction of machine firing, with description of the construction and work of a machine. Discussion follows. 3800 w. Col Guard—Feb. 5, 1897.

Mechanical Devices as Applied to Firing Steam Boilers. W. E. Snyder. Considers various devices, giving the results of experience. 8000 w. Pro Engs' Soc of W Penna—Dec., 1899.

Mechanical Stokers. A comparison of various stokers. 1800 w. Bos Jour of Com—July 4, 1896.

The Advantages of Mechanical Stoking. A. E. Outerbridge, Jr. Historical and general comparison of mechanical stoking and hand firing, proving the practicability of complete smoke-combustion. Ill. 3500 w. Eng Mag—Feb., 1897.

**Cotton Mill.**—Test of an American Stoker. Reviews a test made by G. H. Barrus on a plant in a cotton mill at Lowell, Mass. 800 w. Eng Rec—Feb. 25, 1899.

**Electric Station.**—Stoking in Central Stations. James F. Hobart. Illustrates and describes some of the best known types of mechanical stokers. 1800 w. Am Elect'n—June, 1900.

**Gas Works.**—New Stoking Machinery at the Bury Corporation Gas Works. Gives an account of a visit of inspection, by the Gas Committee, and of the new stoking machinery driven by compressed air, recently fitted to one section of the retort-house. 2000 w. Jour Gas Lgt—Oct. 26, 1897.

**German.**—A German Mechanical Stoker. Illustrated description. 300 w. Eng News—July 9, 1896.

**Playford.**—Mechanical Stoking. Illustrated description of the Playford mechanical stoker is given in part first. Serial. Sci Am Sup—Sept. 15, 1900.

**Proctor.**—Proctor's Mechanical Stoker. Illustrated description of a design the chief feature of which is a ram, or impeller, for the fuel, which is worked with a horizontal reciprocating motion by means of cams and levers. 1800 w. Engng—June 20, 1898.

**Roney.**—The Roney Mechanical Stoker. A well illustrated description of the improved form of this apparatus, which is to equip boiler pants of an aggregate of over 225,000 horse-power in the United States. 1000 w. Sci Am Sup—Sept. 22, 1900.

**Steamship "Pennsylvania."**—Mechanical Stokers. S. S. "Pennsylvania." Describes the principal features of this vessel, engaged in the carriage of freights on the Great Lakes, and gives illustrated description of the stokers, with report of tests. 3800 w. Engr, Lond—Jan. 26, 1900.

See also **MARINE ENGINE—"Pennsylvania."**

### MECHANICAL TRANSPORT.

See **COAL HANDLING; COKE HANDLING; CONVEYOR; DOCK; IRON ORE HANDLING; MECHANICAL HANDLING.**

### MECHANICAL WORKS.

**Manchester District.**—The Mechanical Works and Operations of Manchester and District. Gives illustrated description of the important works and their products. 10500 w. Ir & Coal Trds Rev—Aug. 11, 1899.

### MECHANICS.

See also **ELASTICITY; HEAT; KINEMATICS; LIVING FORCE; MATERIALS' STRENGTH; MATHEMATICS; MECHANICAL ENGINEERING; MOMENT OF INERTIA; PHYSICS.**

Familiar Subjects in Mechanics. Samuel Webber. Part first deals with step or cone pulleys. Serial. Mach, N. Y.—March, 1899.

Mechanical and Technical Gossip. (Mechanische-Technische Plaudereien). A miscellaneous treatment of a number of mechanical problems, chiefly from a mathematical standpoint. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—Feb. 20, 27, 1897.

**Engineering Practice.**—The Application of the Science of Mechanics to Engineering Practice. Abstract of lecture by Prof. Barr, before a special meeting of the students of the Inst. of Civ. Eng., London. A general talk on the subject. 2000 w. Prac Engr—Feb. 10, 1899.

**Heat Vibrations.**—See **HEAT—Vibrations.**

**Moment of Inertia.**—See **MOMENT OF INERTIA.**

**Moment of Resistance.**—The Moment of Resistance. C. V. Kerr. Two methods, the analytical and the graphical, are offered for determining the resisting moment directly from the cross section of a given beam. 2200 w. Am Soc of Mech Engs—Dec., 1896.

**MEGASS.**

See also **BAGASSE; REFUSE DISPOSAL.**

**Furnace.**—See **FURNACE; REFUSE DISPOSAL.**

**MELTING POINT.**

Melting Points of Aluminum, Silver, Gold, Copper, and Platinum. S. W. Holman with R. R. Lawrence and L. Barr. Presented at meeting of the Amer. Acad. of Arts and Sciences. The melting points are offered as provisional only, but with the belief that they are more reliable than previous data. Methods and apparatus are illustrated and described. 4800 w. Tech Quar—March, 1896.

**Latent Heat.**—Relations Between the Melting Points and the Latent Heats of Fusion of the Metals. Joseph W. Richards. A collection of data, pointing out the limits of the relation, with observations. 900 w. Jour Fr Inst—May, 1897.

**Silver and Gold.**—The Melting Points of Silver and Gold (Sur les Points de Fusion de l'Argent et de l'Or). New determination by M. Berthelot, together with comparisons of his results with those of other authorities since 1863. The results are 962 degrees C. for silver, and 1064 degrees C. for gold. 1500 w. Comptes Rendus—Feb. 7, 1898.

**MENSURATION.**

See **AREA; DECIMAL SYSTEM; MEASUREMENT; SURVEYING; WEIGHTS AND MEASURES.**

**MERCANTILE MARINE.**

See **MERCHANT MARINE.**

**MERCHANT MARINE.**

See also **NAVIGATION; SHIP; STEAMSHIP; TRANSPORTATION; WRECK.**

Navigation Interests of Nations. Lyndon W. Bates. Read before International Cong., at Paris. On the value of navigation in advancing international trade and the sense in which it is a national matter, and the duty of the government in regard to public works. 2800 w. Marine Rev—Aug. 30, 1900.

Sea-Power and Sea-Carriage. Benjamin Taylor. An examination of the present extend and conditions of the world's sea-carrying trade, considering the actual shipping of each country, especially the share of Great Britain. 7200 w. Nineteenth Cent—June, 1899.

The Mercantile Shipbuilding of the World. A review of the outputs of the various shipbuilding countries for the last year, with comparison of previous years, based on statistics from Lloyd's Register. 2000 w. Engs' Gaz—Aug., 1898.

The Mercantile Ship-Owning of the World. Tabulated statements of the number and tonnage of vessels and the countries to which they belong. 1600 w. Eng's Gaz—Oct., 1896.

**Bounties.**—See **Subsidies; U. S. Subsidies.**

**British.**—British Merchant Shipping. Editorial on the effect of the withdrawal of the fleet for army service, which aggregated nearly 630,000 tons. 1700 w. Engng—Oct. 27, 1899.

Commissioner of Navigation. Chamberlain's Last Annual Report. Editorial review of the report, with criticisms. 6500 w. Sea—Nov. 19, 1896.

See also **SHIPBUILDING—British.**

**British vs. Foreign.**—British and Foreign Shipping Competition. The extreme probability that foreign competition will increase is noticed, the stringency of the rules restricting British owners is deprecated, and special privileges granted to foreign vessels are condemned. 2000 w. Engng—July 8, 1806.

**Discrimination.**—Ship Protection by Discrimination. An editorial argument supporting the policy of discrimination and setting forth its effects for the first thirty years after the organization of the United States Government as contrasted with effects of the opposite policy during the three decades ending in 1890. 1600 w. Sea—April 16, 1896.

**Free Ships.**—The Upbuilding of a Marine Carrying-Trade. John Codman. An argument for free ships, in answer to Lewis Nixon. 3200 w. Eng Mag—July, 1897.

**French.**—Efforts to Improve the French Merchant Marine. Gives the report of the parliamentary committee appointed by the Minister of Commerce for the purpose of considering the best measures for the upbuilding of the French merchant marine. 1800 w. U S Cons Repts, No. 350—Feb. 14, 1899.

French Shipping Bounties. Unsatisfactory increase in the number of French commercial steamers, notwithstanding the government pays more in bounties than in any other country. Editorial. 1100 w. Engng—Jan. 31, 1896.

Merchant Marine of France. Points of interest upon the present condition. 1600 w. U S Cons Repts, No. 320—Jan. 10, 1899.

The French Mercantile Marine. Editorial review of the conditions in France causing the decadence of the mercantile marine. 1800 w. Eng, Lond—Aug. 13, 1897.

**Future.**—The Future of Merchant Shipping. Editorial discussion of a paper by Elmer Lawrence Corthell, read before the Am. Assn. for the Adv. of Science, at Boston. 1400 w. Engng—Oct. 14, 1898.

**German.**—Striking Growth of Germany's Merchant Marine. Frank H. Mason. An interesting review of the progress and development. 8700 w. Marine Rev—Jan. 4, 1900.

The Conditions of the German Mercantile Marine. Details from Mr. Gastrell's recent report on the commercial and maritime interests of Germany. Its mercantile marine is now the third largest in the world. 2800 w. Ir & Coal Trds Rev—March 8, 1899.

The Progress of the German Mercantile Marine. Considers the present position and the objects in view, as revealed in the yearly reports of the shipping companies. 2800 w. Engr, Lond—May 11, 1900.

See also **SHIPBUILDING.**

**German Exhibit, Paris.**—German Merchant Marine at the Paris Exhibition. An illustrated description of the pavilion and the objects exhibited within, which represent the development of the German merchant marine during the last fifteen years. 4200 w. Engng—Oct. 12, 1900.

Marine and Light House Exhibits at Paris (Die Weltausstellung in Paris, 1900. Schiffahrt und Küstenbeleuchtnung). A. Rudolph. An illustrated account of the German merchant marine exhibit at the Paris Exposition. Serial. Zeitschr d Ver Deutscher Ing—June 9, 1900.

**Great Lakes.**—A Short History of the Lakes. Mary D. Hartt, in "Boston Transcript." An account of the development of the great fresh water fleet on these lakes. 3200 w. Marine Rev—Sept. 27, 1900.

Shipping on the Great Lakes. Henry S. Pickands. Illustrated account of the industry and improvements in marine engineering, especially as manifested on the Great Lakes. 2800 w. Yale Sci M—Feb., 1896.

The New Era in Lake Shipping. Waldon Fawcett. Illustrates and describes the latest type of ore vessels, with its carrying capacity of 8000 or 9000 tons, and reviews interesting developments. 2000 w. Eng & Min Jour—April 21, 1900.

See also **GREAT LAKES.**

**Great Lakes, 1870-1896.**—The Lake Fleet of To-day. Review of the changes in craft employed in the lake commerce that have occurred since 1870. 900 w. Sea—July 30, 1896.

**Hungary.**—See **WATERWAY.**

**International Competition.**—International Competition in Shipping. Editorial on the expansion of British shipping, and the advance by other nations. 500 w. Engng—March 23, 1900.

**Italy.**—The Condition of the Italian Mercantile Marine (Le Condisioni della Marina Mercantile Italiana). Antonio Teso. An interesting statistical review of the status of Italian shipping, with many tables and data. 9000 w. Rivista Marittima—Dec., 1898.

**Japan.**—Japanese Shipping. An interesting review of recent developments. 2000 w. Engr, Lond—Aug. 3, 1900.

Merchant Marine of Japan. Abstract from a series of articles recently published in the "Nichi Nichi Shimbun," with tabulated statement of vessels and tonnage showing the growth of the Japanese merchant marine during the ten years ending with 1894. 400 w. Consular Reports—May, 1896.

New Laws in Japan for the Development of the Mercantile Marine. Gives the text of two laws for the development of the Japanese Mercantile Marine and the encouragement of shipbuilding in that country. 1800 w. Bd of Trd Jour—Feb., 1897.

Projected Steamship Enterprises. Some account of the interest the Japanese are giving to shipping interests, and the effect upon trade that could be expected if the shipping facilities were improved. 2000 w. Nat Assn of Mfrs—Circ. No. 11.

Shipping Affairs in Japan. Editorial consideration of some of the most important points in the rapid development of the mercantile marine of this country. 2500 w. Engng—Sept. 17, 1897.

Shipping in Japan. Important facts relating to Japanese and foreign shipping. 1700 w. Engng—June 15, 1900.

The Development of the Japanese Mercantile Marine. Interesting correspondence portraying the remarkable development of the shipping interest. No less than seven new lines are now talked of. The system of State subsidies is recommended by the Tokyo chamber of commerce. 1800 w. Engng—Jan. 31, 1896.

The Growth of a Japanese Steamship Company. Comments on information contained in a handbook issued by the Japan Mail Steamship Co. of London. The history of the growth of maritime enterprise in modern Japan is briefly reviewed. 2000 w. Engng—April 2, 1897.

The Nippon Yusen Kaisha. A report concerning the successful operations of the Japan Steamship Co. 1100 w. Engng—Aug. 24, 1900.

The Nippon Yusen Kaisha. Status of the chief Japanese shipping company. The probable extension of its business. 2200 w. Engng—Aug. 28, 1896.

The Shipping Industry in Japan. Editorial on the condition of this industry with criticism of the methods of doing business. 1500 w. Engng—Jan. 21, 1898.

**Load-Line.**—The Report of the Load-Line Committee. Editorial stating the circumstances which led to the appointment of the committee, and commenting on the report just presented to the Board of Trade. 2200 w. Engr, Lond—Dec. 16, 1898.

**Russia.**—Merchant Marine of Russia. Information relating to the number of vessels and their location on different seas, size, appointment, etc. 1000 w. U S Cons Repts, No. 682—March 20, 1900.

Russian Mercantile Marine. Editorial review of points in the last report of the Acting-Consul of Odessa. 1500 w. Engng—March 9, 1900.

The Russian Mercantile Marine. Information from a report of the British Consul, with regard to the shipping of Odessa and the Russian mercantile marine. 1000 w. Engng—Oct. 5, 1900.

**Russian School.**—School for Merchant Marine in Russia. Translation of the regulations for the management of an institution recently organized, which has for its object the training of young men in the theory and practice of navigation. 8000 w. U S Cons Repts, No. 809—Dec. 27, 1898.

**Shipping Rings.**—Shipping Rings. Editorial on facts brought out in the paper by John R. Galloway, read in the Economic Science section at the Bristol meeting of the British Assn. Discussing the bad effect of shipping rings on British commerce, and the remedy. 2500 w. Engng—Nov. 11, 1898.

**Subsidies.**—Shipping Bounties of Foreign Countries and Their Effect. The instances of successful results are stated to have been few, and a running review of the bounty system, as it has been tried by various European governments, is presented. 2500 w. Engng—April 17, 1896.

The Policy of Steamship Subsidies. Arthur T. Hadley. An argument against steamship subsidies as a means of relieving congested public treasuries, reprinted from a work printed in 1888. 4000 w. Rev of Revs—March, 1900.

See also **United States; U. S. Legislation; U. S. Subsidies.**

**Supply and Waste.**—The Supply and Waste of Shipping. Editorial comment on the number and tonnage of British vessels removed from active service during 1897, with a comparison of British waste with the rest of the world. Shows a gross decrease of nearly 52000 tons when compared with 1896. 1800 w. Engng—Aug. 5, 1898.

**United States.**—American Merchant Shipping. Editorial discussion of ideas advanced by Captain Alexander McDougall. 1600 w. Eng, Lond—March 19, 1897.

Arthur Sewall's Views on American Shipping. An article from the N. Y. "Tribune," giving an interesting interview. 8700 w. Sea—Feb. 17, 1898.

Charles H. Cramp on American Shipping. Paper read before a conference held in the committee room of the Senate Committee on Commerce. An interesting discussion of the means and methods required for the development of our merchant marine. 1700 w. Ir Age—April 15, 1897.

Establishment of an American Merchant Marine. Eugene Tyler Chamberlain. Reviews the progress of maritime nations and their methods, commenting on the active interest among Americans. 2000 w. Marine Rev—Sept. 28, 1899.

Ocean Shipping and the Export Trade. Willard S. Mattox. On the importance of providing for the movement of American goods to foreign ports. 1800 w. Ir Age—Jan. 12, 1899.

Our Foreign Merchant Marine. Frank J. Firth. Argument on the subject of United States shipping. 1200 w. Marine Rev—Jan. 12, 1899.

Our Mercantile Marine. Editorial review and criticism of the U. S. Commissioner's report of navigation. 1300 w. Sea—Nov. 28, 1895.

Our Merchant Marine. Sereno E. Payne. Discusses the necessity of building up the American merchant marine and the course best to adopt. 2800 w. N Am Rev—Feb., 1899.

Our Merchant Marine upon the Oceans. George F. Edmunds. Discusses ways of increasing foreign trade and of putting the carrying trade in the hands of the United States as far as its own products are concerned. 2500 w. Marine Rev—Nov. 2, 1899.

Our Need of Merchant Vessels. Alex R. Smith. Editorial review of an article by Eugene Tyler Chamberlain, in the October "Forum," on the United States Merchant Marine, with criticism. 2300 w. Sea—Oct. 7, 1897.

Our Neglected Shipping. Alex. R. Smith. An argument for the protection of American shipping by means of discriminating duties, taxes, etc. 8300 w. N Am Rev—Oct., 1896.

Positive Shipping Policy. The project for the creation of an American seagoing merchant fleet recommended by the Commissioner of Navigation. 2000 w. Marine Rev—Dec. 8, 1898.

The American Mercantile Marine. Comment on the report of the Commissioner of Navigation, dealing with the laws of the United States relative to navigation. 2400 w. Bd of Trd Jour—Feb., 1897.

The American Merchant Marine. Charles H. Cramp. Read at a meeting of the New York Board of Trade and Transportation, Oct. 28, 1897. Presents facts showing the condition of the United States merchant marine, explaining why it is in its present situation, and suggesting the remedy. Gives a survey of English experiences. 4000 w. Sea—Nov. 4, 1897.

The American Merchant Marine. Winthrop L. Marvin. Reviews the history of American ship owning, discussing the causes, and steamship subsidies and the Frye bill. 6000 w. Rev of Revs—March, 1900.

The Need of an American Merchant Marine. Alex. R. Smith. Read at meeting of the Trans-Mississippi Commercial Congress. Introductory to a discussion of the importance of restoring American ships to the foreign carrying trade. Serial. Naut Gas—June 15, 1899.

The Rise and Fall of the American Merchant Marine. Joseph R. Oldham. Refers particularly to the foreign trade, considering some of the features that contributed to its decay, and claiming that the time is now ripe for its revival. Discussion. 6000 w. Jour Assn of Engng Socs—May, 1899.

The Upbuilding of the American Merchant Marine. Illustrated description of freight and passenger steamers under construction in the Delaware and the Clyde. 1000 w. Sci Am—May 5, 1900.

What American Shipping Means to American Labor. From the "American Economist." Showing how the United States can benefit by a proper maritime policy. 1800 w. Sea—June 24, 1897.

See also **Free Ships; SHIPBUILDING.**

**U. S. Legislation.**—America's Shipping Bill. Arguments that accompany the bill and which are made a part of it, as introduced in the Fifty-Sixth Congress. 2200 w. Marine Rev—Dec. 14, 1899.

otion of American Commerce. Full text siderations presented by Jacob H. New Hampshire, in respect to senate Serial. Naut Gaz—Jan. 26, 1899.

tion **Laws.**—Protective Navigation ks on the upbuilding of our mer- and the bright outlook for our ng. 2000 w. Gunton's Mag—April, 1897.

**U. S. Subsidies.**—Subsidies for Ships. Full text of the measure for the revival of the American marine. 5000 w. Marine Rev—Dec. 22, 1898.

### MERCURY.

The Constitution of Mercury (Ueber die Konstitution des Quecksilbers). C. Liebenow. A paper before the Electrochemical Society showing mercury to be composed of molecules of different atomic constitution. 3500 w. Zeitschr f Elektrochemie—May 20, 1898.

**Assaying.**—A New Assay for Mercury. Richard E. Chism. Shows the uncertainty of some methods, the drawbacks of the gold method, and describes the use of silver for receiving the mercury. 2500 w. Am Inst of Min Engs—Oct., 1898.

**Assaying, Electrolytic.**—An Electrolytic Method for the Determination of Mercury in Cinnabar. W. B. Rising and Victor Lenher. The cinnabar is dissolved in hydro-bromic acid, neutralized with caustic potash, pure cyanide of potash added in excess to dissolve precipitate, and the metallic mercury deposited on platinum by a weak electric current. 400 w. Jour Am Chem Soc—Jan., 1896.

**California.**—New Almaden Mines of Santa Clara County, California. Arthur Lakes. These mines are the principal producers of quicksilver in the United States. Gives a description of their peculiar features, their geological formation, and a comparison of them with the older mines of Almaden in Spain. 3800 w. Mines & Min—March, 1899.

Quicksilver Reduction at New Alamaden Mines, California. Arthur Lakes. A description of some of the furnaces formerly used and those at present employed for reducing both fine and coarse ores. Ill. 4000 w. Mines & Min—April, 1899.

**Carniola.**—The St. Anna Quicksilver Mine and Works in Krain (Das Quecksilber Berg- und Hüttenwerk zu St. Anna in Oberkrain). Describing the successful reopening and extension of these old abandoned workings. Two articles. 5000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 11, 18, 1897.

**Mexico.**—Mining and Metallurgy of Quicksilver in Mexico. James Mactear. A paper read at a recent meeting of the Inst. of Mining and Metallurgy. The various mines are briefly described. Serial. Min Jour—Dec. 28, 1895.

Quicksilver Mining in the District of Guaralcazar, State of San Luis Potosi, Mexico. Henry F. Collins. A paper read before the Inst. of Mining and Metallurgy. The deposits are described with the mineral associations. An excellent paper. Serial. Min Jour—Dec. 28, 1895.

**New Zealand.**—The Ohaeawai Quicksilver Deposits. André P. Griffiths. Read before the N. Z. Inst. of Min. Engs. Results of prospecting and mining operations, giving locality, geological features, deposits, their origin and formation and describing the furnaces. 4400 w. N Z Mines Rec—March 16, 1899.

**Spain.**—Treatment of Quicksilver Ores in the Asturias, Spain. From "The Mineral Industry," Vol. IV. Describes, with illustrations, the several types of furnaces employed and the method of operating each. 3000 w. Eng & Min Jour—Aug. 15, 1896.

**Texas.**—The Terlingua Quicksilver Mining District, Brewster Co., Texas. H. W. Turner. Brief account of the deposits, with illustration of a retort. 800 w. Min & Sci Pr—July 21, 1900.

### "MERRIMAC."

**Sinking.**—The Sinking of the "Merrimac." R. K. Crank. A detailed description of what happened in the engine room, given by the chief engineer. 3500 w. Am Mach—Oct. 6, 1898.

### METAL.

See also **ALUMINUM; COPPER; GOLD; IRON, etc.; MATERIALS' STRENGTH; TESTING.**

**Ancient Nations.**—The Metals Used by the Great Nations of Antiquity. J. H. Gladstone. Discourse delivered at the Royal Inst. Considers recent knowledge acquired concerning the metals used by different nations at different epochs of their history. 5800 w. Nature—April 21, 1898.

**Crystallization.**—Crystallization by Shock. Gus. C. Henning. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

Crystallization of Metals. Edward B. Gilmour. Presented at the Chicago meeting of the Am. Found. Assn. Incidents from the writer's experience, and suggestions helpful to molders. Ill. 1100 w. Ir Age—June 14, 1900.

See also **METALLOGRAPHY—Crystalline Structure.**

**Deterioration.**—Fatigue and Deterioration of Metals. Walter A. Zinn. An explanation of the cause, with discussion of whether steel or iron is better for railway car axles. 2400 w. Wis Engr—Jan., 1898.

See also **MATERIALS' STRENGTH—Fatigue; METALLOGRAPHY—Fatigue.**

**Diffusion.**—The Diffusion of Metals. W. C. Roberts-Austen. A brief abstract of the "Bakerian Lecture" of the Royal Society, showing that diffusion can be measured in both molten and solid metals. 2500 w. Nature—May 21, 1896.

See also **METALLOGRAPHY.**

**London Markets, 1896.**—The London Metal Markets in 1896. Market reports on antimony, lead and spelter. 2500 w. Eng & Min Jour—Jan. 9, 1897.

**Melting Point.**—See **MELTING POINT.**

**Mining, 1896.**—See **MINERAL INDUSTRY—Metals, 1896.**

**Non-Arcing.**—See **ARC—Metals.**

**Precious.**—See **PRECIOUS METALS.**

**Rare.**—The Rare Metals. Some metals worth more than gold, on account of their scarcity. 700 w. Min Ind & Rev—Sept. 9, 1897.

The Rarer Metals and Their Alloys. W. Chandler Roberts-Austen. A lecture before the Royal Institution covering the entire field, including alloys with iron and steel. 9500 w. Can Min Rev—Nov., 1895.

**Specific Heat.**—See **SPECIFIC HEAT—Metals.**

**Steam.**—See **STEAM METAL.**

**Tests.**—See **MATERIALS' STRENGTH; TESTING.**

**U. S. Production.**—See **MINERAL INDUSTRY.**

### METAL ANALYSIS.

See also **ANALYSIS; ASSAYING; COPPER ASSAY; IRON ANALYSIS; etc.**

**Sulphur.**—Estimation of Sulphur in Metallurgical Products. L. Compredon. From "Revue Universelle des Mines. A monograph. The result of the investigation and study of many years. The first part contains an introduction and examines the question of the selection of specimens. Serial. Col Guard—Nov. 20, 1896.

### METAL CORROSION.

See also **METAL PROTECTION.**

The Chemistry of Certain Metals and Their Compounds Used in Building, and the Changes Produced in Them by Air, Moisture and Noxious Gases, etc. John M. Thomson. Some of the changes which materials used in building undergo through the action of time or exposure to vitiating agents. 6000 w. Jour Soc of Arts—Oct. 16, 1896.

The Relative Corrosion of Wrought Iron, Soft Steel, and Nickel Steel. Henry M. Howe. Abstract of paper read at International Cong. on "Methods of Testing the Materials of Construction." 1500 w. Eng & Min Jour—Aug. 18, 1900.

The Relative Corrosion of Wrought Iron, Soft Steel, and Nickel Steel. Henry M. Howe. Abstract of paper read at the International Congress on "Methods of Testing the Materials of Construction," giving the results of experiments. 1800 w. Ir & Coal Trds Rev—Sept. 7, 1900.

**Concrete.**—The Corrosion of Iron in Concrete. A summary of information that has been published on this subject. Part first gives abstract of paper by G. Bouscaren on the Covington and Cincinnati suspension bridge, and also of the discussion. Serial. Eng Rec—Feb. 19, 1898.

The Corrosion of Iron in Concrete. A symposium on the subject by several engineers and architects, in continuation of information given in this paper, Feb. 19. 1100 w. Eng Rec—Feb. 26, 1898.

### METALLOGRAPHY.

See also **IRON; MICROSCOPE; STEEL.**

A View of the Present Status of Metallography (Ueberblick über den Gegenwärtigen Stand der

Metallographie). E. Heyn. A discussion of the microscopic study of etched sections of metals and alloys, showing the progress which has been made in the study of materials by this method. 1 plate. Serial. Zeitschr d Ver Deutscher Ing—Feb. 3, 1900.

Metallography as a Method of Research (Die Metallographie als Untersuchungs Methode). An important paper by M. Osmond upon the value of the study of etched sections in investigating the quality and nature of metal; presented at the International Testing Congress at Stockholm, 1897. 7500 w. Stahl und Eisen—Nov. 1, 1897.

Metallography as a Testing Method. F. Osmond. Enumerates methods for distinguishing the components. Serial. Am Mfr & Ir Wld—Dec. 3, 1897.

Microphotographic Methods (Ueber die Mikrophotographie). A. Martens and E. Heyn. A description of the apparatus and methods used in photographing microscopic views of materials at the Government Testing Laboratory at Charlottenburg. 6000 w. 2 plates. Mitt aus den Kgl Tech Versuchsanstalt—Part III., 1899.

**Alloys.**—See also **ALLOY—Microscopic Study.**

**Analysis.**—Micro-Chemical Methods in Metallurgical Analysis. An outline of some micro-chemical reactions, and of methods of research in this new branch of chemistry. Ill. 4000 w. Col Guard—Aug. 10, 1900.

**Antifriction Alloys.**—See **ALLOY—Antifriction.**

**Antimony-Tin-Copper.**—Microstructure of Alloys. J. E. Stead. Considers alloys of antimony and tin, antimony and copper, and copper and tin. Ill. 6000 w Metallographist—Oct., 1899.

**Bearing Metal.**—See **CAR BEARINGS—Microstructure.**

**Bibliography.**—Bibliography of the Metallography of Iron and Steel. Albert Ladd Colby. Prepared as an aid to those who wish to study the microscopic examination of these metals. 6000 w. Ir Age—Jan. 27, 1898.

**Bronzes.**—See **BRONZE—Microstructure.**

**Cementation.**—The Micro-Chemistry of Cementation. John Oliver Arnold. Read before the Iron & Steel Inst., at Stockholm. Describes the details of the method, and reports the micro-chemical analyses of a series of bars. 2300 w. Ir & St Trds Jour—Sept. 3, 1898.

See also **Hardening; STEEL—Structure, Cementation Process.**

**Crystalline Structure.**—On the Crystallography of Iron. F. Osmond. A study of the crystallography of gamma-iron with interesting illustrations. Serial. Metallographist—July, 1900.

The Crystalline Structure of Metals. J. A. Ewing and W. Rosenhain. Abstract of Bakerian Lecture read before the Royal Soc. On the effects of strain and the relation of plasticity to crystalline structure. 2400 w. Engng—Oct. 13, 1899.

The Crystalline Structure of Metals. J. A. Ewing and W. Rosenhain. Abstract of the Bakerian lecture before the Royal Soc. Some results of microscopical study considering the effects of strain and the relation of plasticity to crystalline structure. 2000 w. Elect'n, Lond—June 9, 1899.

See also **IRON.**

**Diffusion of Elements.**—The Diffusion of Elements in Iron. John Oliver Arnold and Andrew McWilliam. Read at London meeting of the Iron and Steel Inst. Gives important facts and describes experimental methods which brought out the results presented. Ill. Serial. Engng—Aug. 25, 1899.

The Diffusion of Elements in Iron. John Oliver Arnold and Andrew McWilliam. Abstract of a paper read at meeting of the British Ir. and Steel Inst. Illustrates and describes the experimental methods adopted, giving the results of analysis, details of experiments, etc. 3000 w. Ir & Coal Trds Rev—May 5, 1899.

**1898.**—The Progress of Metallography in 1898. Albert Sauveur. An outline of important recent contributions to the knowledge of metals and alloys. 2400 w. Metallographist—Jan., 1899.

**Fatigue.**—Microscopic Observations on the Deterioration by Fatigue in Iron and Steel. Thomas Andrews. Part first consits mostly of references to various authetic information and opinions on the subject, to be followed by the writer's investigation. Serial. Engng—Feb. 26, 1897.

**Flaws.**—Microscopic Flaws in Steel. A. E. Seaton. The causes of mysterious fractures in the steel used by marine engineers as revealed by the microscope. Read before the Inst. of Naval Architects. 2300 w. Engng—April 10, 1896.

Microscopic Internal Flaws in Steel Rails and Propeller Shafts. Thomas Andrews. Attributing the failure of steel forgings when subjected to repeated stress to cavities filled with sulphide of iron, which are really microscopic flaws. The three sections shown illustrate this plainly. 1600 w. Engng—Jan. 17, 1896.

**Foundry Iron.**—See **FOUNDRY IRON—Testing.**

**Gold.**—See also **GOLD STRUCTURE.**

**Hardening.**—Current Theories of the Hardening of Steel. F. Osmond. A contribution to the discussion of Mr. Sauveur's paper on "The Microstructure of Steel and the Current Theory of Hardening." Differs in the interpretation of results. 10500 w. Trans Am Inst of Min Engs—March, 1897.

The Microstructure of Steel and the Current Theories of Hardening. Albert Sauveur. Describes at some length the changes of microstructure which occur, during slow cooling, in steels containing various amounts of carbon, and examines what bearing, if any, such structural changes as occur at the critical points, have upon the current theories of hardening. 14000 w. Trans Am Inst of Min Engs—Sept., 1896.

Microstructure of Steel and the Current Theories of Hardening. Albert Sauveur. Communications received, constituting a part of the discussion of My. Sauveur's paper. 6000 w. Trans Am Inst of Min Engs—March, 1897.

The Microstructure of Steel and the Current Theories of Hardening. Continued discussion of the paper of Mr. A. Sauveur presented at the Colorado meeting, Sept., 1896. 14000 w. Trans Am Inst Min Engs—Sept., 1897.

The Hardening of Steel. Henry M. Howe. Remarks in the discussion of the paper of Mr. Sauveur on "The Microstructure of Steel and the Current Theory of Hardening." 6400 w. Trans Am Inst of Min Engs—May, 1897.

The Connection between the Hardening Power and the Retardations of Low-Carbon Steel. Henry M. Howe. A comparison of the writer's results with those obtained by J. O. Arnold, and a reply to his remarks on work of the author. 1800 w. Eng & Min Jour—Sept. 25, 1897.

The Constitution of Hardened Steel. Albert Sauveur. Presents the writer's opinion, which differs from the conclusions reached by Messrs. Arnold and McWilliams. Ill. 2000 w. Metallographist—Oct., 1899.

See also **Cementation; Steel.**

**Iron.**—Microscopic Studies upon Deeply-Etched Sections of Iron (Mikroskopische Untersuchungen an Tiefgeätzten Eisenschliffen). E. Heyn. An important contribution to the study of the physical character of iron, with photogravure reproductions of many deeply etched sections. 7500 w. 6 plates. Mitt aus den Kgl Tech Versuchsanstalt—Part VI., 1898.

Notes on the Molecular Constitution of Iron (Einiges über das Kleingefüge des Eisens). E. Heyn. A discussion of some of the latest results obtained by the study of micro-etchings of polished sections of iron. Many microphotographs of sections are given. Two papers. 2 plates. 5000 w. Stahl und Eisen—Aug. 1, 15, 1899.

See also **IRON—Structure.**

**Iron and Copper.**—The Alteration in the Internal Structure of Iron and Copper Through Changes of Form When Cold and Subsequent Annealing (Die Umwandlung des Kleingefüges bei Eisen und Kupfer durch Formänderung im Kalten Zustande und darauf folgendes Ausglühen). E. Heyn. A communication from the National Technical Laboratory, Charlottenburg, giving an elaborate and well illustrated account of the subject, treated microscopically. 2 plates. Serial. Zeitschr d Ver Deutscher Ing—April 7, 1900.

**Iron and Steel.**—How to Distinguish Between the Different Kinds of Iron and Steel. Method of preparing specimen, and the appearance of the polished surfaces of each grade when etched with acid. 700 w. Am Mfr & Ir Wld—Feb. 7, 1896.

Microscopical Examination of Iron and Steel. Albert Sauveur. Part first reviews the use of the microscope as an instrument of research in metallurgy, and the problems to be solved by chemical and microscopic examination. 2500 w. Eng & Min Jour—June 26, 1897.

The Micrographic Analysis of Metals. J. O. Arnold. The writer shows how the microscope may be utilized in the study of the fundamental structure of iron and steel. 2200 w. Ir & Coal Trds Rev—Jan. 31, 1896.

The Microstructure of Iron and Steel. S. S. Knight. Read at Cincinnati meeting of the Am. Foundrymen's Assn. Showing the benefit to be derived from the use of the microscope in this field. Ill. 5000 w. Am Mfr & Ir Wld—June 17, 1898.

The Relation of Chemical Composition and Microscopic Structure to the Physical Properties of Iron and Steel (Zusammenhang der Chemischen Zusammensetzung und des Mikrsokopschen Gefüges mit den physikalischen Eigenshaften von Eisen und Stahl). Hanns Freiherr von Jüptner. An important paper by the leading authority in Germany, giving the latest information on these much discussed points. Two papers. 5000 w. Stahl und Eisen—March 1, 15, 1899.

**Iron Manufacture.**—Microscopy and Iron Making (Mikroskopie und Betrieb). Showing the use of the microscope in investigating blast-furnace work in actual work, with reproductions of microphotographs. 6000 w. Stahl und Eisen—April 15, 1897.

Microscopy and Practice. Extracts from an article published in "Stahl und Eisen. Prof. Ledebur considers the probability of the microscope being employed as a regular adjunct to every steel and iron works. 1000 w. Ir Trd Rev—Aug. 26, 1897.

**Lead-Tin-Bismuth.**—See **ALLOYS—Lead-Tin-Bismuth.**

**Low Temperatures.**—The Effect of Low Temperatures upon Certain Steels (De l'Effet des Basses Températures sur Certains Aciers). F. Osmond. Discussing experiments made upon steel cooled with liquid air, especially with regard to its magnetic properties. 1000 w. Comptes Rendus —June 5, 1899.

On the Influence of Low Temperatures Upon Certain Steels. F. Osmond. A statement of experimental facts and their explanation. 900 w. Metallographist—Oct., 1899.

**Mechanical Uses.**—The Mechanical Uses of the Science of Metallography. Albert Sauveur. A fully illustrated exposition of the method of studying the physical structure of metals by magnified etched sections showing the great practical value of the system in daily use. 4500 w. Eng Mag—Sept., 1899.

**Microscope Accessories.**—Microscope Accessories for Metallographers. John E. Stead. Read before the Iron and Steel Inst. Hints which will facilitate work in this field. Ill. 2500 w. Engng—June 25, 1897.

**Nickel-Iron.**—See **NICKEL-IRON—Microstructure.**

**Reagents.**—New Reagents for the Micrographic Study of Carburized Irons. F. Osmond and C. Cartraud. Gives results of investigations. 800 w. Metallographist—Jan., 1900.

**Shaft Fracture.**—See **SHAFT—Fracture.**

**Shop Etchings.**—Shop Etchings. J. A. Carney. Read before the St. Louis Ry. Club. Short accounts of the methods of manufacture of iron and steel are given, the process of etching described and its use. Ill. 1800 w. Ir Age—Jan. 20, 1898.

**Steel.**—Progress in the Study of Steel (Les Progrès Realisés dans la Connaissance du Métal Acier). Ad. Greiner. A discussion of the various methods of testing steel, and giving especial attention to peculiarities of physical constitution as revealed by metallography and microscopy. 5000 w. Rev Universelle des Mines—May, 1898.

The Microscopic Inspection of Steel. Francis Scott Rice. Notes of experience in the microscopic examination of steel. Ill. 1700 w. Eng News—Oct. 28, 1897.

The Physical Analysis of Steel. John Parry. Read before the South Wales Inst. of Engs. The writer has attempted to collect the essential facts, useful to the manufacturer, that have been obtained by microscopical investigations. 3300 w. Col Guard—Sept. 23, 1898.

The Relation Between Temperature and the Grain of Steel. A. Sauveur and H. M. Howe. A diagram showing the relation of the area of the grain of steel of 1.10 per cent. carbon to the temperature from which it had cooled. 400 w. Eng & Min Jour—Dec. 7, 1895.

The Relation Between the Structure of Steel and Its Thermal and Mechanical Treatment. Albert Sauveur. Read before the Iron and Steel Inst. of Great Britain. Considers the changes of structure brought about by heat treatment, the changes by work, and gives conclusions of interest. 4300 w. Eng News—Aug. 24, 1899.

The Constitution of Steel Considered as an Alloy of Iron and Carbon. Albert Sauveur. Briefly outlines the laws which govern frozen saline solutions, and showing how they help to account for the structure of metallic alloys. Ill. 6000 w. Tech Quar—June, 1898.

See also **Hardening; STEEL—Structure.**

**Steel Manufacture.**—Practical Microscopic Analysis for Use in Steel Works. C. H. Ridsdale. Abstract of a paper read before the Iron & Steel Inst., of Great Britain. On the value of the microscope from the view of steel makers and users. 9000 w. Eng News—Nov. 2, 1899.

See also **Iron Manufacture.**

**Steel Rails.**—Some Peculiarities of Steel Rails. Photographic examination of sections etched by dilute sulphuric acid, as given in an appendix to the report of the committee appointed by the British Board of Trade. 600 w. Ir & Coal Trds Rev—Aug. 3, 1900.

The Causes of Fracture of Steel Rails. An illustrated abstract of the report of a Board of Trade Committee of Investigations into the loss of strength of steel rails by prolonged use, particularly the microscopical examination of a broken rail. 1200 w. Nature, Lond—Sept. 6, 1900.

Further Studies on Steel for Rails (Weitere Studien über Schienenstahl). A very full investigation into the use of basic open-hearth steel for rails, with data and results of tests, microphotographs of etched sections, and diagrams of behavior in service. Serial. Zeitschr d Oesterr Ing u Arch Ver—Nov. 4, 1898.

See also **STEEL MANUFACTURE—Basic.**

**Steel Rails and Tires.**—Micro-Mechanical Examination of Old Steel Rails and Tires. J. E. Stead. Paper presented to the West of Scotland Iron and Steel Inst. Results from the examination of a large number of old steel rails. Serial. Ind & Ir—Jan. 15, 1897.

## METALLOIDS.

See also **FOUNDRY IRON.**

**Castings.**—Metalloids in Castings. Malcolm McDowell. Read before the Western Foundrymen's Assn., at Chicago. Discusses the things that give value to pig iron, grading of foundry iron, etc., with discussion. 4000 w. Ir Trd Rev—Nov. 24, 1898.

**Cast Iron.**—On the Action of Metalloids on Cast Iron. Guy R. Johnson. Read before the Iron & Steel Institute, Stockholm meeting. A discussion of the effect of each element on the properties of the iron and on the state of the other metalloids, with tables of tensile tests in which each element in turn is varied, the others being held constant. Serial. Ind & Ir—Sept. 9, 1898.

Practical Value of the Various Metalloids in Cast Iron. Malcolm McDowell, with editorial. Results of researches and experiments, followed by brief discussion. 4500 w. Ir Age—July 23, 1896.

The Value of Metalloids in Cast Iron. Malcolm McDowell. Read at meeting of the Western Foundrymen's Assn., Chicago. Showing the advantage of buying and selling pig iron by analysis. Also discussion. 4000 w. Ir Age—Jan. 27, 1898.

**Foundry.**—Diffusion and Segregation of Metalloids at the Furnace and Foundry, and Methods for Lessening Their Final Evil Effects. T. D. West. Abstract of a paper read at the meeting of the Foundrymen's Assn. (U. S. A.). The variation in composition is ably discussed. 3000 w. Ind & Ir—Dec. 27, 1895.

## METALLURGICAL EXHIBITION.

See also **IRON EXHIBITION; MINING; MINING AND METALLURGY.**

**German at Paris.**—The German Metallurgical Exhibit at the Paris Exposition (Die Pariser Weltausstellung IV. Von der Deutschen Ausstellung für Hüttenwesen Klasse 64). An illustrated account of some of the exhibits in the German section of the metallurgical department at the Paris Exposition. 1000 w. Stahl und Eisen—June 1, 1900.

**Paris, 1900.**—Mechanical Preparation Plant at the

Paris Exhibition. Illustrated description of preparation appliances shown in the French section, for crushing, sizing, etc. 2200 w. Col Guard—Aug. 10, 1900.

Paris Exposition—Exhibits in the Metallurgical Section. An illustrated account of various exhibits, principally iron and steel. 1500 w. Sci Am Sup—Sept. 29, 1900.

See also **MINING AND METALLURGY.**

## METALLURGY.

See also **COPPER METALLURGY; CUPOLA; ELECTRO-METALLURGY; FOUNDRY; GOLD METALLURGY; IRON MANUFACTURE; LEAD METALLURGY; METAL WORKING; MINING; MINING AND METALLURGY; ORE; SILVER METALLURGY; SMELTING; STEEL MANUFACTURE.**

Between the Mine and the Smelter—A Lecture Delivered Before the Graduating Class of the School of Mines. Albert R. Ledoux. Discusses problems affecting transportation when the smelter is located at a distance from the mine; also the questions of sampling and assaying. 5500 w. Sch of Mines Quar—July, 1898.

Metallurgical Processes (Metallhüttenwesen). C. Schnabel. The first of a series of metallurgical articles; this installment is devoted to roasting furnaces for copper ores. 3500 w. Zeitschr d Ver Deutscher Ing—Sept. 9, 1899.

**America.**—The Progress of Metallurgy and Metal Mining in America during the last Half-Century. James Douglass. Gives the history of these industries in Mexico, United States and Canada, considering each metal separately and the methods employed; also discussion. 138000 w. Jour Soc Arts—Nov. 26, 1897.

**Broken Hill, Australia.**—See **SILVER METALLURGY.**

**Canada.**—The Metallurgical Industries of Canada. Abstract of a discourse by Prof. Roberts-Austen, at the meeting of the British Assn., in Toronto. The importance of the metals of the country, with much general information. 2700 w. Col Guard—Aug. 27, 1897.

**Centrifugal Separator.**—A Centrifugal Separator (Schleuderseparator). L. Kleritj. Illustrating and describing an improved hydraulic centrifugal machine for separating various ores and earths according to density and size of particles. Serial. Oesterr Zeitschr f Berg u Hüttenwesen—March 10, 1900.

**Chemical Changes.**—Chemical Changes Involved in the Extraction of Metals from Their Compounds. J. M. Thomson. Extract from a paper read before the Soc. of Arts. An examination of the chemical changes taking place in the various processes. 1500 w. Col Guard—Oct. 30, 1896.

**Chile.**—Metallurgy in Chile. Henry Watson. Part first discusses the rich mineral deposits, value of the ores, sources of ore supply, sampling, treatment, kilns, smelting, etc. Serial. Aust Min Stand—Sept. 8, 1898.

**Colorado.**—Progress and Present Status of Methods of Ore Reduction in Colorado. H. Van F. Furman. Each metal is considered separately and the progress made is briefly traced. 3300 w. Min Ind & Rev—Dec. 31, 1896.

See also **MINING.**

**Concentration.**—Nature's Concentrators. Alfred C. Lane. Traces the analogy between the natural and artificial processes, and draws conclusions therefrom. 2800 w. Eng & Min Jour—May 29, 1897.

Small Mine Concentration. S. I. Hallett. Sketches of two mills, one having a capacity of from 12 to 25 tons in 24 hours, the other from 35 to 50 tons, with description. 2200 w. Min & Sci Pr—May 5, 1900.

The Concentration of Ores. A lecture by Prof. R. H. Richards, of the Massachusetts Institute of Technology, before the Society of Arts, Boston. Abstract. 1800 w. Mines & Min—July, 1898.

The Concentration of Ores. Robert H. Richards. Examines the methods of concentration, the preliminary machines, the final concentrators, and general details. 3300 w. Tech Quar—March, 1898.

**Concentration, Butte District.**—The Concentration of Ores in the Butte District, Montana. Charles W. Goodale. A study of the treatment of these ores, which present a variety of combinations, with historical account of plants erected in the Butte district. 16000 w. Trans Am Inst of Min Engs—Sept., 1896.

**Concentration, Colorado.**—Some Colorado Concentration Methods. Ph. Rearden. Suggestions from the extensive experience of the writer. 1200 w. Min & Sci Pr—May 15, 1897.

**Copper-Silver-Lead.**—A Hot Blast System for Copper Matting and Silver-Lead Furnaces. From advance sheets of a treatise on this subject by J. W. Nesmith. Illustrated description. 3000 w. Min & Sci Pr—Oct. 17, 1896.

**Crushing Machinery.**—See also **GOLD METALLURGY—Crushing; ORE CRUSHER.**

**Dust and Fume Collection.**—See **DUST—Collection; LEAD METALLURGY; SMELTING.**

**Education.**—The Training of Metallurgists. A. H. Sexton. Abstract of a presidential address delivered before the West of Scotland Iron and Steel Inst., Glasgow. A very interesting and instructive discussion on the systems of education in use, and the qualifications that have to be met. 5000 w. Ir & Coal Trds Rev—Dec. 27, 1895.

See also **EDUCATION; MINING ENGINEER.**

**1885-97.**—See **MINING.**

**1896.**—See **ELECTRO-CHEMISTRY.**

**Electrolytic.**—See **ELECTRO-METALLURGY.**

**Expositions.**—See **METALLURGICAL EXHIBITION; MINING AND METALLURGY.**

**Extrusion Process.**—See **METAL WORKING.**

**France.**—See also **MINING.**

**Gold and Silver.**—Metal Refining Methods (Metallhüttenwesen). C. Schnabel. A discussion of the latest refining methods for gold and silver including the cyanide treatment of gold ores in various parts of the world, and the Stetefeldt and Dewey-Walther silver processes. Two articles. 9000 w. Zeitschr de Ver Deutscher Ing—Oct. 9, 23, 1897.

See also **GOLD METALLURGY; SILVER METALLURGY.**

**Hard Low-Grade Ore.**—Treating Hard Low-Grade Ores. Walter J. May. Describes processes applicable to ores where disintegration, cleaning and separation are all that is necessary to render the ore fit for use or sale. 1800 w. Prac Eng—Dec. 23, 1898.

See also **GOLD METALLURGY.**

**Hydrochloric Acid Gas.**—Metal Separations by Means of Hydrochloric Acid Gas. J. Bird Meyer. From author's thesis presented to the Faculty of the Univ. of Penn. for the degree of Doctor of Philosophy. Investigation of the action of hydrochloric acid gas upon metallic oxides and their salts. 4400 w. Jour Am Chem Soc—Dec., 1896.

**Hydrometallurgy.**—See also **Wet Separation; GOLD METALLURGY.**

**Improvements.**—Recent Improvements in Metallurgical Methods (Neurerungen im Metallhüttenwesen). Dr. Düre. Brief descriptions of improvements in the metallurgy of aluminum, antimony, arsenic, lead. silver, gold, copper, nickel, zinc, and tin. 4500 w. Glückauf—July 16, 1898.

**Iron and Steel.**—See **IRON MANUFACTURE; STEEL MANUFACTURE.**

**Jig.**—See **GOLD METALLURGY; JIG.**

**Laboratories.**—The Equipment of Metallurgical Laboratories. Henry M. Howe. Discusses mainly the value of laboratory work for undergraduate students, but thinks it of great benefit to advanced students and all who wish to investigate metallurgical problems. 3000 w. Trans Am Inst of Min Engs—Feb., 1899.

See also **LABORATORY.**

**Lixiviating.**—Lixiviating or Leaching Processes. J. Ohly. Remarks on various processes. 3500 w. Ores & Met—June, 1900.

See also **GOLD METALLURGY.**

**Machinery.**—Metallurgical Machinery. A. C. McCallum. Read before the Canadian Mining Inst. Deals with the most familiar machines used by miners, such as crushers, rolls, stamps, and feeders, from the designer's point of view. 4000 w. Can Min Rev—Feb. 28, 1899.

See also **MINING MACHINERY.**

**Microscope.**—See **METALLOGRAPHY; MICROSCOPE.**

**Ore Dressing.**—Notes on Ore Dressing. A. W. Warwick. Briefly notes the ancient systems, and the modern improvements, the course of treatment in a wet plant and a few principles governing the design of a perfect mill. 1700 w. Min & Sci Pr—Jan. 13, 1900.

The Progress in Ore Dressing. C. Blömecke. Translated from the "Berg-und Hüttenmännisches Jahrbuch." Describes the Lührig system as applied in modern mills, discussing the advantages and disadvantages. Serial. Sch of Mines Quar—Nov., 1899.

**Ore Washers Sand Removal.**—An Apparatus for the Removal of Sand from the Waste Water of Ore-Washers. J. E. Johnson, Jr. Discussion of this paper, presented at the Atlantic City meeting, Feb., 1898. 900 w. Trans of Am Inst of Min Engs—June, 1898.

**Philippines.**—Native Metallurgy in the Philippines. R. L. Packard. Describes the working of gold-bearing rock, and copper smelting. 1500 w. Eng & Min Jour—June 17, 1899.

See also **MINERAL REGION; MINING TOOL.**

**Russia.**—See **MINING—Russia.**

**Sardinia.**—Mechanical Ore Preparation in Sardinia. N. Pellati. From a communication to the International Cong., at Paris. Describes some new appliances used in Sardinia, and little known outside of Italy. 1200 w. Col Guard—Oct. 12, 1900.

**Standards.**—Metallurgical Standards. Frederick T. Snyder. Read before the Canadian Mining Inst. Discusses the unit of weight, the scale of sizes for crushed ore, and a coefficient that shall represent the mechanical condition of the ore. 2200 w. Can Min Rev—Feb. 28, 1899.

**Sulphides.**—See also **LEAD METALLURGY; SILVER METALLURGY; ZINC METALLURY.**

**Sweden.**—See **MINING; MINING AND METALLURGY.**

**Testing.**—See also **ORE TESTING.**

**United States, Southern.**—See also **IRON INDUSTRY; MINING INDUSTRY.**

**U. S., Western.**—Notes on the Present Western Practice of Metallurgy—Economically Considered. W. B. Devereux. General considerations, with an outline of the more recent metallurgical tendencies and practice. 8500 w. Sch of Mines Quar—July, 1897.

**Wet Separation.**—The Wet Separation of Ores and Minerals. Walter J. May. Discusses some points in the methods used. 1800 w. Prac Engr—Jan. 5, 1900.

See also Ore Washer.

## METAL MINE.

See **MINE; MINERAL REGION; MINING.**

## METAL MINING.

See **MINE; MINERAL REGION; MINING.**

## METAL PRESERVATION.

See **METAL PROTECTION.**

## METAL PRODUCTION.

See **IRON INDUSTRY; MINERAL INDUSTRY; MINING AND METALLURGY.**

## METAL PROTECTION.

See also **FIREPROOF CONSTRUCTION; PAINT; METAL CORROSION.**

Methods of Rust Prevention (Die Mittel zur Verhütung des Rostes). Dr. Julian Treumann. A general discussion of various methods of rust prevention, with especial reference to structural steel and iron work. Two articles. 6000 w. Stahl und Eisen—Oct. 1, 15, 1898.

Preserving Iron from Corrosion. Max Soltz. Conclusions from a paper read before the St. Paul Engineers' Assn. Describes a system which it is believed will protect iron and steel for a longer period than any other system now in use. 1000 w. Bos Jour of Com—Aug. 28, 1897.

Protective Coverings for Iron. Charles E. Koons. The necessity of smoothing rough surfaces before painting, and the right preparation and proper application are discussed. 1300 w. R R Car Jour—Sept., 1897.

Protective Metallic Coatings for Iron and Steel. Sherard Cowper-Coles. Read before the Soc. of Engs.. England. Part first considers the causes that tend to corrode iron and steel, and will later deal with the processes for applying metallic coatings which effectively exclude air and moisture. Serial. Ind & Iron—Oct. 7, 1898.

Rustless Coatings for Iron and Steel. M. P. Wood. Causes of corrosion and protection needed; the danger threatening high buildings of metallic construction, bridges, etc. Examples of remarkable character. 3300 w. Am Soc of Mech Engs—Dec., 1896.

The Preservation of Iron from Rust. Discusses whether there is any need for the use of mixtures containing pigments or linseed oil. Shows the pigment possesses no protective value, and calls attention to tar, pitch and asphaltum as rust preventers. 4000 w. Engr, Lond—Jan. 14, 1898.

The Preservation of Iron in Building Structures. H. C. Standage. Discusses the various pigments used, and why they fail; states that when glycerine is present the paint cannot be a perfect protection, and gives directions for forming a desirable covering. 4000 w. Builder—Sept. 11, 1897.

The Prevention of Rust in Iron and Steel Structures. Editorial showing the importance of this question and our duty to posterity. 1100 w. Sci Am—Dec. 26, 1896.

The Protection of Metal Work. A. H. Sabin. A lecture delivered at the University of Wisconsin. Gives rules for the best results and for good, but less thorough work. 1600 w. Eng Rec—Jan. 7, 1899.

The Theory and Practice of Protective Coatings for Structural Metal. A. H. Sabin. Describes experimental tests made on metal plates, the general effect of different paints, the way the paints are produced, composition of varnishes, etc. Discussion. 8000 w. Pro of Engs' Club of Phila—May, 1900.

**Aluminum.**—See **Steel and Aluminum.**

**Bridges.**—See also **BRIDGE—Gas Protection.**

**Car Frames.**—See **CAR FRAME—Metal.**

**Concrete.**—The Protection of Metal Work in Concrete. Letter from Albert W. Buel. A compilation of statements claiming that paint is unnecessary. 1400 w. Eng Rec—Oct. 8, 1898.

See also **METAL CORROSION.**

**Chicago Post-Office.**—Report Upon the Condition of the Ironwork in the Old United States Post-Office and Custom-House Building in the City of Chicago. The conclusion of the committee is that iron properly painted before being placed in a building, and reasonably protected from air and moisture, does not deteriorate to any serious extent. Discussion. 1200 w. Jour of W Soc of Engs—Aug., 1897.

**Painting.**—The Painting of Iron Surfaces. J. Spennrath. Translated by Henry Szlapka from the "Deutsche Bauzeitung." Alkalies or acids affect paints very strongly. The paper deals with various rust preventive methods in detail and is throughout very instructive. 2800 w. Am Gas Lgt Jour—March 2, 1896.

See also **PAINT—Iron Protection; Tests.**

**Steel and Aluminum.**—Experiments on the Protection of Steel and Aluminum Exposed to Water. A. H. Sabin. A statement of the results of the continuation of a series of experiments to determine the comparative durability of paints and varnishes. 4200 w. Pro Am Soc of Civ Engs—Oct., 1899.

Experiments on the Protection of Steel and Aluminum Exposed to Water. Discussion of paper by A. H. Sabin. 1800 w. Pro Am Soc of Civ Engs—Feb., 1900.

Experiments on the Protection of Steel and Aluminum Exposed to Water. Continued discussion of paper by A. H. Sabin on this subject. 1300 w. Pro Am Soc of Civ Engs—April, 1900.

Experiments on the Protection of Steel and Aluminum Exposed to Sea Water. A. H. Sabin. Results of tests on plates with various preservative coatings. 3000 w. Am Soc of Civ Engs—Sept., 1896.

Experiments upon the Durability of Different Metal Coatings Immersed in Sea Water. An account of the tests made at the Brooklyn Navy Yard, with table showing the results of protective coatings applied to steel and aluminum plates immersed for 13 months. 1500 w. Eng News—July 28, 1898.

**Steel Buildings.**—See also **STEEL CONSTRUCTION—Rust and Fire.**

## METAL WORK.

See also **IRON WORK; LEAD WORK.**

Metal Work. T. Swaffeld Brown. Abstract of a paper read before the Sheffield Society of

Architects. On the principles and processes, the materials used, etc. Ill. 4000 w. Can Archt—Aug., 1899.

**Africa.**—Cast Metal Work from Benin. Illustrates and describes the pieces showing high artistic excellence, brought from West Africa. 1600 w. Nature—July, 1898.

**Architecture.**—Metal Work. T. Swaffield Brown. Read before the Sheffield Soc. of Archts. A discussion of the principles and processes of metal work. Ill. 6400 w. Jour Roy Inst of Brit Archts —Nov. 26, 1898.

**Exhibition, Glasgow.**—Metal Work Exhibitions, Glasgow. Illustrated description of exhibits. 1300 w. Builder—Oct. 27, 1896.

**Ornamental.**—Ornamental Metal Work. W. W. Kent. On the design, manufacture and use of this material. Ill. 2800 w. Cal Archt—Feb., 1900.

**METAL WORKING.**

See also **FIT; MACHINE SHOP; MACHINE TOOL; MACHINE WORK; MECHANICAL ENGINEERING; METALLURGY; TOOL.**

Experimental Study of Shearing and Punching Metals (Étude Expérimentale du Cisaillement et du Poinçonnage des Métaux). M. Frémont. A very full discussion of the work required in punching and shearing, with diagrams, photographs and sections. An important and valuable paper. 30000 w. Bull de la Société d'Encour—Sept., 1897.

To Cut a Thing in Two and Yet Not Separate It. John H. Cooper. Describes an interesting device which has been several times re-invented. Ill. 700 w. Mach, N. Y.—June, 1897.

**Aluminum and Brass.**—See **ALUMINUM—Sheet.**

**Cutting.**—Cutting Semi-Cylindrical Concavities. B. F. Spalding. Common tools inadequate; grubbing; form of cutter; mode of motion; making joint for vise hinge. Ill. 1800 w. Am Mach —May 6, 1897.

**Extrusion Process.**—The Production of Metallic Bars of Any Section by Extrusion at High Temperatures. Perry F. Nursey. Paper read before the Iron and Steel Inst. Descriptive of a metallurgical process for producing bars and tubes of any shape by forcing metal through dies, the invention of Mr. Alexander Dick. Ill. 2400 w. Eng, Lond—May 8, 1896.

**Trimming Wrench Blanks.**—Trimming Wrench Blanks. W. A. Warman. Illustrated description of arrangement used and found speedier and cheaper than milling. 600 w. Am Mach—Aug. 12, 1897.

**METEORIC IRON.**

**Alabama.**—Note on a New Meteoric Iron Found Near the Tombigbee River, in Choctaw and Sumter Counties, Alabama, U. S. A. Warren M. Foote. An outline of the history of these masses, so far as known. Plates. 1800 w. Am Jour of Sci—Aug., 1899.

**METEOROLOGY.**

On Periodicity of Good and Bad Seasons. H. C. Russell. Abridged from a paper read before the Royal Society of New South Wales. Results of systematic observations showing periodicity in the weather, floods and droughts. 2800 w. Nature—Aug. 20, 1896.

**Columbia University.**—Meteorology in the University. Cleveland Abbe. An extract from a report presented in 1893 to President Seth Low, of Columbia College, recommending the establishment of courses in meteorology and a meteorological laboratory in connection with the University. 2800 w. Science—Nov. 29, 1895.

**Cyclone.**—See **CYCLONE.**

**Electrical Instruments.**—See **ELECTRIC INSTRUMENT—Meteorology.**

**Electricity.**—See **ELECTRICITY—Atmospheric.**

**Firedamp.**—See **FIREDAMP—Meteorology.**

**Forestry.**—See **FORESTRY—Meteorology.**

**Humidity.**—See **HUMIDITY.**

**Storms.**—The Origin of Storms (Sopra le Origini delle Tempeste). G. Tolomei. A general dissertation on the various theories of the nature and origin of storms, illustrated with diagrams. 8000 w. Rivista Marittima—Aug.-Sept., 1898.

**Weather Bureau.**—See **WEATHER BUREAU.**

**METER.**

See **ELECTRIC METER; GAS METER; WATER METER.**

**METRIC SYSTEM.**

See **SCREW THREAD; WEIGHTS AND MEASURES.**

**MEXICO.**

See also **SPANISH AMERICA.**

Finances and Industries of Mexico. Statements of the estimates for the fiscal year 1898-99, presented in Dec. last to the Mexican House of Deputies. 1800 w. U S Cons Repts—March 3, 1898.

**MICA.**

See also **INSULATION.**

Mica and Mica Deposits. J. Ohly. Considers the peculiarities of mica and its demand, giving information regarding its preparation for market, etc. 1700 w. Min Rept—July 12, 1900.

Mica—Its Uses and Appliances. Treats of the peculiarities of this mineral and its general uses. 1800 w. Can Min Rev—Nov., 1897.

The Occurrence and Uses of Mica. M. L. Fuller. History of the mining of this mineral in early times, with interesting facts relating to the deposits and uses. 1400 w. Stone—Nov., 1899.

**Bengal.**—Mica Mining in Bengal, India. A. Mervyn Smith. Read before the Institution of Mining and Metallurgy. Describes the mines and native methods of mining, also the present method of work. 2500 w. Col Guard—Feb. 24, 1899.

Mica Mining in Bengal, India. A. Mervyn Smith. Abstract of paper read before the Institution of Mining and Metallurgy, London. Describes the native mines and methods of mining, and the use made of the mineral. 1200 w. Eng & Min Jour—Aug. 26, 1899.

Mica Mining in Bengal. Describes the region, the occurrence and methods of mining. 1500 w. Ind & East Engr—Dec., 1897.

**India.**—Mica Mining in India and the United States. An illustrated account of mica mining in India. 1100 w. Minn & Sci Pr—Sept. 8, 1900.

Mica Mining in the District of Nellore, India. Robert W. Thompson. Describes the region, the deposit, and matters relating to the industry. As the deposit is near the surface the method of working is mere quarrying. The cutting and sorting is of great importance. 2000 w. Jour Soc of Arts—June 17, 1898.

Mining and Marketing Mica. Illustrates an East India mica mine, and the preparation of the plates, giving information relating to this product. 1200 w. Min & Sci Pr—Nov. 26, 1898.

**North Carolina.**—The Mining of Mica. A brief description of the method employed in North Carolina. 500 w. Min & Sci Pr—March 14, 1896.

**Norway.**—Occurrence of Mica in South Norway. J. F. Wells. Condensed from a paper before the Inst. of Min. and Met. Describes a mica mine in Norway, showing remarkably coarse crystallization of some of the minerals. 1800 w. Min & Sci Pr—Aug. 26, 1899.

The Occurrence of Mica in South Norway. J. F. Wells. Read before the Inst. of Min. & Met. Describes the mine and the deposit. Ill. 1500 w. Col Guard—July 7, 1899.

**Scrap.**—A New Use for Scrap Mica. H. C. Mitchell. Read before the Ontario Min. Inst. Showing that this hitherto costly waste may become a valuable by-product. Describes its manufacture as an insulator of steam heat, its use for fireproofing, its use in resisting extreme cold, etc. 3000 w. Can Min Rev—April, 1897.

**United States.**—See **India; North Carolina.**

**MICROGRAPHY.**

See **METALLOGRAPHY.**

**MICRO-METALLURGY.**

See **METALLOGRAPHY.**

**MICROMETER GAUGE.**

See also **GAUGE.**

Micrometer Heads for Special Gauges. Illustrated description of these heads and various applications. 900 w. Am Mach—Sept. 13, 1900.

New Brown & Sharpe Measuring Instruments. An illustrated description of micrometer calipers and gauges. 500 w. Ir Age—Sept. 27, 1900.

**Machine Tool Testing.**—See **MACHINE TOOL—Micrometer Testing.**

**MICROPHONOGRAPH.**

The Microphonograph (Le Microphonographe).

Illustrated description of Prof. Dussaud's combination of the microphone and phonograph for enabling deaf persons to train their hearing, also to furnish a means for most delicate auscultation, recording accurately by the normal or abnormal sounds of the body. 3000 w. Le Génie Moderne—Feb. 15, 1897.

The Perfected Dussaud Microphonograph (Le Microphonographe Dussaud Perfectionné). The improved instrument records very feeble sounds, also enables deaf persons to hear clearly the sounds previously impressed upon the recording cylinders. 1200 w. Le Génie Moderne—Sept. 1, 1897.

**MICROSCOPE.**

See also **METALLOGRAPHY.**

**Mining.**—The Microscope as Used in Mining. J. A. Edman. Address delivered before the Microscopical Society in San Francisco. Showing that the microscopical study of ore deposits to be not only very interesting, but helpful if not absolutely necessary in determining the physical conditions of the ore before deciding on a plant and milling process. 2500 w. Min & Sci Pr—April 25, 1896.

**MICROSTRUCTURE.**

See **METALLOGRAPHY.**

**MICROTOMES.**

On Two Forms of Automatic Microtomes. Charles Sedgwick Minot. Describes the automatic wheel microtome, and the precision microtome; also a new form of microtome knife. Ill. 4500 w. Science—June 4, 1897.

**MILDEW.**

Mildew. Its origin, growth and trouble to cotton and woolen manufacturers. 1300 w. Bos Jour of Com—Nov. 23, 1895.

**MILITARY ENGINEERING.**

See also **WAR.**

The Transformations of Material of War (Les Transformations du Matérial de Guerre). An interesting article by Col. Fix, reviewing the past and probable future of applied engineering in modern warfare. 3500 w. La Rev Tech—March 25, 1897.

**Electric.**—See **ELECTRICAL ENGINEER; ELECTRICITY; ELECTRIC EQUIPMENT.**

**Santiago Campaign.**—The Work of the Engineers in the Santiago Campaign. Eduardo J. Chibas. Map of the district around Santiago, showing the positions of the United States and Spanish forces, with a statement of the work done by the engineers during the advance. 3500 w. Eng News—Oct. 13, 1898.

**Spanish-American War.**—Engineering Lessons from the Hispano-American War. Hiram Stevens Maxim. Showing the necessity of the possession of engineering ability to operate modern fighting machinery, and maintaining that mechanical supremacy is the vital factor in military success. 2500 w. Eng Mag—Sep., 1898.

**U. S. Volunteers.**—The Volunteer Engineers in the War with Spain. J. L. Van Ornum. A statement of the value, as shown by recent experience, of permanent volunteer engineering regiments in the State militia. 1800 w. Eng Rec—Nov. 25, 1899.

I. Work and Experience of the 1st Battalion, 1st Regiment, U. S. Volunteer Engineers, in Porto Rico. John Stephen Sewell. II. Work of the Third Regiment. U. S. Volunteer Engineers, in Cuba. Lyle F. Bellinger. Two letters describing work actually performed. 5400 w. Eng News—June 22, 1899.

**MILITARY RAILWAY.**

See **PORTABLE RAILWAY; RAILWAY—Military; ROAD—Military.**

**MILITARY STRENGTH.**

See also **ARMAMENT; WAR.**

The Fighting Strength of the United States. F. W. Hewes. A comparison of the resources of the several nations. Ill. 2500 w. McClure's Mag—July, 1898.

**Europe.**—The Armed Strength of Europe. Table showing resources in the event of a general conflict, prepared for the "World Almanac" by Lieut. W. R. Hamilton. 650 w. Sci Am Sup—Sept. 3, 1898.

**MILK.**

**Bacteria.**—Bacteria in Milk. H. W. Conn, of the Biological Department, Wesleyan University, in the "Spatula." The effects of bacteria in milk, as related to cleanliness in the procuring of milk from cows, and in the care bestowed upon it subsequently. 1800 w. Sci Am—May 2, 1896.

**Modified.**—Modified Milk. An illustrated description of scientific preparation of milk for food. 1600 w. Sci Am—May 23, 1896.

**MILL.**

See also **FLOUR MILL; MILLING MACHINE; ROLLING MILL.**

**History.**—The Origin of the Grinding Mill (Les Origines du Moulin à Grains). M. L. Lindet. A historical review with many illustrations of ancient and primitive mills. 12000 w. Bull Soc d'Encour—Aug., 1900.

**Metal Stones.**—A Rational Construction of Mill with Metallic Grinding Surfaces (Sur la Construction des Moulins à Meules Métalliques). The mill constructed by M. Schweitzer, has channeled grinding surfaces revolving in a horizontal plane, similar to burr millstones, and is claimed to be superior to the roller mill. 600 w. Comptes Rendus—Nov. 29, 1897.

**Roller, Grain.**—Roller Mill (Moulin à Blé à Cylindres). Detailed description, with illustrations and plate showing plans of building, of a roller mill of 6000 lbs. capacity in 24 hours, erected at Soulièvre. 4000 w. La Rev Tech—Jan. 25, 1897.

**MILLING.**

**Limitations.**—Limitations of Milling in Metal Working. John Richards. Tracing some of the conditions and limitations, as far as proved by common practice. 1200 w. Am Mach—June 16, 1896.

**MILLING CUTTER.**

**Cast Iron.**—Cast-Iron Milling Cutters. E. A. Gay. Description of milling cutters used by the Enterprise Foundry Co., of Rochester, N. Y., in the manufacture of butts and hinges, with illustrations of samples made with these tools. 1500 w. Am Mach—July 1, 1897.

**MILLING MACHINE.**

See also **BORING MACHINE; GEAR CUTTING; MACHINE TOOL.**

On the Development of the Milling Machine for Heavy Engineering Work. Samuel Dixon. The object is to review in some measure the rapid development of milling which has taken place in recent years in all the best engineering workshops, and to point out the broad lines upon which the development is taking place. 5800 w. Ind & Ir—April 17, 1896.

The Development of the Milling Machine. Samuel Dixon. Paper read before the Manchester Association of Engineers. Treats of the principles underlying construction, adaptations to different kinds of work, general usefulness, and the rapid increase of its use in modern shops. 3000 w. Col Guard—April 2, 1896.

**Bench.**—A Small Bench Milling Machine. A. H. Cleaves. Illustrated description of a bench milling machine that has been used to good advantage for many years in different shops. 1200 w. Am Mach—July 1, 1897.

**Circular.**—Circular Milling. C. O. Griffin. Illustrated description of a successful attachment to go on the horizontal spindle machine and to do face-plate work. 1100 w. Am Mach—Nov. 5, 1896.

**Circular Work.**—Fixture for Milling Circular Work. Ed. Snyder. Illustrated description of device designed by the writer. 900 w. Am Mach—May 20, 1897.

**History.**—One of the Earliest Milling Machines. E. G. Parkhurst. Illustrates and describes a primitive hand milling machine made in 1818. 800 w. Am Mach—March 8, 1900.

More Early Milling Machines. E. G. Parkhurst. Illustrates and describes the first improvements made in these machines. 1300 w. Am Mach—June 28, 1900.

Some Early Milling Machines. Historical notes relating to the first beginnings of milling machine construction. 1500 w. Mach—April, 1896.

**Horizontal.**—See **BORING MACHINE.**

**Index Plate.**—See **INDEX PLATE.**

**Inserted-Tooth.**—Inserted-Tooth Mills. Horace L. Arnold. Present practice in the use of these mills in some notable manufacturing establishments. 1100 w. Am Mach—Nov. 5, 1896.

**Locomotive Cylinders.**—Vertical Milling Machine for Locomotive Cylinders (Wagerechte Fräsmachine für Lokomotivcylinder). M. Fröhlich. Illustrated description of a powerful new milling machine built by the Alsace Machine Works for the Berlin Machine Tool Co. It is driven by a 5½ h. p. electric motor. 1000 w. Zeitschr d Ver Deutscher Ing—June 11, 1898.

**MILL SCALE.**

**Electric Removal.**—The Removal of Mill Scale and Magnetic Oxide by Electricity. Sherard Cowper-Coles. Describes processes that have been tried for the removal of mill scale from forgings and plates. 700 w. Engng—Dec. 30, 1898.

**MINE.**

See also **COAL MINE; COPPER MINE; GOLD MINE; IRON MINE, etc.; MINERAL REGION; MINING.**

**Ancient.**—See **MINING.**

**British.**—Statistics of Mines and Quarries. A graphical summary of the general report relating to persons employed and accidents in the mines and quarries of the United Kingdom. 5000 w. Ir & Coal Trds Rev—Sept. 2, 1898.

**British Columbia.**—British Columbia Mines. H. M. Beadle. A general descriptive account. 2000 w. Eng & Min Jour—Aug. 22, 1896.

**British Columbia, 1898.**—British Columbia Mines in 1898. W. M. Brewer. Information from the annual report of the Minister of Mines. 900 w. Eng & Min Jour—June 10, 1899.

**British Inspectors' Reports.**—Reports of the Inspectors of Mines for 1897. Gives reports of the Liverpool district, Durham district, and Newcastle district. 1500 w. Col Guard—May 20, 1898.

**British Royal.**—See **Royal.**

**Chile.**—The Mines and Mill of the Atacama Mineral Company, Ltd., Taltal, Chile. Sidney H. Loram. An account of the work carried on by this company. Ill. 4800 w. Trans Am Inst of Min Engs —Sept., 1899.

**Coeur D'Alene.**—See **MINERAL REGION; TUNNEL—Mine Coeur D'Alene.**

**Cooling.**—See **MINE VENTILATION.**

**Cornish.**—Cornish Mines and Cornish Miners. J. H. Collins. An interesting account of this district and the minerals found, with special review of the great tin and copper industries, the peculiarities of mining, the production, etc. Also discussion. 14600 w. Jour Soc of Arts—March 10, 1899.

See also **TIN.**

**Deep.**—See also **MINE VENTILATION; Cooling; Temperature Change; MINING.**

**Deep Shaft.**—See **COPPER MINE—Calumet and Hecla; MINE SHAFT.**

**Development.**—Some Needed Aids to Development of Mines. John W. Gray. Thinks the things most needed are cheap power, easy and economical transportation and low reduction charges, and the education and training of the worker. 1700 w. Min & Sci Pr—Jan. 28, 1899.

**Eustis, Quebec.**—Notes on the Eustis Mine, Quebec. Raoul Green. Paper awarded prize of $25, being first in a series of students' competitive papers read before the Gen. Min. Assn. of Quebec. It is the result of careful observation while working in this mine. 2500 w. Can Min Rev—June, 1896.

**Fluorine, Cripple Creek.**—The Fluorine Mine. Arthur Lakes. An illustrated description of a geological puzzle furnished by the formations on Copper Mountain near Cripple Creek. Discusses the practical bearing of the solution of such questions upon mining development, and how a correct solution prevents needless waste of time and money. 3300 w. Mines & Min—June, 1898.

**Freak Structure.**—Common Freaks of Nature. Arthur Lakes. Illustrated description of concretionary structures formed in coal, iron and other mines. 1500 w. Col Eng—Jan., 1897.

See also **GEOLOGY.**

**Head Frames.**—Pit-Head Pulley Framings. Their Design and Construction. S. A. Everett. Read before the South Wales Inst. of Engs. A survey of the development and discussion of proper construction. 2800 w. Col Guard—Sept. 29, 1899.

Steel Headframes. Illustrated description of recent examples erected in the Wyoming and Lackawanna coal basins of Pennsylvania. 3500 w. Mines & Min—Feb., 1900.

See also **MINE VENTILATION.**

**Head Frames, Steel.**—Steel Head Frames for Mines. George S. Binckley. Illustrates types of frames, pointing out their defects, and describing designs based on correct principles. 2800 w. Min & Sci Pr—July 22, 1899.

Steel Head Frame for the Philadelphia & Reading Coal & Iron Co.'s Mines at Gilberton, Pa. W. L. Cowles. Illustrated description of the most recent practice in this line. 800 w. Eng News—Nov. 10, 1898.

**Japanese.**—Some Japanese Mines. W. L. Austin. An interesting description of the primitive methods employed, some remarkable results in mining and treating low grade silver, gold and copper ores and other matters of interest. Ill. Serial. Col Eng—Sept., 1897.

**Ladder.**—See **LADDER.**

**Leadville, Colorado.**—Some details relative to the situation and organization of various mining enterprises showing the companies to be rather conservative and not anxious to invite outside capital. 3000 w. Min Jour—Nov. 2, 1895.

**Location.**—See **MINERAL REGION; MINING LAW; PROSPECTING.**

**Mexico.**—Mexican Mining Operations Creating a Market for American Machinery. E. L. Information as to the situation and character of some of the principal mines in Mexico. 1300 w. Mfrs Rec—Jan. 24, 1896.

The Avino Mines. Auguste Mathez. An illustrated description of an old Mexican mine and the good and bad points of some of the ancient methods still in use. 2300 w. Mines & Min—Jan., 1898.

**Mexico, Jalisco.**—"La Brilladora" Mine, Jalisco, Mexico. James L. Buskett. Illustrated description. 600 w. Eng & Min Jour—July 25, 1896.

**Mount Lyell, Tasmania.**—A Copper-Silver-Gold Mountain, Tasmania. Description of the mines of the Mount Lyell Company, on the west coast of Tasmania. 1600 w. Aust Min Stand—Sept., 1896.

See also **GOLD MINE.**

**Nova Scotia.**—The Metal Mines of Nova Scotia. Notes condensed from a monograph on the "Ores of Nova Scotia," by E. Gilpin, Jr. 2500 w. Eng & Min Jour—Aug. 11, 1900.

**Pennsylvania.**—See also **MINING LAW.**

**Pennsylvania, 1866.**—The Mines and Manufactures of Pennsylvania in 1866. Extracts from a series of articles published in "The Iron Age" in 1866, descriptive of the observations made during an excursion, accompanying David A. Wells, special commissioner of Internal Revenue. 2400 w. Ir Age—Jan. 2, 1896.

**Quebec.**—See **Eustis.**

**Royal, England.**—Royal Mines. Explains what mines are termed royal and why. 1000 w. Col Guard—Nov. 20, 1896.

**Subsidence.**—Subsidence Caused by the Workings in Mines. W. Galloway. Read before the South Wales Institute of Engineers. Gives views and observations relating to this subject by eminent engineers, considering also certain phenomena which help to an understanding of the subject. Serial. Col Guard—Sept. 24, 1897.

The Subsidence of Railway Tracks and Other Structures Located Over Mine Excavations. John Keay. Explains the system of working mines, quotes legal decisions and principles relating to surface support in this and other countries. Ill. 4000 w. Eng News—May 27, 1897.

See also **MINING LAW.**

**Tasmania.**—The Mining Boom in Tasmania. Report by Mr. Montgomery on mines that have been worked for some time. Serial. Aust Min Stand —June 18, 1896.

The Mount Read Mines. Report of the deposits and the difficulties arising from the presence of zinc. Ill. 5500 w. Aust Min Stand—April 27, 1899.

The Tasmania Mine. Illustrated description of the plant, and the work of the Lührig vanners. 1500 w. Aust Min Stand—July 29, 1897.

See also **Mount Lyell; GOLD MINE.**

**Temperatures.**—The Internal Temperature of Rocks. Temperatures at different depths in the shafts of the Hecla and Calumet Mining Co. 400 w. Eng & Min Jour—Feb. 8, 1896.

The Rate of Increase of Temperature with the Depth of Subterranean Operations. Notes of investigations and experiments on the subject. Serial. Col Guard—July 31, 1896.

**United Kingdom.**—See **British; Royal.**

**Utah.**—Bingham Canyon Mines. Don Maguire. A description of one of the oldest and still one o the richest mining camps of Utah. A history of the early discoveries of silver-lead ore and their development into great producers of lead, silver, gold and copper. 3000 w. Mines & Min—March, 1899.

Utah Mines in 1899. Notes on the mining conditions in the State. 1500 w. Eng & Min Jour—Jan. 13, 1900.

**Utah, Tintic.**—The Mines of Tintic, Utah. Don Maguire. The largest and one of the most productive silver, lead and copper regions in the state. A description of the situations of the various mines, the formations in which they are found, the extent of their development and the amount of their production. 3500 w. Mines & Min—Nov., 1898.

### MINE ACCIDENT.

See also **COAL MINE ACCIDENT; COAL MINE EXPLOSION; MINE INSPECTION; MINER; MINING LAW.**

The Want of Forethought.—The Causes of Mine Accidents. R. M. Haseltine. Read before the Ohio Inst. of Min. Engs. Describes peculiar accidents arising from conditions which have only recently existed in mines. 1500 w. Mines & Min—May, 1900.

**American Metal.**—Accidents in American Metal Mines. Editorial comment on recently published statistics of the metal mines of Colorado, making comparison with the statistics for the United Kingdom. 1800 w. Eng & Min Jour—Sept. 4, 1897.

**Bodie, Cal.**—Note on a Shaft Fire and Its Lesson. Robert Gilman Brown. The fire described occurred in the shaft of the Standard mine at Bodie, Cal. 1300 w. Trans Am Inst of Min Engs—Sept., 1896.

**Breslau District, Germany.**—Compilation of the Fatal and Disabling Accidents in the Breslau Mining District, Germany (Zusammenstellung der im Jahre 1899, im Oberbergamtsbezirke Breslau beim Bergwerksbetriebe Vorgekommenen Tödtlichen Verunglückungen). A list of the accidents to miners which were fatal, and those which disabled for four weeks or more. 200 w. Glückauf—April 7, 1900.

**British, 1897.**—Statistics of Mining Labor and Accidents. A review of the record of mining accidents for 1897, and a discussion of these with reference to the number of persons employed and the nature of the disasters. 2000 w. Col Guard—Sept. 2, 1898.

**British, 1898.**—Mining Employment and Accidents in 1898. From the report of the British Home Office on mines and quarries. Summary of information on employment in mines and quarries, and accidents of the year. 2500 w. Ir & Coal Trds Rev—Sept. 8, 1899.

**British, 1899.**—Mining Labor and Accidents for the Year 1899. Particulars as to the number of persons employed and accidents at the mines and quarries of the United Kingdom. Ill. 3800 w. Col Guard—Sept. 21, 1900.

**1895-1899.**—Notable Disasters in Foreign Mines (Bemerkenswerthe Unfälle beim Bergwerksbetriebe im Auslande). A tabulated list of mining disasters in other countries than Austria-Hungary, from 1895 to 1899 inclusive. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 27, 1900.

**Germany.**—Compensation for Mining Accidents in Germany. Dr. Beumer in "Stahl und Eisen." On the statistics published in the recently issued report of the Miners' Guilds (Mutual Aid) Assn., as to the accidents which have occured in German mining during the nine years ending 1895. 2500 w. Ir & Coal Trds Rev—Oct. 29, 1897.

**Leadville, Colo.**—Cave-In of the Bon Air Shaft at Leadville, Colorado. An account of how it happened and how the men were rescued after fourteen days' imprisonment. 1800 w. Mines & Min—May, 1899.

**New South Wales.**—Mining Dangers. Editorial on the points brought out by a special inquiry, made recently, because of the belief that the number of accidents in the Albert district (N. S. W.) was greater than formerly. 1700 w. Engng—Aug. 26, 1898.

**Old Workings.**—Dangers of Old Mine Workings. Arthur Lakes. Gives some examples of how these dangers have been successfully met, and of accidents which they have caused. Ill. 1600 w. Mines & Min—June, 1899.

**Prevention.**—Prevention of Accidents. An essay by M. G. Thomas, awarded first prize at an eisteddfod held at Oskaloose, Iowa, Dec. 25, 1897. The best method of preventing accidents in and about the mines of Iowa. 2500 w. Mines & Min—Feb., 1898.

**Prussia.**—The Fatal Accidents in the Prussian Mines in 1896 (Verunglückungen mit Tödtlichem Ausgange beim Bergwerksbetriebe Preussens während des Jahres 1896). With tabulated results from 1891 to 1896, and a general review of the nature and causes of the disasters. 2000 w. Glückauf—Sept. 25, 1897.

**Rescue Appliances.**—Life-Saving Apparatus in Mines (Minen-Rettungsapparate). Johann v. Laues. A general discussion of devices for enabling life savers to penetrate gaseous and burning mines. Two articles. 1 plate. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 6, 13, 1900.

See also **COAL MINE EXPLOSION; RESPIRATOR.**

**Rescue Work.**—Fellow Aid in Mining Accidents. G. W. King. Illustrated instructions for miners, enabling them to render intelligent aid in an emergency. 2200 w. Eng & Min Jour—Aug. 28, 1897.

See also **COAL MINE EXPLOSION.**

**Safeguards.**—Mining Safeguards to Increase the Security of Miners. Valuable instructions from Bulletin No. 1, Colorado State Mining Bureau, by Harry A. Lee, Commissioner of Mines. 3500 w. Col Eng—July, 1896.

**Timbering.**—See **TIMBERING.**

### MINE ACCOUNTS.

See also **COST-KEEPING; MINE MANAGEMENT.**

Keeping Mine Accounts. Deals with the arrangement of mine accounts for the cost sheet rather than the method of keeping them in detail. 2000 w. Ir & Coal Trds Rev—Sept. 23, 1898.

Mine Accounts. John E. Hardman. Read be- Inst. Explains a method of cost accounting. 7800 w. Can Min Rev—Sept. 30, 1899.

Mine Accounts. J. Parke Channing. Analyzing the expenses of mine operation, and suggesting a method of recording them. 3700 w. Eng Mag—Sept., 1897.

Keeping Mine Accounts. A. J. Yungbluth. Read at the Ironwood meeting of the Lake Superior Mining Institute. Discusses general principles, arrangement, grouping, and details. 2800 w. Ir Trd Rev—Sept. 8, 1898.

Mine Accounts. A. J. Yungbluth. On the arrangement of mine accounts for the cost sheet. 5600 w. Can Min Rev—Jan. 31, 1900.

**Depreciation.**—Application of Different Methods of Depreciation to Mining Property. George Johnson. Shows the application of the four principal methods in ordinary use to mining property. 700 w. Col Guard—Nov. 10, 1899.

Systems of recording different methods of Depreciation as Applied to Mining Property. George Johnson. Supplementary to a recent paper by the same writer. Describes modes of recording. 500 w. Col Guard—Nov. 17, 1899.

### MINE CAGE.

See **HOISTING CAGE.**

### MINE COOLING.

See **MINE VENTILATION—Cooling.**

### MINE DAM.

**Michigan Iron.**—A Mine-Dam. William Kelly. Describes a dam constructed in the Curry mine, at Norway, Mich., on the Menominee range, and the results. 1100 w. Trans Am Inst of Min Engs—Sept., 1897.

### MINE DRAINAGE.

See also **MINE FLOODING; PUMP; PUMPING; PUMPING ENGINE; PUMPING MACHINERY; TUNNEL; WATER RAISING.**

**Balancing Bailers.**—Balancing Bailers for Unwatering Mines. William Kelly. Illustration and description of method. 900 w. Eng & Min Jour—April 14, 1900.

**Butte, Mon.**—The "Copper Water" of Butte. George S. Binckley. The conditions existing at the Anaconda mines and the means of overcoming the corrosive action. 800 w. Min & Sci Pr—Jan. 21, 1899.

**Butterfield Tunnel.**—The Butterfield Tunnel Scheme.

A remarkable tunnel reaching a depth below the surface of 2200 ft. and having a length of 8200 ft. It will tap and drain the two mines owned by the company. 1600 w. Min & Sci Pr—Feb. 8, 1896.

**California Report.**—Mine Drainage. Hans C. Behr. Report to California Mining Bureau. Describes water raising machines used in mining; conditions affecting the working of pumps; starting, priming and draining pumps and desirable features. Also different materials for pipes, with illustrations, pipe connections, flanges, etc. Serial. Can Min Jour—Nov., 1896.

**Darien, S. A.**—See **GOLD MINING.**

**Gilberton, Pa.**—Gilberton Water Shaft. George B. Hadesty. The method employed for draining the Gilberton and Draper collieries; the reasons for its adoption; the methods employed in sinking and timbering and the machinery used in hoisting the water. Ill. 3000 w. Mines & Min—Sept., 1898.

**Staffordshire.**—The South Staffordshire Mines Drainage Scheme. E. B. Marten and Edmund Howe. Read at Birmingham (Eng.) meeting of the Inst. of Mining Engs. The paper deals more especially with the surface, and particularly with the Tipton district, where electric power is to be used. 3000 w. Col Guard—Sept. 16, 1898.

**Surface Water.**—Surface Water and Underground Workings. M. Leon Michel. From a paper published in the "Bulletin de la Société de l'Industrie Minerale." The injury to underground workings from surface water, and the mine owner's means of securing protection, from a French point of view. 2200 w. Col Guard—Jan. 20, 1899.

**Sutro Tunnel.**—The Drainage of American Flat. Dan de Quille. Describes the location and existing conditions of American flats and the proposed extension of the Sutro drain tunnel. 1500 w. Min & Sci Pr—Jan. 30, 1897.

## MINE EXAMINATION.

See also **MINE INSPECTION; MINE VALUATION.**

How Mines Should Be Examined. O. H. Parker. The writer's views, given for the purpose of calling out discussion. 1600 w. Eng & Min Jour—Oct. 20, 1900.

## MINE FIRE.

See also **COAL MINE FIRE.**

**Aspen, Colo.**—The Aspen Mine Fire. Arthur Lakes. The geology of Aspen and the conditions existing in the Smuggler mine at the time of the fire, some of the difficulties and the methods employed in extinguishing the fire, with report of the superintendent. Ill. 4000 w. Mines & Min—Jan., 1898.

**Liquid Carbonic Acid.**—See **LIQUID CARBONIC ACID—Mine Fires.**

**Shaft.**—See **MINE SHAFT—Fires.**

**Wyoming.**—Mine Fire. H. Burrell. Describes successful methods employed in extinguishing an underground fire at Diamondville, Wyoming. 800 w. Mines & Min—July, 1899.

## MINE FLOODING.

See also **MINE DRAINAGE.**

The Hygrometric Saturation of the Earth's Crust (Die Hygrometrische Sättigung der Erdrinde). Discussing the various capacities for moisture of the different constituents of the earth's crust, with relation to the accumulation of water in mines. Two articles. 4500 w. Glückauf—Oct. 16, 23, 1897.

**Bohemia.**—Observations on the Sudden Influx of Water from Large Springs (Beobachtungen Eigenthümlicher Auftriebserscheinungen der Wasser Grösserer Quellengebiete). F. W. Klönne. With especial reference to the influx of water into the mines at Dux, Bohemia, from adjacent springs. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 15, 1898.

**Pennsylvania.**—New Method of Mine Flooding. Illustrated description of the method adopted by the Pennsylvania Coal Company for subduing a fire in their No. 6 shaft. 900 w. Mines & Min—May, 1899.

**Surveying.**—See **MINE SURVEYING—Compass Variations.**

## MINE HAULAGE.

See also **COAL HANDLING; COAL MINING MACHINERY—Gob Material; ELECTRIC EQUIPMENT; HOISTING; LOCOMOTIVE—Coal Mine; MINING MACHINERY.**

Mining Haulage. G. W. Westgarth. Deals with underground haulage, indicating where the greatest economy may be effected, and showing how endless haulage installations are often unsatisfactory because of a misapplication of the load. Ill. Serial. Col Guard—April 15, 1898.

Mining Haulage. G. W. Westgarth. From the "Journal of the British Society of Mining Students." Deals with haulage underground, suggesting where economy may be effected, and showing how installations are rendered unsatisfactory by a misappplication of the load. 7800 w. Can Min Rev—Sept., 1898.

The Improvement of Hauling Machinery. Reuben Street. Read at meeting of the W. Penna. Central Min. Inst. Notices the system of rope haulage, compressed air and electricity as they appear in general use. 2600 w. Am Mfr & Ir Wld—Jan. 8, 1897.

**Animal.**—Pit Ponies and Horse Haulage. F. Povey-Harper. Paper read before the British Soc. of Min. Students. Discusses the cost, care, etc. 1300 w. Ir & Coal Trds Rev—May 18, 1900.

**Benzine Locomotive.**—See **BENZINE LOCOMOTIVE—Mine Haulage.**

**Brake Incline.**—New Arrangements of Brake Incline. From communications by Bergassessor Stens of Essenan-der Ruhr, to Glückauf. The method of haulage is described and its advantages and disadvantages noted. Ill. 1800 w. Col Guard—April 2, 1897.

**Coal.**—Haulage in Coal Mines. Description of the systems in operation, with reference to the account of M. A. Pernolet, of the mechanical appliances used in England and Germany. Serial. Ir & Coal Trds Rev—June 5, 1896.

Modern Mine Haulage Practice. Harry K. Myers. Describes the most modern methods used in the coal mines of the United States, illustrating various mining locomotives. 4000 w. Pro Engs' Club of Phila—July, 1899.

Underground Haulage at Cannock and Rugeley Collieries. Robert S. Williamson. From a paper read before the South Staffordshire and East Worcestershire Institute of Mining Engs. The systems used are main-and-tail-rope endless rope by power, and endless rope on self-acting inclines. etc. The powers used are steam, compressed air and electricity. 2500 w. Col Guard Nov. 27, 1896.

Underground Haulage. Ernest H. Thomas. From the "Proceedings of the South Wales Inst. of Engs." A paper for which a prize was awarded in competition for the Lewis prizes. The subject is confined to haulage in coal mines of medium inclination. Ill. Serial. Col Guard—March 25, 1898.

See Electric; Keeling; Pennsylvania; Rhenish—Prussia; **COAL HANDLING; COAL MINE HAULAGE; COAL MINING MACHINERY.**

**Compressed Air.**—See **COMPRESSED AIR HAULAGE.**

**Crossed Ropes.**—Crossing the Ends of the Ropes in Self-Acting Inclines. M. Combalot. From a communication to the Société de l'Industrie Minérale. States the advantage of the arrangement, difficulties to be avoided, conditions to be realized during the lift, etc., with directions for laying down an incline with the rope ends crossed. 5300 w. Col Guard—Jan. 15, 1897.

**Electric.**—An Electrically-Driven Hauling Plant. From a communication by N. Phillippi, to the "Berg-und Hüttenmännische Zeitung." Illustrated detailed description of the plant at the Kaiserin Auguste pit of the Gottessegen Colliery. Ill. 2800 w. Col Guard—Nov. 19, 1897.

Electric Locomotives in Coal Mining. An illustrated account of electric haulage at some Pennsylvania coal mines. 3400 w. Engng—Sept. 7, 1900.

Electrical Haulage at a German Colliery. Herr Koepe, "Zeitschrift des Vereins Deutscher Ingenieure." Description of the installation at the Ewald pit, near Herten. 1200 w. Col Guard—July 17, 1896.

Electrical Winding and Haulage Machinery. W. Müller. Translated and abridged from "Glückauf." Describes the electrical plants in use in the mines of the Ruhr coal district. Ill. Serial. Ir & Coal Trds Rev—May 18, 1900.

Electrically Driven Hauling Winches (Ueber Elektrisch Betriebene Förderhaspel). Wilhelm Müller. An illustrated account of some electric winches at mines in the Ruhr coal district, Westphalia. 8 plates. 6000 w. Glückauf—April 21, 1900.

Electrical Haulage at the Eureka Mines, Windber, Penn. A. S. McAllister. Illustrated detailed description of the plant and power applications. 2500 w. Am Elect'n—July, 1900.

Electric Haulage for Mines. D. C. Thomas. Extract from a paper read at meeting of the Ohio Mining Inst. Points of importance are discussed and details given that will tend to bring satisfactory results. 1300 w. Ir Trd Rev—Jan. 27, 1898.

I. Electric Mine Haulage Plant. E. F. Bradt. II. Underground Electric Haulage Plant. James E. Jopling. The first paper describes the plant of the Pittsburg and Lake Angeline Iron Co., Mich., and the second the plant in the Cleveland Lake Mine, Ishpeming, Mich., with discussion of both papers. 4000 w. Pro L Sup Min Inst—Aug., 1896.

Electricity Down a Coal Mine. Illustrated description of the method of coal haulage in the Abercanaid colliery, Merthyr Tydvil, Wales. 1400 w. Elec Rev, Lond—Sept. 18, 1896.

Further Application of Electric Haulage by Locomotives at the Marles Colliery. M. Baily. Setting forth the improvements in the new installation. 900 w. Col Guard—Aug. 28, 1896.

The Windber, Pa., Electric Haulage Plant. Illustrated description of the equipment and some figures as to operating expenses. 1200 w. Mines & Min—Nov., 1899.

Underground Haulage by Electric Locomotives. Léon Sindic. Communication to the Charleroi section of the Union des Ingénieurs de Louvain. Showing how the system is applied both with accumulators and by the use of a cable, with estimates for each case. 2700 w. Col Guard—April 2, 1896.

See also COAL MINE—Missouri; ELECTRIC EQUIPMENT; ELECTRIC LOCOMOTIVE; ELECTRIC MOTOR—Portable.

**Electric Transmission.**—Mechanical Haulage with Electric Transmission of Power. M. Dickmann. Illustrated description of two mechanical haulage plants with electric transmission of power at the Heintzmann shaft. 2000 w. Col Guard—Dec. 18, 1896.

**Endless Rope.**—Endless Rope Haulage at Pratt Mines. Illustrated description of a system installed in a mine at Ensley, Ala. 2700 w. Ir Trd Rev—Aug. 30, 1900.

Endless Rope Haulage at the Monopol Mine (Flachscheibenhaspel mit Endlosem Seil auf Zeche Monopol). An overhead cable hauling system is used, with independent engine; the cars being clamped to the cable. 1200 w. 1 plate. Glückauf—Aug. 13, 1898.

Heckel's Arrangement of Endless Rope Haulage. M. J. Kersten. From a communication to the Brussels section of the Assn. des Ingénieurs de Liège. Illustrated description of method by which it is claimed that a saving of 10 centimes per ton-kilometre may be effected. 1800 w. Col Guard—Nov. 5, 1897.

Mechanical Haulage by Endless Cable. J. Kerston. Communicated to the Assn. des Ingénieurs Sortis de l'Ecole de Liège, and translated from "Revue Universelle des Mines, de la Métallurgie," etc. Describes a system of mechanical haulage equally suitable for surface requirements or underground purposes. Ill. 1700 w. Ind & Ir—Oct. 22, 1897.

**Gasoline Locomotive.**—See GASOLINE LOCOMOTIVE.

**Horses.**—See MINE HORSES.

**Humboldt Chain.**—Chain Haulage, Humboldt System (Kettenförderung, System Humboldt). Robert Lamprecht. An improved system for hauling mine cars on inclines by endless running chain. 1000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 5, 1898.

**Inclines.**—Inclined Planes (Les Plans Inclines). H. Ghysen. A discussion of the essentials in the construction of inclined planes in mines with regard to safety, including friction brakes, safety appliances, etc. 2500 w. 1 plate. Rev Univ des Mines—Feb., 1900.

The Safety Aspect of Inclines. Henri Ghysen. From a communication to the Charleroi Section of the Assn. des Ingenieurs de Liége. Considers the pulley with its brake, and the fence closing the incline, describing arrangements for safety. Ill. 2800 w. Col Guard—March 30, 1900.

**Keeling Coal Mine, Pittsburg.**—The Longest Mine Haulage. F. Z. Schallenberg. An account of a visit to the Keeling coal mine, near Pittsburg. 1100 w. Trans Am Inst of Min Engs—Feb., 1899.

**Locomotives.**—Underground Haulage by Locomotives. M. J. Kersten. From a communication to the "Annales des Mines de Belgique." Discusses the systems of haulage used when the mine workings are too sinuous for chain or rope haulage. Ill. 2500 w. Col Guard—Dec. 1, 1899.

See also ELECTRIC LOCOMOTIVE.

**Mammoth Coal Mine, Pa.**—Bottom Haulage Landing at the Mammoth Mine. Howard N. Eavenson. Illustrated detailed description of the arrangement and operation. 3000 w. Eng News—Oct. 12, 1899.

**Pennsylvania Anthracite.**—Haulage in Mines. Llewllyn M. Evans. Essay awarded second prize in contest. A comparison of the methods of underground haulage used in the anthracite mines of Pennsylvania. 8300 w. Mines & Min—Nov., 1898.

Underground Haulage. L. C. Morganroth. A comparison of the methods used in the anthracite mines of Pennsylvania. 2200 w. Mines & Min—Sept., 1898.

**Pratt City, Ala.**—Slope No. 6, Pratt City, Alabama. Neill Hutchings. An example of endless rope haulage is described. 1300 w. Mines & Min—Jan., 1900.

**Rhenish-Prussia.**—Automatic Chain and Rope Haulage at the Rheinpreussen Mine at Homberg (Automotorische Ketten und Seilförderung auf der Zeche Rheinpreussen bei Homberg). With plate of details showing the method of driving the cables by the water of the mine, also the manner of connecting the cars. 2500 w. 1 plate. Glückauf—Oct. 1, 1899.

Chain and Rope Haulage at the Rhein-Preussen Colliery. Rhenish-Prussia. From a communication by W. M. to "Glückauf." Illustrated description of an installation for utilizing mine water. 2500 w. Col Guard—Oct. 20 1899

**Road Curve.**—A Mine Road Curve. George W. Engel. Describes an interesting device by which much time and expense are saved and capacity for hoisting coal increased. Ill. 900 w. Mines & Min—Nov., 1898.

**Rope.**—Mining Haulage. G. W. Westgarth. Abstract of paper read before the British Society of Mining students. Considers the systems of rope haulage and their cost. 1800 w. Ir & Coal Trds Rev—July 8, 1898.

Rope Haulage in Mines. Describes the two systems, the endless rope, and the main and tail. 1500 w. Eng & Min Jour—Nov. 25, 1899.

The Cost of Rope Haulage in Underground Workings (Die Betriebskosten der Unterirdischen Seilförderungen). An exhaustive review of the cost of rope haulage in the Ruhr district, as compared with animal power or electricity. 7500 w. 8 plates. Glückauf—Feb. 10, 1900.

See also Endless Rope; Wire Rope; HOISTING; ROPE.

**Rope Friction.**—Calculating the Friction of Haulage Ropes. C. F. Scott. From an article in the "Journal of the Society of British Mining Students." Mathematical. 1000 w. Col Eng—Oct., 1896.

**Rope, Germany.**—Förster and Dinnendahl Arrangements for Rope Hauling. Leon Navez. From a communication to the Société des Ingénieurs des Mines du Hainut. Illustrates and describes two systems much used in Germany, which give excellent results. 1200 w. Col Guard—June 24, 1898.

**Stockett, Mon.**—See COAL MINE.

**Wales.**—Colliery Trams. J. Fox Tallis. Read before the So. Wales Inst. of Engs. Calls attention to the various sorts and conditions of trams in use in the So. Wales coalfield, discussing their design. 2500 w. Ir & Coal Trds Rev—Sept. 28, 1900.

**Wire Rope.**—Wire Rope Haulage, Its Use and Abuse. T. E. Hughes. Read at Columbus, O., before the Ohio Inst. of Min. Engs. The author points out the superiority of standard over long lay wire ropes and the influence of friction on the life of the rope, with some notes on haulage systems. 2400 w. Ir Trd Rev—Jan. 30, 1896.

Wire Rope Haulage. T. E. Hughes. Read before the Ohio Inst. of Min. Engs. Practical points in the use of wire rope, in which it is asserted that a general rule as to manner of operation is impracticable, and a statement of conditions requiring special treatment is made. 2500 w. Min Ind & Rev—July 2, 1896.

Wire Rope Haulage. T. E. Hughes. Read before the Ohio Inst. of Min. Engs. The writer shows the necessity of proper study of conditions in deciding on type, and that the avoidance of friction is necessary to secure most satisfactory and economical results. 2500 w. Col Eng—Feb., 1896.

**MINE HOISTING.**

See **HOISTING.**

**MINE HORSES.**

Mine Stock: Its Use and Abuse. Charles E. Bowron. Directions for proper stabling of the animals, whether beneath or above surface, their food, care and work. 1700 w. Tradesman—Aug. 1, 1897.

Selection and Management of Mine Horses. M. Ernest Boissier. From a communication to the Société de l'Industrie Minérale. Calls attention to the requirements of the work and the points necessary, that the horse may work as long and economically as possible; the care needed, food, stabling, etc. 3500 w. Col Guard—June 25, 1897.

**MINE INSPECTION.**

See also **MINE EXAMINATION; MINING LAW.**

**Pennsylvania Anthracite.**—See **MINING LAW—Pennsylvania Anthracite.**

**Workmen.**—The Periodical Inspection of Mines by Workmen. Extracts from a summary of the Prussian Government Commission, which visited, England, Belgium and France to obtain information as to the working of this system. 1400 w. Col Guard—Sept. 8, 1899.

**MINE LADDER.**

See **LADDER.**

**MINE MANAGEMENT.**

See also **MINE; MINE ACCOUNTS; MINER; MINING; WORKS MANAGEMENT.**

Mines and Management. Robert Archibald. Devoted mostly to mine management, especially of men. 6500 w. Can Min Rev—March, 1897.

The Financial Aspect of Mining. J. H. Chewitt. An examination into the various causes which determine whether a mine will pay or not. 1500 w. Can Min Rev—March, 1896.

The Prevention of Leaks in Mines. L. C. Morganroth. On the importance of system and attention to little things. 1500 w. Mines & Min—Aug., 1900.

**Economics.**—On the Economics of Mining. J. R. Godfrey. Discusses methods of exploiting a mine, flotation and over-capitalisation, management, and the steps that should be taken to prevent loss. 6000 w. Trans of Aust Inst of Min Engs—Vol. V.

The Small Economics in Mining. Howard West. Read before the Can. Min. Inst. Relates to conditions in the Slocan district, calling attention to various points neglected. 4500 w. Can Min Rev—Sept. 30, 1899.

**Eight-Hour Shifts.**—Eight-Hour Shifts and the Minimum Wage in Mining (Ueber die Achtstundenschicht und den Minimallohn beim Bergbau). W. Jicinsky. A general discussion of the labor question in Austrian mines. 4400 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 28, 1900.

**Errors.**—Mining Errors. F. Danvers Power. Read before the New South Wales Chamber of Commerce. Notes on a few of the principal errors that are found in the practice of mining, especially in prospecting, promoting and managing. 6700 w. Can Min Rev—Dec. 31, 1899.

Mining Errors. F. Danvers Power. Read before the New South Wales Chamber of Mines. Discusses prospectus writing, promotors, directors, mine management, and experts. 2500 w. Ir & Coal Trds Rev—March 30, 1900.

See also **MINING.**

**Mexico.**—Mexican Methods of Mine Management and Operation. George F. Binckley. Describes the system of working and the business management. 420 w. Min & Sci Pr—April 29, 1899.

**Nine-Hour Shifts.**—Is it Advisable to Introduce Nine-Hour Shifts at all Coal Mines (Ist es Rathsam, bei Sämmtlichen Kohlenbergbauen die Neunstündige Schichtdauer Einzuführen)? Carl Balling. Discussion of the effect on production and prices, in Austro-Hungary. 3200 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 14, 1900.

**Regulations.**—See also **Siberia, Regulations; MINE VENTILATION—Breslau District; MINING LAW.**

**Siberia, Regulations.**—Mine Regulations in Siberia. Regulations relating to fresh air, ventilation, shafts, etc. 1100 w. Am Mfr & Ir Wld—Sept. 17, 1897.

**Stope Books.**—Stope Books. Joseph Barrell. A description of the most suitable form of book and illustrations of the manner of recording the variations due to the various methods of working and timbering. 5500 w. Mines & Min—Oct., 1899.

**Stores.**—See **MINE STORES.**

**MINE MAP.**

See **MAP; MINE SURVEYING—Map; PANTOGRAPH—Mine Map; SURVEYING.**

**MINE PROMOTION.**

See also **MINE EXAMINATION; MINE VALUATION; MINING ENGINEER.**

Promoters and Promoted; or, Why Mining Investments Are Generally Unprofitable. Edmund B. Kirby. Calls attention to some reasons why mining investments are often a game of chance. 3000 w. Min Ind & Rev—Dec. 31, 1896.

**MINER.**

See also **LABOR; MINE ACCIDENT; MINE MANAGEMENT.**

**Baths.**—Baths for German Miners. H. F. Merritt. A general description of bathing facilities supplied to German miners. 1000 w. San—Sept., 1896.

**British.**—Mines and Miners. Reviews conditions in the British Isles previous to the reign of Queen Victoria, and the reports and evidence furnished by the Royal Commission, which led to legislation for bettering the condition of the miner and his child. Serial. Engng—July 20, 1900.

See also **MINE ACCIDENT.**

**Coal.**—See **COAL MINER.**

**Cornish.**—See **MINE.**

**Lamp.**—See **SAFETY LAMP.**

**Mortality.**—Mining Mortality in England and Wales. James Barrowman. Compares the last two decennial reports to see whether improvements in conditions affect the vital statistics; also makes comparison with other occupations. 1300 w. Col Guard—April 22, 1898.

**Pensions and Relief Societies.**—Old-Age Pensions and Relief Societies for Miners. Extracts from a report of the Labor Department of the Board of Trade, London, giving particulars of schemes in operation for the relief of miners in various countries. 5200 w. Col Guard—Aug. 4, 1899.

**Riot.**—The Coeur d'Alêne Riot. An explanation of the troubles at Kellogg, Idaho, which resulted in the blowing up of the Bunker Hill and Sullivan concentrator. Ill. 1200 w. Mines & Min—July, 1899.

**Transvaal.**—See **LABOR—Transvaal Mines.**

**Wages.**—Piece Rates of Miners' Wages and Sliding Scales. From a report on Standard Piece Rates of Wages and Sliding Scales in the United Kingdom. 1500 w. Col Guard—July 13, 1900.

Wages in the Mining and Quarrying Industries. Reviews the report to the Board of Trade of Great Britain on changes in rates of wages and hours of labor, giving tables showing variations. 1600 w. Col Guard—Oct. 12, 1900.

See also **WAGES.**

**Wages, Prussia.**—The Wages of Miners in Prussia in 1899 (Die Bergarbeiterlöhne im IV. Vierteljahre, sowie im Ganzen Jahre 1899). Tables published in the "Reichsauzeiger," giving wage statistics for the various mining industries. 1000 w. Glückauf—March 17, 1900.

**Yorkshire and South Africa.**—The Miner in Yorkshire and South Africa: His Income and Expenditure Compared. Tabulated statement and interesting comparison. 1300 w. Col Guard—Aug. 24, 1900.

**MINERAL.**

See also **GEOLOGY; MINE; MINERAL INDUSTRY; MINERALOGY; MINERAL REGION; MINING.**

**Determination.**—A Critical Review of the Methods of Determining Minerals. Dr. Joseph W. Richards. Examines the two systems of mineral classification, and reviews the methods of identification, giving the directions as taught at the Lehigh University. 4000 w. Jour Fr Inst—Aug., 1897.

Simple Tables for the Determination of the

Common or Economically Important Minerals. Alfred J. Moses. Gives a tabulation of the important minerals by a few easily made tests and external characters. 1600 w. Sch of Mines Qr—Jan., 1900.

**North Carolina Exhibit.**—The North Carolina Mineral Exhibit. H. S. Fleming. Data concerning this collection which gives not only an excellent idea of the exhibit, but also of the parts of the state in which the minerals are found. 3000 w. Mfrs Rec—Nov. 15, 1895.

**Omaha Exposition.**—Minerals and Mining at the Omaha Exposition. Marcus Benjamin. An interesting description of this exhibit showing the mineral wealth of the United States. 2800 w. Eng & Min Jour—Dec. 10, 1898.

The Trans-Mississippi International Exposition. A description of the mineral exhibits from the different states and territories represented in the mining building. 2500 w. Mines & Min—Aug., 1898.

**Origin Deposits.**—The Origin of Valuable Mineral Deposits. Frederick Danvers Power. A review of the hypotheses advanced, with the arguments for and against them. Serial. Min Stand—Sept., 1896.

See also **GOLD GEOLOGY; MINERAL VEIN.**

**Secondary.**—The Formation of Secondary Minerals in Ore Bodies. E. Moriarty Weston. Notes on their occurrences on the west coast of Australia and elsewhere. 2400 w. Aust Min Stand—March 18, 1897.

**Separation.**—On Some Devices for the Separation of Minerals of High Specific Gravity. S. L. Penfield. Illustrated description of apparatus and methods, and account of some experiments in which these were employed. 1100 w. Am Jour of Sci—Dec., 1895.

**Tasmania.**—The Useful Minerals of Tasmania. A. Montgomery. Paper read before the I. M. E., Hobart meeting. The minerals are mentioned as they occur in the several geological formations. Serial. Min Jour—Feb. 1, 1896.

**U. S. Geological Survey.**—The Work of the United States Geological Survey in Relation to the Mineral Resources of the United States. Charles D. Walcott. An outline of what has been and is being accomplished by the Survey, with map. 7500 w. Trans Am Inst of Min Engs—June, 1900.

**U. S., Minor.**—Minor Minerals of the United States. David T. Day. Classifying minor minerals according to conditions of supply and demand, and stating the sources and uses of each. 3900 w. Eng Mag—May, 1896.

## MINERAL INDUSTRY.

See also **COAL INDUSTRY; METALLURGY; MINE; MINERAL; MINERAL REGION; MINING; MINING AND METALLURGY.**

**Alabama.**—Alabama Mining in the Year 1898. A. H. Carpenter. A review of the progress of the coal and coke industry of the state. 1000 w. Mines & Min—Jan., 1899.

See also **Georgia and Alabama.**

**Algeria.**—See **France and Algeria.**

**Austria.**—The Mining Products of Austria in 1898 (Die Bergwerks produktion Oesterreichs in Jahre, 1898). An abstract of the official report, giving tables of both raw and manufactured mineral products, both as to weight and market value. 1500 w. Glückauf—Dec. 15, 1899.

**Austria, 1897.**—Austrian Mining Industries in 1897 (Der Oesterreichische Bergwerksbetrieb im Jahre, 1897). Tabulated statistics from the official reports, classified and compared with the preceding year. 2500 w. Glückauf—June 10, 1899.

**Belgium.**—The Belgian Mining Industry for 1898 (Die Belgische Bergwerksindustrie im Jahre, 1898). A detailed abstract of the official report of the Belgian government, including coal, coke, metallic ores and operating statistics. 1800 w. Glückauf—Dec. 23, 1899.

**Belgium, 1897.**—Belgian Mineral Statistics for 1897. Emile Harge. Report of the Directeur-Général des Mines. 2000 w. Col Guard—Oct. 21, 1898.

**British.**—See **United Kingdom.**

**British Columbia.**—Mining in British Columbia. Official facts from the report of the Minister of Mines, relative to the mining industry, product during 1899, etc. 600 w. U S Cons Repts, No. 780—July 14, 1900.

**California.**—The Mineral Production of California in 1895. Facts taken from the statement of the California State Mining Bureau with editorial comments. 1000 w. Eng & Min Jour—May 16, 1896.

**Colorado.**—Colorado, 1889-1896. T. A. Rickard. A retrospect of the years which have lapsed and a consideration of interesting features. 2600 w. Eng & Min Jour—Sept. 19, 1896.

Colorado Past and Present. Reviews the condition forty, thirty, twenty and ten years ago, and gives the output of precious metals and review of the mining industry during the past year. 8500 w. Min Ind & Rev—Jan. 6, 1898.

The Development of Colorado's Mining Industry. T. A. Rickard. Historical account. 5000 w. Trans Am Inst of Min Engs—March, 1897.

The Development of Colorado's Mining Industry. T. A. Rickard. Review of its history from 1849 to the present. 2800 w. Min & Sci Pr—Oct. 24, 1896.

**Colorado, 1897.**—Mining in Gilpin County, Colorado, in 1897. George E. Collins. Reviews the different districts showing a large increase over 1896. 2500 w. Eng & Min Jour—Jan. 15, 1898.

Mining in Lake County, Colorado, in 1897. A summary of the year's work and the operations of importance being conducted. 3600 w. Eng & Min Jour—Jan. 22, 1898.

**Colorado, 1898.**—Colorado Mining During 1898. Arthur Lakes. Some of the notable features of advancement and improvement made during the year. 1800 w. Mines & Min—Jan., 1899.

**Cornwall.**—See **MINE; TIN.**

**1896.**—Lead and Other Minerals. Reviews the market for 1896 in lead, nickel, quicksilver, tin, zinc and coal. 11800 w. Eng & Min Jour—Jan. 2, 1897.

**1897.**—The Mineral Statistics for 1897. The usual annual report published by this paper, containing full and valuable information of all the minerals and metals in the United States, and the production of gold in the whole world. 42000 w. Eng & Min Jour—Jan. 1, 1898.

**1898.**—Review of the Mineral and Metal Production Algerie pour l'Année 1897). A general review of this publication, giving information of value and interest. 70000 w. Eng & Min Jour—Jan. 7, 1899.

The Mineral Industry in 1898. Additional information concerning Alaska, Alabama, Arizona, Arkansas, California, Colorado, Kansas, Kentucky, Maryland, N. Carolina, S. Dakota, Vermont, Washington, W. Virginia, Wyoming, British Columbia and Utah. 21500 w. Eng & Min Jour—Jan. 14, 1899.

**Engineering Progress.**—Mechanical and Engineering Progress as Influenced by the Mining Industry. John Birkinbine. Calls attention to some of the achievements due to the mineral resources, and their influence on the progress of the country. 8000 w. Jour Fr Inst—July, 1897.

**France and Algeria, 1897.**—Statistics of the Mineral Industry of France and Algeria in 1897 (Statistique de l'Industrie Minérale en France et en Algerie pour l'Année 1897). A general review from official reports, including also brief statistics of the generation and use of steam. 2500 w. Génie Civil—Feb. 4, 1899.

**France, 1896.**—The Statistics of the Mineral Industries of France for the year 1896 (Statistique des Industries Minérales en France pour l'Année 1896). An abstract from the official report, giving the data for coal and iron, as well as such other minerals as occur in France; together with condensed information concerning steam engines. 1500 w. Génie Civil—Jan. 15, 1898.

**Georgia and Alabama.**—The Mineral Industries in the South. W. M. Brewer. Sketch of progress in the mineral-bearing sections of Georgia and Alabama. 1800 w. Eng & Min Jour—Jan. 2, 1897.

**Great Britain.**—See **United Kingdom.**

**India.**—Mineral Production in India. Statistics concerning salt, coal, iron and petroleum. 1800 w. Ind & East Engr—March, 1898.

**Iowa.**—Iowa Mineral Production in 1897. H. Foster Bain. Summary of statistics of production of the various minerals mined in the State. 1100 w. Eng & Min Jour—May 7, 1898.

**Japan.**—The Mineral Industries of Japan. None of the mineral products except coal and copper are important, although others are found. Information of the extent to which they are developed is given. 3800 w. Nat Assn of Mfrs—Circ. No. 11.

**Metals, 1896.**—Metalliferous Mining in 1896. Editorial review showing that, though the market has been depressed, the industry has made important progress during the year. The subject is treated in detail. 3000 w. Min Jour—Jan. 2, 1897.

**Newfoundland.**—Mining in Newfoundland. James P. Howley. A letter containing statistics of the mineral development, and giving an account of the progress and present standing of this industry. 1200 w. Can Min Rev—May, 1898.

**New South Wales.**—The Mining Industries of New South Wales. An account of the various minerals and metals found, and the value of the deposits. 1400 w. Jour Soc of Arts—Oct. 28, 1898.

**New Zealand.**—Mining in New Zealand. A. J. Cadman. A statement by the minister of mines, of the important features of the past year's mining. Serial. Min Jour—Sept. 19, 1896.

Progress of Mining in New Zealand. Henry A. Gordon. Abstract of presidential address delivered at the first meeting of the New Zealand Institute of Mining Engineers. Historical review. 2800 w. Col Guard—Nov. 12, 1897.

The Mining Industry of New Zealand. Perry F. Nursey. Gold mining is the predominating element. Information from the report of A. J. Cadman. 2400 w. Ind & Ir—April 22, 1898.

**Ohio, 1896.**—Ohio Mining in 1896. Information from the twenty-second annual report which has just been filed. 1200 w. Eng & Min Jour—Aug. 21, 1897.

**Ontario.**—Mining in Ontario: Its Condition and Outlook. A review of the various branches of this industry. The production of petroleum, salt, natural gas, gold, iron, nickel, copper and other minerals. 2500 w. Can Min Rev—May 31, 1899.

**Peru.**—Peru's Mining Industries. H. L. Geissel. Facts in regard to the various ores and minerals and the extent to which they have been exploited. 2800 w. Mines & Min—Sept., 1900.

**Quebec, 1897.**—Mining in Quebec in 1897. J. Obalski. Notes on the state of the mining industry in this province of Canada. 1200 w. Eng & Min Jour—April 2, 1898.

**Saxony.**—The Mining Statistics of the Kingdom of Saxony for 1898 (Statistik des Bergbaues im Königreich Sachsen für das Jahr, 1898). A tabulated abstract from the official Government report. 800 w. Glückauf—Dec. 23, 1899.

**Spain.**—The Mining Industry in Spain (De l'Industrie des Mines en Espagne). A serial article giving a general review of mines and mining in Spain. Serial. Moniteur Industriel—June 23, 1900.

**Sweden, 1897.**—Swedish Mining Work in 1897 (Schwedens Bergbaue im Jahre, 1897). A general review of the work of the past year, including iron, copper, and zinc, as well as the other metals which occur in minor quantities. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 18, 1897.

**Tasmania.**—Mining in Tasmania. A review of the great progress in this industry, and in the industries dependent on it. 1,000 w. Aust Min Stand—April 27, 1899.

Tasmanian Mining Affairs. E. Mulcahy. A ministerial statement of policy and progress, with editorial comment. 4200 w. Aust Min Stand—Aug. 2, 1900.

**Transvaal.**—The Development of the Transvaal (Du Développement du Transvaal). G. Braecke. A carefully written account of the history and development of the mineral industry of the Transvaal, as seen from a Belgian point of view. 8000 w. Rev Univ des Mines—Nov., 1899.

**United Kingdom.**—Mineral Statistics. A criticism on the report of mineral statistics of the United Kingdom, discussing the method of presentation, etc. 3500 w. Builder—Jan. 22, 1898.

On the Industrial Products of the Geological Formations of the United Kingdom. The first of a series of articles aiming to note and consider every strata which in any way affords employment for labor. This part deals with the products of the Pre-Cambrian and Archaean rocks, the Silurian and the Devonian. Serial. Col Guard—June 12, 1896.

The Mineral Industry of Great Britain. Facts given in a series of articles in an English publication form the basis of the information presented. 3200 w. Stone—Nov., 1899.

The Mineral Industry. Editorial review of C. Le Neve Foster's report to the Home Office upon the mineral industries of the United Kingdom. 1900 w. Engng—Jan. 8, 1897.

The Mineral Industry of the United Kingdom. First annual general report upon the mineral industry. Serial. Col Guard—Jan. 17, 1896.

The Mineral Output of the United Kingdom. Particulars concerning each kind of mineral, as given in report of Dr. Foster. 4000 w. Col Guard—Nov. 25, 1898.

**United Kingdom, 1895.**—The Mineral Industry of the United Kingdom. C. Le Neve Foster. From the second annual report for the year 1895. 1800 w. Col Guard—Dec. 11, 1896.

**United Kingdom, 1899.**—The Mineral Statistics of the United Kingdom for 1899. Extracts from the Home Office. Returns concerning persons employed, output and accidents. 1300 w. Ir & Coal Trds Rev—June 1, 1900.

**United States, 1895.**—The Mineral and Metal Production of the United States in 1895. The annual statistical report giving the production in quantity and value, of 69 mineral and metallic substances produced in the United States, showing an increased production in 1895 over 1894 of 15.5 per cent. in value. 5400 w. Eng & Min Jour—April 11, 1896.

**United States, 1896.**—The Mineral and Metal Production of the United States in 1896. A full and corrected statement of the output of the mines and metallurgical works of the United States for the last year, with their values. 4400 w. Eng & Min Jour—May 29, 1897.

United States Mineral and Metal Production in 1896. Review of the year in the production of minerals and metals, with tables; also antimony and copper in this and other countries, as to production, value, etc. 4500 w. Eng & Min Jour—Jan. 2, 1897.

**United States, 1897.**—United States Mineral Production in 1897. Statistics of the production of minerals and metals in the United States, as arranged for "The Mineral Industry." 4500 w. Eng & Min Jour—May 28, 1898.

**United States, 1898.**—United States Mineral and Metal Production in 1898. Statistics showing the production of the more important substances to be the greatest on record. 5400 w. Eng & Min Jour—July 29, 1899.

**United States, 1899.**—The Metal and Mineral Output of the United States in 1899. A summary of the production of the more important metals and minerals. 3200 w. Eng & Min Jour—Jan. 6, 1900.

United States Mineral and Metal Production. Tables showing the total production for 1899, comparing with the previous year. Also comments. 6200 w. Eng & Min Jour—June 9, 1900.

**United States Government Bureaus.**—The Mining Industry, and the Relation of the Federal Government to It Through the Work of the Different Departments. E. W. Parker. Considers briefly the different bureaus each of which deals with mining matters from a different standpoint. 3000 w. Mines & Min—June, 1898.

**U. S., Southern.**—The Mineral Industry of the South. William M. Brewer. Activity in prospecting shows a marked improvement over 1895. Each mineral is briefly discussed. 4000 w. Tradesman—Jan. 1, 1897.

**Victoria, State Aid.**—State Aid to Mining in Victoria. C. C. Longridge. The article approves the action of the State in mining matters, explains ways in which the government have undertaken to assist capitalists, and discusses matters of interest. 1000 w. Min Jour—Feb. 27, 1897.

**Wales.**—Reports of the Inspectors of Mines for 1897. Shows the number of persons employed, output of minerals, accidents, etc. 1000 w. Col Guard—May 6, 1898.

## MINERALOGICAL MUSEUM.

**Colorado.**—The Mineralogical Museum of the Colorado State Mining Bureau in the Capitol Building, at Denver, Colorado. Presents its uses and advantages to miners and students, with illustrated description of interesting and peculiar minerals and specimens there shown. 4000 w. Mines & Min—May, 1898.

**Columbia University.**—The Egleston Mineralogical Museum of Columbia University. Alfred J. Moses. An account of this museum, its collections, classification, etc. 1600 w. Eng & Min Jour—April 7, 1900.

**MINERALOGY.**

See also **MINERAL.**

**Microscopical.**—Optical Mineralogy. Lea McI. Luquer. Treats of a system of microscopical examination for the accurate determination of rocks. 10000 w. Sch of Mines Quar—July, 1896.

**MINERAL REGION.**

See also **COAL REGION; GEOLOGICAL SURVEY; GEOLOGY; GOLD REGION; IRON REGION, etc.; MINE; MINERAL; MINERAL INDUSTRY; MINING; MINING AND METALLURGY; MINING CONCESSION.**

**Africa.**—The Geology of Africa in Relation to Its Mineral Wealth. Walcott Gibson. Abstract from a paper read before the Federated Inst. of Min. Engs. Brief sketch of African geology. 2800 w. Min Jour—Oct. 3, 1896.

**Africa, East.**—Mining and Geological Conditions in German East Africa (Die Bergmännischen und Geologischen Verhältnisse in Deutsch Ost-Afrika). A report by Assessor Bornhardt, showing that the mineral resources of the country, so far as can be determined at present, are insignificant. 2500 w. Glückauf—Jan. 28, 1899.

**Amazon.**—Explorations in the Lower Amazon District (Auf der Lagerstättensuche im Unteren Amazonasgebiete). F. Katzer. A review of the mineral resources of the region, including coal, iron, and gold, by the director of the Pará Museum. 3 articles. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 6, 13, 20, 1898.

See also **MANGANESE.**

**America, Northwest.**—A Sketch of the Mining Fields of British Columbia and the Great Northwest. Arthur Lakes. Their geological formations, nature of the ore veins, location of placers, and physical features of the country; with some facts in regard to the production. 6800 w. Mines & Min—Nov,. 1897.

Mining Camps of the Northwest. Arthur Lakes. A sketch of some of the leading camps in Northern Washington, Idaho, Oregon, and British Columbia. 2800 w. Mines & Min—April, 1900.

Mining in the Northwest. Arthur Lakes. An interesting general account of the advances made in mineral discoveries during the past twenty years in a region not previously recognized as a valuable mineral bearing territory. 2200 w. Col Eng—July, 1897.

Northwestern Mining Camps. W. B. Turner. A description of Stevens Co., and the Colville Reservation in Washington, U. S. A., and the Trail Creek and Nelson Districts, British Columbia. 2000 w. Mines & Min—Feb., 1898.

See also **British Columbia.**

**Antilles, Hawaii, Philippines.**—Mineral Resources of the Antilles, Hawaii, and the Philippines. David T. Day. A review by the chief of the Statistical Division of the U. S. Geological Survey, of the mineral resources of these islands, giving a résumé of the latest official information. 4000 w. Eng Mag—May, 1899.

**Argentine Republic.**—Mineral Resources of the Argentine Republic. James McKean Rowbotham. An abridged paper contributed to the Inst. of Civ. Engs. Reports great variety of mineral products, and some account of the mining and value. 1500 w. Col Guard—July 16, 1897.

The Minerals of the Sierra de Uspallata, Argentine Republic. G. Ave-Lallemant. Treating of the geology and mineralogy of the ores mined. 850 w. Eng & Min Jour—Dec. 21, 1895.

**Arizona.**—Factors in Ore Deposition in Arizona. A. F. Wuensch. Discusses the peculiarities of the region under consideration. 1200 w. Min Ind & Rev—Nov. 19, 1896.

The Chloride District, Arizona. Theo. B. Comstock. Much of the information given was gathered at the Elkhart mine and adjoining region. Gives an account of the development. 2700 w. Eng & Min Jour—July 28, 1900.

The Mineral Resources of Arizona. Thomas Tonge. Considering the territory by counties. Ill. 4100 w. Eng Mag—Aug., 1897.

The Mineral Resources of Arizona. Thomas Tonge. Shows Arizona to be rich in minerals, and reviews the development in the different countries. 2000 w. Min Jour—Oct. 31, 1896.

**Arkansas.**—See also **Missouri to Arkansas.**

**Asia Minor.**—Emery, Chrome-Ore and Other Minerals in the Villayet of Aidin, Asia Minor. W. F. A. Thomae. An account of some of the minerals occurring in this district, describing the general features and geology of the region. Ill. 4800 w. Trans Am Inst of Min Engs—Feb., 1898.

**Australia.**—Geology of Central Australia. Description of explorations made by the South Austrialian government geologist, with special reference to mining deposits. 2300 w. Aust Min Stand—Dec. 7, 1895.

The Scientific Exploration of Central Australia. W. A. Horn. The origin of the expedition, the natural features of the country, Chambers' pillar, Ayres' Rock, and the climate are described. 3600 w. Aust Min Stand—March 26, 1896.

See also **New South Wales; Queensland; Western Australia.**

**Australia, North.**—Resources of the Northern Territory. W. G. Stretton. From the "Northern Territory Times." Reports the minerals found and the mines worked. Gold is the most important mineral. 2300 w. Aust Min Stand—Oct. 21, 1897.

**Brazil.**—Brazil: Minerals, Mining, etc., of the State of Bahia. Report of consul on the minerals and metals of this region. 1600 w. U S Cons Repts—July, 1896.

**British Columbia.**—A Glimpse at Kootenay and Its Wonders. William Bleasdell Cameron. Illustrates and describes the railroad, scenery, points along the route, the mines, ores, etc. 2000 w. Loc Engng—Aug., 1898.

British Columbia—The Big Bend District, West Kootenay. Frank L. Nason. Descriptive of the country, the mining claims already located, and the prospecting that has been done. 2400 w. Eng & Min Jour—May 8, 1897.

In the Kootenay, B. C., District. Notes on Rossland Camp, Nelson, Slocan and Boundary districts. 2000 w. Can Min Rev—Jan. 31, 1900.

The West Kootenay Mines. Extracts from the report published by the Bureau of Mines of British Columbia on the Slocan, Nelson and Ainsworth mining districts in West Kootenay, written by William. A. Carlyle. 1500 w. Min & Sci Pr—Feb. 20, 1897.

West Kootenay Mining District—Rossland. William M. Brewer. A report of recent work in this district, changes in management, etc. 1000 w. Eng & Min Jour—April 7, 1900.

West Kootenay Ore Bodies. R. W. Brock. Read at meeting of the Canadian Min. Inst. Briefly reviews facts relating to the geology so far as it is connected with the ore deposits, and the ore deposits themselves. 5500 w. Can Min Rev—March 31, 1899.

Boundary and Trail Creek Mining Districts of British Columbia. W. L. Austin. Describes the country, the geological formations, occurrence of the ores, their character and value, and the extent of their development. 6000 w. Mines & Min—Jan., 1898.

Mining in the Boundary District, B. C. Brief description of various mines. Ill. 1200 w. Min & Sci Pr—Sept. 23, 1899.

The Boundary District, British Columbia. Charles A. Bramble. Describes preparations made to work the mines of this district. 1400 w. Eng & Min Jour—Dec. 9, 1899.

British Columbia Mines in 1897. William A. Carlyle. Reports the condition of the mining industry, and gives brief description of the principal mining districts. 1800 w. Eng & Min Jour—Jan. 8, 1898.

British Columbia Mines in 1897. William A. Carlyle. An interesting report of this region showing the gratifying progress and steady growth. 3300 w. Eng & Min Jour—June 4, 1898.

Discoveries of Bessemer Steel Ore and the Sources of the Placer Gold of the Fraser River. K. Ludloff. Letter to the editor giving an account of the discoveries made by the writer. 1600 w. B C Min Rec—Feb., 1900.

History of Progress of Mining in British Columbia. H. Mortimer Lamb. A comprehensive review of the development of the region, including discoveries, exploitation, mining methods and equipment, and economic conditions, with many fine illustrations. 5400 w. Eng Mag—July, 1900.

Howe Sound Division, New Westminster Mining District. W. M. Brewer. Report of personal examination made recently. 1500 w. Eng & Min Jour—Aug. 18, 1900.

Leech River, Alberni and Skirt Mountain. W. M. Brewer. Report of the camps named. 1600 w. Eng & Min Jour—July 8, 1899.

Lillooet Mining District. W. M. Brewer. An account of this district, the mines being worked, the formation, etc. 2000 w. Eng & Min Jour—Aug. 13, 1898.

Mineral Regions of British Columbia. H. M. Beadle. Illustrated description of the country within a few miles of Rossland. 1000 w. Eng & Min Jour—Aug. 1, 1896.

Mineral Resources Around Kamloops. W. M. Brewer. Describes the topography and character of the country, and some of the mining properties. Gives illustrations of the Python mine. 1400 w. Eng & Min Jour—Feb. 10, 1900.

Notes on Mining on the Coast of B. C. and the Adjacent Islands. G. F. Moncton. Read at meeting of the Fed. Can. Min. Inst. Information relating to this district. 1500 w. Can Min Rev—March, 1898.

Notes on Some Mining Districts in British Columbia. John E. Hardman. Records facts and observations obtained during a trip in the summer of 1896. Touches briefly the geology, ore, production, etc., of the different districts. 5000 w. Can Min Rev—March, 1897.

Notes on Some of the Mining Districts of British Columbia. William Hamilton Merritt. Reports of various camps and general information showing the promise of development of mineral wealth. 1700 w. Eng & Min Jour—Jan. 16, 1897.

Similkameen Mining Division, Kamloops Mining District. W. M. Brewer. Description of this district, with other information related. 2800 w. Eng & Min Jour—Oct. 20, 1900.

The Atlin District in British Columbia. W. M. Brook. Information concerning this district, taken from the official report. Ill. 1300 w. Eng & Min Jour—Nov. 18, 1899.

The Progress of Mining in British Columbia During 1899. A general review which is most encouraging. 1500 w. B C Min Rec—Jan., 1900.

The Sandon District. W. M. Brewer. Brief review of the mines of this district in British Columbia. 1800 w. Eng & Min Jour—June 18, 1898.

The Trout Lake District. R. Leckie-Ewing. Information concerning the mineral possibilities of this section, with illustrations. The characteristic ore is argentiferous galena, with which is associated grey copper and gold. Other minerals are present also. 1600 w. B C Min Rec—March, 1900.

See also **America, Northwest; Canada; Texada Island; Vancouver Island.**

**Butte, Mont.**—Butte Mining District. Arthur Lakes. Its geology and history and a description of the various ores from which its output is derived. Ill. 2700 w. Mines & Min—March, 1900.

**California.**—Outline of the Geology of California, with References to Its Mineral Deposits. Harold W. Fairbanks. This series of articles aims to awaken an interest in the study of geology as well as impart some information which shall be of value to miners. Serial. Min & Sci Pr—Feb. 13, 1897.

The Relation of Geology to the Development of the Mineral Resources of the State. Harold W. Fairbanks. Read before the California Miners' Convention. Shows the benefits arising from the systematic investigations of geological surveys, and gives an idea of what a survey might accomplish. 4300 w. Min & Sci Pr—Nov. 21, 1896.

**California, Eastern.**—The Mineral Deposits of Eastern California. Harold W. Fairbanks. The economic geology of the gold and the silver and lead deposits with discussion and conclusions. 5600 w. Am Geol—March, 1896.

The Mineral Deposits of Eastern California. Harold W. Fairbanks. This portion of California has a mineral deposit in many respects different from the rest of the State. The important deposits are gold, silver and lead. 1700 w. Min & Sci Pr—Dec. 12, 1896.

**California, Railway Possession.**—See **RAILWAY LANDS—California, Mineral.**

**Canada.**—Canada as a Field for Mining Investment. Dr. G. M. Dawson. From the "National Review." The mineral resources of the country and their prospective values. 4500 w. Can Min Rev—Oct., 1896.

See also **America, Northwest; British Columbia; Nova Scotia; Ontario; Texada Island; Vancouver Island.**

**Caucasus.**—Notes on the Geological Structure of the Caucasus Range Along the Georgia Military Road. Dr. Persifor Frazer. Notes on the formation, based mainly on the labors of the Russian Geological Survey. 1300 w. Trans Am Inst of Min Engs—June, 1898.

**China.**—China and Her Minerals. Perry F. Nursey. Considers the vast unutilized mineral wealth. Coal is the most abundant mineral. 1700 w. Ind & Ir—Nov. 12, 1897.

The Mineral Resources of China. From the London "Mining Journal." Information of the mineral deposits, of which coal is the more plentiful. 1700 w. Eng & Min Jour—Sept. 11, 1897.

**Coeur d'Alene, Idaho.**—Coeur d'Alene Mining Region. Arthur Lakes. Illustrates and describes the peculiarities of the country and gives an account of some of the larger mines. 2000 w. Mines & Min—Feb., 1900.

Coeur d'Alene Mining Region. W. C. Clark. Facts in regard to the development of the country and the forms in which the minerals are found. 1800 w. Mines & Min—July, 1900.

See also **TUNNEL—Mine Coeur d'Alene.**

**Colombia.**—Mining Districts of Colombia. Communications in discussion of the paper by Henry G. Granger and Edward B. Treville. 1800 w. Trans Am Inst of Min Engs—Aug., 1898.

Mining Districts of Colombia. Henry G. Granger and Edward B. Treville. An interesting description of the country, its mines, and methods of working. 19000 w. Trans Am Inst of Min Engs—Feb., 1898.

See also **GOLD MINING—Darien; GOLD REGION; MANGANESE.**

**Colorado.**—Boulder Region, Colorado. Arthur Lakes. In regard to an examination made on a portion of it by an expert. 1600 w. Mines & Min—Jan., 1899.

Notes on the Vein Formation and Mining of Gilpin County, Colorado. Forbes Rickard. Describes the district, the formation, ore deposits, veins, etc. Ill. 4800 w. Trans of Am Inst of Min Engs—June, 1898.

Prospecting Districts of Northern Colorado. Marshall D. Draper. Gives description and formation of some promising localities. Map. 3500 w. Min Rept—March 16, 1899.

Resources of the Mount Wilson District, Colorado. Frank L. Nason. An illustrated account of this region very favorable to the advisability of investing, and explaining the conditions to be met. 2800 w. Eng & Min Jour—July 22, 1899.

Some Mineral Veins of Gunnison County, Colorado. E. R. Warren. Describes veins that may become of considerable economic value. The ores are usually a mixture of galena blende and pyrite, with some silver and gold. 1500 w. Eng & Min Jour—June 12, 1897.

The Undeveloped Economic Resources of Colorado. Arthur Lakes. From Denver "News." Gives general geological section of the formations, and locates what each contains; includes ryolite lava, clays and coal, plastic clays, oil-bearing zone, limestone, sandstones and fire clay, gypsum, lithographic stone, marbles, granite, slate and onyx. Ill. 4000 w. Stone—March, 1897.

Mineral Resources of Colorado. G. Frank Judson. Part first begins a review of the Cripple Creek district. Ill. Serial. Min Rept—April 12, 1900.

See also **Leadville; Pike's Peak.**

**Colorado, Chaffee County.**—St. Elmo and Chaffee County. Illustrated description and general information regarding these mines. 3500 w. Min Ind & Rev—July 16, 1896.

**Colorado, Florissant Basin.**—The Florissant Basin. Arthur Lakes. An account of a prospecting trip in the volcanic region between Cripple Creek and South Park. 2600 w. Mines & Min—Nov., 1899.

**Colorado, La Plata.**—The La Plata Mountains. Arthur Lakes. Where they are, what they look like, and their possibilities as a mining region. A description of the beginning of a laccolith, its progressive development into a mountain, and the influence of this kind of geological formation on the deposition of ores. Ill. Serial. Col Eng—Sept., 1897.

**Colorado, Paradox Valley.**—The Great Paradox Region. A. B. Frenzel. A description of this valley, the copper mines, etc. 2500 w. Ores & Metals—March, 1899.

**Colorado, San Miguel County.**—Resources of San Miguel County. Theo. F. Van Wagenen. Interesting description of the country, deposits, value, transporation facilities, etc. 1800 w. Min Ind & Rev—Dec. 31, 1896.

**Colorado, San Juan.**—A Second Visit to the San Juan, Colorado, Region After Three Years' Absence. Arthur Lakes. Describes the crossing of San Luis park, recent eruptions of lava, great coal fields, visits to prominent ore mines, etc. 6800 w. Col Eng—April, 1897.

Mining Sketches. Arthur Lakes. A view of the San Juan region, Col., from Engineer Mountain. A pen picture of the mountain scenery and an account of a trip with a party of experts to some mines in Mastodon and Poughkeepsie gulches and on Mineral Point. Ill. 1300 w. Col Eng—Jan., 1897.

**Colorado to Texas.**—Geological Notes from Denver, Colorado, to El Paso, Texas. Illustrated description. 2500 w. Mines & Min—March, 1900.

**Colorado-Utah.**—La Sal Mountains. Arthur Lakes. A description of the region about La Sal mountains, including Paradox Valley, which has lately been attracting attention, and of which there is little definite information. Ill. 2500 w. Mines & Min—May, 1899.

**Cuba.**—Mineral Resources of Cuba. Raimundo Cabrera. Translated from the Spanish by Louis Edward Levy. A general statement of the great riches, almost unexplored, of this island, including asphaltum, copper, iron, manganese and gold. Discussion. 7000 w. Jour Fr Inst—July, 1898.

Mining Conditions in Cuba. William B. Phillips. Describes the conditions under which mining is at present carried on. 2100 w. Eng & Min Jour—Nov. 25, 1899.

The Mineral Resources of Cuba. R. Cabrera. A summary of the occurrence and distribution of the deposits of asphaltum, copper, iron, manganese, and gold, with notes on former efforts to develop them. 2500 w. Eng & Min Jour—Sept. 10, 1898.

The Mineral Resources and Railways of Cuba. A most interesting paper showing how the natural resources have been neglected and the general lack of interest in improvements. 1800 w. Ir & Coal Trds Rev—March 27, 1896.

The Mineral Resources of Cuba. Jennings S. Cox, Jr. A well illustrated description of the mineral resources of the island, with special reference to their exploitation, and their present development. The labor problem in Cuban mining is also discussed at some length. 3500 w. Eng Mag—Feb., 1899.

The Natural Wealth and Industrial Possibilities of Cuba. Raimundo Cabrera. Reviewing Cuba's agricultural and mineral resources, and the opportunities for investment which they offer. 8900 w. Eng Mag—Aug., 1896.

See also **Antilles; IRON MINE.**

**Ecuador.**—Minerals and Mining in Ecuador. Facts furnished by a French metallurgist who is regarded as an authority. 1700 w. U S Cons Repts, No. 694—April 3, 1900.

**Galicia.**—The Mines of Galicia. Report on mines of gold, tin, copper, antimony, iron, coal, plumbago, asbestos and slate. 2000 w. U S Cons Repts—March, 1897.

**Georgia.**—The Cartersville Mining District, Georgia. William M. Brewer. A brief account of this district and the diversity of the mineral resources. 1000 w. Eng & Min Jour—June 5, 1897.

**Georgia and North Carolina.**—Notes and Recollections Concerning the Mineral Resources of Northern Georgia and Western North Carolina. William P. Blake. Gold, silver, copper, zinc, iron, coal, building stone and other mineral occurrences are described. 5400 w. Trans Am Inst of Min Engs—Feb., 1896.

**Guatemala.**—Some Minerals Found in the Republic of Guatemala. John Rice Chandler. List of minerals with location and brief description. 1000 w. Eng & Min Jour—Aug. 8, 1896.

**Haiti.**—Mineral Resources of Haiti; Railways. On the need of transporation facilities, and the mineral wealth of the island. 1000 w. U S Cons Repts, No. 783—July 18, 1900.

**Hanover.**—An Examination of the Ore Dopesits at Rammelsberg near Goslar (Beitrag zur Kenntniss der Erzlagerstätte des Rammelsberges bei Goslar). Dr. Söhle. With geological map and sections showing the deposits of copper, lead, and sulphur, in this important district in Hanover. 3500 w. 2 plates. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 11, 1899.

**Hawaii.**—See also **Antilles.**

**Helena, Mont.**—The Geology of Helena, Montana, and Vicinity. L. S. Griswold. A detailed account of the geology of this city and its relation to the region roundabout, with conclusions. 7000 w. Jour Assn of Engng Socs—Jan., 1898.

**Hungary, Metals.**—Metal Mining in Hungary. Describes the occurrence of gold and other metals. 800 w. Am Mfr & Ir Wld—Jan. 29, 1897.

**Idaho.**—The Seven Devils' Mountains. A. F. Wuensch. Information of this district in Idaho, which promises soon to be opened by a railway. Description of mines. 2300 w. Min Ind & Rev—Feb. 18, 1897.

See also **Cœur d'Alêne.**

**Kootenay, B. C.**—See **British Columbia; RAILWAY PROJECT—Kootenay, B. C.**

**Lake Chelan, Washington.**—Lake Chelan District. Arthur Lakes. An illustrated account of an undeveloped mining district in the State of Washington. 3000 w. Mines & Min—Jan., 1900.

**Leadville, Colorado.**—Mining in the Leadville District. Franklin Ballou, Jr. Interesting account of the marvellous mineral wealth to be found in a single square mile, with brief description of the region and the origin of the deposits. 2400 w. Yale Sci M—Dec., 1896.

The Fourth Era of the Leadville Mining District. Thomas Tonge. A review of the successive stages of the Leadville district with especial reference to the development, not only of gold and silver, but also of copper, iron, zinc, and bismuth. 4000 w. Eng Mag—Sept., 1900.

**Location.**—System in the Location of Mining Districts. Theo. F. Van Wagenen. Gives map showing that the mining localities are situated along nearly parallel belts, and conclusions that may be drawn from this fact. 1000 w. Sch of Mines Quar—Jan., 1898.

See also **MINING LAW.**

**Madagascar.**—Mining in Madagascar. From the report of F. W. Turner. Iron, copper, silver, and lead have been discovered, and also tin. Gives some points on French mining laws. 900 w. Engr, Lond—Sept. 8, 1899.

See also **MADAGASCAR.**

**Mexico.**—Mexican Resources. J. W. Gray. An account of the country, its natural riches, and the opportunities they offer for profitable development. 1200 w. Mines & Min—Jan., 1900.

Mining Points of Interest in Mexico. A. F. Wuensch. Gives an account of the Velardena district, the state of Jalisco, and of a copper and molybdenum mine. 2300 w. Min Ind & Rev—March 10, 1898.

Notes on the Geology of Sonora, Mexico. E. T. Dumble. Gives results of geological investigations. 11800 w. Trans Am Inst of Min Engs—Feb., 1899.

Some Mines in Sonora, Mexico. E. T. Dumble. An account of this region, the abandoned properties and working mines, with the opinion that it is destined to become a very active mining region. 1600 w. Eng & Min Jour—June 18, 1898.

The Mineral District of Hidalgo del Parral, Mexico. S. E. Gill. Describes the region and the operations of the leading company. 900 w. Eng & Min Jour—May 22, 1897.

**Minnesota.**—Ore Deposits in Minnesota. Arthur H. Elftman. A brief sketch of the present status of development of iron, manganese, gold and silver, nickel and cobalt, and copper. 900 w. Engs Year Book, Univ of Minn—1896.

**Missouri-Arkansas.**—Notes of a Reconnaissance from Springfield, Mo., into Arkansas. E. J. Schmitz. An inspection of the zinc, lead, and other resources of this region, and a rapid view of the topography. 2300 w. Trans Am Inst of Min Engs—June, 1898.

**Montana.**—Mineral Resources of the Judith Mountains, Montana. Walter Harvey Weed. Geology of the region, with some account of the mines that have been producers, and give promise of bright future. The distance from railroads makes the working of low-grade ores impossible, and a large amount of ore already developed is practically lying idle for want of proper treatment. 1700 w. Eng & Min Jour—May 23, 1896.

Minerals of Cascade County. O. C. Mortson. The deposits in this part of Montana are essentially economic, such as coal, iron, fire clay, building materials, etc. The precious metals have not yet been found. 2200 w. W Min Wld—Oct. 24, 1896.

Ore Deposits of the Little Rocky Mountains, Montana. Walter Harvey Weed. Notes upon the geology and ore deposits of this region made by the writer during a visit to the region as geologist for the government. 1900 w. Eng & Min Jour—May 2, 1896.

See also **Butte; Helena; Rocky Mountains.**

**New Caledonia.**—Mineral Resources of New Caledonia. Henry W. Edwards. An account of the geology and minerals of this island of the South Pacific, with report of conditions of labor, mining operations and processes used in the treatment of the ores. Ill. 3000 w. Eng & Min Jour—May 28, 1898.

**Newfoundland.**—Newfoundland as a Field for Mining Investment. Alexander Dick. Reviews the mineral deposits of the island and concludes that there are vast possibilities as a mineral producing country. 1900 w. Can Eng—Feb., 1897.

Notes on the Mineral Deposits of Newfoundland. William Scott. Reports briefly concerning the various minerals found and gives illustrations of the mines. 2100 w. Eng & Min Jour—Aug. 11, 1900.

The Mineral Resources of Newfoundland. J. H. Collins. Read at the Imperial Inst., London. Considers it one of the richest islands in the world, particularly as regards copper, and perhaps iron. Reports regarding various minerals. 2800 w. Col Guard—March 25, 1898.

The Undeveloped Mineral Wealth of Newfoundland. A. E. Outerbridge, Jr. Brief historical review of the discovery and information of the great variety of minerals. Ill. 3500 w. Jour Fr Inst—Sept., 1897.

See also **NEWFOUNDLAND.**

**New Mexico.**—The Cochiti District, New Mexico. W. C. Wynkoop. Illustrates and describes this district, giving report of the mines, their output, value, etc. 2200 w. Eng & Min Jour—Aug. 25, 1900.

The Geology of a Typical Mining Camp in New Mexico. C. L. Herrick. Describes the Magdalena mountain range as illustrating many conditions of mineral accumulation and a variety of geological problems. 2800 w. Am Geol—April, 1897.

The Mineral Belt of the Mogollon Range. Carl Anderson. Describes the geology of the range and the peculiarities of the deposits. 2000 w. Eng & Min Jour—Sept. 4, 1897.

The Mineral Resources of New Mexico. Thomas Tonge. A brief notice of the leading mineral-producing counties with related information. 3000 w. Min Jour—Nov. 14, 1896.

**New South Wales.**—Metals and Minerals of New South Wales. J. E. Carne. Report on the mineralogical deposits occurring in the high tableland between Tumut and Kiandra. 2200 w. Aust Min Stand—June 21, 1900.

Mines and Minerals of New South Wales. W. H. J. Slee. On the resources and development of the Inverell and Tingha districts. 2600 w. Aust Min Stand—June 28, 1900.

Mining Permanency in New South Wales. W. H. J. Slee. Are our mineral deposits nearly exhausted and worked out? Does mining pay? These questions were answered by the chief inspector of mines, at the recent mining conference at Sydney. 1100 w. Aust Min Stand—Feb. 13, 1896.

Ore Deposits Near Coolac, New South Wales. Describes a district presenting interest features in connection with its ore deposits. 1300 w. Aust Min Stand—Oct. 6, 1898.

The Minerals and Metals of New South Wales. Perry F. Nursey. Calling attention to points of interest in the report of T. A. Coghlan, government statistician. 1800 w. Ind & Ir—April 19, 1898.

The New South Wales Coast. Joseph E. Carne. Its geology and mineral resources. 2000 w. Aust Min Stand—July 9, 1896.

See also **Australia.**

**New Zealand.**—Minerals in the Gold-Bearing Reefs of the Thames. F. B. Allen. Considers minerals other than pyrites which are found on the Thames goldfield. 2400 w. N Z Mines Rec—Aug. 16, 1898.

New Zealand Prospects. Editorial reviewing the bright prospects of this colony. 1400 w. Min Jour—Oct. 10, 1896.

The Mineral Wealth of New Zealand. An article setting forth the varied resources and the exceptional facilities for economical gold mining, with a map giving the chief localities of the different ores. 5000 w. Mach, Lond—April 15, 1896.

**Nova Scotia.**—A Mineralized Zone in Nova Scotia. Henry S. Poole. A compilation of notes on the various ore-bearing localities of Nova Scotia, with references and map. 4500 w. Can Min Rev—Dec., 1895.

New Mineral Discoveries in Nova Scotia. Edwin Gilpin, Jr. Read before the Nova Scotian Inst. of Science. Extract concerning coal, iron ore, etc. 2200 w. Col Guard—March 9, 1900.

The Ores of Nova Scotia. From a report by E. Gilpin, Jr. Deals largely with the gold and silver ores, but mentions rich deposits of copper, coal, iron ore, gypsum and other minerals. 4000 w. Col Guard—Sept. 30, 1898.

See also **COAL ANALYSIS.**

**Ontario.**—Ontario as a Mining Country. Dr. A. P. Coleman. A brief synopsis of the extent of the industry in the various mineral substances which the province produces. 3500 w. Can Min Rev—March, 1896.

Ontario as a Mining Country. A. P. Coleman. An enumeration of the minerals, metals, etc., found in Ontario, and their value, stating that petroleum gives the greatest aggregate return. The mines are many of them worthy the attention of capitalists. 4000 w. Can Eng—May, 1896.

The Mines of Ontario. J. F. Whitson. Read before the Assn. of Ontario Land Surveyors. Information gathered during two years of active exploration. 2000 w. Can Eng—May, 1897.

**Oregon.**—Elkhorn Mountain and Rock Creek District of the Blue Mountains, Oregon. Robert W. Barrell. Description of this district, which the writer considers a very favorable field for capital to invest in mining. 1500 w. Eng & Min Jour—Aug. 8, 1896.

The Claims of Oregon to Prominence as a Mining Region. Describes the chief mining region of the State, showing a profitable yield of gold and valuable copper deposits. 1600 w. Min Jour—Feb. 20, 1897.

**Persia.**—The Mineral Resources of Persia. R. Helmhacker. Reports showing large mineral resources, but little developed. 2200 w. Eng & Min Jour—July 9, 1898.

**Peru.**—A Rich Peruvian Mining Region. William Griffith. A geological description of the mineral resources in the neighborhood of Hualgayoc, Peru, with some account of the methods of mining, and the quaint village. 1700 w. Mines & Min—Jan., 1898.

Peru and Its Mineral Wealth. Information from a pamphlet by Ernest Thorndike. 1600 w. Engr, Lond—Nov. 17, 1899.

**Philippines.**—Mining in the Philippines. George D. Rice. Reports concerning the mineral deposits, and the interest being shown in them. 1500 w. Eng & Min Jour—Oct. 6, 1900.

Prospective Mines in the Philippines. Extracts from the United States Mint Report for 1898. 2700 w. Min Repts—Jan. 26, 1899.

Some of the Resources of the Philippines. G. D. Rice. An account of the minerals and methods of mining, native labor, etc. 1700 w. Eng & Min Jour—April 14, 1900.

Prospecting in the Philippines. G. D. Rice. Reports plenty of metals, but must be developed at considerable cost. 1800 w. Am Mfr & Ir Wld—July 26, 1900.

See also **Antilles; METALLURGY.**

**Pike's Peak.**—Pike's Peak. Arthur Lakes. Its geological formation and the reason why the ore veins are few and poor. 1800 w. Col Eng—Sept. 1896.

**Porto Rico.**—Porto Rico. Manuel Victor Dormnech. Describes the physical characteristics of the country and gives what is known of the undeveloped mineral deposits, which promise to be valuable. 4000 w. Mines & Min—July, 1899.

The Mineral Resources of Porto Rico. W. L. C. Abstract of the preliminary report of Robert T. Hill, who has recently returned from a tour of investigation to determine the mineral resources. 1500 w. Ir Age—March 16, 1899.

See also **Antilles.**

**Queensland.**—The Macarthur District. A. Dewhurst Gore. Describes the silver and copper fields, and the development. 1800 w. Aust Min Stand —June 14, 1900.

**Rocky Mountains.**—Mining Camps of the West. Sam Davis. History of the progress of mining in Rocky Mountain region and of the effect of the discovery of the precious metals upon the entire country. 4000 w. Chau—April, 1897.

**Rocky Mountains, Montana.**—Notes on the Structure of the Rocky Mountains in the Lewis and Clarke Timber Reserve, Montana. Robert H. Chapman. Description with map. 1300 w. Trans Am Inst of Min Engs—Feb., 1899.

**Russia.**—A Trip to Russia and the Ural Mountains. George F. Kunz. An account of a trip through a rich mineral district, discussing the resources, the finding and working of precious or ornamental stones, the washing for gold and platinum, with notes of general interest. Serial. Jour Fr Inst—Sept., 1896.

Geological Excursion Through Southern Russia. S. F. Emmons. Presents some features of the trip of interest to the mining engineer and geologist. Ill. 7400 w. Trans of Am Inst of Min Engs—June, 1898.

The Ural Excursion of the International Geological Congress. Remarks on the localities visited which produced rare minerals and the more important mining centers. 3800 w. Engr, Lond—Nov. 12, 1897.

See also **Siberia; GEOLOGY—St. Petersburg Congress; GOLD REGION.**

Mineral and Agricultural Resources of Siberia. Translation from a recently published book by Baron de Batz, giving information about the gold-bearing strata, climate, etc. 2800 w. U S Cons Repts, No. 808—Aug. 15, 1900.

**Spain.**—Mineral Resources of Spain. Reginald W. Barrington. A condensed description. Serial. Ind & Ir—Jan. 10, 1896.

**Tasmania.**—Tasmania as a Mining Field. C. C. Longbridge. Information gained from the report of the Sec. for Mines in Tasmania, calling attention to mines likely to prove of commercial value. 1700 w. Min Jour—Feb. 20, 1897.

The Minerals of Eastern Tasmania. H. Grout. Describes the formation and minerals of this district. Serial. Aust Min Stand—Dec. 8, 1898.

The "Wild West Coast" of Tasmania. F. E. Harris. The first part is largely descriptive of this country of vast mineral wealth. Serial. Min Jour—July 25, 1896.

The Zeehan-Dundas (Tas.) Mineral Fields. Extract from report of the Tasmanian mines inspector. Informations as to some of the geological features, with correction of statement previously made regarding concentration losses. 1800 w. Aust Min Stand—June 11, 1896.

**Tasmania West Coast.**—The Mineral Fields of the West Coast of Tasmania. General description of the fields, setting forth the principal facts as to their topography, geological structure, and the local conditions under which mining has to be carried on. 5000 w. Aust Min Stand—Sept., 1896.

**Texada Island.**—Texada Island. Alfred Raper. A description of the deposits and development of a young and promising British Columbia mining field. 2000 w. Mines & Min—May, 1899.

See also **British Columbia; Vancouver Island.**

**Texas.**—See also **Colorado to Texas.**

**Transvaal.**—The Mineral Resources of the Middelburg District (Transvaal). Herbert Lloyd. Read before the Manchester Geological Society. Describes the geology of the region, gives information relating to the coal deposits, and the rich mineralised districts. 1700 w. Col Guard—Aug. 19, 1898.

The Transvaal: Its Mineral Resources. J. Logan Lopley. An excellent description, including statistics from the State Mining Engineer's report, and geological section of the deposits, and a map of the State. 3300 w. Knowledge—March 2, 1896.

See also **Africa; GOLD MINE; GOLD REGION.**

**Turkey.**—The Useful Minerals of Turkey. R. Helmhacker. Reports the country rich in mineral wealth although the production is small. Gold, silver, copper, lead, antimony, arsenic, sulphur, chrome ore, manganese, iron, emery, salt, soda, coal, etc., are found. 3300 w. Eng & Min Jour —Nov. 26, 1898.

**United States Southern.**—Minerals of the Southern States. From an account prepared by the Southern Railway of the United States. Facts and figures concerning coal, iron, manganese, corundum, copper, bauxite and aluminum ore. 4200 w. Ind & Ir—Aug. 25, 1899.

The Mineral Interests of the South in 1895. Wm. M. Brewer. The rare minerals, coal, iron ore, building stones, gold, copper, lead, clays and cement are fully treated. 10000 w. Tradesman —Jan. 1, 1896.

See also **Georgia.**

**Ural.**—See **Russia; GOLD REGION.**

**Utah.**—Mining in Utah. Don Maguire. Reviews the progress in the development of the various mineral properties of the state during 1898. 2500 w. Mines & Min—Jan., 1899.

The Oquirrh Mountains of the Mercur Mining District, Utah. An epitome of the Geological Survey's report of the region by Messrs. Emmons and Spurr, with notes and comments by Prof. Arthur Lakes. 5400 w. Col Eng—June, 1896.

**Vancouver Island.**—Mining Development on Vancouver Island in 1899. W. M. Brewer. Report of work and results. 1200 w. Eng & Min Jour—March 10, 1900.

Mining on Vancouver and Texada Islands. W. M. Brewer. A report of these districts, which have been recently visited by the writer. 1700 w. Eng & Min Jour—May 6, 1899.

Progress on Vancouver and Texada Islands. W. M. Brewer. Shows the varied and important deposits, and the progress of development work. 1600 w. Eng & Min Jour—July 14, 1900.

See also **British Columbia.**

**Venezuela.**—Venezuela. Its Industry, Mining and Commerce. I. B. Storch. The mineral deposits are undeveloped, as prospecting, owing to the dense underwood, is difficult. The annual production of gold was 180,000 ounces. 900 w. Min & Sci Pr—Jan. 18, 1896.

**Washington.**—See **America Northwest; Lake Chelan.**

**Western Australia.**—A Year's Mining in Western Australia. Some facts and figures from the Report of the Department of Mines of Western Australia giving the production, revenue, and area covered. 1200 w. Min Jour—Nov. 23, 1895.

Notes on the Geology and Mineral Deposits of West Australia. E. F. Pittman. Read before the Australasian Assn. for the Advancement of Science. Descriptive. Two parts. 6500 w. Aust Min Stand—Jan. 27, and Feb. 10, 1898.

**West Indies.**—See **Antilles; Cuba; Porto Rico.**

**Wyoming.**—The Grand Encampment and Saratoga Mining Districts of Wyoming. Thomas Tonge. An account of the region, its prospects and development. 2000 w. Mines & Min—Aug., 1899.

The Mineral Belt of the Sierra Madre Range of Mountains in Southern Wyoming. E. P. Snow. The location, discovery, development and account of the principal mines. Ill. 2400 w. Min Rept —April 6, 1899.

Wyoming Mining Interests. Wilbur C. Knight. Contains reports of coal, petroleum, iron, soda, plaster, asbestos and mica. Only coal mines have been developed, but the state's resources are varied and extensive. The writer considers it reasonable to expect the discovery of valuable gold deposits, and reviews causes which have retarded the growth of the state. 2400 w. Min Ind & Rev—Dec. 31, 1896.

**MINERAL TRANSPORTATION.**

See also **COAL TRANSPORTATION; IRON ORE TRANSPORTATION; RAILWAY TRANSPORTATION; TRANSPORTATION.**

**United Kingdom.**—Mineral Traffic on Railways in 1897. Report for the United Kingdom, showing the progress as compared with 1896. 800 w. Col Guard—Nov. 18, 1898.

Economy in Handling and Transport of Minerals. Charles de Neuville Forman. Read before the Engineering Conference of the Inst. of Civ. Engs., England. Calls attention to the importance of this subject, offering suggestions. 1200 w. Col Guard—June 16, 1899.

**MINERAL VEINS.**

See also **GEOLOGY; GOLD GEOLOGY; MINERAL.**

Mineral Bearing Veins. A general article treated in an elementary manner. 2200 w. Aust Min Stand—Nov. 16, 1895.

**Clear Creek, Colorado.**—Vein Occurrence. Arthur Lakes. A study of vein formation as illustrated in Clear Creek cañon, Colorado. Ill. 1200 w. Col Eng—Oct., 1897.

**Enrichment.**—Enrichment of Mineral Veins by Later Metallic Sulphides. Walter Harvey Weed. From the "Bulletin of the Goel. Soc. of Am." An explanation of chemical and mineralogic changes in deposits. Serial. Min Rept—June 21, 1900.

The Secondary Enrichment of Ore-Deposits. S. F. Emmons. A statement of the writer's belief and argument sustaining it. 15700 w. Trans Am Inst of Min Engs—June, 1900.

**Extensions.**—Extensions of Great Veins. Arthur Lakes. How to follow them and some points to be considered in locating a claim on them. Ill. 2500 w. Mines & Min—Aug., 1899.

**Fissure.**—Filling and Replacement in Gold-Bearing Fissure Veins. Waldemar Lindgren. Considers the alterations of the country rock in and near the fissure veins, the silicification, and the structure of the veins. 1600 w. Eng & Min Jour—June 5, 1897.

**Fissure vs. Shearing Zone.**—True Fissure vs. Shearage-Zone Veins. Arthur Lakes. On the probability that the origin and method of formation of both are practically the same. 1800 w. Mines & Min—July, 1900.

**Indicator.**—See **GOLD GEOLOGY.**

**Intersections.**—Vein Intersections in Clear Creek County, Colo. James Underhill. Illustrated examples showing some of the causes that operate to make enrichments at intersections. 900 w. Eng & Min Jour—Sept. 18, 1897.

**Walls.**—The Walls of Mineral Veins. Reviews opinions as to the relation of mineral veins to their walls, and gives conclusions of S. F. Emmons as to the origin of the Leadville ore deposits. 1500 w. Min & Sci Pr—Nov. 25, 1899.

Vein Walls. T. A. Rickard. Abridged from a paper read before the Am. Inst. of Min. Engs. Interesting illustrated description of some typical formations as shown in the mining fields of western America. 3800 w. Col Eng—July, 1897.

Vein-Walls. T. A. Rickard. Interesting study of the subject with many illustrations. 12000 w. Trans Am Inst of Min Engs—July, 1896.

**MINERAL WOOL.**

**Patents.**—On the Validity of Mineral Wool Patents. A. D. Elbers. Gives extracts relating to compositions contained in early patents and reviews enumerated patents for the purpose of judging of their validity. 1800 w. Am Mfr & Ir Wld—Feb. 17, 1899.

**Sulphur-Free.**—The Manufacture of Sulphur-Free Mineral Wool. A. D. Elbers. Gives the history of the manufacture of this product, and the invention which makes it quite certain such an article can be produced. 2000 w. Eng & Min Jour—Aug. 26, 1899.

**MINE RECORDS.**

See **MINE ACCOUNTS; MINE MANAGEMENT.**

**MINE ROADS.**

See also **MINE HAULAGE; RAILWAY.**

Mine Roads and Tracks. H. L. Auchmuty. The importance of good roads for securing economical handling of the mine products. The material, grades, weight of rail and size of ties, drainage, switches, curves, etc. 5000 w. Mines & Min—March, 1900.

**MINER'S LAMP.**

See **SAFETY LAMP.**

**MINE SHAFT.**

See also **HOISTING; MINE; MINE VENTILATION; SHAFT SINKING.**

Shafts and Shaft Machinery. A. S. Boucher. Read before the N. S. W. Chamber of Mines. Considers the kind of shaft, shape, size, and position, the timbering, equipment, etc. 8900 w. Aust Min Stand—Feb. 1, 1900.

**Deep.**—The Deepest Shafts in the Earth (Die Tiefsten Schächte der Erde). Giving a table of the notably deep shafts in various parts of the world. 600 w. Glückauf—May 22, 1897.

See also **MINE; MINING; SHAFT SINKING.**

**Fires.**—Precautions for Minimizing and Preventing Shaft Fires. Joh. Mayer. From "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Considers preventive, remedial, and subsidiary measures. Ill. 1500 w. Col Guard—Sept. 16, 1898.

See also **COAL MINE FIRE; MINE FIRE.**

**Lining.**—Repairing the Lining of Shaft No. 1 of the Gneisenau Mine at Derne (Reparatur der Cuvelage des Schachtes I der Zeche Gneisenau bei Derne). F. Schulte. Describing the manner in which the cast iron lining of the shaft was reinforced by an inner lining for a portion of its length. 1500 w. 1 plate. Glückauf—June 17, 1899.

See also **Tubbing.**

**Lining Cast Iron.**—The Manufacture of Linings for Mine Shafts, at Garcy, France (Etude sur la Fabrication des Cuvelages de Puits de Mines à Garcy, Meurthe-et-Moselle). E. Clère. An illustrated description of the manufacture of cast iron linings for shafts, in sections, with lead joints. 2400 w. 1 plate. Mem d l Soc d Ing Civils de France, No. 10—1900.

**Lining Iron.**—Iron Lining to Shaft for Catching the Water. M. Vrancken. From an administrative report published in the "Annales des Mines de Belgique." Describes the manner of overcoming the incursion of water in the winding shaft. 1400 w. Col Guard—June 16, 1899.

**Repairs.**—Temporary and Permanent Repairs to a Winding Shaft. The trouble was caused by a movement of the strata forcing in the masonry lining of the shaft. Piles were driven into the loose material and the surface held in place by cross timbers, until the wrought iron tubing lining, backed by concrete, could be inserted. Ill. 1100 w. Eng, Lond—Dec. 20, 1895.

**Safety Appliances.**—See **HOISTING; HOISTING CAGE.**

**Tubbing.**—Description of Tubbing Shafts Against Water. R. Clive. Prize essay of the British Soc. of Min. Students. An illustrated description of the tubbing of two shafts and the method of putting it in. 2000 w. Ir & Coal Trds Rev—July 7, 1899.

See also **Lining.**

**Tubbing Repairs.**—Repairs to a Shaft Tubbing at a Westphalian Colliery. From a communication by Ingenieur Schulte to "Glückauf." Longitudinal and transverse sections showing the method by which the water inburst was eventually kept back and the shaft made tight. 1600 w. Col Guard—Aug. 25, 1899.

**Warming.**—Warming the Air of a Damp Downcast Shaft; for Preventing the Formation of Ice. M. Petit. From a communication to the Société de L'Industrie Minérale. Reviews the methods in general use and their shortcomings, and explains method worked out by the writer, and apparatus used. Ill. 1700 w. Col Guard—Jan. 21, 1898.

**Water.**—See **MINE DRAINAGE—Gilberton, Pa.**

**MINE SIGNAL.**

**Electric.**—See **ELECTRIC SIGNAL—Mines.**

**Mexico.**—Signal Device for Mines. C. S. Herzig. Illustrated description of apparatus designed for a mine in Mexico. 1000 w. Trans Am Inst of Min Engs—June, 1900.

**MINE STORES.**

Mine Stores. F. Danvers Power. Abstract of paper read before the Aust. Inst. of Min. Engs. Suggestions for the ordering and distributing of mining stores, and the keeping of the accounts. 2500 w. Ir & Coal Trds Rev—Aug. 17, 1900.

**MINE SURVEYING.**

See also **SURVEYING.**

A Contribution to Mine Surveying. Bergrath Brathuhn in "Berg- und Hüttenmännische Zeitung." Explains the determining the depth of perpendicular shafts by the aid of a measuring wheel, determining the perpendicular by the aid of an inscribing plummet, and other measurements. 2200 w. Col Guard—May 20, 1898.

Dialling Troubles and Their Treatment. Arthur Mort. Remarks on the troubles which beset the dialler in his work. 1500 w. Col Guard —Jan. 21, 1898.

General Practice in Surveying Mineral Lands and Gold and Silver Mines. Auguste Mathez. A description of the instruments, their use, adjustment and care, with explanations of the principles involved in practical work. Ill. Serial. Col Eng—Nov., 1896.

General Practice in Surveying Mineral Lands, and Gold and Silver Mines. Auguste Mathez. A description of the instruments, their use, adjustment and care, with explanations of the principles involved in practicel work. Serial. Col Eng—March, 1897.

Mine Maps and Surveys. Selwyn M. Taylor. Abstract of paper read before the Western Pennsylvania Central Mining Institute. Briefly describes how a mine survey should be made. 600 w. Am Mfr & Ir Wld—Dec. 24, 1897.

The Real Error of a Survey. Joseph Barrell. Notes on the accuracy of surveys in inclined seams and an analysis of the sources of error. 2500 w. Mines & Min—Feb., 1900.

Underground Surveys and Their Connection with the Surface by the Transit Method. E. H. Liveing. An illustrated description of a method particularly suited to deep shafts. 2200 w. Mines & Min—March, 1900.

Underground Surveys and Their Connection with the Surface by the Transit Method. E. H. Liveing. Read before the Midland Inst. of Min., Civ. & Mech. Engs., at Leeds, Eng. Particulars from the writer's experience in the use of this method. Ill. 2500 w. Prac Engr—March 23, 1900.

**Claims.**—Surveying Mining Claims. Charles Tappan. Describes the transit work and chaining, showing the accuracy of modern methods. 2000 w. Jour Assn of Engng Soc—July, 1897.

**Compass Variations.**—A Danger in Flooded Workings. An article, with diagrams, calling attention to the errors arising from neglecting the changes in the magnetic declination. 3500 w. Col Guard —Dec. 9, 1898.

**Curves.**—The Employment of Regular Curves in Driving Headings. P. Krassnig. Instructions for laying out regular curves without a transit. Ill. 500 w. Col Guard—Dec. 20, 1895.

**Inclined Shafts.**—A Method of Surveying in Inclined Shafts (Zur Markscheiderischen Vermessung Steiler Schächte). Describing a practical method for doing accurate theodolite work in shafts inclined at angles of about 70 degrees. 1500 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 21, 1897.

Surveys in Inclined Shafts. Joseph Barrell. Theoretical and practical considerations governing the choice of instruments. 2700 w. Mines & Min—April, 1900.

Survey Measurements of Steep Drivages. Joh. Nemecek, in "Oesterrichische Zeitschrift für Berg und Hüttenwesen." Illustrated description of methods suggested. 900 w. Col Guard—Sept. 24, 1897.

**Instruments.**—See **Levelling; COMPASS—Langer Suspension; SURVEYING INSTRUMENT.**

**Levelling.**—Levelling in Mines. Bennett H. Brough. Abstract of a lecture given at Chesterfield, Eng. Describes the various forms of levelling instruments used in mines. 1700 w. Col Guard—March 19, 1897.

**Magnetic.**—See **MAGNETIC PROSPECTING; MAGNETIC SURVEYING.**

**Map.**—Mining Maps for Working Use (Grubenkarten für Erzbergbaue). A discussion of the proper surface and underground maps, with especial reference to the conditions of the Hungarian mines. Two articles. 8000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 1 and 8, 1897.

See also **MAP; PANTOGRAPH; PROTRACTOR.**

**Outline Scheme.**—Outline Scheme for Mine Surveying. Edward B. Durham. Considers the location of stations, running underground traverse, shaft surveys, calculations and plots. 4500 w. Sch of Mines Quar—April, 1896.

**Plumbing Shafts.**—Plumbing Shafts. George B. Hadesty. A republished article, giving a reliable and simple method for carrying a meridian into a mine. 1600 w. Col Eng—July, 1897.

Plumbing Shafts. George B. Hadesty. A rèliable and simple method for carrying a meridian into a mine. Describes a four-wire method, said to be speedy and reliable. 1500 w. Col Eng—Aug., 1896.

**Prussia.**—The Education of Mine Surveyors in Prussia. Bennett H. Brough. A summary of the regulations for the examination of mine surveyors recently adopted. 900 w. Col Guard—Feb. 17, 1899.

**Rocky Mountain.**—Rocky Mt. Mine Surveying. Joseph Barrell. Some convenient methods especially suited to the conditions. Plumbing vertical shafts, surveying inclined shafts, methods for instruments commanding any vertical angle, also for those without extra attachments. Ill. 5000 w. Mines & Min—Jan., 1899.

### MINE TEMPERATURE.

See **MINE—Temperature.**

### MINE TRANSPORT.

See **MINE HAULAGE; TRANSPORTATION—Mine.**

### MINE TUNNEL.

See **MINE DRAINAGE; TUNNEL—Mine.**

### MINE VALUATION.

See also **MINE EXAMINATION; MINE PROMOTION; ORE RESERVES.**

Mine Valuation from an Investor's Standpoint. A discussion of methods of approximating the present value of a mine. 1600 w. Can Min Rev —Nov. 30, 1898.

The Examination and Valuation of Mines. Alfred Harper Curtis. Abstract of paper contributed to the New Zealand Inst. of Min. Engs. A summary of the points in mine examinations on which the writer laid especial stress, with brief report of discussion. 1600 w. N Z Mines Rec—Oct. 17, 1898.

**Reports and Salting.**—Mining Reports and Mine Salting. Walter McDermott, with discussion. Remarks against the indiscriminate use of terms familiar in mining reports, used as catch-penny phrases in a way to imply more than they really mean. The fixing of mines for selling and the danger from these sources. 15800 w. Inst of Min & Met, Lond—Vol. III., Pt. II.

### MINE VENTILATION.

See also **COAL MINE EXPLOSION; FAN—Mine; FIREDAMP.**

Adequate Ventilation. E. W. Thirkell. Read before the Midland Inst. of Mining, Civil and Mechanical Engs., at Barnsley, March 27, 1897, and published in the "Fed. Inst. of Mining Engs." The amount of air needed for men, horses and lights under various conditions, the effects of gases, methods of improving the ventilation and dangers from coal-dust. 3000 w. Mines & Min —Jan., 1898.

Influence on the Air Current of Water Falling Down a Shaft. Paul Petit. From a communication to the International Min. Cong., at Paris. An account of investigations made to ascertain the mode of action of water thus falling, and to determine the amount of influence it may have on the total depression or water gauge. Ill. 3700 w. Col Guard—Sept. 28, 1900.

Loss of Load Due to the Motion of Air in Mine Shafts. From a communication by M. Paul Petit to the International Mining and Metallurgical Congress at Paris, on calculating the loss of load in order to arrive at the total depression required for ventilating the face of a heading. 3000 w. Col Guard—Sept. 14, 1900.

Mine Atmosphere. From the "Cours d'Exploitation des Mines," by M. Haton de la Goupillière. Considers both the temperature and chemical composition, the regulation of the air supply, and effect on the workers. 4700 w. Col Guard—Feb. 25, 1898.

Mine Ventilation. J. T. Beard. A study of the equivalent orifice method as applied to the measurement of the yield of fans. A general review of the method and of the development of the equations upon which it is based, showing that they are founded on an error. 4500 w. Col Eng—Sept., 1896.

Mine Ventilation. James Grant. Describes and discusses the three methods employed, and the difficulties. Serial. Aust Min Stand—Nov. 30, 1899.

Notes on the Ventilation of Mines. T. A. Southern. A lecture delivered at University College, Nottingham. Part first discusses the pressure which produces ventilation; exhausting fans vs. forcing fans; upcast or downcast, which should be the larger, etc. Serial. Col Guard—March 19, 1897.

Substitution of Convergent-Divergent Adjutages for Wickets in Mine Ventilation. Paul Petit. From a paper prepared for the Min. & Met. Con., Paris. An illustrated account of experimental investigations, with conclusions. 3000 w. Col Guard—Aug. 24, 1900.

The Effect of Contractions in Area of Passages in Mine Ventilation. Paul Petit. Abstracted from paper read before the International Cong., at Paris. An account of tests and experiments, with conclusion. 2700 w. Eng & Min Jour—Oct. 13, 1900.

The Study of Mine Ventilation. On the importance and interest in this study and the need of a recent and able treatise on this subject. 3200 w. Col Guard—Jan. 13, 1899.

Ventilation of Mines. J. Sharpe. Discusses natural, artificial and mechanical ventilation. 2000 w. Aust Min Stand—April 8, 1897.

**Air Crossings or Bridges.**—Air Crossings or Bridges. Gives their history, describes undercasts and overcasts, and discusses which is to be preferred and when. 1500 w. Mines & Min—Feb., 1899.

**Air Current Control.**—The Control of Air Currents in Gaseous Mines. Considers the mode of treatment necessary, stating conditions often found and the remedies. 900 w. Am Gas Lgt Jour—Sept. 18, 1899.

**Air Shaft.**—See **SHAFT SINKING.**

**Air Splits.**—Useful Effects of Air Splits and the Limits to Which They May Be Usefully Applied. Charles Connor. Condensed from a paper read before the joint meeting of the Western Penn. Central Mine Inst., and the Ohio Inst. of Min Engs. The subject is discussed theoretically and practically; the advantages of air splits are stated and their limit in practice. 1600 w. Am Mfr & Ir Wld—July 3, 1896.

**Alluvial.**—Alluvial Mines Ventilation. A. Robertson. The manner of working is described and the best means of ventilating. 1200 w. Aust Min Stand—April 8, 1897.

**Anthracite.**—See **COAL MINING—Anthracite.**

**Blowers.**—Compression Ventilators at the Schlesien and Deutschland Pits (Upper Silesia). Bergassessor Steinoff, "Zeitschrift für Berg-Hütten und Salinenwesen." Illustrated description, with statement of advantages of this system. 2000 w. Col Guard—March 17, 1899.

The Ventilation of the Schlesien and Deutschland Collieries by Blowers. Abstract from article in "Zeitschrift für das Berg-Hütten und Salinenwesen." A description of the ventilation of two collieries by means of blowers placed underground. Ill. Serial. Ir & Coal Trds Jour—Feb. 24, 1899.

See also **Fan.**

**Breslau District.**—Additional Mine Regulations in the Breslau District. Changes, chiefly relating to ventilation and use of explosives. 1600 w. Col Guard—Aug. 13, 1897.

**Capell vs. Mortier.**—Comparative Experiments with Capell and Mortier Ventilators at the Bonifacius Mine (Vergleichende Versuche mit Einem Capell und Einem Mortier Ventilator auf Zeche "ver. Bonifacius"). Both fans were electrically driven, and the methods of test are given in detail; also tables of results and graphical diagrams. 4000 w. 2 plates. Glückauf—Oct. 28, 1899.

**Compression.**—Compression Ventilators in German Coal Mines. From "Zeitschrift für Berg-Hütten und Salinenwesen. Translation of paper by Bergassessor Steinhoff. Illustrated description of the system, with statement of its advantages. 1800 w. Eng & Min Jour—April 8, 1898.

**Cooling.**—Cooling Down Warm Working Places Underground. Bergassessor Tübben, in "Glückauf." Proposes a method of cooling down by means of liquid air. 1400 w. Col Guard—Sept. 1, 1899.

Means for Counteracting High Temperatures in Deep Mines. Léon Poussigue. From a paper prepared for the International Cong., at Paris. States the prevailing conditions, and discusses the points needing attention, the use of fans, etc. Ill. 3500 w. Col Guard—June 29, 1900.

Methods of Cooling Overheated Workings in Mines (Vorschläge zur Abkühlung Warmer Betriebspunkte in Grubenbauen). Dr. Tübben. Reviewing the present methods of cooling by sprinkling and by the expansion of compressed air, and suggesting the use of liquid air. 1200 w. Glückauf—July 8, 1899.

**Deep Mines.**—See also Cooling; Temperature Changes; **MINE; MINE SHAFT; MINING.**

**Dimensions.**—Sources of Error in the Proportioning of Mine Workings (Ueber die Fehlerquellen bei der Bestimmung der Grubenweiten). L. Volf. A detailed discussion of the method of computing the proper dimensions for passages in mines, with especial reference to the Murgue system of ventilation. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Dec. 30, 1899.

**Doors.**—Automatic Colliery Air Doors. Illustrates and describes automatic doors, arranged to remain closed except when trucks are required to pass. 350 w. Engr, Lond—Dec. 2, 1898.

Automatic Interlocking of Two Air Doors. M. Botton. From a communication to "Comptes Rendus Mensuels" of the Société de l'Industrie Minérale, Sainte Etienne. In the apparatus shown, the doors open in the same manner as two ordinary doors, although they cannot both be opened at the same time. 700 w. Col Guard—Jan. 28, 1898.

Interlocking Mine Air Doors. M. Martinet. Illustrated description of a method without any rigid part for transmitting motion. 600 w. Col Guard—May 25, 1900.

Doors in Mines. James Blick. Their effect on the air currents; their use, abuse, and the extent to which they may be avoided. Read before the joint meeting of the West. Penna. Cent. Min. Inst. and the Ohio Inst. of Min. Engs. 2000 w. Col Eng—July, 1896.

Improvements in Automatic Trap Doors for Mine Shafts (Ueber Neuerungen an Bremsschachtverschlussen). Illustrating several devices for operating the doors automatically by the action of the cage; as used in a number of the mines of the Westphalia district. 2500 w. 2 plates. Glückauf—Feb. 5, 1898.

The Effect of Trap Doors in Mines; their Use, Abuse, and the Extent to Which They May be Avoided. James Blick. Read before the joint meeting of the W. Penna. Central Mining Inst. and the Ohio Inst. of Mining Engs. Favoring the treble entry system, and setting forth its advantages. 1900 w. Am Mfr & Ir Wld—June 12, 1896.

**Equivalent Orifice.**—Experiments with a Ser Fan at the Saint-Eloy Colliery for Determining the Equivalent Orifice. M. de Lachapelle. From a communication to the Société de l'Industrie Minerale. Experiments made in the passage orifice of the fan drift connected with the upcast shaft. 1200 w. Col Guard—Dec. 11, 1896.

Relation Between a Mine's Equivalent Orifice and the Theretical Thin-Edged Orifice. M. S. Hanappe. From a communication to the Société des Ingénieurs des Mines du Hainaut. Shows the extent of the error committed by identifying these two and gives conclusions reached from calculations and facts given. 2500 w. Col Guard—Aug. 18, 1899.

Theory of the Equivalent Orifice. M. Lafitte. From a communication to the Société de l'Industrie Minérale, Sainte Etienne. An adaptation of Guibal's theory of moduli to the notion of the equivalent orifice due to M. Murgue, and generally adopted on account of the convenient representation it affords of a mine's resistance. 1200 w. Col Guard—June 17, 1898.

The Practicable Scope of the Equivalent Orifice Theory. H. W. Halbaum. Discusses the work and results of M. Murgue in its application to fan tests. 4000 w. Col Guard—Aug. 17, 1900.

**Fan.**—A Combined Exhaust and Blast Fan for Colliery Ventilation. Illustrated description with a statement of the advantages of such fans. 900 w. Col Guard—July 6, 1900.

American Fan Ventilation for Mines. Illustrations, with details of some of the large centrifugal fans. 2000 w. Ir & Coal Trds Rev—July 2, 1897.

Comparative Tests of a Rateau and a Guibal Fan. A report of tests under the same conditions, showing the superiority of the Rateau fan. 1000 w. Col Guard—May 4, 1900.

Note as to the Theory of Fans. S. Hanappe. From a communication to the Société des Ingénieurs des Mines du Hainaut. Mathematical demonstrations showing the applicability of Bernouilli's theorem to the motion of air between fan vanes. 1500 w. Col Guard—Sept. 15, 1899.

Screw Fans. Charles H. Innes. Read before the N. E. Coast Inst. of Engs. and Shipbuilders. Illustrates and describes the methods of obtaining a reasonable efficiency of these fans. 700 w. Col Guard—Dec. 15, 1899.

See also Blower; Equivalent Orifice; Furnace vs. Fan; Guibal; Hanarte; FAN.

**Fan Efficiency.**—Determination of a Fan's Efficiency by Guibal's Conception of the Temperament. Gustave Hanarte. From a communication to the Société des Ingénieurs du Hainaut. Gives methods for ascertaining the useful work given out by a fan, which in the author's opinion permit the testing of the various types. Ill. 3300 w. Col Guard—Nov. 18, 1898.

The Useful Work of Mine Fans and Method of Observing It. Gustave Hanarte, in a communication to the Société des Ingénieurs du Hainaut. Describes the trial at the mine and the conditions. 2800 w. Col Guard—Nov. 11, 1898.

**Fan Measurement.**—A Peculiarity in the Measurement of a Fan's Industrial Yield by Means of a Thin-Edged Wicket. S. Hanappe. Communicated to the Société des Ingénieurs des Mines du Hainaut. Explains how the pressure should be taken and the cause of incorrectness. 2000 w. Col Guard—Oct. 6, 1899.

**Fan Recorders.**—Fan Speed and Pressure Recorders at the Roche-la-Moliere et Firminy Collieries, France. M. Denogent. Describes the apparatus used, which gives correct indications and requires but little power. 1200 w. Col Guard—Sept. 29, 1899.

Fan Speed and Pressure Recorders. Describes two appliances used at the Saint-Etienne collieries, which have given entire satisfaction. Ill. 1400 w. Col Guard—March 9, 1900.

Fan Volume Recorder. M. Murgue. Illustrated description of apparatus for recording the volume of air delivered and the method of using it. 3200 w. Col Guard—April 12, 1900.

**Fiery Mines.**—Separate Ventilation in Fiery Mines. Bergrath J. J. Mayer. The author treats of the ventilation of preliminary headings lying out of the direct line of the main air supply. 1800 w. Col Guard—March 20, 1896.

**Firedamp.**—See also COAL MINE EXPLOSION; FIREDAMP.

**Firedamp Control.**—Errors in Firedamp Control (Die Häufigsten Fehler bei der Wetterführung). A paper by Bergassessor Stens, discussing the proper method of mine ventilation to prevent the accumulation of firedamp. 2500 w. Glückauf—May 13, 1899.

**Forced.**—Forced Ventilation Plants (Ueber Blasend Wirkende Hauptventilator-Anlagen). A discussion by Bergassessor Kette, of the relative merits of forced and exhaust ventilation for mines. The use of underground blowers to force the air out of the mine, is advocated. 4500 w. Glückauf—June 24, 1899.

**Furnace.**—Some Notes on Mine Ventilation by Furnace. H. W. Halbaum. Describes a ventilating furnace at a large colliery in the north of England, which convinced the writer that in some instances it is better policy to ventilate a mine by means of a furnace rather than a fan, even where a large volume of air is required. 5000 w. Col Guard—Oct. 8, 1897.

**Furnace vs. Fan.**—Furnace versus Fan Ventilation. William Clifford. Read before the Ohio Inst. of Min. Engs. A review of the progress made in mechanical ventilation in the past 40 years. Part first deals with the arrangements in use in early times. Serial. Am Mfr & Ir Wld—Feb. 12, 1897.

**Guibal.**—Calculating Guibal Fans with Single Inlet. Emile Gosseries. Experiments made with the Guibal fan lately put up at the Sacre-Madame Colliery, Charleroi. 2400 w. Col Guard—Oct. 2, 1896.

Installation of a Guibal Ventilator at a French Colliery. E. Gosseries. Description of the ventilator and the conditions it has to satisfy. The reasons for choosing this type and the tabulated results of experiments are given. 2000 w. Col Guard—Nov. 20, 1895.

**Hanarte.**—Contribution to the Study of Mine Ventilation. M. G. Hanarte, with explanations by J. W. P. Gives the Hanarte arrangement of fan and its method of work. Serial. Col Guard—March 12, 1897.

Hanarte's Contribution to the Study of Mine Ventilation. J. W. P. The substance of a preface called forth by the new edition of M. Haton de la Goupillière's "Course of Mine Working." 1500 w. Col Guard—Jan. 7, 1898.

**Head Works Arrangement.**—The Best Arrangement of Ventilators to Enable the Utilization of the Entire Shaft Section (Welche Einrichtung Gestattet bei Oberirdischer Aufstellung des Ventilators den Ganzen Querschnitt eines Förderschachtes zur Wetterführung zu Benutzen). H. Dehnke. With illustrations showing the arrangement of head works to offer the least obstruction to ventilation. 1500 w. 1 plate. Glückauf—July 29, 1899.

**Lansell Pneumatic.**—See WATER RAISING.

**Metal Mines.**—Metal Mining—Ventilation by Natural Draft and by Assisted Draft. Albert Williams, Jr. Importance of ventilation in metal mines is less than in collieries, but too often overlooked. The sources of vitiation of mine air, special need of studying and utilising natural draft, working rules and practical suggestions for controlling air currents underground are discussed. Serial. Col Eng—Feb., 1896.

**Mortier.**—The Mortier Ventilator (Die Mortier Ventilator Anlage der Zeche Alma). A powerful fan ventilator and steam plant recently erected at the Alma mine at Gelsenkirchen. With plate showing general arrangement. 1000 w. Glückauf—July 24, 1897.

See also Capell vs. Mortier.

**Natural and Artificial.**—Influence of Natural Ventilation in Mines Ventilated Artificially. A discussion of the effect, which either adds to the force or is antagonistic, and the necessary allowance to be made. 900 w. Col Guard—Sept. 15, 1899.

**Neumühl Coal Mine, Westphalia.**—Utilizing for Ventilation the Whole Cross-Section of a Winding Shaft. Bergassessor Dehnke in "Glückauf." Illustrated description of arrangement to be provided for the Neumühl Colliery, with its advantages over other described arrangements. 2200 w. Col Guard—Sept. 29, 1899.

**Orifice.**—See Equivalent Orifice.

**Panel System.**—The Advantages of the Panel System. Gives points in regard to ventilation and states the circumstances under which this system is preferable to others. 1200 w. Mines & Min—May, 1899.

**Pressure Recorder.**—See Fan Recorder.

**Pressure vs. Exhaust.**—Should Mine Ventilation Be Positive or Negative? Extract from a work by M. Haton de la Goupillière. Discusses the advantages and disadvantages of pressure and exhaust fans. 1000 w. Col Guard—Jan. 20, 1899.

**Principles.**—Root Principles of Mine Ventilation. Deals with the nature of theory and the atomic theory. Serial. Col Guard—Jan. 27, 1899.

Root Principles of Mine Ventilation. Points out some of the principles associated with the theory of heat, which should be understood by students of mine ventilation. Serial. Col Guard—Feb. 24, 1899.

Root Principles of Mine Ventilation. A study of the general theory of force. 5300 w. Col Guard—Feb. 10, 1899.

**Ser Fan.**—See Equivalent Orifice.

**Siberia.**—See MINE MANAGEMENT.

**Temperature Changes.**—Notes on the Ventilation of a Deep Metal Mine as Affected by Seasonal Changes of Temperature. John E. Preston. Considers the causes of this unsatisfactory ventilation, with the means taken to better the condition, and gives a series of analyses of the underground air. Ill. 1800 w. Can Min Rev—March, 1898.

**Testing.**—Testing Ventilators with the Aid of an Opening to Free Air (L'Essai des Ventilateurs à l'Aide d'un Guichet à l'Air Libre). S. Hanappe. A long analytical discussion of the whole subject of the movement of air in mine galleries and the finding of the equivalent orifice for a given mine section. 10000 w. Rev Universelle des Mines—Oct., 1898.

**Theory.**—A Theory in Mine Ventilation. An account of interesting experiences in mine ventilation in which certain anomalies in air flow, contrary to currently accepted theory, manifested themselves, and which have compelled the author to think it is time that colliery managers and engineers recognized that there are other factors in efficient ventilation than mere volume, and that the ventilating pressure shown by the water-gauge is not a record of the subtle gains, losses, restitutions and differential influences of the pressure en route. 2400 w. Col Guard—May 1, 1896.

**Up-Cast Pits.**—See COAL MINING—Covering Up-Cast Pits.

**Velocity of Air Currents.**—Determining the Velocity of Ventilating Air Currents. P. Fuchs, in "Zeitschrift für Berg-Hütten und Salinenwesen." Describes the mode of calculation and illustrates a reliable instrument for carrying out these measurements. 1300 w. Col Guard—Aug. 11, 1899.

**Victorian Report.**—Report of the Victorian Mines Ventilation Board. Abstract of report by the board appointed to deal with the applications received for a bonus of £1,000 offered by the Victorian Government for the best method of ventilating mines. 1500 w Ir & Coal Trds Rev—Oct. 13, 1899.

**Wickets.**—Resistance Opposed to Air-Currents by Wickets. Paul Petit. From a paper prepared for the International Congress at Paris. Considers the theory of the wicket, method of experimenting, and the results obtained. 2700 w. Col Guard—Aug. 17, 1900.

**MINE WATERS.**

**Ferric Sulphate.**—Ferric Sulphate in Mine Waters and Its Action on Metals. L. J. W. Jones. Paper read before the Colorado Scientific Society. Gives experience at Idaho Springs, with experiments, analyses, etc. Also discussion. 2800 w. W Min Wld—Sept. 11, 1897.

**MINING.**

See also COAL MINING; GOLD MINING; IRON MINING, ETC.; MINE; MINE MANAGEMENT; MINERAL INDUSTRY; MINERAL REGION; MINING AND METALLURGY; QUARRYING; SHAFT SINKING; TIMBERING.

Review of Recent Progress in the Mining Industry (Revue des Progrès de l'Industrie Minière). M. Leproux. Especially devoted to recent improvements in machinery and methods in all parts of the world, with many illustrations. 10000 w. Bull de la Société d'Encour—Nov., 1897.

**America.**—See also METALLURGY—America.

**American.**—American Metal Mining. Theodore F. Van Wagenen. The present article discusses the deposits of iron, their working and transportation. Serial. Min Rept—Oct. 4, 1900.

**Ancient.**—Ancient Mining: With Especial Reference to that Carried on in Great Britain. A. Cooper Key. The author has endeavored to consolidate and condense all the facts he could obtain in regard to ancient mining, and to present them as clearly as was possible in the limit of a short paper. The first part treats of Egyptian surface-working and mining, mines in Asia, and Phoenician mining. 1200 w. Min Jour—May 16, 1896.

Phoenician Mining. A. Cooper Key. From a paper on "Ancient Mining," read before the Inst. of Mining and Metallurgy. The journeyings of the Phoenicians in seeking riches, as few metals were found in their country. 1800 w. Col Guard—Aug. 21, 1896.

**Arizona.**—Mining in Yavapai County, Arizona. John F. Blandy. Some notes on the development work of this field. 900 w. Eng & Min Jour—Nov. 5, 1898.

**Asia Minor.**—Notes on the Cost of Mining and Earthwork in Asia Minor, Persia, and Burmah. T. Trafford Wynne. Statistics of the cost of labor in various mining operations in countries not often visited. 1600 w. Min Jour—July 18, 1896.

**Belgium.**—The Operation of the Mines of Belgium (De l'Exploitation des Mines en Belgique). H. Kuborn. A review of the Belgian mines, with especial reference to the conditions of health and safety of the employees. Tables of data are given from 1850 to the present time. 4500 w. La Rev Tech—Jan. 25, 1899.

**Bracing.**—See TIMBERING.

**British Columbia.**—Mining and Transportation. William M. Brewer. Some of the methods practiced in British Columbia and the conditions of geography and climate which necessitate them. 1800 w. Mines & Min—June, 1898.

See also GOLD REGION; MINERAL REGION.

**Brussels Exhibition.**—See Wedges and Explosives.

**Burmah.**—See Asia Minor.

**California.**—California as a Mining Country. Arthur Lakes. How it impresses a Coloradoan in regard to its general appearance and methods of working and treating the ores. 2300 w. Mines & Min—Jan., 1899.

Mining in California. J. R. Schuphaus. A review of the general conditions surrounding the mining industry and its progress during 1898. 2200 w. Mines & Min—Jan., 1899.

**Caving System.**—The Caving System of Mining. E. F. Brown. Illustrated description of the method employed in the Pewabic mine, at Iron Mt., Mich. 2500 w. Min & Sci Pr—Dec. 9, 1899.

**China.**—Metal Mining in China. Herbert C. Hoover. Paper read before the Inst. of Min. & Met., London. Concerning the geography, geology and history of metal mining in the provinces of Chi-li and Shantung. Copper, gold and silver ore found and native methods of mining described. 3000 w. Aust Min Stand—June 7, 1900.

See MINERAL REGION; MINING CONCESSIONS; MINING REGULATIONS.

**Coal.**—See COAL MINING.

**Colorado.**—Evolution of Mining and Ore Treatment in Colorado. Thomas Tonge. A comprehensive exposition of the effect of improved appliances, exact methods and economical management in developing low-grade properties and eliminating the element of chance in mining. 3000 w. Eng Mag—Nov., 1899.

See also MINE; MINERAL INDUSTRY; MINERAL REGION.

**Compressed Air.**—See COMPRESSED AIR—Mining.

**Congelation.**—Horizontal Driving with the Aid of Congelation. M. F. Schmidt. Two methods were described before the Société de l'Industrie Minérale of Saint Etienne. One where the freezing pipes were inserted around the periphery of the section, the other where the whole heading was frozen solid. A cut illustrates each method. 1600 w. Col Guard—March 27, 1896.

The Use of Congelation in Mining Operations. From a communication by M. F. Schmidt, to the Société de l'Industrie Minérale, Saint Etienne. A condensation from the original exhaustive article which covers the entire field and deals with both the scientific and economic applications of this principle. Serial. Col Guard—Feb. 21, 1896.

See also SHAFT SINKING—Freezing Process.

**Crossings.**—Some Notes on "Crossings." Herbert C. Hoover. The crossing referred to is where the vein passes through some material differing from the country rock. Sections illustrating crossings through slate are given and the statement made that the vein continues usually on the other side. 1200 w. Min & Sci Pr—Feb. 29, 1896.

**Deep.**—Deep Mining at the Utica Mine, Angels, California. J. H. Collier, Jr. Gives an outline of the general nature of the deposit and the difficulties of mining, shaft sinking, etc, with detailed explanation of the excavation of the ore. Ill. 6500 w. Trans Am Inst of Min Engs—Sept., 1900.

Mining at Great Depths. Bennett H. Brough. An elaborate paper discussing all phases of the subject. It gives a summary of existing literature on the subject and observations of the writer. 11400 w. Jour Soc of Arts—Dec. 11, 1896.

Mining at Great Depths. Reviews some of the great depths already reached and discusses proposed work, especially in the Witwatersrand. 1200 w. Engr, Lond—Nov. 3, 1899.

See also GOLD MINING—Victorian Deep Leads; MINE; MINE SHAFT; SHAFT SINKING.

**Ditch.**—See DITCH—Idaho, Rapp's Creek.

**Education.**—See EDUCATION; MINING ENGINEER.

**1885-97.**—Improvements in Mining and Metallurgical Appliances during the Last Decade. E. Gybbon Spilsbury. Reviews the many and various improvements made in the last ten or twelve years which have resulted in increase of output and lessening of cost. 5500 w. Trans Am Inst of Min Engs—Nov., 1897.

**Electric.**—See ELECTRIC EQUIPMENT—Mine; MINING MACHINERY.

**Errors.**—Mistakes in Mining. Edmund B. Kirby. Calling attention to mistakes and waste in mining and working of ores. 2000 w. Min & Sci Pr—Dec. 31, 1898.

See also MINE MANAGEMENT.

**Freezing Process.**—See Congelation; SHAFT SINKING.

**Gold.**—See GOLD MINING.

**Great Britain.**—Twenty Years' Mining Progress. James T. Forgie. Abstract of a presidential address delivered before the Mining Inst. of Scotland. Reviews the marked progress in Great

Britain and especially in Scotland. 3200 w. Col Guard—June 17, 1898.

**Herberton, Queensland.**—The Mining in and Around Herberton, North Queensland. John Munday. Paper contributed to the Aust. Assn. for the Advancement of Science. Describes lode mining and alluvial mining in this locality, and machinery used. 2800 w. Min Jour—Aug. 1, 1896.

**Hydraulic.**—See **HYDRAULIC MINING.**

**Iron.**—See **IRON MINING.**

**Ladders.**—See **LADDER.**

**Lake Superior Practice.**—Elements of Methods of Metal Mining, Based upon Lake Superior Practice. F. W. Denton. A description of the method or system of mining, the work of the removal of the deposit, and the considerations which should influence the establishment of a method of mining. Ill. 6200 w. Engs' Year Book, Univ of Minn—1896.

See also **IRON MINING.**

**Live Stock.**—See **MINE HORSES.**

**Location.**—See **MINERAL REGION.**

**Mechanical Appliances.**—Economics in Mining by the Use of Mechanical Appliances. Cyrus Robinson. The advantages gained by their adoption, with statements of their economy and the conditions suited to the different kinds. 2900 w. Col Eng—July, 1896.

See also **MINING MACHINERY.**

**Mechanics.**—The Mechanics of Mining. D. W. Robb. Read before the Canadian Mining Assn. Deals with the successful operation of a mine. 1400 w. Can Eng—March, 1897.

**Mexico.**—Mexican Methods of Mining. Describes the modus operandi of a typical Mexican mining company. 1700 w. Min & Sci Pr—Aug. 27, 1898.

Mexican Methods of Mining. S. B. Newall. Abstract of a paper read before the Institution of Mining and Metallurgy, London. Describes the methods of working, and their adaptation to the majority of Mexican mines. 1700 w. Col Guard—Jan. 28, 1898.

See also **MINERAL REGION.**

**Mexico, Chiapas.**—Mining in the State of Chiapas, Mexico. Read before the Inst. of Mining and Metallurgy. Transportation, climate, labor, geology, etc., are intelligently described. 3800 w. Min Jour—April 4, 1896.

**Mexico, Durango.**—Mining and Smelting in the State of Durango, Mexico. H. Van F. Furman. An illustrated description of the mines and some peculiar problems met with in smelting. 3000 w. Mines & Min—May, 1900.

**Mexico, Oaxaca.**—Notes on Mining in Oaxaca, Mexico. Maurice Clark. Reports concerning the three mining districts of this state, and pronounces it one of the most favorable fields in Mexico. 2200 w. Eng & Min Jour—July 10, 1897.

**Mexico, Sinaloa.**—Mining in Sinaloa, Mexico. John W. Gray. Some notes on the mines of the state and the extent of their development. 2000 w. Mines & Min—May, 1899.

**Michigan.**—Notes on Michigan Mining Practice. W. L. Hildburgh. Notes on mine plants and methods of mining in the iron and copper regions. 11300 w. Sch of Mines Quar—Jan., 1899.

**Microscope.**—See **METALLOGRAPHY; MICROSCOPE.**

**Miners' Baths.**—See **MINER—Baths.**

**Motive Power.**—Motive Power at the Mines. A. E. Chodzko. A discussion of the most desirable methods in the production of motive power at a mine. Serial. Min & Sci Pr—Nov. 18, 1899.

See also **MINING MACHINERY.**

**Oil Engine.**—See **OIL ENGINE—Mining.**

**Omaha Exposition.**—See **MINERAL.**

**Persia.**—See **Asia Minor.**

**Peru.**—Mining in the Department of Ancachs, Peru. F. J. Schafer. Brief reports of the different companies, giving mining conditions and general remarks on Ancachs. 2000 w. Eng & Min Jour—Sept. 4, 1897.

**Philippines.**—See **METALLURGY; MINERAL REGION; MINING TOOL.**

**Phoenician.**—See **Ancient.**

**Prussia, 1896.**—Advances in Mining in Prussia in 1896 (Versuche und Verbesserungen beim Bergwerksbetriebe in Preussen während des Jahres, 1896). A very full review of improvements in tools, methods and appliances. Three articles. 1200 w. Glückauf—Aug. 21, 28, Sept. 4, 1897.

**Prussia, 1897.**—Improvements in Mining Plant and Methods. From an official report on the working of the Prussian mines during 1897. Part first deals mainly with blasting. Serial. Col Guard—Sept. 30, 1898.

**Prussia, 1898.**—Progress in Mining in Prussia During 1898 (Versuche und Verbesserungen beim Bergwerksbetriebe in Preussen während des Jahres, 1898). A very complete review of the year's progress, with numerous illustrations. Four articles. 8000 w. Glückauf—Sept. 16, 23, Oct. 1, 7, 1899.

**Queensland.**—Government Experts on Queensland Mining. C. C. Longridge. Special features from the reports of R. L. Jack, W. H. Rand, A. G. Maitland and P. F. Sellheim. 1200 w. Min Jour—March 20, 1897.

**Section Work, Horizontal Rocks.**—Rapid Section Work in Horizontal Rocks. Marius R. Campbell. A new system introduced by the writer which has met with general approval. 5400 w. Trans Am Inst of Min Engs—July, 1896.

**Shaft Sinking.**—See **SHAFT SINKING.**

**Staffordshire Primitive.**—Primitive Mining in Staffordshire. A brief account of the early mining in this district. 900 w. Col Guard—Sept. 1, 1899.

**Submarine, Spain.**—Under-Sea Mining at Arnao, Spain. Alphonse Dory. From a communication to the Société des Ingénieurs des Mines du Hainaut. Describes the surface and underground works. Ill. 3000 w. Col Guard—March 16, 1900.

**Timbering.**—See **TIMBERING.**

**Transportation.**—Notes on Mining and Transportation. Harry J. Lewis. Read before the Western Pennsylvania Central Mining Institute. Showing how closely allied are these two industries. 1500 w. Am Mfr & Ir Wld—Dec. 24, 1897.

See also **COAL TRANSPORTATION; IRON ORE TRANSPORTATION; MINERAL TRANSPORTATION; TRANSPORTATION.**

**Tunnel.**—See **MINE DRAINAGE; TUNNEL—Mine.**

**U. S. Geological Survey.**—Hydrographic Investigations of the U. S. Geological Survey in Their Relation to Mining. F. H. Newell. Explains the manner of carrying on these investigations and their value. Ill. 3000 w. Trans Am Inst of Min Engs—June, 1900.

**Wedges.**—See also **QUARRYING.**

**Wedges and Explosives.**—Mechanical Substitutes for Explosives at the Brussels Exhibition. Victor Watteyne and Armand Halleux. From a report on the plant and methods of mine working at the Brussels International Exhibition of 1897. 1800 w. Col Guard—April 15, 1898.

Wedges and Explosives in Mines. Utility of Elliot's compound wedge. 800 w. Eng, Lond—Aug. 14, 1896.

**MINING AND METALLURGY.**

See also **METALLURGY; MINING.**

Improvements in Mining and Metallurgical Appliances During the Last Decade. E. G. Spilsbury. Notes the many and varied improvements, progress in furnace practice, steel-making, copper production, gold, silver and lead, aluminum and nickel. Pres. Address at the Chicago meeting of the Am. Inst. of Min. Engs. 6300 w. Ir Age—Feb. 25, 1897.

**Austria-Hungary, 1899.**—Austro-Hungarian Foreign Trade in Mining and Metallurgical Products for 1899 (Der Auswärtige Handel des Oesterreichisch-Ungarischen Zollgebietes in Waaren der Montanindustrie im Jahre, 1899). Dr. Moritz Caspaar. A general account, with statistical tables. Two articles. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 5, 12, 1900.

**Belgium.**—Mining and Metallurgy in Belgium During 1898 and the First Half of 1899 (Bergwerks und Hüttenbetrieb in Belgien im Jahre, 1898, und im I. Semester, 1899). A short article taken from the "Annales des Mines de Belgique," giving tables showing the production of mines, accidents, etc. 400 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 17, 1900.

**Belgium, Charleroi.**—A Tour of the Charleroi District, Belgium (Excursions dans le Bassin de Charleroi). M. J. Smeysters. An account of the visit of a party of engineers to the various mining and metallurgical establishments in the district about Charleroi, Belgium, with much information of interest. 10000 w. 8 plates. Rev Univ des Mines—Jan., 1899.

**Bosnia-Herzegovina.**—Mining and Metallurgy in Bosnia and Herzegovina in 1899 (Das Berg-und Hüttenwesen in Bosnien und der Hercegovina im Jahre, 1899). General statistics, with tables. 1200 w. Oest Zeitschr f Berg u Hüttenwesen—June 30, 1900.

**Budapest Exposition, 1896.**—Notes from the Millennial Exposition (Von der Millenniums-Landesausstellung). Giving an account of the exhibits relating to the mining industry; chiefly mechanical. 1000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 13, 1897.

The Hungarian National Exhibition. A description of the interesting mining exhibit. 2500 w. Col Guard—July 3, 1896.

**Congress, Paris, 1900.**—The Congress of Mines and Metallurgy at the Paris Exposition (Congrès des Mines et de la Métallurgie). Gérard Lavergne. An abstract of the proceedings of this congress, held June 18 to 23. 3500 w. Génie Civil—Aug. 4, 1900.

**France.**—State of Mining and Metallurgy in France. From a report founded upon data collected by the "Ingénieurs des Mines" during 1895, to the French Minister of Public Works. 2200 w. Col Guard—April 17, 1896.

**Germany and Luxemburg.**—The Mining Products of Germany and Luxemburg for 1899 (Die Gewinnung der Bergwerke, Salinen und Hütten im Deutschen Reich und in Luxemburg während des Jahres, 1899). Preliminary official report, giving tables of both raw and manufactured mineral products, both as to weight and market value. 500 w. Glückauf—April 7, 1900.

**History.**—The Characteristics and Conditions of the Technical Progress of the Nineteenth Century. James Douglas. Presidential address reviewing the changes that have affected the industrial growth of the United States. 7300 w. Trans Am Inst of Min Engs—Sept., 1899.

Three-Quarters of a Century's Progress in Mining and Metallurgy. Charles Kirchhoff. Full address reviewing progress, delivered on the occasion of the celebration of the Seventy-Fifth Anniversary of the Franklin Institute. 5000 w. Jour Fr Inst—Dec., 1899.

**Paris Exposition.**—Mining and Metallurgy Exhibits at the Paris Exposition. Description of the exhibits, with a few illustrations. 3200 w. Eng News—July 19, 1900.

See also **CONCRETE REINFORCED—Paris Exposition Buildings; IRON EXHIBITION; METALLURGICAL EXHIBITION.**

**Russia.**—Mining and Metallurgy in South Russia (Le 24 Congrès de l'Industrie Minérale du Sud de la Russie). An account of the proceedings of a meeting of those engaged in mining and metallurgy in South Russia, with statements about the coal, iron and other industries, and lines of communication. 2500 w. Moniteur Industriel —May 26, 1900.

**Stockholm Exhibition.**—The Mining and Metallurgical Industries of Sweden as Shown at the Stockholm Exhibition. Bennett H. Brough. Interesting account with excellent description of exhibits in the departments named. Also discussion. Ill. 10000 w. Jour Soc of Arts—Dec. 10, 1897.

See also **IRON EXHIBITION.**

**United States, Southern.**—The Mining and Metallurgical Industries of the Southern States. Part first relates to the mining of iron ores, and gives illustrations of the mines in Alabama, with details of the economic conditions. 2000 w. Ir & Coal Trds Rev—Sept. 8, 1897.

**MINING CONCESSIONS.**

See also **MINERAL REGION; MINING LAW.**

**China.**—British Mineral Concessions in China. A résumé of the meeting of the Pekin Syndicate held in London, with other statements in regard to the Shansi concessions. 1800 w. Col Guard—Nov. 18, 1898.

Chinese Mining Regulations. A copy of amendments to the regulations governing mines. 900 w. U S Cons Repts, No. 553—Oct. 14, 1899.

Mining and Railway Companies in China. Comments on the seeming chaos prevailing, and discusses the new regulations which have been preferred by the Tsung-li-Yamen, for regulating railway and mining enterprises. 1700 w. Engng—Feb. 3, 1899.

Mining in Szechuen. A copy of the regulations for the working of mines in this province. 3800 w. U S Cons Repts, No. 471—July 8, 1899.

Present Situation of the Mining Industry in China. H. C. Hoover. Information relating to the regulations and concessions affecting the mining industry. 2000 w. Eng & Min Jour—May 26, 1900.

Regulations for Mines and Railways in China. Translation of the regulations prepared by the bureau of control for mines and railways. 1400 w. U S Cons Repts, No. 355—Feb. 20, 1899.

The Present Position of Mining in China (Die Gegenwärtige Lage des Bergbaues in China). Paul Speier. A list of the principal mining concessions to foreign companies, with some of the Chinese regulations governing concessions. 800 w. Glückauf—July 7, 1900.

The Value of Chinese Mining Concessions. John A. Church. A discouraging report of the mining outlook in China. 1100 w. Eng & Min Jour—June 23, 1900.

**Siberia.**—Siberian Mining Concession. Concerning concessions and the mining industry, the restrictions and the outlook. Does not advise Americans without capital to enter this field. 1600 w. U S Cons Repts, No. 754—June 13, 1900.

**MINING ENGINEER.**

**Address.**—Presidential Address of Mr. Lindsay Wood. Address before the Federated Institute of Mining Engineers, London. Discusses the influence of mining and engineering institutes, the advancement made in the science of mining, etc. 4300 w. Ir & Coal Trds Rev—June 4, 1897.

**American Institute.**—Colorado Meeting of the American Institute of Mining Engineers. List of the 48 papers presented, with brief abstracts of some of them. 5000 w. Eng & Min Jour—Sept. 26, 1896.

The Colorado Meeting of the American Institute of Mining Engineers. The programme of the meeting, with brief abstracts of a number of papers presented. 4000 w. Eng & Min Jour—Sept. 19, 1896.

The Mining Engineers meeting of the American Institute at Buffalo. A brief account of the meeting with abstracts of papers presented. 7500 w. Ir Age—Oct. 27, 1898.

**Coal Mines.**—See **COAL MINING—Engineer.**

**Education.**—Technical Training in Mining. Henry Louis. Read at meeting of Federated Inst. of Min. Engs., at Newcastle-on-Tyne. An examination of the principles that should form the basis of a sound mining education. Discussion. 4700 w. Col Guard—Feb. 25, 1898.

The Training of Mining Engineers. Part first discusses why the present system, or systems, have not worked satisfactorily. The next paper will offer suggestions. Serial. Col Guard—Nov. 5, 1897.

See also **EDUCATION; MINING SCHOOL.**

**Geology.**—Geology as Applied to Mining. James Stirling. The importance of a knowledge of geology to the mining engineer, and the facts that are helpful to him. 3500 w. Aust Min Stand—Sept., 1896.

**German Society.**—See also **IRON INDUSTRY—Convention.**

**Reports.**—See **MINE PROMOTION; MINE VALUATION.**

**MINING INDUSTRY.**

See **MINE; MINERAL INDUSTRY; MINERAL REGION; MINING; MINING AND METALLURGY.**

**MINING LAW.**

See also **COAL MINER; MINE ACCIDENT; MINE INSPECTION; MINER; MINING CONCESSION.**

Mining Law and Its Bearing on the Development of Mines and Mining Districts. Frank C. Loring. Paper read at meeting of the B. C. Assn. of Min. Engs. Historical review of laws in various lands regarding ownership and right to dispose of mines, reviewing quite extensively the conditions existing in the United States, with the special object of considering the state of affairs in British Columbia. 7500 w. Can Min Rev—Jan., 1898.

Mining Law in British Columbia, Mexico and the United States. Rossiter W. Raymond. A general summary by the secretary of the American Institute of Mining Engineers intended to afford a basis for comparison with other countries and especially with the laws of South Africa. 2500 w. Eng Mag—March, 1898.

Mining Law of Foreign Countries. Reviews and compares the laws of different lands. 1600 w. Col Guard—Dec. 24, 1896.

**Alaska.**—See **Yukon.**

**Australia.**—Needed Reforms in Mining. James Inglis. Read at meeting of Sydney Chamber of Commerce. Calling attention to the need of a new mining law for Australia, and discussing the special points needing correction. 2500 w. Aust Min Stand—May 19, 1898.

See also **New South Wales; Queensland; Victoria; Western Australia.**

**British.**—Covenants to Work Mines. Reviews decision under English law upon this subject. 2800 w. Col Guard—Jan. 7, 1898.

Provision for Dead Rents in Mining Leases. Explaining British law on this subject. 2400 w. Col Guard—Jan. 21, 1898.

Royalties and Wayleaves and Their Treatment. George Johnson. An explanation of these terms and difficulties arising from them in the United Kingdom. 2800 w. Col Guard—June 2, 1899.

The Statute of Limitations, with Regard to Mining Trespass. Cites cases illustrating English law on this subject. 1200 w. Col Guard—Jan. 27, 1899.

See also **Subsidence.**

**British Coal.**—Colliery Royalty Accounts and Depreciation. George Johnson. Explains the meaning of the term "royalty," and gives an illustration. 2500 w. Col Guard—Aug. 12, 1898.

The Interpretation of a Colliery Guaranty. Gives the text of a common form of colliery guaranty with the various clauses numbered and explained by references to points which have been decided in the courts. 4400 w. Col Guard—Sept. 29, 1899.

The Sale of Coal Under the Weights and Measures Act of 1889. Brief statements of noteworthy adjudications pronounced by the Queen's Beach Divisional Court. 2800 w. Col Guard—Oct. 13, 1899.

**British Columbia.**—Mineral Lode Locations in British Columbia. William Braden. An account of the trial and abandonment of this feature, and the working of the Mineral act as it stands to-day. 1500 w. Am Inst of Min Engs—Oct., 1898.

Mining Laws of British Columbia. Copy of a placer mining act passed Jan. 18, 1899. 3600 w. U S Cons Repts, No. 413—April 29, 1899.

The Mineral Act of British Columbia. R. W. Raymond. Considers various points of the law, especially the size of claims, the proof of their mineral value, and the manner of their demarkation. 2000 w. Can Min Rev—Feb., 1898.

**British Damages.**—Remedies for Mining Damages. Laws of England as governing property acquired in mines are discussed, especially in cases requiring modification of the usual remedies. 1800 w. Col Guard—Feb. 19, 1897.

**British Leases.**—Arbitration Clauses in Mining Leases. Adjudications and essential facts relating to decisions pronounced in the Supreme and Appeal Courts of England, and in the Court of Session of Scotland. 3000 w. Col Guard—Sept. 1, 1899.

Specific Performance of Contracts for Lease of Mines. The essential facts of the decisions in the cases relating thereto which have come before the High and Appeal Courts of England for adjudication. Also a statement of the principles which guide these courts in directing and refusing specific performance of contracts. 3000 w. Col Guard—April 2, 1897.

**British Mortgage.**—Working Mines by Mortgages in Possession. Cases in equity defining the privileges of the party holding mortgage. 1800 w. Col Guard—Jan. 31, 1896.

**British Taxes.**—Rating of Mines. Information of English law on this subject, with several cases illustrating contested points. 2000 w. Col Guard—Oct. 22, 1897.

**British Titles.**—Acquisition of Mines by Adverse Possession. An explanation of English law relating to titles of mines or quarries. 2700 w. Col Guard—Dec. 17, 1897.

**British, Under Water.**—Mines Under Rivers, the Foreshore, and Streams and Locks. Essential points and facts of decisions pronounced by the high courts of England on this subject. 2500 w. Col Guard—April 21, 1899.

**British Waterworks.**—Mines and Minerals Under and Adjacent to Waterworks. A statement of British law and report of cases. 3000 w. Col Guard—Dec. 9, 1898.

**California.**—Needed Mining Laws. Proposed mining laws for remedying the defects that exist in California, with editorial comment. 6500 w. Min & Sci Pr—Oct. 31, 1896.

See also **HYDRAULIC MINING.**

**Canada.**—Mr. Hamilton Smith on Canadian Mining Regulations. Extracts from a letter published in the Montreal "Star," containing much of interest in regard to the mining regulations for the Yukon district. 1200 w. Eng & Min Jour—March 19, 1898.

New Canadian Mining Regulations. A copy of the new regulations issued by the Interior Department of Canada, governing mining in the Yukon regions. 5500 w. U S Cons Repts—March 10, 1898.

See also **British Columbia; Nova Scotia; Ontario; Yukon.**

**China.**—See **MINING CONCESSIONS.**

**Colorado.**—The Colorado Mining Law. A copy of the code of regulations provided for mines in operation, which is a part of a new law which goes into effect July 9. 1800 w. Eng & Min Jour—May 27, 1899.

An Important Tunnel Decision. Full text of the Colorado Supreme Court regarding the ownership of mineral where a tunnel site crosses prior locations. 17500 w. Min & Sci Pr—Dec. 9, 1899.

The Calhoun-Ajax Case. The Rights of Tunnels and of Locations on Cross Veins. A recent decision of the Supreme Court of Colorado on a subject of importance. 4800 w. Eng & Min Jour—Dec. 30, 1899.

**Contracts.**—Questions Arising on Mining Contracts. Gives cases illustrating the sort of questions arising and of the principles of British law that are applied to their decision. 3000 w. Col Guard—Sept. 30, 1898.

**Co-ownership.**—The Law as to the Co-ownership of Mining Property. Discusses the subject from the English point of view. 2800 w. Col Guard—April 15, 1897.

**Criminal.**—The Criminal Law Relating to Mines. An exposition of British law on this subject. 2400 w. Col Guard—Jan. 14, 1898.

**Damages.**—Damages for Breaches of Contract in the Coal Trade. British law on this subject is shown by report of important cases. 2800 w. Col Guard—Dec. 31, 1897.

Delay in Seeking Remedy for Mining Damages. An explanation of English mining law on this subject. 3000 w. Col Guard—Dec. 24, 1897.

See also **British.**

**Denver Convention.**—The Proposed Revision of the Mining Laws. Full text of the report of the subcommittee of the International Gold Mining Convention at Denver. 3500 w. Eng & Min Jour—Dec. 4, 1897.

**Easements.**—Mining Easements. An explanation of the law relating to easements in England. 2200 w. Col Guard—March 5, 1897.

**Extra-Lateral Rights.**—The Question of Extra-Lateral Rights. A. H. Wethey. A discussion of Court decisions, having the plan of claims and workings illustrated. 2400 w. Eng & Min Jour—Jan. 11, 1896.

**Germany and Austria-Hungary.**—Mining Rights in Germany and Austria-Hungary. Particulars with regard to mining rights in Prussia from the official report by Mr. C. Fortéscue-Brickdale. The information was collected at Beuthen, in Silesia, the centre of one of the largest mining districts. 1100 w. Col Guard—Dec. 4, 1896.

**Gold Dredging.**—See **GOLD DREDGING—Law.**

**Indiana.**—Mining Legislation in Indiana. Robert Fisher. A history of its development and the improvement of the condition in the mines up to the present time. Statistics for 1897. 1500 w. Mines & Min—July, 1898.

**Klondike.**—See **Yukon.**

**Last Chance Decision.**—The Last Chance Decision. Important decision of the U. S. Supreme Court. Full text. Serial. Eng & Min Jour—July 16, 1898.

**Locating Claims.**—Location Before Discovery. R.

W. Raymond. A consideration of the arguments opposing the location of claims on public mineral lands of the United States without proof of discovery within the claim of a valuable mineral deposit, with statements defining the situation. Serial. Eng & Min Jour—Feb. 12, 1898.

**Lodes vs. Placers.**—Lodes vs. Placers. F. T. Freeland. Discusses an opinion rendered by Justice Goddard in the Supreme Court of Colorado, and also other decisions. 900 w. Eng & Min Jour—April 1, 1899.

**Mexico.**—Outlines of the Mexican Mining Code. C. C. Longridge. The introduction of this code is said to have very much simplified mining business, and greatly diminished the occasions for misunderstanding and litigation. 1600 w. Min Jour—Dec. 5, 1896.

**New South Wales.**—Chamber of Mines, N. S. W. Suggestions for the amendment of mining laws submitted to the Minister for Mines. 2200 w. Aust Min Stand—Feb. 25, 1899.

**Nova Scotia.**—Amendments to the Nova Scotia Mines Act. A report before the Mining Society making various recommendations for the consideration of the law-makers. Mining education was discussed and the nature of the instruction specified. 9000 w. Can Min Rev—Dec., 1895.

On the Proposed Revision of the Mines Act of Nova Scotia. Alex. McNeill. From "Proceedings" of Dec. meeting of the Mining Society of Nova Scotia. An examination of the proposed law, with general discussion. 6000 w. Can Min Rev—Feb. 28, 1899.

**Ontario.**—The Mines Law of Ontario. Archibald Blue. Read before the mining congress, at Milwaukee. The provisions of the law in regard to prospecting and the acquiring of mining locations, etc. 3500 w. Mines & Min—Oct., 1900.

The Ontario Mines Act. R. W. Raymond. Discusses some of the features. 1800 w. Can Min Rev—Oct., 1897.

**Pennsylvania Anthracite.**—Mine Legislation and Inspection in the Anthracite Coal Region of Pennsylvania. G. M. Williams. Address before the International Mining Congress at Salt Lake City. States the salient parts of the law, and the benefits derived, reviewing the legislation enforced and the duties of inspectors. 2700 w. Min & Sci Pr—July 23, 1898.

**Pennsylvania Bureau.**—A Chief of Bureau of Mines for Pennsylvania. A certified copy of the law providing for the new officer, and defining his duties. 2300 w. Col Eng—Aug., 1897.

**Petroleum.**—See PETROLEUM LAND.

**Providence-Champion Decision.**—The Providence-Champion Decision. R. W. Raymond. Discusses the parts of the case having a general application, and the decision rendered. 1600 w. Eng & Min Jour—Aug. 20, 1898.

**Prussia.**—See Germany; MINE INSPECTION.

**Queensland.**—Queensland Mines Regulations. A summary of some of the recommendations made by the Royal Commission, appointed to report on the laws relating to mining for gold and other minerals. 1200 w. Col Guard—Dec. 3, 1897.

**Russia.**—See GOLD MINING—Russian Law.

**Siberia.**—See MINE MANAGEMENT.

**Soudan.**—Mining Ordinance in the Soudan. A copy of the Mining Ordinance of 1899. 1400 w. N Z Mines Rec—May 16, 1900.

**Spanish Grants in United States.**—Mining Titles on Spanish Grants in the United States. R. W. Raymond. Considerations affecting the validity of a mining deed. 3000 w. Trans Am Inst of Min Engs—Feb., 1896.

**Subsidence.**—Some Recent Cases on the Law of Support. Some cases on damage caused by subsidence as recently decided in English courts. 2000 w. Col Guard—Aug. 31, 1900.

The Right to Vertical Support. Discusses the right of owners of the surface to absolute support of property in mining regions. 2000 w. Col Guard—Feb. 5, 1897.

See also MINE.

**Tasmania.**—Tasmanian Mining Laws. J. W. Hudson. A statement of reforms that the writer considers necessary to make this field attractive to capitalists. 2400 w. Aust Min Stand—Sept. 8, 1898.

**Tenants' Rights.**—Tenant-for Life's Power to Work Mines. A legal discussion of the rights of life tenants in connection with the development of mining property. 1200 w. Col Guard—Sept. 2, 1898.

**Tunnel.**—See TUNNEL.

**United States.**—Proposed Change in Federal Mining Law. Address of W. S. Keyes before the California State Miners' Assn. on the amendments required to the existing statutes of the United States concerning mineral lands. 5500 w. Min & Sci Pr—Nov. 6, 1897.

The Proposed Revision of the United States Mining Law. R. W. Raymond. Editorial discussion of the improvements urged by Francis T. Freeland. 1100 w. Eng & Min Jour—Oct. 30, 1897.

United States Mining Laws, and Regulations Thereunder, Relative to the Reservation, Exploration, Location, Possession, Purchase and Patenting of the Mineral Lands in the Public Domain. The latest official compilation of Federal Mining Law. Serial. Min & Sci Pr—Feb. 19, 1898.

The Proposed Revision of the United States Mining Law. R. W. R. Editorial criticism of the resolutions presented by W. S. Keyes, and the propositions of Mr. Freeland. 1800 w. Eng & Min Jour—Dec. 11, 1897.

See also Spanish Grants.

**Vertical Support.**—See Subsidence.

**Victoria.**—Victorian Mining Law. Joseph Woolf. Summary of statute law and regulations. 4000 w. Aust Min Stand (special)—June 1, 1899.

**Washington.**—The Field Mining Law. A new set of regulations that became effective in the State of Washington, June 9, 1899. 1700 w. Mines & Min—Nov., 1899.

**Western Australia.**—Mining Tenure in Western Australia. Raymond Radclyffe. Showing how the interests of investors are jeopardized by the anomalous state of the law, and emphasizing the necessity of reform. 1200 w. Min Jour—June 20, 1896.

**Yukon.**—The Mining Regulations for the Canadian Yukon. The new regulations governing placer mining and dredging of this district in Canadian territory. 4400 w. Eng & Min Jour—Feb. 5, 1898.

The Yukon Mining Laws. Rossiter W. Raymond. Comments on and objections to the regulations governing placer mining along the Yukon river and its tributaries, recently adopted by the Dominion Government. 2000 w. Can Min Rev—Aug., 1897.

The Yukon Royalty. A. N. C. Treadgold. Discusses the justice of the royalty imposed, concluding that the crown keeps back too much considering the conditions. 1500 w. Can Min Rev—Sept., 1898.

Yukon Gold Region. Canada's Mining Regulations. Copy of the regulations governing placer mining on the Yukon, issued by the Canadian Government. 3300 w. U S Cons Repts—Oct., 1897.

## MINING MACHINERY.

See also COAL-CUTTING MACHINERY; COAL-MINING MACHINERY; ELECTRIC EQUIPMENT; MINING—Mechanical Appliances.

**Abuse.**—Abuse of Mining Machinery. D. L. Howard. Read before the Ohio Inst. of Min. Engs. Calls attention to a few of the abuses and injuries and the disadvantages under which the machinery is worked. 1300 w. Can Min Rev—Aug. 31, 1899.

**Boring.**—Boring in Mines. T. Railton. Notes of a lecture delivered to mining students at Abercynon. Results from the experience of the writer, dealing with methods and different classes of work in boring. 2500 w. Col Guard—May 20, 1898.

The Historical Development of Boring (Die Bohrtechnik in Ihrer Historischen Entwickelung). An address by Oberbergrat Tecklenburg, reviewing the development of deep boring for mining and prospecting. 3500 w. Glückauf—Dec. 9, 1899.

See also Drill; Electric Drill; ROCK DRILL.

**Boring, Fauck's Apparatus.**—A New System of Boring (Ueber ein Neues Bohr System). An account of Fauck's apparatus for deep rock boring. The impact tool is operated at the end of a cord, the blows being given by a specially designed and illustrated mechanism. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—April 9, 1897.

**Boring, Raky Apparatus.**—The Raky Boring Apparatus. A. Lukaszewski, in "Oesterrichische Zeitschrift für Berg- und Hüttenwesen. Illustrates and describes an improved percussion system which has worked well under trying conditions. 1200 w. Col Guard—Jan. 13, 1899.

**British Columbia.**—Mining Machinery in the Slocan. Howard West. Read before the meeting of the Brit. Col. Assn. of Min. Engs. Gives information of this division of West Kootenay and the machinery now in use. The writer thinks the district is destined to become a marvellous producer of the precious metals. 4000 w. Can Min Rev—Jan., 1898.

**Coal.**—See **COAL-CUTTING MACHINERY; COAL-MINING MACHINERY; ELECTRIC EQUIPMENT—Coal Mine.**

**Compressed Air.**—See **COMPRESSED AIR; COMPRESSED AIR PLANT; POWER TRANSMISSION; ROCK DRILL.**

**Copper.**—See **COPPER MINING MACHINERY.**

**Drill.**—Machine Drills in Stoping. B. L. Thane. An outline of the writer's experience in Alaska, with discussion of the work and its difficulties. 2800 w. Aust Min Stand—Sept. 28, 1899.

See also **Boring; Electric Drill; COAL MINING MACHINERY; ROCK DRILL.**

**Electric.**—Electric Mining in the Rocky Mountain Region. Irving Hale. States advantages of electric power, describes systems, gives history, illustrates and describes machinery and gives list of electric-power plants for mines, mills and melters in this region. 5800 w. Trans Am Inst of Min Engs—Sept., 1896.

The Application of Electric Power to Mining in British Columbia. George P. Low. A brief account of the Kootenay-Rossland transmission. 3400 w. Can Min Rev—Dec. 31, 1899.

See also **ELECTRIC EQUIPMENT—Coal Mine; Mine; ELECTRIC MOTOR—Portable.**

**Electric Drill.**—Boring a Mine Heading by Electricity. From "Le Génie Civil." Describes the system recently adopted by the Société de Charbonnages des Bouches-du-Rhône for driving a gallery. The electrical energy employed as motive power is generated by the pressure of the pit water. Ill. 2300 w. Col Guard—Feb. 26, 1897.

Electric Boring Installation at Gardanne. M. H. Dubs, in the "Bulletin de la Société Scientifique Industrielle de Marseilles. Describes the plant used in the construction of a tunnel from coal mines to the sea, near Marseilles. 900 w. Eng Rec—July 10, 1897.

Electric Rock Drilling by the Société de Charbonnages des Bouches-du-Rhône. Albion T. Snell. Particulars taken from a description by M. M. H. Dubs in the "Bulletin de la Société Scientifique de Marseille of the Galerie de la Mer." Ill. 2200 w. Elect'n—Feb. 26, 1897.

Electric Rotary Drills on Tunnel Work in France. Abstract from description in "Le Génie Civil," of a plant of the coal-mining company of Bouche-du-Rhône, France. The rock drills are operated by electric power generated by utilising the water under pressure which is contained in the strata through which the heading is being driven. Ill. 1500 w. Eng News—July 22, 1897.

Electric Transmission and Electric Drills for Mines. F. Hille. Read before the Can. Min. Inst. Discusses long-distance transmission, the production of electricity by some other medium than water and directly at the mines, the application to machine driving, and the advantage of the electric drill. Ill. 4000 w. Can Min Rev—May 31, 1899.

See also **TUNNEL—Gardanne-Marseilles.**

**Gold.**—See **GOLD MINING MACHINERY; GOLD PLACER—Machinery.**

**Hoisting.**—See **HOISTING; HOISTING ENGINE.**

**Maintenance.**—Care and Maintenance of Mining Machinery. G. D. Rice. Discusses the care necessary for the various kinds of machines, and mentions considerations to be taken into account. 2800 w. Am Gas Lgt Jour—Oct. 16, 1899.

**Mexico.**—See **MINE—Mexico.**

**Motors.**—The Design of Mining Motors. F. C. Caldwell. Read before the Ohio Inst. of Min Engs. The principles of their construction and the points to be considered in selecting motors for mining work. Ill. 2200 w. Mines & Min—May, 1898.

See also **ELECTRIC EQUIPMENT; ELECTRIC MOTOR; MINING—Motive Power; OIL ENGINE—Mining.**

**Philippines.**—See **METALLURGY; MINING TOOL.**

**Prussia.**—Improvements in Hauling, Winding and Loading. After extracts by "Glückauf" from the official report, "Versuche und Verbesserungen beim Bergwerksbetriebe in Preussen wahrend des Jahres, 1898." Descriptive. 2500 w. Col Guard—Feb. 23, 1900.

**Winding.**—See **HOISTING; HOISTING ENGINE.**

**MINING REGULATIONS.**

See **MINE MANAGEMENT; MINING CONCESSIONS; MINING LAW.**

**MINING ROAD.**

See **MINE ROAD; ROAD—Mining; TRANSPORTATION.**

**MINING SCHOOL.**

See also **EDUCATION; MINING ENGINEER—Education.**

**Michigan College.**—The Michigan College of Mines. M. E. Wadsworth. An account of the aim and work of this institution. 5300 w. Trans Am Inst of Min Engs—Feb., 1898.

**Witwatersrand.**—School of Mines for the Witwatersrand. John Daniell. Refers to some of the best known schools of mines, and the systems of instruction adopted, making suggestions relating to this special field. 2800 w. Chem & Met Soc of S Africa—Nov. 20, 1897.

**MINING TOOL.**

**Philippines.**—Mining Tools in the Philippines. George D. Rice. Illustrates and describes some of the crude types used by the natives. 1400 w. Eng & Min Jour—Oct. 27, 1900.

See also **METALLURGY; MINERAL REGION.**

**MINT.**

See also **COINAGE; MINTING.**

**Bullion.**—See also **ASSAYING; BULLION; GOLD BULLION.**

**Denver.**—The Denver Mint. Thomas Tonge. The first coinage of gold there by a private firm in the early "sixties." Great increase in Colorado's annual gold production. The careful methods followed. Ill. 2800 w. Mines & Min—March, 1899.

**Melbourne.**—The Melbourne Mint. Description of the melting house, assay department, refining, and coining department. 3000 w. Aust Min Stand—Aug. 27, 1896.

**Proof Gold and Silver.**—See **GOLD—Proof.**

**United States.**—The Mint Report. An editorial review of the report of the director of the U. S. mint. 700 w. Bradstreet's—Nov. 30, 1895.

**MINTING.**

See also **ASSAYING; BULLION; COINAGE; GOLD BULLION; MINT.**

The Minting of Gold and Silver. J. Foster Symes. Brief description of the operations. 2900 w. Yale Sci M—May, 1899.

The Mining and Minting of Gold and Silver. Alexander E. Outerbridge, Jr. A review of the last thirty years, the processes recently employed, coining, etc. 6000 w. Jour Fr Inst—Dec., 1898.

**MIRROR.**

**Ancient.**—Ancient Mirrors of Glass Backed with Metal (Sur les Miroirs de Verre Doublé de Métal dans l'Antiquité). Account, by M. Berthelot, of some interesting archaelogical specimens showing that the ancient Romans possessed the art of producing reflecting surfaces by backing glass with metal. 3000 w. Comptes Rendus—Oct. 4, 1897.

**MITIS.**

See also **CASTING; WROUGHT IRON.**

Mitis Founding. K. K. Gives a general idea of the process of making castings from wrought iron. Ill. 2000 w. Am Mach—Nov. 25, 1897.

**MODEL.**

Models and Model Loading (Modell und Modellbelastung). G. Griot. A discussion of the relative strength of models and full size structures, with an example of a loaded model roof truss. 1200 w. Schweizer Bauzeit—Oct. 13, 1900.

**Arches.**—See **ARCH—Austrian Experiments.**

**Engineering.**—The Use of Models in Engineering. Shows the use of models in giving information and gives examples of fine works illustrating bridges, aqueducts, canals, and works in mining and metallurgy. 1800 w. Engr, Lond—Feb. 24, 1899.

**Glyptic.**—See **GRAPHICS—Diagrams.**

**Locomotive.**—See **LOCOMOTIVE; RAILWAY.**

**Railway.**—See **RAILWAY—Model.**

**MODEL TANK.**

See **NAVAL ARCHITECTURE—Model Tank.**

**MOLD.**

**Brass or Bronze.**—A New Form of Ingot Mold for Casting Brass or Bronze Ingots, with Remarks on the General Form of Ingots. Erwin S. Sperry. Illustrated description. 1700 w. Trans Am Inst of Min Engs—Nov., 1897.

**Porcelain Insulation.**—See **PORCELAIN—Mold Making.**

**MOLDER.**

How to Turn Out Good Molders. D. F. Matlack. Read at the Philadelphia meeting of the Am. Foundrymen's Assn. In apprentices, fitness, industry and intelligence should be rigorously recognized. 700 w. Am Mach—Sept. 24, 1896.

**Apprentices.**—The Molder of the Future and the Need of an Adequate Apprenticeship System. P. W. Gates. Read at the Cincinnati meeting of Am. Foundrymen's Assn. Discussing means of securing desirable apprentices. 2300 w. Ir Age—June 16, 1898.

**MOLDING.**

See also **CASTING; FOUNDRY.**

Hints Helpful to the Molder Who Does Not "Know How." E. H. Putnam. Causes and cure for scales; difficulty arising from shot iron; tempering sand; venting from cores; gating. 1500 w. Foundry—Dec., 1895.

Molds. Warren E. Willis. Practical points of interest about moulding, including casting, drop forging, coining, compressing, embossing, etc. Serial. Mach, N. Y.—Jan., 1899.

**American.**—The American Molder and His Art. Simpson Bolland. An able review of progress in molding. 3200 w. Mach—Jan., 1896.

**Bench.**—Ethics of Bench Molding. Henry Hansen. Some remarks on small castings, the causes of their not being true to pattern, etc. 2500 w. Am Mach—Nov. 17, 1898.

**Brasses.**—Molding Connecting Rod Brasses. C. Vickers. Suggestions, description of method, and remarks on shrinkage. Ill. 1100 w. Am Mach—April 28, 1898.

**Bronze Tuyeres.**—Molding Bronze Tuyeres. George O. Vair. Illustrated description of flask core box mold and process. 700 w. Am Mach—June 18, 1896.

**Bull Ring.**—Molding a Bull Ring. R. H. Palmer. Illustrates and describes the work. 2400 w. Am Mach—Sept. 28, 1899.

**Check Valve.**—Molding a 30-Inch Check Valve in Loam. Arch. Landon. Illustrates and describes the method employed in the molding. 800 w. Foundry—Jan., 1899.

**Chemical Pans.**—Molding Chemical Pans. George O. Vair. Drawings with description of a casting made by a process termed "skin-drying." 700 w. Am Mach—July 1, 1897.

**Columns.**—Molding Cast Iron Columns. John S. Knoeppel. Gives points helpful to young molders. Ill. 1100 w. Foundry—Feb., 1899.

Molding Columns in the Floor. L. C. Jewett. Gives a sketch of a column and the rigging used to mold it, with description of process. 700 w. Am Mach—Jan. 6, 1898.

Molding Columns. R. H. Palmer. Illustrates and describes various methods. 2000 w. Foundry—Sept., 1899.

**Comparative Methods.**—Utility and Advancement of Green, Dry Sand, and Loam Molding. Thomas D. West. Read at the first National Convention of Foundrymen. On the different methods, and a knowledge of general principles being necessary to enable the molder to determine which method was best for any piece of work. 1700 w. Ir Trd Rev—May 14, 1896.

**Compressed Air.**—Blackening Dry Sand Molds with Compressed Air. I. B. Thomas. Illustrates and describes the construction and operation of the apparatus used. 500 w. Foundry—Feb., 1899.

**Cone Pulleys.**—Molding Cone Pulleys. George O. Vair. Two different plans are illustrated and described. 650 w. Am Mach—March 5, 1896.

**Core.**—Judgment in the Use of Cores. R. H. Palmer. Suggestions for the making and setting of cores. 1800 w. Am Mach—March 8, 1900.

**Core Prints.**—Core Prints. Herbert Aughtie. How core prints ought to be made for different positions and uses. 1000 w. Prac Eng—Sept. 4, 1896.

Core Prints. John M. Richardson. Describes the various prints used, offering suggestions. Ill. 1600 w. Foundry—Dec., 1898.

Round Cores and Prints. From the "English Mechanic." Remarks on the common round or square print fastened on the top and bottom faces of a pattern, to carry a vertical core. 2800 w. Prac Engr—Feb. 24, 1899.

**Double Cylinder.**—Molding a Double Cylinder. Joseph Horner. Illustrated detailed description. Serial. Mech Wld—Aug. 4, 1899.

**Double-Thread Worm.**—Casting a Double-Thread Worm. L. C. Jewett. Sketch and brief description showing a method of molding a double-threaded worm to be cast vertically and without joint seams. 400 w. Am Mach—July 5, 1900.

**Drop Press Bed.**—Molding a Drop Press Bed. R. H. Palmer. Illustrated detailed description. 1200 w. Am Mach—June 8, 1899.

**Fluid Pressure.**—The Pressure of Fluid Iron. R. D. Moore, in "Iron Molders' Journal." The importance of rule for estimating the pressure of the metal on the mold. 1000 w. Ir Trd Rev—Aug. 19, 1897.

**Flywheels.**—Molding a Flywheel. R. H. Palmer. Illustrates and describes the work. 1600 w. Am Mach—Feb. 8, 1900.

**Follow Boards.**—Making Follow Boards. L. C. Jewett. Describes in detail the making of follow boards, and the materials used. 1100 w. Am Mach—April 26, 1900.

**Gates.**—Molders' Gates. R. D. Moore. Hints concerning the shaping of gates. Ill. 700 w. Am Mach—Jan. 13, 1898.

Skimming Gates. Eli H. Pearce. Suggestions for this work. Ill. 800 w. Foundry—Nov., 1899.

**Gating.**—Gating. Paul R. Romp. Discusses the manner in which a mold is gated. Ill. 800 w. Foundry—Aug., 1900.

**Gating Brass Patterns.**—Gating Small Patterns for Brass. C. Vickers. An endeavor to point out the best way to gate patterns from which brass castings are to be made, so as to produce the greatest percentage of good castings with the least expenditure of time on the part of the molder. Ill. 1300 w. Am Mach—June 24, 1897.

**Gears.**—Gear Molding and Gear Molding Machines. S. Groves. Read before the Nat. Foundrymen's Convention. Some particulars and practical details noted in the process of actual manufacture. Ill. 2400 w. Foundry—Feb., 1897.

**Hawse Pipes.**—Molding Hawse Pipes at the Bath Iron Works Foundry. George W. Dean. Illustrated description. 900 w. Am Mach—Feb. 11, 1897.

**Heaters.**—An Unusually Difficult Molding. Describes and illustrates an interesting work connected with the manufacture of heaters made by the Mitchell Heater Co., of Poughkeepsie, N. Y. 700 w. Ir Age—May 13, 1897.

**Hot Spot.**—The Molder's Hot Spot. R. D. Moore. Examples given illustrate points requiring skill and give suggestions. Ill. 1000 w. Foundry—Jan., 1898.

**Kettle in Loam.**—Making a Large Kettle in Loam. Illustrates and describes the molding and casting of kettles weighing 18000 lbs., several of which have recently been produced in a western iron foundry. A good study in loam practice. 700 w. Foundry—March, 1896.

**Lathe Bed.**—Molding a Lathe Bed. L. C. Jewett. Illustrates and describes a method of doing this work. 1000 w. Am Mach—July 5, 1900.

**Machine.**—See **MOLDING MACHINE.**

**Malleable Iron.**—See **FOUNDRY—Gray and Malleable Iron.**

**Multiple.**—Multiple Molding. F. O. Farwell. Illustrated description of the writer's method. 1100 w. Foundry—March, 1898.

**Mustard Top.**—A Mustard Top Mold, and the Process of Making It. A. H. Cleaves. Illustrated detailed description. 1800 w. Am Mach—March 17, 1898.

**Oven.**—An Oven for Dry Sand Molds. I. B. Thomas. Illustrated detailed description of a down-draught oven which gave great satisfaction. 3000 w. Foundry—Sept., 1896.

**Pillow Block.**—Molding a Corliss Engine Pillow Block. R. H. Palmer. Illustrated detailed description. 1300 w. Am Mach—June 29, 1899.

**Planer Platen.**—Molding a Large Planer Platen Without a Pattern. R. H. Palmer. Illustrates and describes the method used. 1400 w. Am Mach—April 19, 1900.

**Plaster Casts.**—Plaster Casts and Other Methods of Molding Shell Forms. John C. Knoeppel. Read at Chicago meeting of the Western Foundrymen's Assn. Describes the making of the casts and their use, the taking of block patterns by stripping, etc. 2300 w. Ir Age—Nov. 25, 1897.

**Plumbago Facing.**—Plumbago Facing. John A. Walker. Reasons why plumbago makes the best facing for sand molds, are found in the physical character of this form of carbon. 600 w. Foundry—April, 1896.

**Propeller Wheel.**—Molding a Propeller Wheel in Green Sand. R. H. Palmer. Shows a way of molding a propeller wheel of four blades from a pattern of one blade. Ill. 900 w. Am Mach—March 1, 1900.

**Pulleys.**—Molding Large Pulleys. L. C. Jewett. Illustrated description of a departure from ordinary methods. 900 w. Am Mach—Oct. 22, 1896.

**Roller Path.**—Making a Roller Path in Loam. James A. Murphy. Illustrated description of the making of a large casting. 1900 w. Foundry—April, 1899.

**Sand.**—See **MOLDING SAND.**

**Sheave Wheels.**—See **SHEAVE WHEEL.**

**Soft Metal.**—See **TOOL.**

**Spur Pinion.**—Sweeping a Large Spur Pinion. R. H. Palmer. Illustrated detailed descrption. 1400 w. Am Mach—Nov. 2, 1899.

**Steel Cores.**—Steel Cores. George L. Roby. Read before the Western Foundrymen's Assn. The advantage of using steel cores in foundry work. 1200 w. Ir Trd Rev—March 25, 1897.

**Steel vs. Iron.**—Molding and Gating Steel Castings. George O. Vair. Sketches showing the dissimilarity between iron and steel molding. 1000 w. Am Mach—Jan. 14, 1897.

**Sweeping a Gear.**—Sweeping a Gear in Loam—Teeth to Be Cut Over After Casting. R. H. Palmer. Gives an illustrated detailed description of the work. 2500 w. Am Mach—Sept. 14, 1899.

**Wheel.**—Molding a Road-Wheel in Loam. Joseph Horner. Illustrates and describes wheels made in this way to save the expense of making full patterns. 1200 w. Mech Wld—March 17, 1899.

See also **WHEEL—Machine Molded.**

**Wheel Segment.**—Molding a Wheel Segment. R. H. Palmer. Illustrated description of the molding of a segment of a driving-wheel of a large Corliss engine. 2200 w. Am Mach—April 27, 1899.

**MOLDING MACHINE.**

See also **FOUNDRY—Worthington, Elizabethport, N. J.**

Machine Molding Without Stripping Plates. E. H. Mumford. Describes machine and its operation. 1600 w. Trans Am Soc of Mech Engs—Dec., 1897.

Molding Machines and Air Hoists. John Randol. Illustrated description of machines and processes. 1400 w. Am Mach—June 11, 1896.

Molding Machines and Their Field. Harris Tabor. General treatment of the subject and statement of advantages and limitations. 2500 w. Ir Trd Rev—May 21, 1896.

The Problem of Machine Molding. E. H. Mumford. Prepared for the meeting of the Foundrymen's Assn. Discusses why and how these machines should be used in foundries. 1800 w. Ir Trd Rev—Sept. 6, 1900.

**Avery.**—The Avery Molding Machine. Illustrated description of an apparatus and plan of molding in strange contrast to the usual custom, but which has more than satisfied the expectations. 1500 w. Foundry—Jan., 1898.

**Bryant.**—The Bryant Revolving Molding Machine. Illustrated description of the invention of Orrin Bryant. 800 w. Eng News—Feb. 18, 1897.

**Poole.**—The Poole Molding Machine. Illustrated description of the machine and its work. 1500 w. Foundry—Nov., 1899.

**Stripping Plate.**—Stripping Plate Molding Machines. E. H. Mumford. Read before the New England Foundrymen's Assn. Discusses some of the problems arising with machines for general work, quoting from a letter from John C. Meloon, giving his experience with stripping plate patterns in constant use. 2200 w. Ir Trd Rev—June 30, 1898.

**Tabor.**—The Tabor Molding Machine. Illustrated description of an improved machine, operated by compressed air. 1200 w. Am Mach—Sept. 30, 1897.

**MOLDING SAND.**

Molding Sand and Its Preparation for Mold and Cores by Old and New Methods. A. E. Outerbridge. A practical discussion of the selection of molding sand and methods of mixing, with a description of Sellers' sand mixer and sifter. 2300 w. Foundry—Feb., 1896.

Molding Sand. D. H. Truesdale. Read at the Cincinnati meeting of the Western Foundrymen's Assn. Discusses the necessary elements of molding sand and the proportions needed in combination. Considers refractory qualities, porosity, fineness and a sufficient bond. 1200 w. Am Mfr & Ir Wld—Oct. 22, 1897.

Views on Molding Sand. Interesting discussion by Western Foundrymen at the meeting in Cincinnati, of the paper read by D. H. Truesdale. 5000 w. Ir Trd Rev—Nov. 4, 1897.

**MOLECULAR PHYSICS.**

See **PHYSICS—Molecular.**

**MOLYBDENUM.**

The Preparation and Properties of Molybdenum. H. Moissan. From the "Bulletin de la Société de l'Encouragement de l'Industrie Nationale." Description of method of making soft metallic molybdenum and also the carbide. 700 w. Aust Min Stand—Dec. 14, 1895.

**Mexico.**—See **MINERAL REGION.**

**MOLYBDENUM STEEL.**

See also **STEEL.**

Certain Properties of Molybdenum Steel. W. v. Lipin, in "Stahl und Eisen." Compares molybdenum steel with wolframium steel and studies the treatment and effects. 600 w. Am Mfr & Ir Wld—Aug. 20, 1897.

**MOMENT OF INERTIA.**

See also **MATERIALS' STRENGTH; MECHANICS.**

Prismatic Moments Considered as Surface Moments of the Second Order in Computations of Resistance (Die Säulenmomente als Darstellung der Flächenmomente Zweiter Ordnung in der Festigkeitslehre). Prof. R. Land. A mathematical discussion simplifying computations involving the moment of inertia in mechanical and statical problems. 5000 w. Zeitschr d Ver Deutscher Ing—Oct. 30, 1897.

**Rolled Sections.**—Computations of Statical and Inertia Moments of Rolled Sections (Zur Berechnung von Statischen und Trägheits-momenten von Walzprofilen). Giving the formulas for a number of the more usual sections with tables of numerical values. 1500 w. Zeitschr d Ver Deutscher Ing—Aug. 21, 1897.

**Theory.**—The Theory of the Moment of Inertia. C. V. Kerr. States the fundamental ideas underlying the theory, gives a comparison of results from analytical and graphical methods for the purpose of showing the correctness of the methods used, and the salient features of this form of the theory. 5000 w. Trans Am Soc of Mech Engs, No. 793—Nov., 1898

**MONAZITE.**

See also **INCANDESCENT GAS LIGHTING; THORIUM.**

Monazite. H. B. C. Nitze. This paper embodies the results, in somewhat condensed and rearranged form, of previous communications which have appeared in the Sixteenth Annual Report of the U. S. Geol. Survey, and in Bull. No. 8, of the North Carolina Geol. Survey. Describes the mineral, where found, on what its value depends and price. 2400 w. Jour Fr Inst—Aug., 1897.

**Carolinas.**—The Monazite Deposits of North and South Carolina. H. B. C. Nitze. An interesting illustrated article by the Asst. State Geologist of N. Carolina, on these interesting thorium producing mineral. This is one of the localities from which the world draws its supply. 1500 w. Pro Age—Dec. 2, 1895.

The Monazite Districts of North and South Carolina. C. A. Mezger. A general description of deposits and method of working. 2500 w. Trans Am Inst of Min Engs—Feb., 1896.

**Idaho.**—Monazite from Idaho. Waldemar Lindgren. Report of the widespread occurrence of this mineral in the Idaho basin. 1100 w. Min & Sci Pr—Aug. 21, 1897.

**MONITOR.**

See also **ARMORED SHIPS; TURRET SHIPS; WARSHIP.**

**"Amphitrite."**—The Coast Defense Monitor "Amphitrite." Illustrated description. 1300 w. Sci Am—Nov. 21, 1896.

**"Arkansas," Harbor Defence.**—The United States Harbor Defence Vessels. Illustrated description of the "Arkansas," one of the four vessels being constructed for the U. S. Navy. 1800 w. Engr, Lond—Dec. 29, 1899.

**"Arkansas" Class.**—United States Monitors, "Arkansas," "Connecticut," "Florida," and "Wyoming." Extracts from a circular issued by the Navy Department, giving the elements of design. 1800 w. Jour Am Soc of Engs—Aug., 1898.

**"Nahant."**—Ericsson's Coast-Defense Monitor "Nahant." Historical account with illustrated description of the vessel and its operation. 2200 w. Sci Am—Aug. 13, 1898.

**Old Type.**—The Old Type of Monitor. William H. Wiley. Remarks of Admiral Bunce, with description of the engines. Ill. 1700 w. Ir Age—May 18, 1899.

**"Puritan."**—U. S. Monitor "Puritan." Illustrated description of the largest craft of her class. 1100 w. Eng, Lond—March 19, 1897.

**Reconstructed "Puritan."**—Recontructed American Monitors. F. M. Bennett. The history of the "Puritan" is given as an example of the class, experience in a reconstructed monitor related, and the means by which the worst faults were corrected, with much other information. 9500 w. Jour Am Soc of Nav Engs—Aug., 1897.

**United States.**—The Proposed New Monitors. Illustrated description of the designs now rejected, of the harbor defense vessels ordered by Congress. To be followed by the amended designs. 1800 w. Sci Am—Nov. 12, 1898.

See also **BATTLESHIP—United States.**

**"Wyoming."**—See **"Arkansas" Class.**

**MONO-RAIL.**

See **SINGLE-RAIL.**

**MONTANA.**

**Engineers' Society.**—Address before the Montana Society of Engireers. C. W. Goodale. Reviews some important engineering works in the state that have been executed during 1897. Ill. 5800 w. Jour Assn of Engng Socs—May, 1898.

**MORTAR.**

See also **ARTILLERY; BUILDING MATERIAL; CEMENT; CONCRETE; LIME; MASONRY; PLASTERING; PORTLAND CEMENT; SAND.**

Hardening and Deterioration of Lime Mortar. H. K. Landis. An explanation of the changes that take place in mortars, the cause of deterioration, and other effects. 1500 w. Br Build—Sept., 1897.

Mortar. Gustave W. Drach. Read at meeting of the Cincinnati Chapter of Architects. The history of the use of this material is given and the various kinds of mortars discussed. 2500 w. Stone—April, 1900.

Quality of Mortar. Gives some facts relating to mortar and its use, and the superiority of machine mixed mortar. 1500 w. Br Build—July, 1898.

**Analysis.**—The Analysis of Mortar. W. J. Dibdin and R. Grimwood. Read at the Summer meeting of the Society of Public Analysts and published in the "Analyst." Provisions made in the by-laws of the London County Council with methods of analysis and experiments. 2500 w. Arch, Lond—Oct. 23, 1896.

The Chemical Examination of Mortar. H. F. Hills. Reports the examination of various samples of old mortar. 800 w. Builder—Sept. 17, 1898.

**Cement.**—Economics of Cement Mortar. Ira O. Baker. Abstract. Presents methods of equating results, and discusses tests and related subjects. 1400 w. Pro of Ill Soc of Engs & Surv—1899.

Economies of Cement Mortar. Ira O. Baker. Considers methods of proportioning the mortar, tensile strength, cost, etc. 2200 w. Br Build—Dec., 1899

See also **CEMENT—Mortar.**

**Disintegration.**—The Mechanism of the Disintegration of Hydraulic Mortars (Sur le Mécanisme de la Désagrégation des Mortiers Hydrauliques). H. Le Chatelier. A note to the French Academy, developing a theory for the hitherto unexplained action sometimes occurring in hydraulic mortar. 1000 w. Comptes Rendus—March 13, 1899.

**Frozen Cement.**—Tests of Frozen Cement Mortar. Report of numerous experiments by Arthur G. Fogg, showing freezing is not injurious under certain conditions. 2000 w. Eng Rec—Dec. 31, 1898.

See also **CEMENT—Freezing.**

**Limestone Screenings.**—Limestone Screenings in Cement Mortar. Arthur N. Talbot. Report of a series of tests made by request. Followed by discussion by Alfred Noble and others. 7500 w. Jour of W Soc of Engs—Aug., 1897.

**Portland Cement.**—Study of the Ultimate Constitution of Hydraulic Mortar (Etudes sur la Constitution Intime des Mortiers Hydrauliques). R. Feret. An account of tests of Portland cement mortars, showing the importance of using fine sand and securing thorough admixture. Compression tests are considered most reliable. 20000 w. Bull de la Société d'Encour—Dec., 1897.

Variations in Volume of Portland Cement Mortars (Variations de Volume des Mortiers de Ciment de Portland). M. Considère. A communication to the French Academy giving the result of experiments made to determine the influence of the expansion of cement upon reinforcements of imbedded metal. 2000 w. Comptes Rendus—Sept. 18, 1899.

**Puzzolana.**—Puzzolana and Its Practical Use. Josef Zervas. Information regarding one of the oldest materials used for making mortar, especially hydraulic mortars. 4200 w. Sch of Mines Quar—April, 1897.

**Sand.**—See **SAND—Mortar.**

**Sand Tests.**—Tests of Sands for Making Mortars. Abstract of a paper by M. R. Feret, chief of the "Laboratorie de Ponts et Chaussées," at Boulogne, prepared from the translation by O. M. Carter and E. A. Geiseler. 1500 w. Eng Rec—Sept. 26, 1896.

**Sea Water.**—The Influence of Sea Water on Mortars. E. Candlot. Abstract translation. Reports the investigations made in the harbor of La Rochelle since 1856, with discussion. 8000 w. Eng Rec—Nov. 27, 1897.

**Testing.**—See **CEMENT TESTING.**

**Wet Sand.**—The Use of Wet Sand in the Making of Mortars. P. Hervieu. Translated from "Nouvelles Annales de la Construction." Retards the setting by inducing the formation of aluminate of lime, and affects the volume. Results of experiments. 800 w. Br Build—Oct., 1897.

**MOSAICS.**

An Improved Process and Apparatus for Manufacturing Mosaics. Report of the Institute, through its Committee on Science and the Arts, on the invention of Herman C. Mueller, of Zanesville, Ohio. Description of the invention, with commendation. 2700 w. Jour Fr Inst—March, 1898.

**MOSQUE.**

**Damascus.**—The Great Mosque of the Omeiyades, Damascus. R. Phenê Spiers. Revised illustrations with explanatory notes. 2500 w. Jour Roy Inst of Brit Archts—Jan. 29, 1898.

**MOTION.**

See also **MECHANICS; PHYSICS.**

Note on the Propagation of Motion (Sur la Vitesse de Propagation d'un Mouvement). P. Vieille. An investigation of the velocity of propagation of a movement in a medium which is at rest, showing experimentally that the velocity is that of sound in the same medium. 1500 w. Comptes Rendus—Jan. 3, 1898.

**MOTIVE POWER.**

**Railway.**—See **LOCOMOTIVE; RAILWAY MOTIVE POWER.**

**MOTOCYCLE.**

See **MOTOR CYCLE.**

**MOTOR.**

**Diesel.**—See **OIL ENGINE—Diesel Motor.**

**Electric.**—See **ELECTRIC MOTOR.**

**Gasoline.**—See **GASOLINE ENGINE.**

**Mining.**—See also **ELECTRIC EQUIPMENT; ELECTRIC LOCOMOTIVE; ELECTRIC MOTOR; MINE HAULAGE; MINING MACHINERY.**

**Oil.**—See **OIL ENGINE.**

**Petroleum.**—See **GASOLINE ENGINE; OIL ENGINE.**

**MOTOR-CAR.**

See also **CAR**—Automotor; Gasoline Motor; Steam Motor; **LIGHT RAILWAY**—Motor-Car.

**MOTOR CYCLE.**

See also **AUTOMOBILE; GASOLINE ENGINE; GASOLINE VEHICLE.**

Bicycle with Rotary Petroleum Motor (Bicyclette à Pétrole à Moteur Rotatif). Illustrating and describing an improved form of petroleum motor bicycle, which has given good results in practice. 1500 w. La Rev Tech—June 10, 1898.

Motobicycles. From "La Nature." Illustrates and describes several new styles shown at the last automobile exhibition. 1200 w. Sci Am Sup—Dec. 9, 1899.

Moto Cycles. For the purpose of developing a discussion on this subject a letter enclosing questions relating to the subject was sent out, and the results are given. Ill. 12500 w. Jour W Soc of Engs—Oct., 1897.

The Bicycle as a Motor Vehicle (Das Fahrrad als Droschke). K. Hallbauer. With numerous illustrations showing motor vehicles designed on the lines of the bicycle and tricycle, and adapted for delivery vehicles and general use. 1200 w. Glaser's Annalen—June 15, 1899.

**Benzine.**—Benzine Motor Cycles. An illustrated description of a machine made in München, Bavaria, and brought to this country by Mr. Henry Hirsch. 1800 w. Sci Am—Dec. 12, 1896.

Studies in the Efficiency of Benzine Motors for Vehicles (Leistungsversuche an Fahrzeug-Benzinmotoren). Hugo Güldner. Giving details of the testing apparatus and data of tests upon benzine motors of motor cycles. Serial. Zeitschr d Ver Deutscher Ing—Sept. 29, 1900.

**Boston Contest.**—Practical Motocycles at Charles River Park, Boston, November 9. Hugh Dolnar. Considers the two main classes of mechanically propelled vehicles, and illustrates and describes various types and the contest at the place named. 8000 w. Am Mach—Dec. 29, 1898.

**Chicago Contest.**—The Motocycle Contest. Brief account but comprising all the essential facts of the race, and concluding with the opinion that it has greatly advanced the art in the U. S. 1200 w. Ir Age—Dec. 5, 1895.

The Chicago Motocycle Contest. H. L. A. Full account of the race with illustrations of motocycles. 3700 w. Am Mach—Dec. 19, 1895.

The Tests of Motocycles at Chicago. Summary of a report of a committee of examination, with tabulated data. 550 w. Am Mach—March 26, 1896.

**De Dion.**—Petroleum Motor for Tricycles (Moteur à Pétrole pour Tricycle). The Dion Bouton & Co. motor is operated with vaporized petroleum, on the Otto cycle, with electric ignition. The speed is controlled by varying the air admission. 1500 w. La Rev Tech—Sept. 25, 1897.

**Power.**—Power for Motocycles. Leland L. Summers. A discussion of the advantages, and a comparison of results, of the gas engine, or internal combustion motor, and the electric motor. 8400 w. Elec Engng—July, 1896.

**Racing.**—Motor Cycle Racing. Al. Reeves. An illustrated account of the working of these machines and of some of the races in the United States. 1200 w. Auto Mag—Jan., 1900.

**Strickland.**—The Strickland Air-Cooled Motor. An illustrated description of a motor fitted to a tricycle. 400 w. Auto Car—Sept. 8, 1900.

**Variable Speed Gear.**—See **GEAR—Variable Speed.**

**MOTOR GENERATOR.**

See also **ELECTRIC CURRENT CONVERTER; ROTARY CONVERTER.**

Some Experiments with a Motor Generator. An account of tests made to ascertain why the machine failed to do the work for which it was designed. Ill. 1600 w. Am Elect'n—Sept., 1900.

**Accumulators Compared.**—Motor-Dynamos or Accumulators. Alton D. Adams. Showing the motor generator often proves more desirable than the accumulator. 1800 w. St Ry Jour—April, 1898.

**Armature Winding.**—See **ARMATURE WINDING—Motor Generator.**

**Dynamotor.**—See also **SEARCHLIGHT.**

**Dynamotors Compared.**—Dynamotors versus Motor Generators. Alton D. Adams. A comparison showing the former to be superior in many ways, but that the other machine was brought into favor because of the difficulty in regulating the secondary pressure in the dynamotor. 1900 w. Elec Wld & Engr—Sept. 8, 1900.

**Tramway Sub-Stations.**—On Converting Machinery for Tramway Sub-Stations. A. C. Eborall. Discusses some fundamental considerations relating to rotary converters and motor generators for use in sub-stations. Considers that in the majority of cases motor generator equipments will give the best results in actual working. 2000 w. Tram & Ry Wld—July 5, 1900.

**Winding.**—See **ARMATURE WINDING—Motor Generator.**

**MOTORMAN.**

See also **STREET RAILWAY—Employees.**

A Plea for the Motorman. A. E. D. The importance of the motorman's work, the need of appreciation, desirability of attracting a better class of men, etc., with comments on the work. 1700 w. Elec Eng—Nov. 13, 1895.

School for Motormen. Describes the training methods in use by the Metropolitan Street Railway Co., of New York. Ill. 1200 w. St Ry Rev—May 15, 1899.

Selection of Motormen and Conductors. Summary of methods employed by various companies; compiled from correspondence. 2800 w. St Ry Rev—Sept. 15, 1896.

Some Notes on the Motorman as an Element in Street Railway Economy. Charles Hewitt. Reports experiments tried and the results. Also discussion. 1600 w. Pro Engs' Club of Phila—Feb., 1900.

**MOTOR WHEEL.**

**Simms.**—The Simms Patent "Motor Wheel." Illustrated detailed description. 900 w. Auto Jour—April, 1899.

**MOULDING.**

See **MOLDING.**

**MOUNTAIN RAILWAY.**

See also **CABLE RAILWAY; LIGHT RAILWAY; NARROW GAUGE RAILWAY; RACK RAILWAY; RAILWAY.**

**Chamounix.**—The Chamounix Railway. Translated from "L'Illustration." General description of the proposed adhesion and rack railroad, to ascend 6300 ft. from Chamounix to the Mer de Glace. 1000 w. Sci Am Sup—May 16, 1896.

The Railway from Fayet to Chamounix (Le Chemins de Fer du Fayet to Chamounix). Illustrated description of combined adhesion and rack railway, opening communication by rail from Geneva to Chamounix, and from the latter to the Swiss frontier. 2500 w. La Rev Tech—Feb. 10, 1898.

**Chile Nitrate.**—See **RAILWAY.**

**Darjeeling Himalayan.** The Darjeeling Himalayan Railway. Details of a unique mountain railway, worked entirely by adhesion. 1700 w. Engng—Sept. 17, 1897.

The Darjeeling Himalayan Railway. Illustrated brief description of an interesting construction, showing several complete loops, zigzags, and curves. 900 w. Engng—April 30, 1897.
See also **LIGHT RAILWAY—India; LOCOMOTIVE—Himalayan; NARROW GAUGE RAILWAY—India.**

**Electric.**—Mountain Electric Railways. W. L. Hedenberg. Reviews some of the early attempts to climb mountains by mechanical means, describing and illustrating some of the electrically operated roads. 2500 w. Elec, N. Y.—March 22, 1899.
See also **ELECTRIC RAILWAY.**

**Garesfield and Derwenthaugh.**—Machinery for the Garesfield and Derwenthaugh Incline Railway. Illustrated description of the hauling plant for the road named. Serial. Engng—July 13, 1900.

**Gornergrat, Switzerland.**—The Electric Rack Railway to the Gornergrat (Die Elektrische Zahnradbahn auf den Gornergrat). A very full descriptive account of the new road now partially constructed from Zermatt to the Gornergrat, Canton of Valais. Four articles. 8000 w. Schweizer Bauzeit—April 16, 23, 30, May 7, 1898.

The Zermatt-Gornergrat Electric Rack Railway. Abstract from article in "Le Génie Civil," describing this road. 1200 w. Eng News—June 30, 1898.

The Zermatt-Gornergrat Mountain Railway. Brief description of an interesting and instructive railway undertaking in Southern Switzerland. Ill. 1300 w. St Ry Rev—July 15, 1898.

Three-Phase Electric Road from Zermatt to the Gornergrat, Switzerland (Chemins le Fer Electrique à Courants Triphasés de Zermatt au Gornergrat). A very fully illustrated account of this important electric rack railway. 1 plate. 4500 w. Génie Civil—Jan. 22, 1898.

**Great Falls, Mont.**—An Electric Inclined Railway at Great Falls, Mont. A counter-balanced incline railway 400 feet long, and on an incline of 22 degrees 10 minutes with the horizontal. 400 w. Eng News—March 26, 1896.

**India.**—See Darjeeling; LIGHT RAILWAY; NARROW GAUGE RAILWAY.

**Isle of Man.**—The Mt. Snaefel Railway, Isle of Man. A well illustrated description. A third rail in the center line of the track prevents derailment and in cases of emergency is clutched by a grip brake. 400 w. St Ry Jour—Feb., 1896.

**Jungfrau.**—Construction and Cost of the Jungfrau Tunnel (Ueber den Bau und die Kosten des Jungfraubahn-Tunnels). A discussion of the difficulties to be encountered in this bold and interesting piece of Alpine railroading. 2000 w. Schweizer Bauzeit—April 10, 1897.

The Jungfrau Electric Railway. Illustrated description of this great work in Switzerland. 1500 w. Elec Wld—Oct. 15, 1898.

The Jungfrau Mountain Electric Railway, Switzerland. Illustrated description of the route, method of construction and operation, the electrical work, etc. 1800 w. Elec Eng—Nov. 18, 1896.

The Jungfrau Railway (Die Jungfraubahn). A general description of the mountain road now in course of construction with views of the present state of the work at various points. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—May 27, 1898.

The Jungfrau Railway (Die Jungfraubahn). F. Hennings. A general description of the plans for the electric rack railway to the summit of the Jungfrau, with a statement as to the present condition of the work. 3000 w. Zeitschr d Ver Deutscher Ing—Dec. 25, 1897.

The Jungfrau Railway. Brief account of this unique railway, with perspective view, profile and geological section. 1800 w. Ry Wld—March, 1897.

The Jungfrau Railway. L. Bayly. Interesting illustrated description of this great engineering work. 1800 w. Engr, Lond—Oct. 1, 1897.

The Jungfrau Railway. L. Bayly. Illustrated description of this wonderful electrical engineering work. 1600 w. Elec Eng, N. Y.—Feb. 24, 1898.

The Jungfrau Railway. Edgar R. Dawson. Describes and illustrates the railway being constructed to the top of this mountain whose altitude is 13720 feet. 2500 w. Scribner's Mag—Sept., 1898.

The Jungfrau Railway (Ueber die Jungfraubahn). A finely illustrated paper read before the German Railway Society by Dr. Wrubel, giving an account of the preliminary work, plans, rolling stock and motive power of this most important piece of mountain electric railway work. 7500 w. Glaser's Annalen—May 1, 1898.

The Jungfrau Railway (Le Chemin de Fer de la Jungfrau). R. Godfernaux. A general description of the three-phase electric rack railway now under construction to the summit of the Jungfrau, in Switzerland, with topographical map. 4000 w. Rev Gen des Chem de Fer—Jan., 1899.

The Jungfrau Railway. Views of the section just opened, with reports, by various authorities, upon the project. Serial. Engr, Lond—Feb. 10, 1899.

The Jungfrau Railway (Le Chemin de Fer de la Jungfrau). H. Martin. A very complete account of this important Swiss mountain road, with details of the hydraulic and electric plant and of the three-phase system adopted; also of the road structure, tunneling, etc., and photographs of the present condition of the work. Two articles, two plates. 7500 w. Génie Civil—April 22, 29, 1899.

The Jungfrau Railway. Gives a description of the line so far as it is built, its operation and equipment. 3800 w. Engng—Sept. 8, 1899.

The Jungfrau Three-Phase Electric Railway. Ernest Kilburn Scott. A very fully illustrated description of the latest development in mountain railroading in Switzerland. 4500 w. Eng Mag—April, 1900.

The Jungfrau Three-Phase Electric Railway. W. H. Molesworth. An illustrated descriptive account of the electrical features of this remarkable engineering work. 3800 w. Elec Wld & Engr—May 12, 1900.

The Plant of the Jungfrau Railroad (Die Kraftanlagen, Leitungen und Fahrzeuge der Jungfraubahn). E. Strub. An account of the power plant and general scheme of the electrically operated rack railway now being constructed to the summit of the Jungfrau; with illustrations of the electric locomotive. 4000 w. Schweizer Bauzeit—July 17, 1897.

The Railway up the Jungfrau. A brief description with illustrations. The road will be operated by electricity, developed from the Lauterbrunnen falls; it will be about eight miles in length, largely in tunnel; the ascent of the cone will be completed by an electric elevator, running in a shaft bored in the rock. 500 w. Sci Am Sup—May 9, 1896.

See also ELECTRIC RAILWAY—Polyphase; RACK RAILWAY.

**Lins, Austria.**—The Street and Mountain Tramway between Lins, Urfahr, and Pöstlingberg (Die Strassen-und Bergbahn Lins-Urfahr-Pöstlingberg). Illustrated description of this Austrian electric mountain tramway. The ascent is made by adhesion, with a uniform grade of 10 per cent. Map and profile. Two articles. 2500 w. Die Schmalspurbahn—Oct. 1, 16, 1897.

**Locomotive.**—See LOCOMOTIVE—Himalayan Ry.; Light Railway; Narrow Gauge.

**Lookout Mountain.**—New Incline up Lookout Mountain at Chattanooga. A description of the construction, operation and safety devices. 2200 w. St Ry Rev—June 15, 1896.

**Mont Blanc.**—A Railway Up Mount Blanc. A report made by a scientific commission upon the suggested railway. Translated from "La Revue Alpine." 2000 w. Engr, Lond—Nov. 17, 1899.

**Mont Dore, France.**—See CABLE RAILWAY.

**Mount Lowe, Cal.**—Mount Lowe Electric Mountain Railway. Olaf Ellison. Illustrates and describes a scenic railway in California. 2000 w. Sci Am—Oct. 29, 1898.

**Mount Tamalpais, Cal.**—Mill Valley and Mount Tamalpais Scenic Railway. Brief description of road, with illustrations of the mountain-climbing locomotives. 400 w. Loc Engng—March, 1897.

**Mt. Tom.**—Incline Railway Up Mt. Tom. Illustrated description of the road and equipment. 900 w. St Ry Rev—July 15, 1897.

**New Zealand.**—A Mountain Railway in New Zealand. A. P. Godber. Illustrated description of the Rimutaka Incline, and its equipment. 1000 w. Loc Engng—Aug., 1900.

**Pike's Peak.**—The Pike's Peak Railway. An illustrated account of this railway to the summit. It is built upon the Apt system. Also describes the equipment. 1500 w. Ry Age—Sept. 30, 1898.

**Profiles.**—Profiles of the Principal Mountain Railways of the World. Chart superimposing European, South American and U. S. mountain lines, with brief explanatory comment. 400 w. Eng News—April 9, 1896.

**Salève, Geneva.**—The Electric Railway Up Mont Salève, Geneva. Interesting illustrated description of an electric road ascending 4000 ft., with grades of 25 per cent., and curves of 35 meters radius. 750 w. Elec Eng—Aug. 26, 1896.

The Salève Electric Railway (Chemins de Fer Electriques du Salève). Description of a new third-rail electric rack railway from Veyrier to Treize Arbres, in Savoy. The road is about 4½ miles long, with a maximum grade of 25 in 100; the current is generated by water power. 2500 w. 1 plate. La Rev Tech—Oct. 25, 1897.

**Snowdon.**—Snowdon Mountain Railway. A full description from the historic, descriptive and technical standpoints, with map, profile and eight fine half-tones from photographs of scenery. Serial. Engng—April 3, 1896.

The Mechanical Equipment of the Snowdon Mountain Railway. Gowrie Colquhoun Aitchison. Descriptive account. 3500 w. Prac Engr—July 6, 1900.

**Stansstadt-Engelberg.**—The Electric Railway between Stansstadt and Engelberg (Die Elektrische Bahn Stansstadt-Engelberg). A very full account of this important Swiss mountain road. The three-phase system is used and a ladder rack between the rails. 3000 w. Zeitschr d Ver Deutscher Ing—April 15, 1899.

The Stansstadt-Engelberg Electric Railway (Die Elektrische Bahn Stansstadt-Engelberg). A description, with map and many illustrations, of the new electric rack-railway from Stansstadt, on the Lake of Lucerne to Engelberg, nearly 2000 feet above, at a distance of about 14 miles. Two articles. 3500 w. Schweizer Bauzeit—April 15, 22, 1899.

The Stansstadt-Engelberg Electric Railway. Illustrated detailed description of an electric line connecting this village, Lake of Lucerne, with a favorite tourist's resort. 2200 w. Elect'n, Lond—Jan. 27, 1899.

The Three-Phase Electric Railway from Stansstadt to Engelberg. Charles Rochat. Illustrates and describes this road, its electric equipment, rolling stock, and operation. 3800 w. St Ry Jour—Jan., 1899.

See also **ELECTRIC RAILWAY—Burgdorf-Thun.**

**Stanserhorn, Switzerland.**—Electric Cable Railway up the Stanserhorn. A three section cable line in the Alps, having a length of 13124 feet, and a difference in elevation of 1400 ft.; it is operated by electricity generated by water power. 1000 w. Am Eng & R R Jour—Nov. 14, 1895.

The Electric Cable Railway of the Stanserhorn, in Switzerland. Illustrated description from "La Nature." 2200 w. Sci Am Sup—Jan. 25, 1896.

The Stanserhorn Cable Railway. Brief description of a steep inclined road. 450 w. Ry Wld—April, 1896.

**Tyrol.**—A Proposed Mountain Railroad for the Tyrol. From the "Illustrirte Zeitung." An account of the plans being considered for an electric railroad from Gossensass to Amthorspitz, which commands an extensive and very beautiful view. 800 w. Sci Am Sup—July 16, 1898.

Concerning Roads in the Tyrolese Alps, Executed, Projected, and Desired (Ueber Ausgeführte, Projectirte, und Wünschenswerthe Tyroler Alpenbahnen). A detailed account of the existing roads, dealing mainly with costs and financial results, together with a similar discussion of proposed constructions. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—May 28, June 4, 1897.

**Zermatt.**—See **Gornergrat.**

**MOVING BUILDING.**

See **BUILDING MOVING.**

**MOVING SIDEWALK.**

History of the Attempts at Continuous Locomotion (Historique des Tentatives de la Locomotion par Entrainement Continu). M. Armengaud. An historical review of the various schemes which have been advanced for a traveling platform, down to the present device adopted for the exposition of 1900 w. 4500 w. 1 plate. Soc Ing Civ de France—Feb., 1899.

**Berlin Exhibition, 1896.**—The Moving Sidewalk Railway at the Berlin Industrial Exhibition, 1896. Illustrated description. 1500 w. Eng, Lond—Sept. 18, 1896.

**Berlin Exposition.**—Traveling Sidewalks and Their Advantages for Large Cities (Stufenbahn und ihre Bedeutung für den Massenverkehr in Gross-Städten). A description of the traveling sidewalk at the Berlin exhibition, with data as to power consumed and carrying capacity. 1200 w. Glaser's Annalen—Feb. 1, 1897.

**Paris Exposition.**—Automobile Conveyance in the Interior of the Exposition. Brief illustrated description of the rolling platform and the electric railway. 1600 w. Auto Mag—June, 1900.

Electric Transportation at the Exposition of 1900 (Les Transports Electriques de l'Exposition de 1900). An account of the tests made upon the trial platform submitted by M. de Mocomble for the Exposition; with numerous illustrations. 1800 w. 1 plate. Génie Civil—Feb. 18, 1899.

Electric Transport at the Exposition of 1900 (Les Transports Electriques de l'Exposition de 1900). Emile Dieudonné. With a plan of the routes of the traveling platform, and the electric tramway, and plan and elevation of the trains for the latter. 1800 w. La Rev Tech—Jan. 25, 1900.

Electric Transport at the Exposition (Les Transports Electriques de l'Exposition). Alfred Boudon. A very full account of the traveling platform and the electric railway at the Paris Exposition. Two articles. 1 plate. 5000 w. Génie Civil—Sept. 15, 22, 1900.

Electric Transportation at the Paris Exposition (Der Elektrische Verkehr auf der Ausstellung in Paris, 1900). An illustrated account of the traveling sidewalk and the electric railway inside the Exposition grounds. 2000 w. Oest Monatschr f d Oeff Baudienst—Aug., 1900.

Proposed Traveling Sidewalk (Projet de Plate-Forme Mobile). An illustrated description of the elevated traveling sidewalk for the Paris Exposition of 1900, with plan and plate of details. 1 plate. 2500 w. Génie Civil—July 3, 1897.

The Blot Movable Railway (Chemin de Fer à Voie Mobile, Système A. Blot). A description of plans for a traveling sidewalk for the Paris Exposition of 1900. 8000 w. La Rev Tech—Jan. 10, 1897.

The Electric Platform of the Exposition (Plate-Forme Electrique de l'Exposition). An illustrated description of the experimental traveling platform constructed to demonstrate the practicability of the device on a large scale. 1000 w. La Rev Tech—Jan. 25, 1899.

The Moving Sidewalk at the Paris Exposition of 1900 (Die Rollenden Trottoire der Weltausstellung von 1900). A general description, with two illustrations. 800 w. Zeitschr f Klein u Strassenbahnen—April 16, 1900.

The Moving Sidewalk at the Paris Exposition. Illustrated description, with comments on its success and method of operations. 3300 w. Elec Wld & Engr—June 30, 1900.

Traveling Platform with Two Speeds (Plate-Forme Electrique à Deux Vitesses). Report upon the scheme of MM. Blot, Guyenet and Mocomble for a continuous traveling platform as a means of transportation at the Paris Exposition of 1900. The motive power to be electricity and the platform to be elevated. 7500 w. Bull de la Société d'Encour—Nov., 1897.

See also **PARIS EXPOSITION; TRANSPORTATION—Paris Exposition.**

**MOVING STAIRWAY.**

**Dodge Link-Belt.**—An Electric Stair Lift. A well illustrated description of the Dodge link-belt stair lift, in which the treads are horizontal. 700 w. Elec Wld & Engr—Sept. 22, 1900.

**Paris Exposition.**—Moving Stairways at the Paris Exposition (Les Chemins Elévateurs à l'Exposition de 1900). J. Laverchère. A well illustrated description of several kinds of electrically driven, continuously moving inclined planes in operation at the Paris Exposition. 1500 w. Génie Civil—July 14, 1900.

**Reno.**—Electric Inclined Elevators for the Elevated Railway. A short illustrated description of the Reno inclined elevator at the Manhattan Elevated Railroad Station at Third avenue and Fifty-ninth street. 400 w. Elec Wld & Engr—Sept. 15, 1900.

The Reno Inclined Elevator in a Department Store. Illustrates and describes the installation of this elevator in the department store of Bloomingdale Bros., New York. 1200 w. Elec Eng, N. Y.—July 7, 1898.

**Store, Paris.**—A Traveling Staircase (Un Escalier qui Marche). Illustrated description of an inclined traveling way for general public use in the Magasins du Louvre at Paris. 1000 w. Le Génie Moderne—Sept. 15, 1897.

**MUFFLE FURNACE.**

See **FURNACE—Muffle Coke Burning.**

**MULTIPHASE.**

See **POLYPHASE.**

**MULTIPHASE CURRENT.**

See **ALTERNATING CURRENT—Polyphase.**

**MUNICIPAL ADMINISTRATION.**

**New York.**—New York's Civic Assets. William Howe Tolman. A summing up of the progress made during Mayor Strong's administration, giving explanation of the mistakes and praise for the patriotism and civic pride, which studied always the city's welfare, showing that the assets will far exceed the liabilities. 5000 w. Am Rev of Revs—Jan., 1898.

**MUNICIPAL ART.**

See also **ARCHITECTURE; MUNICIPAL IMPROVEMENT; STREET—Architecture.**

I. The Ideal City. Halsey Recardo. II. Streets and Bridges. Considered in connection with our Unideal City. W. D. Caröe. III. The Sculptor's Point of View. T. Stirling Lee. Papers and discussion before the Royal Inst. of Brit. Archts. 12000 w. Builder—June 23, 1900.

**New York.**—See **NEW YORK.**

**Sculpture.**—Municipal Sculpture. Karl Bitter. Suggestions for the beautifying of New York by statues, fountains, fine buildings, and other decorative works of art, with reference to work in other cities. 10000 w. Munic Af—March, 1898.

**MUNICIPAL BUILDINGS.**

See also **MUNICIPAL IMPROVEMENT; PUBLIC BUILDINGS; PUBLIC WORKS.**

Municipal Buildings. H. T. Hare. Paper read before the Arch. Assn. of England. An epitome of the writer's experience and containing many valuable suggestions. Followed by discussion. 8500 w. Builder—Jan. 18, 1896.

Notes on the Construction of Town Buildings. Howard Chatfield Clarke. A paper taken as read at the Manchester (Eng.) meeting of the Surveyor's Inst. Considers these buildings from the points of view of construction, materials, and cost. 3300 w. Builder—April 30, 1898.

**Boston.**—Municipal Architecture in Boston. A statement of the results of the present plan of obtaining designs for civic buildings and the proposed amendments. 1000 w. Eng Rec—Jan. 14, 1899.

**Croydon, Eng.**—New Municipal Buildings, Croydon. Descriptive. 6000 w. Brit Arch—May 22, 1896.

**Edinburgh.**—Proposed Extension of the Edinburgh Municipal Buildings. R. Morham. Illustrated description and general remarks. 1000 w. Brit Arch—Aug. 7, 1896.

**Oxford.**—Oxford Municipal Buildings. Brief record of the materials employed by the architect in the construction. 1800 w. Brit Arch—Dec. 18, 1896.

**Paris.**—The Mairies of Paris. Fernand Mazade. Description, with many illustrations, of these edifices, and criticisms showing that they are usually ill-adapted to the purpose they are intended to serve. 4200 w. Arch Rec—April, June, 1898.

**Toronto.**—The New Municipal Buildings, Toronto. A résumé of the plans and specifications as finally adopted for the heating, plumbing, ventilation, gas and electric wiring. 2800 w. Can Arch—Dec., 1897.

**MUNICIPAL CONTROL.**

See also **MUNICIPAL OWNERSHIP; STATE OWNERSHIP.**

A New Plan for the Control of Quasi-Public Works. J. D. Forrest. Presents a plan recently brought forward by Alfred F. Potts, which is, in brief, the management by disinterested trustees of institutions endowed for the purpose of rendering the public service at cost. 4500 w. Am Jour of Soc—May, 1898.

**Electric Stations, Paris.**—The Paris Municipality and Electric Installations. Editorial consideration of the rules referring to electric power stations and distribution of the current in Paris, with general summary of the restrictions placed upon industrial companies. 3900 w. Engng—Dec. 13, 1895.

**Gas Companies.**—Municipalities vs. Gas Companies: Their Reciprocal Relations. Andrew Hickenlooper. It is shown that private companies are subject to the same governmental control as municipalities, but that the latter have less opportunity and are, therefore, less likely to evade law than municipalities. 15000 w. Am Gas Lgt Jour—June, 1896.

See also **GAS INDUSTRY—Municipal Control.**

**Indianapolis.**—See **MUNICIPAL OWNERSHIP—Substitute.**

**MUNICIPAL ENGINEER.**

See also **MUNICIPAL ENGINEERING.**

The Duties and Compensations of Municipal Engineers. A. D. Thompson. Enumerates the most important duties required, and gives statistics relating to salaries paid, with comments. 1300 w. Munic Engng—Jan., 1899.

**British Association.**—The Incorporated Association of Municipal and County Engineers. A statement of the organization and work in Great Britain of a unique society of engineers for municipal works. 2200 w. Eng Rec—July 22, 1899.

**Consulting.**—The Consulting Engineer in Municipal Affairs. William H. Searles. Shows the necessity of an engineering department of a great city, the growth of the work as the city increases in size, and the advisability of employing a consulting engineer that the work may be properly carried on. 3000 w. Jour Assn of Eng Soc—Sept., 1897.

**Qualifications.**—Qualifications for Municipal Engineers. Charles Carroll Brown. A plea for a more thorough education. 2300 w. Pav & Mun Engng—June, 1896.

**MUNICIPAL ENGINEERING.**

See also **MUNICIPAL ENGINEER; MUNICIPAL IMPROVEMENT; PUBLIC WORKS; REFUSE DISPOSAL; SANITARY ENGINEERING; SEWAGE DISPOSAL; WATERWORKS.**

The Problem of the City. Clinton Rogers Woodruff. A discussion of what good city government is in certain directions. The importance of an abundant supply of pure water, drainage, street cleaning, transportation, etc., is presented, and examples of European cities given, with other matters of related interest. 3500 w. Am Mag of Civ—Nov., 1896.

Cultivation of Vacant City Lots. Michael A. Mikkelsen. Account of the system adopted by Mayor Pingree of Detroit, followed by a discussion favorable to the advantages and practicability of this mode of helping the poor of our large cities. 2000 w. Forum—May, 1896.

Efficiency, Economy, and Ethics in Municipal Engineering. Charles Carroll Brown. Faults in corporate action which result in disagreeable and expensive consequences, and their avoidance. 1800 w. Pav & Mun Eng—July, 1896.

Municipal Notes. Illustrated description of various novel water, sewer and paving undertakings in a number of cities. 3500 w. Eng Rec—May 6, 1899.

**America.**—A Review of Important Municipal Work in America. George H. Benzenburg. Read at Washington meeting of the Am. Soc. of Munic. Imp. Compiled from replies to a circular letter of inquiry. 4800 w. Munic Engng—Jan., 1899.

An English Municipal Engineer's Visit to America. George Livingstone. Read before the Incor. Assn. of Munic. and Co. Engs., London. Notes on traffic, paving, cleansing, dust removal, water supply, baths, buildings, etc. 9400 w. Builder—April 8, 1899.

**American Society.**—The Convention of the American Society of Municipal Improvements. A report of discussions on methods of preparing municipal statistics, cement testing for small cities, and asphalt pavements. Serial. Eng Rec—Sept. 8, 1900.

**Chicago.**—Recent City Engineering in Chicago, Ill. An account of work and costs. 700 w. Eng Rec—Nov. 21, 1896.

**Electrical.**—See **ELECTRICAL ENGINEERING—Municipal.**

**New York.**—The Financial Effects of Consolidation. Bird S. Coler. A lecture at Cooper Union, by the Comptroller of New York, on the results of the greater New York consolidation. 4000 w. Eng Rec—Nov. 25, 1899.

**Paris Exposition.**—Municipal Engineering Exhibits at the Paris Exposition. Describes exhibits of interest, especially the display made by the city of Paris. Ill. 2000 w. Eng News—Aug. 2, 1900.

**Review, 1898.**—Municipal Notes. A review of waterworks, sewage disposal and garbage cremation undertakings during 1898, in several cities. 4200 w. Eng Rec—March 4, 1899.

**Salt Lake City.**—Notes on Municipal Engineering Work at Salt Lake City. Details, compiled from drawings and information furnished by the city engineer. Principally details of street work. Ill. 1400 w. Eng News—May 6, 1897.

**MUNICIPAL IMPROVEMENT.**

See also **CITY PLAN; MUNICIPAL ART; MUNICIPAL BUILDING; MUNICIPAL ENGINEERING; PUBLIC BUILDINGS; PUBLIC WORKS; STREET—Architecture; STREET IMPROVEMENT.**

Building Reform in Cities (Stadtbau Reform). Dr. Schmidkunz. A general discussion of the defective plans of most European cities with suggestions for improvements as to lighting, communication, and beauty. 5000 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1898.

Municipal Public Improvements and the Laws Governing Them. David Molitor. Presents a scheme for the organization of a board of public improvements as would best serve a municipality of from two to three hundred-thousand inhabitants. 2500 w. Munic Engng—Dec., 1897.

**American Society.**—Meeting of American Society of Municipal Improvements. A critical review. 1700 w. Munic Engng—Nov., 1896.

**American Society.**—The Convention of the American Society of Municipal Improvements. An account of the meeting with abstracts of papers on sewers, pavements, street extensions, electrolysis, etc. 6000 w. Eng Rec—Nov. 5, 1898.

**Assessments.**—Local Assessments. A statement of the results of an endeavor in Jersey City to proportion the cost of local improvements equitably on property-holders and the city at large. 1000 w. Eng Rec—Oct. 14, 1899.

**Florence.**—See **STREET IMPROVEMENT.**

**London.**—A Hausmann for London. From the "Telegraph." The subject of municipal embellishment.' Its financial returns. The beauty of Paris, Berlin, and other cities, and the needs of London. 1200 w. Ill Car & Build—July 10, 1896.

The Proposed London Improvements. Text of the bill promoted by the London Council, which defines the nature and extent of the proposed improvements. 1800 w. Builder—Dec. 31, 1898.

The "Uglification" of London. Editorial criticism of various works which have been carried out in London and its suburbs. 2500 w. Builder—March 27, 1897.

See also **STREET IMPROVEMENT.**

**Manchester, Eng.**—Development of Manchester. E. Salomons. An address at a meeting under the auspices of the Manchester Soc. of Archts., on the development and suggested improvements. Brief discussion. 2400 w. Arch, Lond—Dec. 30, 1898.

**New York.**—The Greater New York. Franklin Matthews. Justification of the project, with statistics, improvements under way, government and general discussion. Ill. 3000 w. Harper's Wk—April 17, 1897.

See also **NEW YORK.**

**Philadelphia.**—Philadelphia: What Are Its Needs? Discussion, introduced by H. V. B. Osbourn, of the municipal improvements desirable in this city. Ill. 5000 w. Pro Engs' Club of Phila—Feb., 1900.

**Taxation vs. Assessment.**—General Taxation and Special Assessment for Municipal Improvements. N. P. Lewis. A consideration of the means of securing the money to pay for improvements, and whether they pay. 2500 w. Munic Engng—Nov., 1897.

**United States.**—The Importance of Municipal Improvements. A statement by W. P. Lewis, in an address before the Am. Soc. of Munic. Imp. at the Toronto meeting, of the magnitude of public works in the U. S. 1000 w. Eng Rec—Oct. 14, 1899.

**Vienna.**—City Improvements between the Park and Theatre in Vienna (Die Regulirung des Stadttheiles vom Stadtparke bis zum Theater a. d. Wien). Jos. Hudetz. A discussion of several plans for cutting new streets, and accompanying municipal improvements. The author offers a substitute plan for that of the city engineers of Vienna. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 22, 1897.

**Village Societies.**—Village Improvement Societies. Mary Caroline Robbins. Reviews the work and notes what has been accomplished, shows in how many directions the art is being applied, its effect on the value of property and the character of the community. 7500 w. Atlantic M—Feb., 1897.

**Washington.**—See also **ASPHALT—Washington.**

**Zurich.**—Buildings for the Old Tonhalle Place in Zurich (Bebauungsplan des Areals der Alten Tonhalle in Zürich). Handsomely illustrated account of Prof. Bluntschli's admirable design for the occupation of a most valuable building location. 2500 w. 1 plate. Schweizerische Bauzeitung—April 17, 1897.

## MUNICIPALITY.

**Co-operation vs. Consolidation.**—Municipal Co-operation a Possible Substitute for Consolidation. Refers to the experience of Boston and Newark, and their suburbs, as cases of municipal co-operation, and the advantages of consolidation, as represented by Greater New York, favoring co-operation. 3000 w. Eng News—Feb. 16, 1899.

## MUNICIPAL OWNERSHIP.

See also **MUNICIPAL CONTROL; MUNICIPAL WORKS; STATE OWNERSHIP.**

Municipal Advantages—How to Obtain Them. Allen R. Foote. An argument against municipal ownership. 7500 w. Pro Age—July 1, 1896.

Municipal and Private Ownership of Water, Gas and Electric Light Plants in the United States. Editorial discussion of the report just published by the U. S. Dept. of Labor. 4000 w. Eng News—Aug. 9, 1900.

Municipal Control of Public Works. H. J. Malochee. A discussion of the various plans adopted and suggested, and of the reasons for and against municipal control. 4500 w. Jour Assn of Engng Soc's—Oct., 1898.

Municipal Functions: A Study of the Development, Scope and Tendency of Municipal Socialism. Milo Roy Maltbie. A study of what the municipality does; discussing the historic development; the scope of present municipal activities, and the future outlook. 60000 w. Munic Af—Dec., 1898.

Municipal Ownership and Municipal Control. Charles Carroll Brown. Brief discussion of what works are best owned by the city. 900 w. Munic Engng—Jan., 1898.

Municipal Ownership. Roderick J. Parke. Presents the principal considerations for and against, and the control of municipal industrial services, especially the supplying of electrical current for street lighting, etc. Aims to present facts which must be considered before a wise conclusion can be reached. Serial. Can Eng—June, 1898.

Municipal Trading. Abstracts of papers discussing the subjects of the limits of municipal trading in the Section of Economic Science and Statistics, at the meeting of the British Assn. 2300 w. Arch, Lond—Sept. 16, 1898.

Objections to the Municipal Ownership of Public Works. T. Carpenter Smith. A discussion of this much-mooted question, especially in regard to the municipal ownership of electric-lighting plants, viewed from the standpoint of the electrical engineer, and taking the adverse position to city control. 4000 w. Eng Mag—Feb., 1898.

Report of a Special Committee of the Northwestern Electrical Association on Municipal and Opposition Ownership. Really two reports, one submitted by H. L. Doherty, the other by E. Coleman. Abstracts. The reports give no new information. 2200 w. Elec—Jan. 27, 1897.

**British Tramways.**—See also **Electric Tramway; Street Railway; TRAMWAYS—British.**

**Cost.**—The Cost of Municipal Enterprise. Discussion of Dixon H. Davies' paper. 14000 w. Jour Soc of Arts—Feb. 17, 1899.

The Cost of Municipal Enterprise. Dixon H. Davies. An interesting consideration of this subject favorable to private companies, and presenting the disadvantages and dangers attending municipal enterprise. Also discussion. 11200 w. Jour Soc of Arts—Feb. 3, 1899.

**Cost of Service.**—Cost of Service to Users and Taxpayers. Allen R. Foote. Read before the League of American Municipalities, Sept., 1897. Considers this the only proper basis of comparison to show the relative economic advantages derived from private and municipal ownership and operation of water, gas and electric-lighting works. Investigations made. 8800 w. Elec Eng, N Y—Nov. 4, 1897.

**Detroit Street Railways.**—Decision in the Detroit Case. Text of the decision of the Supreme Court of Michigan holding the law providing for municipal ownership of Detroit street railways to be unconstitutional. 8000 w. St Ry Rev—July 15, 1899.

See also **ELECTRIC TRAMWAY.**

**Electric Lighting.**—Municipal Plants. Prof. Bemis. Presented at Detroit meeting of the League of American Municipalities. Notes on the recent progress of municipal electric lighting, with discussion. 5000 w. Pro Age—Sept. 1, 1898.

Practical Hints on Starting a Municipal Electrical Department. J. J. Steinitz. Extracts from a paper read before the Falcon Works Engineering Society. Discusses the difference between a municipal and a company undertaking the work of a municipal electric engineer, etc. 8700 w. Elect'n, Lond—Feb. 18, 1898.

Public Control, Ownership or Operation of Municipal Franchises. R. R. Bowker. Written from the point of view of the economist or citizen, with special references to electric lighting. Does not favor municipal ownership. 11000 w. Munic Affairs—Dec., 1897.

See also **ELECTRIC LIGHTING—Bolton, Eng.; Colombo, Ceylon; Detroit; Municipal Ownership; Public; San Francisco; ELECTRIC STATION—Hamilton, O.**

**Electric Lighting, Utica, N. Y.**—Report on Municipal Ownership of Electric Street Lighting Plant for Utica, N. Y. The committee of the Common Council after quite a discussion and reviewing the experience of other cities, concludes that the service can be secured quite as cheaply by private contract. But the appointed electrical engineer in his deport, strongly recommends municipal ownership. 900 w. Eng News—May 7, 1896.

**Electric Station.**—Municipal Ownership of Electric Light Plants. John A. Britton. A powerful argument against the moral and legal right to wrest the property of electric light plants, or other analogous property from their present ownership, and claiming that in the case of electric light plants, the maintenance would be increased 75 per cent. under municipal control. 4800 w. Am Gas Lgt Jour—Jan. 20, 1896.

Municipal Ownership of Electric Plants. Editorial on the subject referring to paper of Allen R. Foote, read at the Street Lighting Convention in New Haven. 1400 w. Elec Eng—July 1, 1896.

Some Views and Data on Municipal Ownership. Henry Hopkins. States the reasons that warrant a municipal plant, and discusses why they are not usually desirable. Serial. Elec Eng, N. Y.—Oct. 13, 1898.

**Electric Subways.**—See **ELECTRIC CONDUIT—Municipal Ownership.**

**Electric Supply.**—Management of Electrical Undertakings by Local Authorities. Councillor Hesford. Read at meeting of the Munic. Elec. Assn., London, with discussion. 2500 w. Elec Eng, Lond—June 10, 1898.

The Control by Municipal Authorities of Consuming Devices and the Wire Connecting Them to the Mains. C. H. Wordingham. Paper read before the Municipal Elec. Assn. Points in connection with the question which are of importance to municipalities in possession of electric supply stations. 5000 w. Elect'n—June 26, 1896.

**Electric Tramways.**—See also **Street Railways; ELECTRIC TRAMWAY—Bradford, Eng.; Municipal Ownership.**

**England.**—See **Great Britain; Street Railway.**

**Factories.**—Municipal Factories. Editorial discussion of the functions to be undertaken by public bodies, and the absurdity of modern socialistic theories. 2200 w. Engng—Feb. 10, 1899.

**Franchises.**—The Fallacy of Municipal Ownership of Franchises. Frank M. Loomis. Showing that municipal ownership is robbery under the form of law, and that municipal control is the true solution. 3300 w. Eng Mag—Aug., 1896.

See also **FRANCHISE.**

**Gas.**—A Fabric of Misstatements. Editorial criticism of the paper entitled "The Municipal Ownership of Gas Plants" read before the recent New Haven street-lighting convention. 3000 w. Pro Age—July 15, 1896.

Is the Municipalization of Gas Undertakings Advantageous? Herbert Lees. Read before the Incorporated Gas Inst. at Bath, Eng. Concludes that under present circumstances it is not to the advantage of the consumer. Discussion. 9500 w. Gas Wld—June 19, 1897.

Municipal Ownership. John A. Britton. Municipal ownership is treated adversely. Discussion. 6000 w. Am Gas Lgt Jour—Aug. 24, 1896.

I. New York City Should Own the Gas Supply. Edward M. Grout. II. No Government Should Operate an Industry—A Reply. Allen Ripley Foote. III. A Rejoinder. Edward M. Grout. Papers written at the request of the Committee on Municipal Administration of the Reform Club of New York, presenting the pro and con of this question. 23800 w. Munic Af—June, 1897.

The Purchase of Gas Undertakings. Frank Balfour Browne. Notes the tendency to pass to municipal bodies the undertakings that have gained success through private capital, and discusses questions which were raised in connection with the Morley case in England. 2500 w. Jour Gas Lgt—Nov. 8, 1898.

See also **GAS INDUSTRY—Municipal Control; Philadelphia.**

**Gas and Electric Plant.**—Municipal Light, Heat, and Power. Alton D. Adams. A comparison of the results obtained by gas and electric energy. 2700 w. Munic Engng—May, 1900.

Municipal Lighting Plants in Massachusetts. An analysis of the reports of 17 municipal lighting plants, giving costs of service to private consumers and for public lighting. 1100 w. Eng Rec—June 9, 1900.

The American Case Against Municipalization. Editorial review of the address of Dr. Allen R. Foote against municipalization of gas and electric lighting undertakings, delivered at the Street Lighting Convention at New Haven, Conn. 1000 w. Jour of Gas Lgt—Aug. 18, 1896.

The Municipal Ownership of Gas and Electric Plants. T. B. Persse. An argument favoring municipal ownership. 7000 w. Pro Age—July 1, 1896.

**Glasgow.**—Cities and Public Works. The Correct Story of Glasgow's Achievements. Robert Watt. Compares the conditions of Glasgow and San Francisco, and favors private control. 2400 w. Am Gas Lgt Jour—Dec. 4, 1899.

The Story of Municipal Glasgow. Review of a recent volume by Sir James Bell, very complimentary to the author. 2800 w. Jour Gas Lgt—March 30, 1897.

**Great Britain.**—Municipal Trading. Editorial discussion of this subject as viewed in England, and of some of the difficulties in the distribution of profits and losses. 2200 w. Engr, Lond—March 10, 1899.

Municipal Trading. The first of a series of articles discussing conditions in England which have led to the development of municipal trading, and the measure of success which has thus far attended the practice. Serial. Jour Gas Lgt—Feb. 28, 1899.

See also **ELECTRIC POWER—Great Britain.**

**Indianapolis.**—See **Substitute.**

**Leeds Electric Tramways.**—See **ELECTRIC TRAMWAYS—Leeds Municipal.**

**Massachusetts.**—See **Gas and Electric Plant.**

**Lighting Plants.**—See **Electric; Gas; Gas and Electric Street Lighting.**

**Michigan Street Railways.**—The Prohibition of Municipal Ownership of Michigan Street Railways. A statement for the reasons for the constitutional prohibition of the municipal ownership of street Railways. A statement of the reasons for the constitutional prohibition of the municipal ownership of street railways in the State. 1900 w. Eng Rec—Aug. 5, 1899.

**New York Rapid Transit.**—Municipal Construction and Ownership of Works for Public Accommodation. Editorial upon the recent decision of the Supreme Court declaring the rapid transit act of New York State constitutional. 800 w. Eng Rec—Aug. 22, 1896.

**Street Lighting.**—See also **ELECTRIC LIGHTING—Street; LIGHTING—Street.**

**Street Railway.**—Facts and Fancies Concerning Street Railroads. W. W. Cole. Read before the N. S. State Convention at Niagara Falls. Discusses public and private ownership, and the attitude of leading magazines to this question. 2000 w. St Ry Rev—Sept. 15, 1897.

Municipal and Private Ownership and Operation of Street Railways—A Study of Results and Possibilities. Edward E. Higgins. Concludes that the best solution of the problem is found in complete monopoly, private ownership and operation, perpetual franchises and a system of perpetual profit sharing with the municipality, joined to a remission of charges to the public if and whenever profits come to be sufficient for that purpose. 1150 w. St Ry Jour—Sept., 1897.

Municipal or Private Ownership and Control. Charles Carroll Brown. Discusses certain phases of the transportation problem. 1800 w. Munic Engng—Oct., 1899.

Municipal Ownership and Operation of Street Railways. H. H. Vreeland. Extracts from a paper presented at the N. Y. State Street Railway Assn.'s Convention. Discussion of the difficulties that would arise in purchasing back the franchises, and of various phases of the subject. 2400 w. Elec Wld—Sept. 18, 1897.

Municipal Ownership and the Operation of

Street Railways. P. F. Sullivan. Abstract of a paper read before the convention of the American Street Railway Assn. Unfavorable to municipal ownership in American cities. 800 w. Elec Wld —Oct. 23, 1897.

Municipal Ownership of Street Railroads. Abstracts of speeches by Charles Richardson favoring, and by Frank M. Loomis opposing ownership, both delivered before the National Municipal League of Baltimore. 2300 w. R R Gaz—July 24, 1896.

Public and Private Operation of Street Railways. I. Should Greater New York Operate Its Street Railways? Yes. John Dewitt Warner. II. Municipal and Private Ownership of Street Railways—A Study of Results and Possibilities. Edward E. Higgins. Two papers discussing the pros and cons of this subject. Munic Af—Sept., 1897.

See also **ELECTRIC TRAMWAY—Municipal Ownership; STREET RAILWAY; TRAMWAY.**

**Street Railway, England.**—Municipal Ownership of Street Railroads in England. W. M. Acworth. Gives experience in England, stating the general tramway conditions, proportion of public ownership, power of purchase, public working, etc. 3000 w. R R Gaz—June 4, 1897.

**Street Railway, New York.**—A Matter of Municipal Ownership, and What Came of It. F. M. Explains the position of the city of New York in its relation to the Sixth and Eighth Avenue systems. 2000 w. Harper's Wk—Oct. 30, 1897.

**Substitute.**—A Successful Substitute for Municipal Ownership. Alfred F. Potts. Indicates a solution of the question how the people may own and control street railways, water, telephone and light companies without resorting to municipal ownership. Outlines the plan of organization on which the Consumers' Gas Trust Co., of Indianapolis was formed. 2800 w. Munic Engng—April, 1898.

**Telephones.**—See **TELEPHONE—Municipal Ownership.**

**Tramways.**—See **Electric Tramway; Street Railway.**

**Water Works.**—See **WATER WORKS—Danville, Ill.; Madison, Wis.; Municipal.**

**MUNICIPAL PLAYGROUND.**

See **PARK—Municipal Playground.**

**MUNICIPAL SERVICE.**

**Boston.**—The Municipal Service of Boston. Francis C. Lowell. The article considers what we get from the city and what we pay for it, taking the city of Boston as an example. 7000 w. Atlantic M—March, 1898.

**MUNICIPAL STATISTICS.**

The Tabulation of Municipal Statistics. Summary of a report to the Am. Soc. of Munic. Imp. on forms for giving municipal statistics in order that the figures of different cities may be comparable. 3000 w. Eng Rec—Oct. 14, 1899.

**MUNICIPAL WORK.**

Public Work and How to Do It. I. A Boston Argument in Favor of Direct Municipal Performance. Sylvester Baxter. II. Toronto and Chicago Compared in the Matter of Street-Cleaning by Contract. George E. Hooker. Part first presents the evils of the contract system, with comparative costs of public and private contract, etc. Part 2d gives highest praise to the direct labor system of Toronto and severely criticises the contract system in Chicago. Ill. 4500 w. Rev of Rev—April, 1897.

**MUNICIPAL WORKS.**

See **MUNICIPAL BUILDINGS; MUNICIPAL IMPROVEMENT; PUBLIC WORKS.**

**MUSCULAR POWER.**

See **ANIMAL POWER.**

**MUSEUM.**

**Arts et Métiers, Paris.**—The Centenary of the Conservatoire des Arts et Métiers (Le Centenaire du Conservatoire des Arts et Métiers). A historical account of this famous French mechanical museum and educational institution, with illustrations of various portions of the buildings. 1500 w. Génie Civil—July 16, 1898.

**Bern.**—The Historical Museum at Berne (Das Historische Museum in Bern). Illustrated description of this fine new museum building in Switzerland, with plate of interior view. Two articles. Schweizerische Bauzeitung—Jan. 1, 8, 1898.

**Commercial, New York.**—A Commercial Museum for New York. A permanent exhibition to be established which will contain a library of information as to the industries, etc., of all countries, with samples also of manufactured goods, both American and foreign. Illustrations of exterior and interior of building are given. 400 w. Inv Age —Jan., 1896.

**Commercial, Philadelphia.**—An Important Work in Finding Foreign Markets for American Manufactured Products. The character of the Philadelphia Museum, its purposes and methods. 400 w. Mfrs Rec—Aug. 14, 1896.

**Electric.**—See **ELECTRIC MUSEUM.**

**Liverpool.**—Liverpool Museum Extension and Technical Schools. Perspective view, plans, and descriptive text of the selected design. 1000 w. Builder—Aug. 8, 1896.

**Munich.**—A Plan for Buildings on the "Kohleninsel" at Munich (Ein Entwurf zur Bebauung der Kohleninsel in München). Description and illustrations of very artistic museum, exposition building, etc., which it is proposed to erect on an island in the Isar River at Munich. Abstracted from a memoir entitled "Die würdige Ausgestaltung der Kohleninsel und die Jubiläums-Ausstellung des Bayerischen Kunstgewerbevereins. Serial. 3 parts. 2000 w. Deutsche Bauzeitung—April 14, 18, 21, 1900.

**Paris, Natural History.**—The New Galleries of the Museum of Natural History, at Paris (Les Nouvelles Galeries du Muséum d'Histoire Naturelle à Paris). With exterior and interior views, also plans and elevation of the fine buildings for the Paris Zoological Museum. 2500 w. 1 plate. Génie Civil—May 21, 1898.

**Reichenberg, Bohemia.**—The Competition for the Technical Museum of Northern Bohemia at Reichenberg (Zum Wettbewerb des Nordböhmischen Gewerbe-museums in Reichenberg). A discussion, with plans, elevations and sections, of the two most important designs submitted. 5000 w. Wiener Bauindustrie Zeitung—July 15, 1897.

**Smithsonian, Washington.**—See **ELECTRIC MUSEUM.**

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**NAIL.**

**Holding Power.**—The Holding Power of Nails in Douglas Spruce (Oregon Pine) and in Redwood (Sequoia Sempervirens). Frank Soule. Data obtained from tests made in the laboratory of the Univ. of California, in Berkeley, and conclusions drawn. 4200 w. Jour Assn of Eng Soc —Feb., 1898.

**Wire.**—The Shearing Strength of Wire Nails. A thesis by Frank Bates Walker and Charles H. Cross, University of Minnesota. Statement of experiments made by the writers with tabulated results. Also discussion. Ill. 8800 w. Jour Assn of Engng Socs—Dec., 1897.

**NAIL WORKS.**

**Duncanville, Pa.**—The Portage Iron Company, Limited. Illustrates and describes a model plant at Duncansville, Pa. 2500 w. Ir Age—Dec. 15, 1898.

**NAPHTHA LAUNCH.**

See **LAUNCH—Naphtha.**

**NAPHTHALENE.**

See also **GAS MANUFACTURE—Naphthalene.**

A Few Words on Napthalene. John Gimper. Dissents from the opinion that the formation of naphthalene is caused by temperature changes, and attributes it to the presence of water. Discussion. 2000 w. Am Gas Lgt Jour—June 1, 1896.

A Method Successfully Employed to Obviate Trouble from Naphthalene. K. M. Mitchell. Read before the American Gas Light Assn. States the difficulties met with and the method that finally brought success. Also discussion. Ill. 3500 w. Am Gas Lgt Jour—Nov. 1, 1897.

Estimation of Naphthalene in Coal Gas. Harold G. Colman and J. F. Smith. Paper read at meeting of the Nottingham Section of the Soc. of Chem Ind. An explanation of a method devised by the writers. Ill. 2000 w. Jour Gas Lgt—March 27, 1900.

Naphthalene and Coal Gas. An interview with William Young, discussing the novel theory recently presented in a paper by R. W. Allen. 3000 w. Gas Wld—March 31, 1900.

Naphthalene. A topical discussion by members of the New England Assn. of Gas Engineers, at its twenty-sixth annual meeting. A great variety of experience in the formation of naphthalene is given, and theories as to causes and modes of prevention are presented in the discussion, which resulted in the appointment of a committee to investigate the subject and present a report. 2800 w. Am Gas Lgt Jour—March 23, 1896.

Naphthalene Deposits; Their Cause and Prevention. John P. Leather. Read before the Incorporated Gas Inst., England. Discusses the subject and the remedy most favored by the author. Discussion. 6500 w. Gas Wld—June 17, 1899.

The Causes Underlying the Formation of Naphthalene and Their Prevention. Paul Doty. Reviews papers and investigations recently reported from Europe, and gives personal experiences. 5000 w. Am Gas Lgt Jour—June 26, 1899.

The Naphthalene Question. Dr. P. Eitner. Abstract translation of a paper read before the Mid-Rhemish Assn. of Gas and Water Engs., with editorial. A valuable contribution to the solution of this question. 4600 w. Jour Gas Lgt—Feb. 21, 1899.

The Presence of Naphthalene in Coal Gas: A Novel Theory. R. W. Allen. A summary of the contents of a paper read at meeting of the London section of the Soc. of Chem. Ind. Gives experimental data presenting this question in a new aspect. Also editorial, correspondence, and discussion. 9000 w. Jour Gas Lgt—March 13, 1900.

The Quantity of Naphthalene in Gas. William Young. On the value as an illuminant of the naphthalene usually present in coal gas. 1700 w. Jour Gas Lgt—Sept. 26, 1899.

**Hastings Prevention Process.**—Extended Experience with the Hastings Carburation Process for the Prevention of Naphthalene Deposits in the Distributing Mains and Services. Charles E. Botley. Read at meeting of the So. Dist. Assn. of Gas Engs. and Managers, England. A brief description of the process, with report of extended experience. Also discussion. 6300 w. Gas Wld—Nov. 12, 1898.

## NARROW GAUGE RAILWAY.

See also **LIGHT RAILWAY; MOUNTAIN RAILWAY.**

Comparative Study of the Standard and the Metre Gauge (Etude Comparative entre la Vôie Normale et la Voie de 1 Metre). J. Martin. A revival of the narrow gauge discussion, with especial reference to conditions in France. Serial. 4 parts. 18000 w. Revue Technique—May 25, June 10, 25, July 10, 1897.

Narrow-Gauge Railways, Two Feet and Under. Leslie S. Robertson. Read before the Inst. of Mech. Engs. at Derby, England. 6000 w. Engng—July 29, 1898.

On the Choice of a Gauge for Local Railways and Tramways (Ueber die Wahl der Spurweite für Lokal-und Trambahnen). A. Trautweiler. A consideration of the gauge question, with a discussion of the advantages and disadvantages of a narrow gauge. Serial. Schweiz Bauzeitung—July 7, 1900.

**America.**—Narrow Gauge Railways. A tabulation of the narrow gauge roads of the United States, Canada and Mexico, with comment on present status of construction. 500 w. Ry Age—Oct. 16, 1896.

**Azores.**—Proposed Railway in the Azores. Summary of a contract for the building and equipping of a modern narrow gauge railway to connect Ribeira Grande, and Furnas, a local resort noted for its hot springs. 1200 w. U S Cons Repts, No. 681—March 19, 1900.

**Car.**—See **Transshipment Car; CAR—Narrow Gauge Tramway.**

**Ceylon.**—See **RAILWAY.**

**Galicia.**—Narrow Gauge Steam Timber Roads in Galicia (Ueber Schmalspurige Waldbahnen mit Dampfbetrieb in Galizien). A. R. Fleischl. General description of a system of roads of 800 mm. gauge in the forests of Galicia, with topographical maps, profiles and details of rolling stock. Six plates. 7500 w. Mitt d Ver f d Förd d Local u Strassenbahnwesens—Aug., 1897.

**India.**—Narrow Gauge Railways. F. J. E. Spring. Describes the Darjeeling-Himalayan railway, the Howrah-Amta and Howrah Sheakhalla tramways, the Barsi light railway and the Tezpur tramway. 3500 w. Ind & East Engr—Feb., 1899.

See also **LIGHT RAILWAY; MOUNTAIN RAILWAY.**

**Locomotive.**—See **LOCOMOTIVE—Himalayan; Light Railway; Narrow Gauge.**

**Normandy.**—Narrow Gauge Light Railway; Caen to Dives and Luc sur-Mer. This 2-ft. gauge track in Normandy is equipped with 30 lb. rails, built at a cost of 2143 l. per mile, exclusive of cost of land. The description includes six views from photographs. 1300 w. Engng—Feb. 28, 1896.

**Rhenish Prussia.**—The Wallücke Railway (Die Wallückebahn). Illustrated description of an 18 mile, 24-in. gauge steam road in Rhenish Prussia, with details of track and rolling stock. The road is mainly used for the transportation of iron ore. Three articles. 10000 w. Die Schmalspurbahn—Oct. 1, 16, Nov. 1, 1897.

**South Africa.**—Little Railways for South African Colonies. Editorial discussion of the conditions prevailing in these colonies and the advisability of constructing a 2-ft. gauge line. Considers the views of C. Bodtker, given in a recent pamphlet. 2000 w. Engng—Jan. 20, 1899.

**Transshipment Car.**—Light Railways. J. B. Corrie. Describes and illustrates a car, invented by E. R. Calthorp, for transporting standard railway waggons over narrow gauge lines. 2000 w. Ind & Ir—Nov. 26, 1897.

Narrow Gauge Light Railways and How to Avoid Transshipment. Everard R. Calthorp. A letter to the editor from the consulting engineer of the Barsi Light Railway. Describes a transportation car, by means of which standard gauge cars of all kinds can be carried over a narrow gauge line. 1400 w. Trans—Sept. 17, 1897.

## NATURAL GAS.

See also **PETROLEUM.**

Changing a Coal Gas System to the Use of Natural Gas. John Kempf, Jr. Read before the Pacific Coast Assn. An account of work at Salt Lake City, with discussion. 2400 w. Am Gas Lgt Jour—Aug. 16, 1897.

Natural Gas. J. M. Buckley. The gradual decrease of output at all points, showing that the early predictions as to the permanency of the supply were at fault, but predicting that the use of gas as a fuel will continue and a cheaper and better gas will take the place of the natural product. 1500 w. Pro Age—Nov. 16, 1896.

Natural Gas. Southard Hay. Brief account of the geological conditions upon which the occurrence seems to depend, the simple machinery required for its storage and transmission, and the extent and convenience of its use. 2000 w. Yale Sci M—April, 1900.

**Breathing Well, California.**—Note on a Breathing Gas Well. Harold W. Fairbanks. Brief description and remarks upon a well situated on the Eagle Ranch, in San Luis Obispo Co., California, which gives an intermittent flow of natural gas. 900 w. Science—May 8, 1896.

**China.**—See **PETROLEUM; SALT MINE.**

**Cincinnati.**—I. Cincinnati Natural Gas Investigation. II. Natural Gas Supply. The first article gives the principal provisions of the Laidlaw Ordinance and the discussion. The second is the testimony of Edward Orton, the State geologist. 5500 w. Pro Age—June 15, 1899.

**Colorado.**—Natural Gas in Colorado. Arthur Lakes. Deals with the origin of natural gas and petroleum, and their relations to bituminous shale and asphaltum, describing the White River gas field. 2500 w. Mines & Min—March, 1899.

**Composition.**—Fluctuations in the Composition of Natural Gas; and a Method for the Determination of Nitrogen in Gas Mixtures. Francis C. Phillips. Describes experiments made in studying the causes of fluctuation in the heating power. 4500 w. Pro of Engs' Club of W Penna—Dec., 1898.

**Fuel.**—Natural Gas and Its Use as a Fuel. Bert M. Seymour. Present practice in applying natural gas to heating furnaces in the arts and to generation of steam. 1000 w. Sta Eng—June, 1896.

**Hydrogen Sulphide.**—On the Occurrence of Hydrogen Sulphide in the Natural Gas of Point Abino, Canada; and on a Method for the Determination of Sulphur in Gas Mixtures. Francis C. Phillips, in "Jour. Am. Chem. Soc." A summary of tests made at the wells and results obtained. Ill. 3000 w. Am Gas Lgt Jour—Sept. 26, 1898.

**New York.**—Gas-Well Sections in the Upper Mohawk Valley and Central New York. Charles S. Prosser. Gives descriptions of the various wells, and of samples, with discussions of records. 2700 w. 5500 w. Am Geol—March, 1900.

**Sussex, Eng.**—The Discovery of Natural Gas in Sussex, England. An outline of investigations of C. Dawson and Dr. Hewett in regard to the utility of this gas, with an account of its discovery, and probable origin. 1800 w. Jour of Gas Lgt—June 14, 1898.

**United States.**—Natural Gas. Its Production and Consumption. Abstract of a U. S. Geological Survey report compiled by F. H. Oliphant, comprising a survey of the gas fields, a discussion of the question of their exhaustion, and statistics concerning the utilization of natural gas in iron and steel industries. 2000 w. Ir Age—Sept. 27, 1900.

Natural Gas Production in the United States. From advanced sheets of the "Eighteenth Annual Report of the United States Geological Survey." Report of the production for 1896, with the condition of the fields, value of the gas, consumption and distribution. 2000 w. Am Mfr & Ir Wld—Sept. 17, 1897.

**NATURAL GAS EXPLOSION.**

**Cleveland Tunnel.**—Gas Explosion in the Cleveland Waterworks Tunnel. Describes an explosion of natural gas which killed or injured eight men. Caused by electricity. 700 w. Eng Rec—May 21, 1898.

See also **EXPLOSION.**

**NAVAL ARCHITECTURE.**

See also **MARINE ENGINEERING; RUDDER; SHIP; SHIPBUILDING; SHIP PROPULSION; SHIP RESISTANCE; STEAMSHIP; STEERING; STEERING GEAR; VESSEL.**

A Short Account of Some of the Changes Which Have Been Introduced into the Types, Sizes and Construction of Ships During the Last Forty Years. B. Martell. Abstract of a paper read before the Inst. of Naval Archts. 4000 w. Engs' Gaz—July, 1900.

Naval Architecture—A Few Principles Popularly Explained. First part deals with displacement, illustrating the text of diagrams, and employing only simple equations of the first degree. Serial. Eng, Lond—Jan. 17, 1896.

Naval Architecture. Vernon D. Cox. From "The Independent." Notes on the art and practice of shipbuilding. 1700 w. Sci Am Sup—July 8, 1899.

Notes on Naval Architecture. Joseph R. Oldhorn. Quotes from paper of Sir Edward J. Reed, and the discussion called out, briefly describes the Japanese battleship "Shikishima"; comments on American warships, etc. Discussion. 6000 w. Jour Assn of Engng Socs—July, 1898.

On the Advances Made in the Mathematical Theory of Naval Architecture During the Existence of the Institution. Edward J. Reed. Read at the International Congress of Naval Architects and Marine Engineers. Interesting historical review of progress. 15000 w. Jour Am Soc of Nav Engs—Nov., 1897.

**American Society.**—Annual Meeting of the Society of Naval Architects and Marine Engineers. Account of meeting with abstracts of papers. 3000 w. Eng News—Nov. 18, 1897.

Seventh General Meeting of the Society of Naval Architects and Marine Engineers. Report of the meeting, giving abstracts of papers and discussions. 31500 w. Marine Engng—Dec., 1899.

**Bilge Keels.**—Bilge Keels and Rolling Experiments. Lawrence Spear. A description of the manner in which bilge keels were added to the U. S. S. "Oregon," together with an account of the experimental demonstration of the effect in increasing stability. 4000 w. 4 plates. Trans Soc of N A & M E—1898.

The Action of Bilge Keels. G. H. Bryan. Read before the Inst. of Nav. Archts. A theoretical discussion of the principles underlying the use of the bilge keels, showing that their efficacy in extinguishing roller motion is greater than would be directly inferred from experiments. 6500 w. Engng—June 1, 1900.

The Means Adopted for Moderating the Rolling of Ships. W. J. Luke. Abstract of paper read before the Inst. of Engs. and Shipbuilders, in Scotland. Discusses the utility of bilge keels, experiments made, etc., in part first. Serial. Engs' Gaz—Jan., 1900.

The Steadying of Ships. G. H. Bryan. Describes investigations made, showing that the efficiency of bilge keels in modifying the rolling of ships may be greatly increased by the action of the sides of the ship itself. Abstract of paper read before the Inst. of Nav. Archts. 1800 w. Nature—June 21, 1900.

**Construction Development.**—Changes in Vessel Construction in Forty Years of Lloyd's Register. B. Martell. Read before the Inst. of Naval Archts., London. A summary of the changes and developments in the construction of ships for the mercantile marine. 5800 w. Marine Engng—Oct., 1900.

**Glasgow University.**—See **MARINE ENGINEERING.**

**Great Lakes.**—Recent Designs in Steamship Construction upon the Great Lakes. Richard L. Newman. Some of the difficulties are discussed, the position of machinery, the midship sections, etc. Discussion. Ill. 5400 w. Jour Assn of Engng Socs—Jan., 1898.

**Hull Weights.**—On Graphic Aid in Approximating Hull Weights. J. Johnson. Read at the International Congress of Naval Architects and Marine Engineers. Gives the system used by the writer and found to be satisfactory. 600 w. Engng—July 23, 1897.

**Keel, Cambered.**—Cambered Keels. States the leading particulars of the case of Burrell vs. Russell, which has excited much interest in England, and calls attention to erroneous views entertained in regard to the influence of cargoes upon a vessel's form. 2200 w. Engr, Lond—Jan. 13, 1899.

**Mean Water-Line.**—The Use of the Mean Water-Line in Designing the Lines of Ships. A. G. Ramage. Read at session of the Inst. of Naval Archts. Explains method, giving table of results. 600 w. Eng, Lond—April 16, 1897.

**Model Experiments.**—Experiments with Ship Models. Illustrated description. 1500 w. Sci Am Sup—Sept. 19, 1896.

The Practical Application of Model Experiments to Merchant Ship Design. Archibald Denny. Abstract of paper presented at the recent Engineering Conference, in London. Shows how tank experiments are practically applied, and their value. Brief report of discussion. 2500 w. Steamship—July, 1897.

**Model Tank.**—Experimental Tanks as an Aid to Marine Engineer and Naval Architect. W. F. Durand. Discussion of their application to experimental investigation, especially in regard to the resistance of ships and the performance of screw propellers. Ill. 3000 w. Marine Engng—Nov., 1897.

See also **SHIP RESISTANCE—Model Experiments; Transverse Waves.**

**Model Tank, Washington.**—The Navy's New Experimental Tank. Description of the new basin at the Washington Navy Yard, which will be used for the purpose of experimenting with warship models. 3000 w. Naut Gaz—July 13, 1899.

The New Government Testing Tank for Ship Models at the Washington Navy Yard. D. W. Taylor. An interesting illustrated account of basin at the Washington Navy Yard, the method of building the models, and conducting the experiments, etc. 3000 w. Eng News—July 6, 1899.

The U. S. Navy Experimental Model Basin. An illustrated description of the testing tank at Washington, D. C., with a description also of the apparatus and method of experimenting. 2800 w. Am Mach—July 6, 1899.

The United States Experimental Model Basin. An illustrated description of the experimental basin at the Washington Navy Yard, recently completed. 3500 w. Sci Am—July 8, 1899.

**Net Register.**—Minimum Net Register and Its Effect on Design. A. G. Ramage. Read at the meeting of the Inst. of Naval Archts., England. The result to the general usefulness of the ship of aiming at a low net register. Abstract of discussion. 2500 w. Steamship—May, 1898.

**Resistance of Ships.**—See **SHIP RESISTANCE.**

**Rolling Prevention.**—See **Bilge Keels.**

**Skin Resistance.**—See **SHIP RESISTANCE.**

**Stability.**—Ascertaining the Stability of Ships. A. G. Ramage. Read before the Inst. of Naval Archts. Illustrated description of a mechanical method of ascertaining the statical stability of ships. 1000 w. Engng—April 9, 1897.

Hints on Elementary Stability, with Remarks on Water Ballast. A. S. Thomson. Read before the Shipmaster's Society, London. A study of the relation of the center of buoyancy to the center of gravity. 1800 w. Marine Engng—May, 1897.

The Stability of Ships. Abstract of address by Mr. James Reid at the meeting of the graduates' section of the Scottish Inst. of Engs. and Shipbuilders. Defines and discusses the subject and considers that safer vessels were never built than those of the present. Related matters of interest are briefly considered. 2400 w. Eng, Lond—Nov. 20, 1896.

The Various Methods of Determining the Stability of Vessels (Ueber Verschiedene Methoden der Stabilitätsbestimmung von Schiffen). A very thorough discussion of this important subject by Inspector Schromm, with tables, diagrams and stability curves. Three articles. 15000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 27, Sept. 3 and 10, 1897.

**Stability Battleships.**—Stability of a Battleship Under Damaged Conditions. C. H. Peabody. A study of stability based upon experiments upon a model, with numerous diagrams. 2000 w. 3 plates. Trans Soc of N A & M E—1898.

**Stability Curves.**—Calculating Cross-Curves of Stability. C. F. Munday. Read before the Inst. of Naval Archts. On the advantages of using Tchebycheff's rule in association with the integrator to obtain cross-curves of stability. 1200 w. Engng—April 14, 1899.

**Stresses.**—Stresses on Ships. J. Bruhn. Paper read before the Inst. of Naval Archts., England, on the "Stresses at the Discontinuities in a Ship's Structure." Deals with the forces acting on the vessel as a whole, and not with those due to local forces. 6000 w. Engng—March 31, 1899.

**Testing Tank.**—See **Model Tank.**

**Theory.**—Advances Made in the Mathematical Theory of Naval Architecture. Edward J. Reed. Read at the International Congress of Naval Architects and Marine Engineers. A summary of the progress since 1860. Part first deals with strains and the provisions to withstand them, and with stability. Serial. Eng, Lond—July 16, 1897.

**Water-Tight Door.**—See **BULKHEAD DOOR; WATER-TIGHT DOOR.**

**Wimshurst's Rules.**—Wimshurst's Rules for the Construction of Steam Vessels. Gives rules for the construction of steel vessels, with editorial. 5000 w. Engng—Dec. 16, 1898.

## NAVAL BATTLE.

See also **GUN FIRE; NAVAL OPERATIONS; WAR.**

**Future.**—The Naval Warfare of the Future. Lawrence Irwell. Discusses various types of vessels used, the present conditions and the dangers of modern sea-fights. 2500 w. Marine Rev—Oct. 26, 1899.

**Manila.**—The Great Naval Victory at Manila. Discussion of the opposing forces, giving the composition of both American and Spanish squadrons, and some information of the harbor fortifications. Map. 1800 w. Sci Am—May 14, 1898.

See also **GUN FIRE.**

**"Monitor"-"Merrimac."**—See **ARMORED SHIPS—"Monitor"-"Merrimac."**

**Santiago.**—The Performance of Individual Ships at Santiago. Outlining the action of individual ships to determine how they fulfilled their parts. Ill. 2800 w. Engr, Lond—Feb. 24, 1899.

The Spanish-American War. On the encounter of the fleets at Santiago. Ill. 2000 w. Engng—July 21, 1899.

The First Battle Between Modern Armorclads. An account of the battle at Santiago, on July 3, 1898, reprinted from the "Literary Digest," and agreeing practically with official reports. 3000 w. Jour Am Soc of Naval Engs—Aug., 1898.

The Battle with Cervera's Fleet Off Santiago. Winston Churchill. Compares the training for the navy in America and Spain; the race differences; the ships; giving incidents of the battle and pictures of brave deeds. Ill. 7800 w. Am Rev of Revs—Aug., 1898.

The Destruction of Cervera's Fleet. I. As Seen by an Eye-Witness on the "Brooklyn," Commodore Schley's Flagship. George E. Graham. II. As Seen by an Eye-Witness on the "New York," Admiral Sampson's Flagship. W. A. M. Goode. Very fully illustrated. 9800 w. McClure's Mag—Sept., 1898.

The Remains of Cervera's Fleet. Illustrated description of the vessels showing the effect of the recent battle. 1400 w. Sci Am—July 30, 1898.

See also **GUN FIRE; NAVAL ENGINEER.**

**Spanish-American.**—Ships of War in Action. Reviews the results of the naval warfare in the late Spanish-American war, giving interesting and valuable information. 5000 w. Engr, Lond—Sept. 16, 1898.

## NAVAL DEVELOPMENT.

Tendencies of Foreign Naval Development. George H. Peters. A review of foreign views and tendencies as represented in the press and other publications. 4500 w. Naut Gas—Feb. 22, 1900.

## NAVAL ENGINEER.

See also **NAVAL ENGINEERING; NAVAL PERSONNEL.**

The Engineer and His War-Engine. R. H. Thurston. Traces the work of development in the modern war-vessel and discusses the relation of the personnel, the need of increasing the number of engineer officers, etc. 4200 w. N Am Rev—Dec., 1897.

The Engineer in Naval Warfare. John G. Walker, A. T. Mahan, R. D. Evans and S. A. Staunton. A symposium of opinions on the standing of engineers in the navy. 9500 w. N Am Rev—Dec., 1896.

The Engineer in Naval Warfare. Symposium by George W. Melville, W. S. Aldrich, Ira N. Hollis, Gardiner C. Sims, and George Uhler. The great and increasing importance of the engineer in marine warfare, and the needs of the future are herein set forth. 21700 w. N Am Rev—May, 1896.

The Modern Naval Engineer. Editorial discussion of the proposed change in personnel in the U. S. navy, and referring to the British views on the subject. 1400 w. Eng News—Oct. 27, 1898.

**British.**—Assistant Engineers in the Royal Navy. Text of the regulations for the guidance of candidates for direct appointments in the Royal British Navy, indicating very clearly the nature of the examinations through which candidates for the post of assistant engineer are required to pass. 8000 w. Eng, Lond—April 10, 1896.

The Duties of Naval Engineers. The first of a series of articles giving a synopsis of their life on board ships of war. The present issue deals with the responsibility of the chief engineer, and the senior engineer. Serial. Engr, Lond—Feb. 10, 1899.

The Engine-Room Staff. Editorial discussion of the position of engineers in the British navy, and the grievances of the engine-room artificers. 1800 w. Engng—July 21, 1899.

The British Naval Engineer: His Present Position and Influence on Our Sea Power. D. B. Morison. Discusses the education and training; duties and responsibilities; present position, pay, etc. Serial. Brit Inst of Marine Engs & Naval Archs, Adv Proof—March 30, 1900. Also Engng—April 6, 1900.

Naval Engineers. Editorial discussion of paper by D. B. Morison. 3500 w. Engng—April 6, 1900.

**Electrical.**—See **ELECTRICAL ENGINEER.**

**French.**—French Naval Engineers. The position of the naval engineers in France is explained and the demands for increased numbers, better pay, and improved status. 1300 w. Engr, Lond—April 13, 1900.

**Santiago.**—The Fighting Engineers at Santiago. Arthur Warren. A well illustrated account of the excellent work of the U. S. naval engineers in the Santiago campaign and in the great battle with the Spanish squadron. 4200 w. Eng Mag—Jan., 1899.

**United States.**—American Naval Engineers. An examination of the scheme of Ira N. Hollis, as published in the "Atlantic Monthly," for September. 3000 w. Engng—Nov. 12, 1897.

Are Our Warships to be Run Without Engineers? J. M. C. Extracts from a communication to the Philadelphia "Public Ledger," Aug. 14, which show that the costly and extensive machinery of the U. S. Navy, is in danger of neglect from the want of an adequate engineering force to care for it. 1800 w. Am Mach—Aug. 27, 1896.

The Future of Engineering in the Navy. Reviews some of the changes that would improve the smooth running of the engineering department of a ship. 2800 w. Ir Age—Aug. 5, 1897.

**U. S. Assistant.**—The Position of United States Assistant Engineers. Editorial discussion of the position and pay of these engineers and what ought to be done to bring about a just recognition and compensation. 3000 w. Eng News—Aug. 4, 1898.

**U. S. Reorganization.**—See **NAVAL PERSONNEL.**

**NAVAL ENGINEERING.**

See also **MARINE ENGINE; MARINE ENGINEERING; NAVAL ENGINEER; STEAM ENGINEERING.**

**Auxiliary Machinery.**—Auxiliary Naval Machinery. Henry S. Pickands. Illustrated description of a steering device, and of a search light, with general discussion of the effect upon crews, resulting from use of auxiliary marine machinery. 1800 w. Yale Sci M—June, 1896.

See also **AUXILIARY ENGINE.**

**Spanish-American War.**—Readings from Experience in Naval Engineering. George W. Melville. A review, by the Engineer in Chief of the United States Navy, of the lessons learned in the engineer's department by experience in the recent war with Spain. It is full of information, hitherto unpublished, of great interest. Serial. 1st part. 3500 w. Eng Mag—Feb., 1899.

Readings from Experiences in Naval Engineering. Commodore G. W. Melville. Commodore Melville's second paper deals mainly with the changed requirements due to increasing power, speed and economy, and gives important lessons learned during the late war. 4000 w. Eng Mag—March, 1899.

The War's Teaching in Naval Engineering. George W. Melville. The topics specially discussed are the importance of coal, water, repair-ships, uniform design of machinery, water-tube boilers, triple screws, speed, tests and training. The highest praise is given the personnel of the engineers corps. 4000 w. Stevens Ind—Jan., 1899.

**United States.**—Applied Science in the Navy. R. H. Thurston. Comments on information in the report of the Chief of the Bureau of Steam Engng. of the Navy Dept. of the U. S., on the work performed during the war with Spain. 1300 w. Science—Dec. 9, 1898.

Steam Engineering in the United States Navy. Editorial review of the annual report of Commodore George W. Melville. 1800 w. Engr, Lond—Jan. 27, 1899.

**U. S. Report.**—Admiral Melville's Report. Abstract of report to the Secretary of the Navy, urging a liberal appropriation that will enable the U. S. to keep abreast with other naval powers, and indicating some of the needs. 3000 w. Ir Age—Oct. 25, 1900.

Steam in the Navy and Naval Engineering. Abstracts from the report of Engineer-in-Chief of the Navy, Commodore G. W. Melville, showing the part played by the mechanical engineer and machine-constructor in modern naval wars. 5000 w. Sib Jour of Engng—Dec., 1898.

The Annual Report of the Engineer-in-Chief. From the report of George W. Melville, giving the important parts. 18300 w. Jour Am Soc of Nav Engs—Nov., 1899.

**NAVAL EVOLUTIONS.**

**Italian.**—Use of Curves of Space and Velocity in Evolutions (Impiego delle Curve degli Spazi e delle Velocità nei Cambiamenti di Distanze o d'Intervalli e nelle Evoluzioni in Generale). G. Como. The author argues for the closer study of graphical methods in the Italian navy. 7000 w. 2 plates. Rivista Marittima—Aug.-Sept., 1898.

**NAVAL MANŒUVRES.**

**British.**—Outline of the British Naval Manoeuvres Recently Concluded. States the purpose of the manoeuvres and gives the official programme, with description of the fleets. Ill. 1600 w. Marine Engng—Sept., 1899.

**French, 1896.**—The French Naval Manoeuvres. Illustrated description with particulars of the armored ships that participated. Serial. Engng—Sept. 11, 1896.

**French, 1898.**—The French Naval Manoeuvres of 1898. Editorial account of the Manoeuvres of the Mediterranean Squadron is given in part first. Serial. Engng—Oct. 7, 1898.

**NAVAL OFFICER.**

**French, Education.**—The Training of French Naval Officers. Editorial. Historical sketch from the initiation of the project, to its final adoption, and its general value to French marine progress, with an outline of the scheme of training it will offer. 2500 w. Engng—Feb. 14, 1896.

**NAVAL OPERATIONS.**

See also **NAVAL BATTLE.**

**Spanish-American War.**—The Navy in the War with Spain. Ira Nelson Hollis. Reviews the history of the naval part of the war and what the United States learned of value to naval development. 7000 w. Atlantic M—Nov., 1898.

**West Indies.**—Official Report on the Naval Operations in the West Indies. A chronological abstract of Secretary Long's report of Sampson's fleet, which describes the naval operations before Cuba which ended in the destruction of Cervera's fleet. Chart. 7800 w. Sci Am Sup—Nov. 12, 1898.

**NAVAL PERSONNEL.**

**U. S. Reorganization.**—The Naval Engineers' Reorganization Bill. Editorial review of the bill for reorganizing the Corps of U. S. Naval Engineers, introduced by Senator Squire and Representative Wilson. The main features of the bill are unqualifiedly approved. 1800 w. Eng Rec—March 28, 1896.

The Reorganization of the Naval Personnel. A symposium including: 1. The suggestion of a solution. Francis H. Wilson. 2. The genesis of the personnel bill. Theodore Roosevelt. 3. A line officer's view. John W. Philip. 4. An engineer officer's view. George W. Melville. 5. From the standpoint of the people. George Edmund Foss. 20000 w. N Am Rev—Dec., 1898.

**NAVIGATION.**

See also **COMPASS; FOG SIGNAL; LIFE-SAVING; MERCHANT MARINE; TRANSPORTATION; WRECK.**

**Aerial.**—See **AERONAUTICS.**

**Bech's Apparatus.**—Bech's Apparatus for Controlling the Course of a Vessel (Der Bech'sche Schiffscurs-Controlapparat). A combination of compass and photographic recording apparatus by means of which any deviation of a vessel from a given course is recorded and shown. 3500 w. Oesterr Monatschr f d Oeffent Baudienst—March, 1898.

**Collision Protection.**—Minimizing the Effects of Collision at Sea. Extract from address delivered at General Chamber of Commerce, Hong Kong, by Rear Admiral S. Makaroff, Imperial Russian Navy. Deals with appliances for protective use, and with methods of construction designed to lessen risk of damage through collisions at sea. 1800 w. Eng, Cleveland, O—July 4, 1896.

**Inland.**—See **CANAL; HARBOR; RIVER REGULATION; WATERWAY.**

**Latitude Abacus.**—Abacus for Calculating Latitudes from Meridian Altitudes (Abbaco per il Calcolo della Latitudine Medianti un'Altezza Circummeridiana). G. Pesci. Illustrated description of a simple and rapid method of finding latitudes at sea. 3500 w. Rivista Marittima—Oct., 1898.

**Latitude Determination.**—See **LATITUDE.**

**Ocean Routes.**—Routes Adopted by the Transatlantic Steamship Lines (Routes Adoptées par les Compagnies Transatlantiques). A statement of the new routes going into effect January 15, 1899, with chart of the North Atlantic. 1200 w. Le Yacht—Jan. 28, 1899.

**Oil on Waves.**—See **OIL—Waves.**

**Position Indicator.**—Is There Any Excuse for Collisions at Sea? Hermann Herberts. A letter explaining means for detecting the presence of a vessel or iceberg, and how their movements may be followed. 3200 w. Sci Am Sup—Aug. 6, 1898.

Means for Detecting the Presence of a Ship or Iceberg. Hermann Herberts. Outlines methods for study with the view of avoiding collisions at sea. Describes an apparatus consisting of a thermopile and connections. 2700 w. Elec Eng, N. Y.—Aug. 4, 1898.

**Rule of the Road.**—The Rule of the Road at Sea.

Editorial review of the report of a select committee of the British House of Commons appointed to consider the rule of the road at sea, which is regarded, with slight modifications, as the work of Sir Robert Reid. New rules have been formulated and approved by all the officers of the navy, after a conference at Washington of representatives of European powers and of the United States. 1500 w. Trans—May 1, 1896.

**Safety.**—Safety in Ships. Discourse delivered before the British Assn., by Dr. Francis Elgar. The primary conditions of safety are treated at length. Appendix giving number of vessels lost at sea from 1881 to 1895 inclusive, with particulars. 4700 w. Eng, Lond—Sept. 25.

**Signaling.**—Signaling at Sea (Le Segnalazioni in Mare). Giuseppe Gavotti. An interesting article by a Vice-Admiral of the Italian Navy, tracing the history of sea signaling from ancient times to the present. 9000 w. Rivista Marittima—Dec., 1898.

**Time Unification.**—Unification of Time at Sea. An attempt to explain why the change of time recommended by Sir John Herschel nearly a half century ago has not become an accomplished fact, and why it has hitherto attracted so little attention and received so little consideration. 2500 w. Trans—Dec. 25, 1896.

**True Meridian.**—Obtaining the True Meridian by an Observation of the Sun. C. C. Hommann. The method herein described requires only a single observation of the sun. It is an old method, but having for a time been neglected, it appears now to be coming again into use. 1600 w. Eng News—July 9, 1896.

**NAVY.**

See also **ARMORED CRUISER; BATTLESHIP; CRUISER; GUNBOAT; MONITOR; NAVAL; SEA POWER; TORPEDO-BOAT; TORPEDO-BOAT DESTROYER; WARSHIP.**

Modern Navies (Les Marines de Guerre Modernes). M. de Chasseloup-Laubat. A full general treatment of the subject. Serial. Bull de la Soc d'Encour—March 31, 1900.

Modern Navies (Les Marines de Guerre Modernes). M. de Chasseloup-Laubat. An exhaustive review of the vessels of various naval powers. This issue covers the British navy. 20000 w. Bull de la Soc d'Encour—Sept., 1900.

The Naval Situation. H. W. Wilson. Discusses the position of the seven great powers, the growth of navies, new factors in naval war, and the standing of Great Britain. 7000 w. Nineteenth Cent—April, 1899.

The Navies and Naval Construction Programme of 1898. H. W. Wilson. A review of the present tendencies in naval design, armament, and engineering, with especial reference to the new construction work of the present year. 3500 w. Eng Mag—Aug., 1898.

The Navies of the World. An article on the British navy, dealing with the battleships and armored cruisers. The first of a series on the subject named. Ill. Serial. Sci Am—Nov. 26, 1898.

The Navies of the World. A summary of the fleets of Great Britain, France and Russia, with comments. 2000 w. Eng, Lond—Nov. 13, 1896.

Comparative Strength of the World's Navies. A comparison to show the position of the U. S. in naval strength. Ill. 2300 w. Sci Am—Dec. 31, 1898.

**Auxiliary Vessels.**—List of Vessels Recently Purchased or Requisitioned by the Navy. Reference table giving the new name of each vessel acquired for the United States service in the Spanish-American war, with her general characteristics. 1500 w. Marine Engng—May, 1898.

Merchant Steamers and War Requirements. John Harvard Biles. Read before the Engng. Conference of the British Inst. of Civ. Engs. On the practicability of so constructing merchant steamers as to render them readily available for war purposes. 1000 w. Engng—June 9, 1899.

**British.**—British Naval Progress. Gives information concerning the new work to be given out by the Admiralty to private contractors, and reviews the progress made with warship building. Serial. Engng—Dec. 23, 1898.

The British Navy. A review of the British navy, noting its best features, and also its defects. 3400 w. Ill Car & Build—Jan. 6, 1899.

The Latest Reconstruction of the Navy. W. H. White. Considers the magnitude of the work that has been done, and some of its salient features. 6500 w. Nineteenth Cent—April, 1898.

The Navy Estimates. Editorial discussion of the British Navy estimates, and the circumstances which give them more than the usual interest. 3800 w. Engng—March 17, 1899.

The Navy Estimates. Reviews the work for the coming year, the annual statement for last year, estimates and general matters connected with the navy. 2500 w. Engng—March 11, 1898.

The Queen's Navy, 1837-1897. Abridged from an article by A. Laird Clowes, contributed to the "English Illustrated Magazine." The changes during the present reign are reviewed. Ill. 1600 w. Ill Car & Build—June 25, 1897.

See also **WARSHIP.**

**British, 1897.**—Additions to the Navy in 1897. Reviews the warships built and tried during the year. 1700 w. Engng—Dec. 24, 1897.

**British, Expenditure.**—Naval Expenditure. Editorial discussion of the Board of Trade returns for 1897, giving comparison with other countries, and information of interest. 2000 w. Engng—Dec. 16, 1898.

**British vs. Foreign.**—British and Foreign Navies. Editorial discussion of official figures given in a recent Government return, making a comparison. 2100 w. Engng—Jan. 12, 1900.

See also **France vs. England.**

**Electrical Engineers.**—See **ELECTRICAL ENGINEER—Naval Corps.**

**Europe.**—Naval Statistics. Statistics of the four principal naval powers of Europe, with comparison. 3000 w. Engng—Oct. 12, 1900.

**France.**—A New French Naval Scheme. Editorial comment on the programme of 1896, and on the programme to be soon submitted to Parliament. 1700 w. Engr, Lond—Feb. 9, 1900.

The French Marine. Editorial discussion of the new strategy of the Minister of the Marine, and of the debate on the estimates in the Chamber of Deputies. 3000 w. Engr, Lond—March 31, 1899.

The French Navy in 1899 (La Marine Française en 1899). A review of the work in progress and laid down in 1899, with a brief notice of the work at the various French yards. 2000 w. Le Yacht—Jan. 6, 1900.

The Naval Policy of France (Après Fachoda: La Politique Navale de la France). Lieut. Emile Duboc. A criticism of the French naval programme, with a strong plea for a commerce-destroying policy in case of war with England. 5000 w. Questions Diplomatique et Coloniales—March 15, 1900.

The Navy and New Construction at the Close of 1898 (La Marine et les Constructions Neuves a la Fin de 1898). A review of the state of the French navy, and the progress of the work in course of construction. 2000 w. Le Yacht—Jan. 7, 1899.

The Reorganization of the French Marine. Editorial review of the proposed reorganization, which is expected to lead to a higher standard of efficiency. 2500 w. Engng—Sept. 4, 1896.

See also **WARSHIP.**

**France vs. England.**—The Respective Risks of France and England (Les Risques Respectifs de la France et de l'Angleterre). V. Guillox. A study of the comparative weakness of the two countries in case of war. It is maintained that the vulnerability of England's merchant marine overbalances her preponderance in naval strength. 2000 w. Le Yacht—Jan. 14, 1899.

**Germany.**—See **WARSHIP.**

**Italy.**—The Necessary Navy (L'Armata Necessaria). G. Astuto. A discussion of the conditions which indicate the degree of naval strength which should be possessed by a nation; with especial consideration of the position of Italy. 3500 w. Rivista Marittima—Jan., 1899.

**Japan.**—The Sea Power of Japan. Comments on the relation of Japan to the other Powers, her progress, and her aim to possess a strong enough fleet to guarantee against attack. A brief review of the present navy is given; with ships now building. 2400 w. Engng—May 20, 1898.

The Imperial Japanese Navy. C. C. P. Fitz-Gerald. Read before the Inst. of Nav. Archts. Reviews the history of this navy, its rise and development. 2800 w. Engng—April 6, 1900.

**Repair Ship.**—See **REPAIR SHIP.**

**Russia.**—Lord Charles Beresford on the Russian Naval Programme. Gives a diagram showing the growth or decrease in numbers of British, French and Russian armor-clads during the last ten years. Calls attention to the increase in the Russian navy, and the prudence of British preparation for maintaining naval supremacy. 1700 w. Engr, Lond—July 29, 1898.

**Spain.**—Spain's Naval Strength. A. K. Fiske. Information compiled mainly from a "List of the Battleships, Cruisers and Torpedo-boats of the Spanish Navy," prepared in the Military Information Division of the Adjutant-General's Office at Washington. Ill. 2200 w. Harper's Wk—April 16, 1898.

Strength of the Spanish Navy Brought Down to Date. Gives a series of reference tables, with remarks. 2000 w. Marine Engng—May, 1898.

**Spain vs. United States.**—The Navies of the United States and Spain—A Comparison. Brief review of the two navies, showing Spain to possess a fleet not to be despised, which would enable her to maintain a fierce and destructive warfare. 1200 w. Sci Am—Nov. 6, 1897.

The Navies of the United States and Spain—A Comparison. Illustrations of the Spanish and American warships, with remarks on their strength and importance. 2200 w. Sci Am—April 2, 1898.

**United States.**—Comprehensive Scheme of Naval Increase. A. M. Bailey. From the "N. Y. Sun." Discussing the vessels needed to complete the present equipment and furnish the country the protection required. 5800 w. Marine Rev—Nov. 16, 1899.

Effect of the Late War on the American Navy. Editorial discussing the effect on war material, gunnery, etc. 1500 w. Engr, Lond—Dec. 16, 1898.

Our Navy. Summary of report of U. S. Sec. of the Navy, reprinted from the New York "Journal of Commerce." 1100 w. Sea—Dec. 5, 1896.

Present Strength of the New United States Navy. A list of the United States warships with brief descriptions, and two-page illustrations, showing comparative dimensions of forty of them. 2000 w. Sci Am Sup—Jan. 18, 1896.

The American Fleet. J. D. Jerrold Kelley. Illustrative descriptive review of the ships of the United States navy. 7000 w. Harper's Wk—June 19, 1897.

The Navy of the United States. Henry W. Raymond. Reviews the fighting capacity of the naval force, and considers the different classes in detail, with interesting comments. Ill. 3000 w. Chau—June, 1898.

The Steam Navy of the United States. Review of book by Frank M. Bennett, treating of the growth of the steam war vessel of the United States, giving information obtained therefrom. 8000 w. Trans—July 9, 1897.

The United States Navy Under the New Conditions of National Life. Admiral P. H. Colomb. Considers the necessary changes and the expense that must be incurred to protect newly acquired territory, giving suggestions of a system of defense. 4500 w. N Am Rev—Oct., 1898.

See also **WARSHIP.**

**U. S. Auxiliary.**—See **Auxiliary Vessels; REPAIR SHIP.**

**U. S. History.**—Naval History of the United States of America. Part first reviews the earliest history of the U. S. Navy to the breaking out of the revolutionary war. Serial. Naut Gaz—Jan. 5, 1899.

### NAVY YARD.

See also **DRY DOCK; SHIPYARD.**

**Brooklyn.**—New York Navy Yard, Brooklyn. Gives briefly the history of this yard, describing the buildings and various departments, and the proposed improvements. Ill. 2700 w. Sci Am—March 3, 1900.

### NEEDLE.

**Manufacture.**—The Manufacture of Neddles. Illustrated description of the work as carried on at the most important factory in the world—that of H. Milward and Sons, Ltd., in Redditch, England. 3800 w. Engr, Lond—April 1, 1898.

### NERNST LAMP.

See also **ELECTRIC CONDUCTIVITY—Oxides; INCANDESCENT LAMP—Efficiency.**

A One-and-One-Half Watt Lamp. Alton D. Adams. Considers the probable effect on arc and incandescent lamps, etc., if the claims of the Nernst lamp are sustained. 1000 w. Elec Wld & Elec Engr—April 1, 1899.

Nernst's Electric Lamp. James Swinburne. Gives a brief review of the position of electric lighting and describes the Nernst lamp. Also considers the future outlook. Discussion. 4500 w. Jour Soc of Arts—Feb. 10, 1899.

Nernst Lamp at the Exposition. Illustrated description of this interesting exhibit and its operation. 1300 w. Sci Am—Sept. 1, 1900.

Possibilities of the Nernst Lamp. Frank H. Mason. Brief statement of the advantages and disadvantages. 1200 w. Gas Wld—Jan. 6, 1900.

The Nernst Incandescent Lamp (Die Nernstsche Glühlampe). An abstract of an address recently delivered by Prof. Nernst, giving details concerning the construction and performance of his new incandescent lamp. 1500 w. Elektrotech Zeitschr—May 18, 1899.

The Nernst Lamp. W. McA. Johnson. Gives a brief account of the first commercial application of the Nernst lamp, in Gottingen, Germany, the home of the inventor. 1000 w. Elec Wld & Engr—March 3, 1900.

The Nernst Lamp in Commercial Form at the Paris Exposition. C. L. Durand. An illustrated description of present forms of the Nernst lamp. 2500 w. Elec Rev, N. Y.—Sept. 19, 1900.

The Nernst Lamp of the Allgemeine Elektrizitäts-Gesellschaft, Berlin (Die Nernst-lampe der Allgemeinen Elektrizitäts-Gesellschaft, Berlin). An address given by the inventor at a public exhibition of the Nernst lamp in Berlin, showing the importance of the invention and the relation it bears to its predecessors. 2500 w. Glaser's Annalen—June 1, 1899.

**American Patent.**—The American Nernst Lamp Patent. An account of the principles of the Nernst lamp as contained in the American patent. 1300 w. Elec Wld & Elec Engr—April 29, 1899.

**Arc and Incandescent Compared.**—Nernst Lamp vs. the Arc and Incandescent Lamps. John I. Hall. Part first gives attention to the cost and concludes in this matter at least the Nernst lamp has not the advantage. Serial. Elec Rev, Lond—March 17, 1899.

**Forerunners.**—Forerunners of the Nernst Lamp. Calls attention to other workers in this field who have apparently anticipated this invention. 2500 w. Elec Rev, Lond—Feb. 24, 1899.

The Forerunners of the Nernst Lamps. Etienne de Fodor. Translated and abridged from "Elektrotechnischer Anzeiger." Historical review of predecessors. Serial. Elec Rev, N. Y.—Sept. 27, 1899.

The Incandescence of Refractory Electrolytes. Editorial discussion of Prof. Nernst's invention, and of the neglected discoveries which anticipated it. Ill. 2800 w. Engng—March 3, 1899.

The Predecessors of Nernst (Les Précurseurs de Nernst). L. de Somzée. A brief review of the early inventions in incandescent electric lighting, based upon the conductivity of refractory substances when heated; discussing the extent to which these anticipated the Nernst lamp. 1200 w. L'Electricien—Jan. 20, 1900.

**Patents.**—Nernst Lamp Patents. An account of patents on details of the Nernst lamp system, interesting in showing the difficulties in its commercial development. 3300 w. Elec Wld & Engr—July 7, 1900.

### NEW CALEDONIA.

See also **MINERAL REGION; NICKEL.**

Trade and Industry of New Caledonia and Tahiti. Descriptive of the people and their work; the facility with which the white man becomes acclimatized; the resources, etc. 1800 w. Bd of Trd Jour—Dec., 1895.

### NEWFOUNDLAND.

See also **MINERAL REGION.**

To Europe by Steamer in Three Days. Comment on an article by Dr. Wilfred Grenfell, in the Toronto "Globe," pointing out matters of interest concerning the mineral and other advantages of the province, and the facilities for traffic with not much more than a three days journey by water. 1000 w. Bradstreet's—Aug. 28, 1897.

### NEW YORK.

See also **MUNICIPAL ART; MUNICIPAL IMPROVEMENT.**

Greater New York a Century Hence. George E. Waring, Jr. A brief forecast of future conditions, based on present tendencies. 2000 w. Munic Affairs—Dec., 1897.

**NIAGARA.**

See also **ELECTRIC DISTRIBUTION; ELECTRIC PLANT; ELECTRIC STATION; ELECTRIC TRANSMISSION; ELECTRO - CHEMICAL WORKS; HYDRO-ELECTRIC PLANT; TURBINES; WATER POWER.**

Niagara as an Industrial Center. The first of a series of articles descriptive of the topographical and engineering features. Map. Serial. Sci Am—May 27, 1899.

Niagara Falls Industrial Number. A comprehensive, interesting, and fully illustrated account of the history, geology, fine bridges, power plants, etc., with much information concerning the utilization of the energy. 12000 w. Sci Am Sup—March 3, 1900.

**Model for Electrical Exposition.**—Niagara Model for the Electrical Exposition. Orrin E. Dunlap. Illustrated description of a beautiful model of Niagara in miniature, to be exhibited at the forthcoming electrical exposition to be held in New York. 1400 w. W Elec—April 18, 1896.

**NICARAGUA.**

Nicaragua: Natural Resources and Industrial Conditions; Opportunities for United States Trade; American Interests. Rates of wages; attitude toward foreigners; needed legislation upon emigration and naturalization; climate; water, public health, etc., are topics treated. 4300 w. U S Cons Repts—July, 1896.

**Lake Level.**—See **CANAL—Nicaragua Lake Level.**

**NICARAGUA CANAL.**

See **CANAL—Nicaragua.**

**NICKEL.**

Nickel. Arthur Lakes. Its ores and some of their distinguishing peculiarities. Where they are found. 1000 w. Mines & Min—Oct., 1898.

**American Refining.**—Modern American Nickel Refining. Titus Ulke, in the "Zeitschrift für Electrochemie." Consideration of the methods in use, which are claimed to be superior to the European methods. Abstract with diagrammatic scheme of the Orford method of treating nickel-copper matte. 1800 w. Eng & Min Jour—July 3, 1897.

**Assay, Sulphide Ores.**—See **COPPER ASSAY—Sulphide Ores.**

**Bessemerizing Matte.**—Bessemerizing Nickel Matte. H. W. Edwards. Notes made from the result of work from 1891 to 1894, when the author had charge of a nickel smelting plant in Sudbury district, consisting of two blast furnaces and a set of Bessemer converters (Manhes modification). 1500 w. Eng & Min Jour—May 2, 1896.

**Electro-Metallurgy.**—Some Notes on the Recovery and Refining of Nickel. Sherard Cowper-Coles. Reviews briefly some methods for the treatment of nickel ore by electro-metallurgical methods. 1700 w. Elec Rev, Lond—Dec. 23, 1898.

The Electrolytic Winning and Refining of Nickel. Report of experiments of Dr. F. Foerster, as published in the "Zeitschrift für Elektrochemie," with account of other work in this field. 1600 w. Elect'n—Oct. 8, 1897.

See also **ELECTROLYSIS: ELECTRO-METALLURGY.**

**Lake Huron.**—See **COPPER.**

**Malaga, Spain.**—Notes on the Ore Deposits of the Malaga Serpentines (Spain). Fritz Gillman. Paper read before the Inst. of Mining and Metallurgy. A mineralogical description of the nickel and iron ore deposits. 2500 w. Min Jour—Feb. 15, 1896.

**Metallurgy.**—Some Novelties in Nickel Metallurgy (Ueber Einige Neuerungen in der Metallurgie des Nickels). Prof. Ed. Donath and B. M. Margosches. A long article on nickel ores and their metallurgy. Serial. Oesterr Zeitschr f Berg u Hüttenwesen—May 12, 1900.

The Mining, Smelting, and Refining of Nickel. Titus Ulke. With views of the mines and smelting works, and a detailed account of the methods and costs of nickel production. 3000 w. Eng Mag—Nov., 1898.

**Mining and Metallurgy.**—The Mining, Smelting and Refining of Nickel. Titus Ulke. A detailed account of a variety of processes in use in various places, giving data of cost and with special reference to the electrolytic refining method and the saving of valuable by-products. 2500 w. Eng Mag—Dec., 1898.

**Minnesota.**—Reputed Nickel Mines in Minnesota. Horace V. Winchell. An account of fraud in a mining enterprise. 1600 w. Eng & Min Jour—Nov. 13, 1897.

**Mond Process.**—The Extraction of Nickel from Its Ores by the Mond Process. Prof. Roberts-Austen. Abstract of paper read at meeting of the Inst. of Civ. Engs. (England). Describes the experiments which led to this method, and the satisfactory results. 1100 w. Col Guard—Nov. 11, 1898.

The History of Mond's Nickel Extraction Process. Ludwig Mond. Abstract of a paper read before the New York Section of the Society of Chemical Industry, giving the results of experiments which led to the present process of absorbing the nickel by C O gas. 1500 w. Eng & Min Jour—Nov. 16, 1895.

**New Caledonia.**—Nickel Mining in New Caledonia. Brief illustrated account of the deposits and ores in this South Sea island. 600 w. Eng & Min Jour—June 23, 1900.

**Ontario.**—Nickel Mining in Ontario. Extracts from article in the Toronto "Globe," concerning the value of the product and arrangements for the development of the industry. 900 w. U S Cons Repts, No. 604—Dec. 15, 1899.

**Oregon.**—Nickel Deposits Near Riddles, Oregon. W. L. Austin. Abstract of paper read before the Colorado Scientific Society. Relates circumstances of the discovery and describes the deposits. 1000 w. Mines & Min—Dec., 1898.

**Steel.**—See **NICKEL STEEL.**

**United States.**—The Occurrence and Production of Nickel. Perry F. Nursey. Particulars respecting the occurrence and production in the United States. 2500 w. Ind & Ir—June 10, 1898.

**NICKEL IRON.**

See also **IRON ALLOY; NICKEL STEEL.**

Alloys of Iron and Nickel. M. Rudeloff. From the "Verhandlungen des Vereins sur Beförderung des Gewerbfleisses." A number of results are given on expansion by heat analyses, tensile, compressive, and drop tests. 800 w. Ir Age—April 23, 1896.

Comparative Tests of Nickel Iron Alloys. David H. Browne. The writer proposes to show, in practical units and figures which are readily comprehended and remembered, the effect which nickel has on the strength of wrought iron, cast iron and steel. 1200 w. Eng & Min Jour—May 16, 1896.

**Microstructure.**—The Microstructure of Alloys of Iron and Nickel (Sur la Microstructure des Alliages de Fer et de Nickel). A preliminary note by M. Osmond, giving the micrographic classification of the nickel-iron allows up to 50 per cent. of nickel. 1000 w. Comptes Rendus—May 9, 1898.

See also **METALLOGRAPHY.**

**NICKEL PLATING.**

Apparatus for Nickel Plating Numerous Small Objects at a Time. From "Revue Industrielle." Calls attention to the great care necessary in preparing the objects, and describes the arrangements employed for the immersion in the bath. Ill. 1200 w. Sci Am Sup—March 4, 1899.

Nickel Plating. Information relating to cleaning metals and nickel plating taken from a treatise published by the Zucker & Levett & Loeb Co. 4300 w. Ir Age—July 1, 1897.

**NICKEL STEEL.**

See **ARMOR PLATE; NICKEL IRON; SHIPBUILDING MATERIALS—Nickel Steel and Aluminum.**

Investigations upon Nickel Steel (Recherches sur les Aciers au Nickel). A paper by M. Guillaume discussing the behavior of various alloys at different temperatures. 1000 w. Comptes Rendus—March 7, 1898.

Investigations upon Nickel Steel (Recherches sur les Aciers au Nickel). Giving an account of the properties of an alloy of nickel and steel which has a very low coefficient of expansion besides other properties which make it especially adapted for standards of length. 1200 w. Comptes Rendus—April 5, 1897.

Nickel Steel. William Beardmore. Read before the Inst. of Engineers and Shipbuilders in Scotland. Results of investigations with a view to proving that what can be done with carbon steel can be more advantageously accomplished with nickel steel. 1800 w. Ind & Ir—May 1, 1896.

Nickel Steel and Its Uses. R. A. Hadfield. Abstract of paper read before the Inst. of Civ. Engs. Describes several special applications of nickel steel. 3500 w. Ir & Coal Trds Rev—Nov. 17, 1899.

Nickel Steel as an Improved Material for Boiler-Shell Plates, Forgings and Other Purposes. The advantages of nickel steel, with tables of comparison. 1000 w. Engng Mech—May, 1897.

Nickel Steel as an Improved Material for Boiler Shell Plates, Forgings and Other Purposes. William Beardmore. Paper read before Inst. of Naval Archts. Showing reasons why, in the writer's opinion, nickel steel is a most suitable material with which to meet the demands for a metal stronger than steel. Ill. 2500 w. Ind & Iron—April 15, 1897.

Nickel Steel; A Synopsis of Experiment and Opinion. David H. Browne. Discusses the physical qualities of nickel and nickel-steel and the various uses of the metal. Ill. 21500 w. Trans Am Inst of Min Engs—Sept., 1899.

Nickel Steel. C. E. Guillaume. Translated from "Comptes Rendus." A study of these alloys, giving results. 700 w. Am Mfr & Ir Wld—Oct. 15, 1897.

Researches on Nickel Steel (Recherches sur les Aciers au Nickel). C. E. Guillaume. A full account of the important investigations of Mr. Guillaume into the magnetic, thermal and physical properties of alloys of steel and nickel with details of the apparatus, and many tables and diagrams. An important paper. 12000 w. Bull de la Soc d'Encour—March, 1898.

Nickel Steel. H. K. Landis. The history, physical and mechanical properties, and the application of this metal. 1800 w. Sci Am—Jan. 9, 1897.

Nickel Steel in Metallurgy, Mechanics and Armor. Henry W. Raymond. Reviewing the events that led up to the congressional appropriation of one million dollars for the purchase of nickel ore. 8600 w. Eng Mag—Feb., 1897.

The Age of Nickel Steel. Harry J. Williams. Relates the facts concerning armor plate tests in 1890, and the effect on this product, also states its advantages. 2000 w. Ir Age—Nov. 9, 1899.

The Properties and Possible Uses of Nickel Steel. Editorial on the limited production of nickel and its impossibility of increase unless there is a discovery of nickel ore; with review of paper by David H. Browne, presented at the Inst. of Min. Engs.' meeting. 4000 w. Eng News—Feb. 15, 1900.

**Acid Open Hearth.**—The Physical Qualities of Acid Open Hearth Nickel Steel, as Compared with Carbon Steel of Similar Tensile Strength. H. H. Campbell. Read before Am. Soc. of Civ. Engs. A valuable paper giving the results of tests on nickel steel, "hard forging" steel and forging steel in order to determine their comparative qualities when manufactured into various shapes. The superiority of nickel steel is clearly shown. 1000 w. Trans Am Soc of Civ Engs—Oct., 1895.

**Bessemer's Notes.**—Bessemer on Nickel Steel. Interesting notes from Sir Henry Bessemer's note book which are made as far back as 1842. 1700 w. Ir Age—Feb. 27, 1896.

**Crank Pins and Axles.**—Nickel Steel for Crank Pins and Axles. H. F. J. Porter. A paper containing much information concerning steel, with results of tests, mechanical treatment, improvement of quality, etc. 3800 w. R R Gaz—Feb. 25, 1898.

Nickel Steel for Crank Pins and Axles. H. F. J. Porter. Condensed. Gives results of tests, and shows that this metal possesses valuable qualities, and insures a combination of elastic strength and ductility. 2000 w. Am Mach—March 24, 1898.

**Expansion Coefficients.**—The Expansion of Nickel Steel (Sur la Dilatation des Aciers au Nickel). A communication to the Académie des Sciences by M. Guillaume, giving coefficients of expansion for a number of different alloys of steel and nickel. 1000 w. Moniteur Industrielle—Feb. 13, 1897.

**Magnetic Properties.**—See **MAGNETISM—Nickel Steel.**

**Paris Exposition.**—Nickel Steel at the Exposition of 1900 (Les Aciers à Nickel à l'Exposition de 1900). A. Abraham. An account of the exhibits at Paris, and a discussion of the researches of M. Guillaume. 3000 w. Génie Civil—Aug. 11. 1900.

**Rivets.**—See **RIVET—Nickel Steel.**

**Variations.**—Temporary and Residual Variations in Reversible Nickel Steel Alloys (Sur les Variations Temporaires et Résiduelles des Aciers au Nickel Réversibles). C. E. Guillaume. A continuation of the experiments of the author upon nickel steel alloys, with especial reference to the construction of standards. 1500 w. Comptes Rendus—July 17, 1899.

**NILE.**

See **DAM—Assouan; IRRIGATION—Egypt; RIVER; RIVER REGULATION.**

**NITRATE.**

See **ELECTRO-CHEMISTRY; SALTPETER; SODA.**

**NITROGEN.**

**Coal.**—See **GAS MANUFACTURE—Nitrogen.**

**Fixation.**—The Electrical Fixation of Nitrogen. Sir William Crookes. Extracts from the presidential address before the British Assn. for the Advancement of Science. Calling attention to the need of some means of "fixing" atmospheric nitrogen. Gives figures demonstrating that it can be done electrically by high-tension discharges with extremely cheap power. 1500 w. Elec Wld—Sept. 24, 1898.

Fixation of Atmospheric Nitrogen. William Bouldin, Jr. Discusses the recent address by Prof. Crookes before the British Assn. and suggests other lines for study of this important subject. 1500 w. Am Gas Lgt Jour—Oct. 8, 1898.

**Plant Food.**—The Nitrogen of the Air as a Plant Food. George McGowan. The physical and biological principles whereby some kinds of plants are rendered pre-eminent as absorbers and storers of nitrogen, which, if they are left to decompose in the earth become food for other plants having this power in less degree. 3200 w. Sci Am Sup—Dec. 7, 1895.

**NITRIC ACID.**

Lyte and Lunge's Nitric Acid Process. Julius L. F. Vogel. Describes an improved process which leaves the soda portion in its most valuable form, and in which there is no waste product. Ill. 2200 w. Eng & Min Jour—April 7, 1900.

**NOBEL.**

See **EXPLOSIVE—Nobel.**

**NOTE BOOK.**

See **ENGINEER'S NOTE BOOK.**

**NUT.**

**Lock.**—See **LOCK NUT.**

**Metric Screw System.**—See **SCREW THREAD—Metric.**

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**OBELISK.**

How Did the Egyptians Raise their Obelisks? (Comment les Egyptiens ont-ils Erigé leurs Obélisques?) Short illustrated abstract of an article on this subject in "Construction Moderne," by J. C. Kruseman. 700 w. Génie Civil—Oct. 29, 1898.

**OBSERVATORY.**

See also **TOWER.**

**Denver.**—The Chamberlin Observatory, Denver. Illustrated description of building and equipment. 2500 w. Engng—May 28, 1897.

**Edinburgh Royal.**—The Edinburgh Royal Observatory. Some interesting details of its design and construction, as given in the "Scotsman." 1800 w. Brit Archt—April 3, 1896.

The New Royal Observatory, Edinburgh. Illustrated description. Serial. Engng—April 10, 1896.

**Magnetic.**—See **MAGNETIC OBSERVATORY.**

**Mont Blanc.**—The Mont Blanc Observatory. From "La Nature." Brief illustrated description of an interesting construction. 1000 w. Sci Am Sup—June 12, 1897.

**Paris.**—The Observatory of Paris. J. Guénaire. Illustrated historical account, with some reference to the important work carried on. 2000 w. Sci Am—Nov. 19, 1898.

**Yerkes.**—A Famous Astronomical Observatory Built of Brick and Terra-Cotta. Illustrated description of the observatory given by Charles T. Yerkes, to the University of Chicago, and located at Lake Geneva, Wis. 1000 w. Brick—Nov., 1897.

**OCEAN ROUTES.**

See **NAVIGATION.**

**OCEAN TRANSPORTATION.**

See **TRANSPORTATION.**

**OFFICE BUILDING.**

See also **ELECTRIC PLANT; HEATING; HEATING AND VENTILATION; MECHANICAL PLANT; TALL BUILDING.**

The Modern Office Building. Barr Feree. A lecture delivered before the Franklin Inst., Nov. 15, 1895. An able summary review with references, in foot notes, to the recent literature of the subject from which more extended accounts of the points brought under discussion may be obtained; these references not being quoted as authorities, but as forming a key to more extended study. Serial. Jour Fr Inst—Jan., 1896.

**Edison, Chicago.**—The New Edison Building in Chicago. Describes and illustrates this fine building and its contents. 5400 w. W Elect'n—May 19, 1900.

**New Orleans.**—The Era of Better Buildings in New Orleans. The improvement of business buildings in the last few years is briefly noticed, with illustrations of two buildings. 1000 w. Mfrs' Rec—July 17, 1896.

**U. G. I., Philadelphia.**—The United Gas Improvement Company Office Building. Illustrated description of a fine building in Philadelphia, devoted entirely to the gas business. 1700 w. Pro Age—May 15, 1900.

**OHM.**

See **ELECTRIC MEASUREMENT—Standard Ohm.**

**OIL.**

See also **LUBRICATION; PETROLEUM.**

**Dielectric Strength.**—See **DIELECTRIC STRENGTH—Oils; INSULATION.**

**Flash-Point.**—The Flash-Point of Burning Oil. Editorial discussion of the effort in England to raise the flash-point to 100 deg. Fahr., and the effect it will have. 2500 w. Ind & Ir—Jan. 27, 1899.

**Olive.**—See **OLIVE OIL.**

**Shale.**—See **SHALE OIL.**

**Waves.**—The Action of Oil on Waves at Sea. Notes on the calming action of oil in rough weather. 1200 w. Engr, Lond—April 14, 1899.

**OIL ENGINE.**

See also **AUTOMOBILE; GAS ENGINE; GASOLINE ENGINE; GASOLINE VEHICLE; LIGHTSHIP—Oil Engine Plant.**

Evolution and Future of Benzine and Petroleum Motors. Georg Lieckfeld. Herr Lieckfeld's second paper shows the evolution of the petroleum motor from the gas engine, and discusses the lines along which it promises to become the motor of the future. 3000 w. Eng Mag—Aug., 1899.

Low Cost Power for Electric Lighting, Pumping, Machine Shop, etc. Charles Hansel. Illustrated description of a 25 h. p. oil engine, and a statement of the advantages from its use. 2200 w. R R Gaz—July 20, 1900.

Oil Engines. J. Warren. Presents some of the details of construction and working in connection with the leading oil engines at present in the market. 1500 w. Elec, Lond—July 30, 1897.

Oils as Sources of Energy in Explosion Engines. The advantages of the oil engine are discussed, the merits of different oils as heating agents, the types of engine used, etc. 1800 w. Auto Jour—April, 1900.

Petroleum Engines. Frederick Grover. Part first examines the physical properties of the oil which more directly affect the design of oil engines, and the construction of some early types. Ill. Serial. Prac Eng—May 7, 1897.

Petroleum Motors (Ueber Motorenbetrieb mit Erdölen). Ludwig Loos. A review of the development of petroleum motors, and a comparison of the fuel consumption of various types. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—June 16, 1899.

The Commercial Advantage of the Oil Engine. John A. Secor. Considers the use of kerosene as a fuel in internal combustion motors, its thermodynamic value, price, features of the oil motor, etc. 1800 w. Mach, N. Y.—June, 1899.

The Oil Machine. George Richmond. Historical review of oil engines, with methods used, and principles involved, efficiency, etc. 4500 w. Sch of Mines Quar—Jan., 1897.

**Brussels Exposition.**—See **GAS ENGINE—Brussels Exposition.**

**Campbell.**—Campbell Portable Oil Engine. Brief description and illustrations of 20 h. p. petroleum engine. The jacket water is cooled and re-used, and the engine is entirely independent of any fixed connections. 800 w. Engng—Sept. 2, 1898.

**Capitaine.**—Petroleum Power Engine (Petroleum-Kraft-Maschine). E. Capitaine. Illustrating and describing Capitaine's improved petroleum motor, with very complete exhibition of details, showing much ingenuity of design. 4500 w. Zeitschr d Ver Deutscher Ing—Dec. 31, 1898.

The Capitaine Petroleum Engine. From "Zeitschrift des Vereins Deutscher Ingenieure." Illustrates and describes an oil engine especially designed with the view of meeting the requirements for isolated small powers. 2800 w. Ir Age—March 9, 1899.

See also **Diesel-Capitaine.**

**Carburettor.**—The Longuemare Petroleum (Heavy Oil) Carburretor. Illustrated description of the improved apparatus. 500 w. Automotor Jour—March, 1900.

**Classification.**—See **GAS ENGINE.**

**Cooling.**—Calculations for Oil Engines. W. H. Booth. Showing how the amount of cooling water may be found. 1400 w. Am Mach—Aug. 5, 1897.

**Diesel.**—The Diesel Rational Heat Motor (Diesel's Rationeller Wärmemotor). The original paper read before the meeting of the Society of German Engineers at Cassel, by Herr Rudolf Diesel, describing an improved petroleum motor of high efficiency. Two articles. 10000 w. Zeitschr d Ver Deutscher Ing—July 10, 17, 1897.

The "Diesel" Oil Engine. Illustrated description of the invention of Rudolph Diesel, called a "Rational Heat Motor," as given in the "Zeitschrift des Vereines Deutscher Ingenieure." The summarized translation is by B. Donkin. 4500 w. Engr, Lond—Oct. 15, 1897.

Diesel's Rational Heat Motor. From "Zeitschrift des Vereines Deutscher Ingenieure." Translation of a lecture delivered by Rudolph Diesel, with illustrations and tables. Also editorial. Serial. Pro Age—Dec. 1, 1897.

The Diesel Motor. Rudolph Diesel. Translation of a report in the "Zeitschrift des Vereines

Deutscher Ingenieur." Gives illustrations of recent motors and an account of experiments with various fuels. Serial. Pro Age—May 1, 1899.

Combustion Motors with High Compression (Moteurs à Combustion et Haute Compression). A paper by M. Witz, discussing especially the theories of Diesel, in connection with the high compression used with the Diesel motor. 1000 w. Comptes Rendus—March 28, 1898.

Critical Notes on the Theory and Construction of recent Gas Engines (Kritische Bemerkungen über die Theorie und Bauart der Neueren Gaskraftmaschinen). G. Wellner. A review of the theories advanced by Diesel, with especial regard to the compression of the gas and air separately. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—March 23, 1898.

Diesel's Rational Heat Motor. E. D. Meier. Reviews work in connection with steam, and conclusions that led to a renewal of interest in the internal combustion engines, and the great advance made by Rudolf Diesel, describing his invention and its working. Ill. 6500 w. Sib Jour of Engng—Feb., 1899.

Diesel's Rational Heat Motor. E. D. Meier. Introductory review of progress leading to this latest development in engine construction, with an account of the inventor and his work, a description of the invention and its operation. Ill. 8800 w. Jour Fr Inst—Oct., 1898.

New Experiments on the Diesel Oil Engine. A short summary of tests at Augsburg, abstracted from a paper by Mr. Diesel at the Congrès de Mécanique at Paris. 900 w. Engng—Sept. 7, 1900.

Improvements in the Diesel Motor. States the principles of the method for effecting ignition and combustion in internal combustion motors. Ill. 1000 w. Automotor—Aug., 1899.

Notes on the Diesel Heat Motor (Mittellungen über den Dieselschen Wärmemotor). R. Diesel. With a number of illustrations of recently constructed motors, and data of experiments with a variety of liquid fuels. 2 articles. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 14, Feb. 4, 1899.

Progress of the Diesel Oil Engine. An account of the progress made by this intersting engine and the results achieved. 2000 w. Engr, Lond—Nov. 4, 1898.

Recent Developments in Diesel Motors. Information from report of Alfred Musil published in the "Journal für Gasbeleuchtung," with short biographical sketch and portrait of Dudolph Diesel. 1300 w. Pro Age—Feb. 15, 1898.

The Diesel Heat Engine. Illustrated description of the engine and its operations. 1300 w. Am Eng & R R Jour—Aug., 1898.

The Diesel Motor and Thermal Engines (Le Moteur Diesel et les Moteurs Thermiques). Donat Banki. An exhaustive discussion of the thermal action of internal combustion and explosion motors, and an inquiry into the conditions which conduce to highest efficiency. An important paper. 4000 w. Génie Civil—Aug. 19, 1899.

The Diesel Motor (Le Moteur Diesel). C. Lambotte. A general discussion and criticism of the Diesel motor, comparing its performance with that of other internal combustion motors. 5000 w. 1 plate. Rev Univ des Mines—Dec., 1899.

The Diesel Motor. E. D. Meier. Reviews work of many mechanical engineers aiming to develop a perfect heat engine, and discusses the degree of success attained by each. Gives the principles of the Diesel motor, the results of tests made, and interesting general information. 7500 w. Jour Am Soc of Nav Engs—Feb., 1898.

The Diesel Motor. E. D. Meier. Some account of the work done in thermodynamics, especially the careful work of Rudolph Diesel, stating what the writer considers the underlying principle of this invention, and giving a short description of the motor as thus far developed. Ill. 1400 w. Jour Assn of Engng Socs—Jan., 1898.

The Diesel Oil Engine. An illustrated description of the theory and construction of the Diesel engine, and related information. 4800 w. Engng—Jan. 5, 1900.

The Diesel Oil Motor. Interesting particulars from articles by Bryan Donkin and M. Hospitalier. Ill. 3000 w. Automotor Jour—Feb., 1898.

The Diesel Rational Heat Motor. States the conditions regarded as essential for an economic heat engine, defines ignition and combustion, and gives comparison of efficiency, etc. Ill. 2800 w. Elec Eng, N. Y.—Feb. 17, 1898.

The Merits of the Diesel Motor. From the paper of Aimé Witz to the Academy of Science. Notes that the absolute efficiency remains the same whatever the work may be, and the value of this property. 700 w. Automotor Jour—June 15, 1898.

The New Diesel Motor (Diesel's Neuer Wärmemotor). A paper by Fritz Krauss, discussing the performance and theory of the Diesel motor in comparison with other heat engines. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—March 11, 1898.

See also **GAS ENGINE—Thermodynamics.**

**Diesel, America.**—Diesel Motor in America. A brief account of Rudolph Diesel and his work, with illustrated description of the engine. 1200 w. Mod Mach—Aug., 1899.

**Diesel and Dopp.**—Petroleum Motors, with Especial Reference to the New Motors of Diesel and of Dopp (Ueber Petroleum-Motoren mit besonderer Berücksichtigung der Neueren Motoren von Diesel und von Dopp). A paper before the German Society of Mechanical Engineers showing that the Dopp Motor gives results as economical as the Diesel. 6000 w. Glaser's Annalen—July 15, 1899.

**Diesel-Capitaine.**—Oil Engines. Capitaine vs. Diesel. Discussion of a paper by E. Capitaine criticising the theory propounded by Herr Diesel and the results he has obtained. 4000 w. Engr, Lond—July 8, 1898.

**Diesel Test.**—Diesel's Rational Heat Motor (Diesel's Rationeller Wärmemotor). A report of a test by Prof. Schröter, of Munich, of the new Diesel motor, showing the remarkable efficiency of 38.5 per cent. A valuable article on testing a motor. 8000 w. Zeitschr d Ver Deutscher Ing—July 24, 1897.

Tests of a Diesel Motor. Condensed report by James E. Denton, of a series of economy tests using various kinds of oil as fuel. Describes the motor and gives results. 2300 w. Eng News—Dec. 29, 1898.

**Diesel Thermal Efficiency.**—Comparative Thermal Efficiency of Steam Engines and Diesel Motors. E. D. Meier. The comparison given shows that the Diesel motor has in actual practice far outstripped the theoretical possibilities of the steam engine. Ill. 1800 w. Sib Jour of Engng—March 1899.

**Diesel Thermodynamics.**—The High Pressure Heat Motor (Der Hochdruckwärme Motor). A paper by J. Lüders discussing the increase of working pressure in internal-combustion motors, with especial reference to the thermodynamics of the Diesel motor. 6000 w. Zeitschr d Ver Deutscher Ing—July 9, 1898.

See also **GAS ENGINE—Thermodynamics.**

**Dopp.**—Improvements in Four-Stroke Petroleum Motors During the Past Ten Years (Verbesserungen des Viertakt-Petroleummotors in den Letzen 10 Jahren). Fr. Dopp, Jun. A general review of the development of the petroleum motor, with especial reference to the engine designed by the writer. 4000 w. Zeitschr d Ver Deutscher Ing—June 24, 1899.

See also **Diesel and Dopp.**

**Edinburgh Trials.**—Judges' Report of the Trial of Oil Engines at the Edinburgh Show, 1899. Gives the conditions of trials made by the Highland and Agricultural Soc. of Scotland, with description and results. 2000 w. Engr, Lond—Oct. 13, 1899.

The Oil Engine. Editorial review of the results of the trials at Edinburgh, by the Highland and Agricultural Soc. of Scotland. 1600 w. Engr, Lond—Oct. 20, 1899.

**English Tests.**—Test of English Oil Engines. Brief report of trials made of ten motors at full brake load, half load, and light load, in which nine proved successful. 500 w. Am Mfr & Ir Wld—Jan. 18, 1900.

**Explosions.**—The Explosion in the Oil Engine. Samuel Rodman, Jr. A critique of views previously published in the same journal by Mr. Tecumseh Swift. 900 w. Am Mach—March 19, 1896.

The Measure of the Instantaneous.—The Time

Occupied in Oil Engine Explosions. Tecumseh Swift. An important question ably discussed. 700 w. Am Mach—Feb. 6, 1896.

**Geneva Exposition, 1896.**—See **GAS ENGINE—Geneva Exposition, 1896.**

**German Tests.**—Tests of Oil Engines. Results of German tests of twenty-seven different engines, with tabulated data. 900 w. R R Gaz—Jan. 3, 1896.

**Koch.**—See **AUTOMOBILE—Koch Oil Motor.**

**Lightship.**—See **LIGHTSHIP—Oil Engine Plant.**

**Mine Pumps.**—Oil Engines as Pump Motors Underground. George L. Kerr. Discusses the various methods of ridding mines of water and gives plan and elevation showing the general arrangement of oil engine and pump for this purpose. 1600 w. Col Guard—Oct. 6, 1899.

**Mining.**—On the Choice of an Oil Engine for Mining Purposes. C. C. Longridge. A few simple principles as a guide to the purchase. 1000 w. Min Jour—Sept. 19, 1896.

**Nijni-Novgorod Exposition, 1896.**—See **GAS ENGINE.**

**Paris Exposition.**—See also **GAS ENGINE—Paris Exposition.**

**"Ruston."**—The "Ruston" Oil Engine. Brief illustrated description. 900 w. Engng—Aug. 27, 1897.

**Southall.**—Southall's Ideal Oil Engine. Illustrated description of an engine working on the Otto cycle, and using only heavy petroleum for both starting and running. 700 w. Engr, Lond—Sept. 17, 1897.

**Testing Plant.**—See **GAS ENGINE.**

**OIL FUEL.**

See **LIQUID FUEL.**

**OIL GAS.**

See **GAS MANUFACTURE; PINTSCH GAS.**

**OILING.**

See **LUBRICATION.**

**OIL MOTOR.**

See **OIL ENGINE.**

**OIL SLINGS.**

The Design of Oil Slings. Edwin Rust Douglas. Describes experiments made to find the cause of failure in devices used and to determine the preventive. 1000 w. Am Mach—June 21, 1900.

**OIL STORAGE.**

See also **PETROLEUM ACCIDENT.**

**Gas Works.**—Notes on the Storage of Oil at Gas Works. Frederic Egner. Paper read at meeting of Am. Gas Lgt. Assn. Various methods of storing oil are described and the description is followed by a statement of the author's practical experience in oil storage in the Metropolitan gas works, New York city. Discussion. 2800 w. Am Gas Lgt Jour—Nov. 11, 1895.

**OIL TAR.**

See also **GAS MANUFACTURE—By-Products; Tar.**

Oil-Tar and Its Uses. J. B. Grimwood. The uses to which oil-tar may be put and the transformation of the raw material into a state of usefulness other than its employment as fuel. Also discussion. 4500 w. Am Gas Lgt Jour—Aug. 24, 1896.

**OLIVE OIL.**

The Olive. A. Taltavull. Its usefulness to mankind and interesting facts about its culture. The process of extracting oil from olives and preparing it for market is illustrated and described. 1-700 w. Prog of Wld—July, 1896.

**ONYX.**

**Kentucky.**—Onyx Beds in Kentucky. From the St. St. Louis "Star." Report of the discovery of the richest and most extensive beds of onyx ever known to exist. 1000 w. Arch & Build—Oct. 2, 1897.

The Onyx Deposits of Barren County, Kentucky. S. S. Gorby. An illustrated description of the deposits and their location. 1500 w. Eng & Min Jour—June 17, 1899.

The Kentucky Onyx Fields. S. S. Gorby. A description of the formation of onyx with illustrated account of the deposits named, and general remarks. 1700 w. Am Mfr & Ir Wld—March 31, 1899.

**Marbles.**—The Onyx-Marbles. Courtenay De Kalb. An explanation of the term, the requisite qualities, preparation and cost, localities where deposits are found and other information. 3800 w. Stone—Nov., 1898.

The Onyx Marbles. George P. Merrill. Their origin, composition, and uses, both ancient and modern. An interesting article giving the distinctive qualities possessed by each variety of onyx. Serial. Stone—Nov., 1895.

**OPEN-HEARTH PROCESS.**

See also **STEEL; STEEL CASTINGS; STEEL INDUSTRY; STEEL MANUFACTURE; STEEL PLATE.**

Development in Open-Hearth Steel. R. C. Lauth. Suggestions that might lead to great results in cheapening the cost. 2000 w. Am Mfr & Ir Wld—Sept. 6, 1900.

Recent Progress in Open-Hearth Steel Making. Bernard Dawson. The increasing demand for steel castings, improvements in charging and furnace construction, and the production and application of mild steel are treated in an interesting manner. 2800 w. Ir & Coal Tr Rev—Jan. 31, 1896.

The Development of Open-Hearth Steel. This look into the future shows that 62 open-hearth furnaces, ranging from 5 to 50 tons capacity, have been built since 1894, and claims many advantages for these furnaces over the Bessemer converters. 900 w. Ir Age—March 12, 1896.

**Basic.**—The Manufacture of Steel on the Basic Open-Hearth. Thomas Turner. Read before the West of Scotland Ir. and Steel Inst. Gives suggestions of value in steel making, and some results obtained by the basic open-hearth process, considering the different stages of the practice. Serial. Col Guard—Feb. 16, 1900.

A New Process for the Production of Basic Open-Hearth Steel from Pig and Ore. Ambrose Monell. A description of this process, also calling attention to other developments in metallurgy. 3500 w. Ir & Coal Trds Rev—May 11, 1900.

**Bertrand-Thiel.**—An Explanation of the Rapidity of the Bertrand-Thiel Process. Henry M. Howe. An explanation of the changes made in the various steps of the process is given. 1600 w. Eng & Min Jour—Sept. 2, 1899.

Further Notes on the Bertrand-Thiel Process. Joseph Hartshorne. Summary of a report on the operations at Kladno, with general information. 1600 w. Trans Am Inst of Min Engs—June, 1900.

Notes on the Bertrand-Thiel Process. James Hartshorne. Showing the developments of this process and the results. Gives a brief résumé of what has been recently published on this subject. 3800 w. Trans of Am Inst of Min Engs—June 1898.

Notes on the Practice of the Combined Open-Hearth Process of Messrs. Bertrand and Thiel. E. Bertrand. Describes a series of experimental heats, with general results given in tabulated form, and discusses the work. Discussion follows. Read at Iron and Steel Inst., London. 10000 w. Ir & St Trds Jour—May 15, 1897.

The Bertrand-Thiel Open-Hearth Process. Joseph Hartshorne. Comments on the paper of P. C. Gilchrist on the above named process, with its discussion, with report on the work which is being done at present. 3500 w. Ir Age—April 15, 1897.

The Bertrand-Thiel Open-Hearth Process. Joseph Hartshorne. Describes a new development of the open-hearth process which the inventors claim has increased the product per furnace, reduced the amount of refractories and additions used, enabled a poorer and more varied quality of stock to be employed, improved the quality of the material produced and rendered the control of the operations and product more certain. 2000 w. Trans Am Inst of Min Engs—Sept., 1896.

The Bertrand-Thiel Steel-Making Process. Percy C. Gilchrist. Read at meeting of the Cleveland Institution of Engineers. The process is briefly stated and the results given. Discussion follows. 2300 w. Ir & Coal Trds Rev—Dec. 18, 1896.

The Bertrand-Thiel Process (Der Bertrand-Thiel Process). A paper by Herr Thiel before the Düsseldorf Convention with an active discussion by various members. 8000 w. Stahl und Eisen—May 15, 1897.

The Bertrand-Thiel Modification of the Open-Hearth Process. J. S. Robeson. A general description of the method, with some detailed facts in connection with it. Ill. 2200 w. Pro Engs' Club of Phila—July, Sept., 1897.

The Bertrand-Thiel Open-Hearth Process. Comments on the investigations of this process made by P. C. Gilchrist, which were presented to the Cleveland Inst. of Engs. 1500 w. Eng, Lond—Feb. 5, 1897.

**Birmingham, Ala.**—Steel Making at Birmingham. P. G. Shook. Extract from a paper read before the Alabama Industrial and Scientific Society. Relates to the availability of raw material required for basic open-hearth steel manufacture in Alabama. 1300 w. Ir Tr Rev—July 16, 1896.

**Carnegie Steel Co.**—The New Open-Hearth Plant of the Carnegie Steel Company, Limited. Illustrated description of the main features of this fine plant. 2200 w. Ir Age—June 30, 1898.

**Charging Machine.**—Charging Apparatus for Martin Furnaces (Beschickungsvorrichtung für Martinöfen). An illustrated account of electrically driven carriage and charging machinery. 800 w. Stahl und Eisen—July 15, 1900.

Charging Devices for Open-Hearth Furnaces (Beschickungsvorrichtungen für Martinöfen). Principally illustrating the Wellman electric charging machine as used in Germany, with photographs of the device at the Lauchhammer Works. 5000 w. Stahl und Eisen—Sept. 1, 1897.

Mechanical Charging of Steel Furnaces. Henry Tomkins. Abstract of paper and discussion presented at meeting of the Cleveland Inst. of Engs., at Middlesborough, Eng. Describes a machine invented by the writer, which has given satisfaction during a twelve-month's trial. 3500 w. Col Guard—April 28, 1899.

On Charging Open-Hearth Furnaces by Machinery. Jeremiah Head. Paper read before the Iron and Steel Inst. Illustrated description of charging machines, with discussion of their advantages. 4000 w. Engng—May 14, 1897.

The Wellman Charging Machine. An illustrated account of a machine operated by electric motors, for charging open-hearth steel furnaces. 1800 w. Engr, Lond—March 16, 1900.

The Wellman Charging Machine. Illustrated description of machine for charging open-hearth furnaces. 900 w. Ir Age—Aug. 27, 1896.

**Combined.**—Combined Open-Hearth Steel Manufacture. Benjamin Talbot. Description of process with results and impressions gained by practical experience in its use. 1800 w. Ir Age—June 17, 1897.

**Cost of Plant.**—Cost of Basic Open-Hearth Plants. From "Tin and Terne." Refers only to such a basic open-hearth plant as would be appropriate as an adjunct to a tin plate plant. Estimates is given in which the writer endeavors to allow fully for all expenses. 1400 w. Ir Trd Rev—June 4, 1896.

**Costs.**—Varying Costs of Open-Hearth Steel. Extract from new work by H. H. Campbell. On open-hearth costs. 1500 w. Ir Trd Rev—Oct. 8, 1896.

**1896.**—Twelve Months' Progress in Open-Hearth Steel Making. Bernard Dawson. Review of advances made in the past year, most of which have come from the chemists rather than the engineers. 2600 w. Ir & Coal Trds Rev—Jan. 29, 1897.

**Fluid Metal.**—The Use of Fluid Metal in the Open-Hearth Furnace. James Riley. Read before the Iron and Steel Inst. A discussion of this process and its advantages, and the opinion that eventually this process will prevail. 4200 w. Engng May 11, 1900.

**Germany.**—Open-Hearth Practice in Germany. A recent improvement, designed to evenly distribute the current of gases, consists of a transverse middle division wall in the regenerators. 700 w. Ir Trd Rev—Feb. 6, 1896.

**Glass Works.**—See GLASS FURNACE.

**Granite City, Ill.**—The Basic Open-Hearth Process at Granite City. Ill. The steel furnaces are illustrated by plans and sections, and are well described. Data and analyses are included. 900 w. Ir Age—April 16, 1896.

**Illinois Steel Co.**—Open-Hearth Steel and Its Manufacture by the Illinois Steel Company. T. L. Condron. Historical sketch with description of process and the work as carried on by this company. Ill. 4800 w. R R Gaz—Sept. 3, 1897.

**Manganese.**—Manganese in the Acid Open-Hearth Process. F. A. Matthewman. Abstract of a paper read before the West of Scotland Ir. and Steel Inst. Presents the principal effects of manganese in this process, the statements being founded on practical observations. 2700 w. Ir & Coal Trds Rev—March 17, 1899.

**Martin.**—Improved Martin Steel Process. A. Sattmann, in "Stahl und Eisen." Description with illustrations showing the general arrangement of the plant. 2800 w. Col Guard—Nov. 24, 1899.

Notes on the Martin Process (Verchiedenes über Martinofenbetrieb). A discussion of Herr Springorum's report at the convention of the Eisenhüttenleute, upon the open hearth steel process, treating of details of performance during the past year. 5000 w. Stahl und Eisen—Aug. 1, 1897.

The Martin Process (Der Martin Process). With details of gas producers, and a general account of present open hearth steel methods. By Herr Springorum, at the Düsseldorf Convention. 3500 w. Stahl und Eisen—May 15, 1897.

See also **Siemens-Martin.**

**Nashua Furnace.**—The Nashua Open-Hearth Furnace of 1867. S. T. Wellman. An early steel melting furnace built at South Boston. Various sections are given which fully illustrate the construction. 600 w. Ir Age—Jan. 2, 1896.

**Pencoyd, Pa.**—See **Talbot.**

**Sattmann.**—A New Open-Hearth Steel-Making Process. Alexander Sattmann, in "Stahl und Eisen." Illustrated description of the process with discussion of the technical points. 3200 w. Ir & Coal Trds Rev—Oct. 20, 1899.

The Use of a Large Proportion of Soft Pig Iron in the Open Hearth Process (Martiniren bei Verwendung eines sehr Hohen Procentsatzes Weichen Roheisens). A. Sattmann. A very complete description of an improved basic open-hearth process to be used continuously in direct connection with the blast furnace. 4500 w. Stahl und Eisen—Oct. 15, 1899.

**Siemens-Martin.**—The Siemens and Siemens-Martin Processes. History of the development and the difficulties encountered, the changes and improvements in the methods of manufacture, changes in cost, etc. 3800 w. Ir & Coal Trds Rev—June 18, 1897.

See also **Martin.**

**Talbot.**—The Open-Hearth Continuous Steel Process. Benjamin Talbot. Read before the Iron and Steel Inst. Describes this process as worked at the Pencoyd Steel Works, at Pencoyd, Pa., and a statement of the advantages. Discussion. 9000 w. Ir & Coal Trds Rev—May 11, 1900.

The Talbot Continuous Open-Hearth Steel Process. Describes the plant at the Pencoyd Iron Works, the process, the operation, results, etc. 4000 w. Ir Age—Feb. 8, 1900.

The Talbot Steel Process at the Pencoyd Iron Works. Explains a continuous basic open-hearth process conducted in an 80-ton tilting furnace. 1000 w. Eng Rec—Feb. 17, 1900.

**Furnaces.**—On Tilting Open-Hearth Furnaces. Archibald P. Head. Illustrated description of the furnace of this type used for the past ten years in the United States, and its advantages. 2700 w. Ir & Coal Trds Rev—May 5, 1899.

Tipping Furnace for Combined Martin and Bessemer Process. P. Eyermann, in "Stahl und Eisen." Describes a new method of regenerating crude iron, giving illustration of the furnace. 2000 w. Col Guard—March 30, 1900.

Tipping Martin Furnaces (Zur Frage der Kipbaren Martinöfen). P. Eyermann. An illustrated account of improvements in the details of the Martin basic steel process. 2000 w. Stahl und Eisen—March 15, 1900.

**United Kingdom, 1895.**—The Open-Hearth Steel Industry of the United Kingdom in 1895. Statistics dealing with the production of ingots, of finished open-hearth steel, and of open-hearth furnaces, with a comparison of British and American output. 900 w. Ir & Coal Trds Rev—June 12, 1896.

**Wellman Charging Machine.**—See **Charging Machine.**

**Westphalia Basic.**—The Basic Open-Hearth Process in Westphalia (Der Basische Martin process in Westfalen). Karl Johansson. A general account of the basic open-hearth practice, with data as to the product and methods. Two articles. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 12, 19, 1898.

**OPERA HOUSE.**

See also **THEATRE.**

**Paris.**—The New Building of the Comic Opera at Paris (Das Neue Gebäude der Komischen Oper in Paris). An illustrated description of this handsome new auditorium in Paris, with especial reference to the manner in which exits have been provided in case of fire. Two articles. 3000 w. Schweiz. Bauzeitung—July 15, 22, 1899.

The New Opéra Comique, Paris. Brief description with illustration. 700 w. Builder—Jan. 7, 1899.

The Paris Opera House. Description, with illustrations, of the most remarkable modern edifice in France. 1400 w. Sci Am Sup—Nov. 12, 1898.

**OPTICAL LANTERN.**

**Electric.**—The Electric Light in the Optical Lantern. Cecil M. Hepworth. A consideration of points necessary to get the greatest amount of light and send it in the right direction. 2000 w. Sci Am Sup—May 15, 1897.

**OPTICAL VERIFICATION.**

**Surfaces.**—See **SURFACE—Optical Verification.**

**ORDNANCE.**

See **ARMAMENT; ARMOR PLATE; ARTILLERY; BATTLESHIP; COAST DEFENCE; GUN; GUN CARRIAGE; GUN MANUFACTURE; TURRET; WARSHIP.**

**ORE.**

See also **GEOLOGY; GOLD GEOLOGY; IRON ORE; MINERAL; MINERAL VEIN.**

**ORE CRUSHER.**

**Centrifugal.**—A New Form of Roll Crusher for Rock and Ore Crushing. Illustrations showing the design and construction of an improved type, called the centrifugal roll crusher. Details of its efficiency. 900 w. Eng News—March 8, 1900.

**Sectional Rolls.**—Sectional Cushioned Rolls. Joseph William Pinder. Describes a system for increasing the efficiency in crushing. Ill. 600 w. Trans of Am Inst of Min Engs—June, 1898.

**ORE DEPOSIT.**

See **GEOLOGY; GOLD GEOLOGY; MINERAL REGION; MINERAL VEIN.**

**ORE DRESSING.**

See **METALLURGY—Ore Dressing.**

**ORE MARKET.**

**Colorado.**—Colorado Ore Market. From the report of the State mine commissioner. Relating to the methods pursued for the determination of values contained in ores. 1800 w. Min & Sci Press—May 28, 1898.

**ORE RESERVES.**

See also **MINE VALUATION.**

Calculating and Recording the Value of Ore Reserves. John Clince Little. Paper read before the British Soc. of Min. Students. Suggests the use of a slide-scale for calculations of value, cost, profit, or loss, illustrating the method of working by an example. 2200 w. Can Min Rev—Jan., 1898.

Calculating Value of Ore Reserves. John Clince Little. Abstract of paper in the "Journal of the British Association of Mining Students." Gives a diagram for estimating ore in sight, and offers suggestions for the speedy manipulation of figures that may result from careful measuring and sampling. 1700 w. Eng & Min Jour—June 25, 1898.

**ORE SAMPLING.**

See **SAMPLING.**

**ORE SCREENING.**

See **SCREENING.**

**ORE TESTING.**

See also **ASSAYING; GOLD PLACER; SAMPLING.**

Experimental Ore Testing Works. Arthur Lakes. Means for determining the proper method to be used in treating ores from a new mine, and the importance of tests. 1500 w. Mines & Min—Oct., 1900.

**Hand-Jig.**—An Experimental Hand-Jig. Paul Buttgenbach. Describes an apparatus used for making preliminary tests previous to treating a large quantity of ore with machinery, and also for tests of samples. Ill. 800 w. Eng & Min Jour—Sept. 11, 1897.

**ORE TREATMENT.**

See **METALLURGY.**

**OSCILLATING ENGINE.**

Acceleration Diagram for the Oscillating Engine. A. C. Elliott. Acceleration diagrams for the oscillating engine are given and the constructions explained. 1000 w. Engng—May 21, 1897.

**OSCILLATION...**

**Electric.**—See **ELECTRO-PHYSICS—Oscillation.**

**OSCILLATOR.**

**Electric.**—See **ELECTRIC OSCILLATOR.**

**OSCILLOGRAPH.**

See also **ALTERNATING CURRENT—Curve.**

**Arcs.**—Experiments on Alternate Current Arcs by Aid of Oscillographs. W. Duddell and E. W. Marchant. Abstract of a paper presented to the Inst. of Elec. Engs., London. Gives some of the more important results developed by the investigation. Serial. Elect'n, Lond—April 14, 1899.

**Blondel.**—M. Blondel's Oscillographs. Abstract of a paper read before L'Association Française pour L'Avancement des Sciences. Discusses the principles of construction and the theory of this class of galvanometers with which the forms of the periodic curves of alternating currents may be observed. 1700 w. Elec Rev, Lond—June 16, 1899.

Recent Experiments with the Oscillograph. Andre Blondel. Abstract translation from "L'Industrie Electrique." Reports recent progress in the construction of the two principal types of this apparatus. 2500 w. Elec Rev, N. Y.—May 24, 1899.

**Duddell.**—The Duddell Oscillograph. An illustrated detailed description of an electrical measuring apparatus. 1300 w. Engng—May 4, 1900.

**OVEN.**

See **COKE OVEN; FURNACE.**

**OVERFLOW PIPE.**

The Arrangements and Dimensions of Overflow Pipes (Anordnung und Bemessung des Durchmessers der Ueberlaufrohre). Especially dealing with overflow pipes for water tanks, including cost. 2000 w. Gesundheits Ing—April 30, 1897.

**OVERHEAD TRAMRAIL.**

See also **CRANE; MECHANICAL HANDLING.**

**Foundry.**—Trolley System. H. M. Ramp. The uses and advantages of overhead trolley systems in foundries, and the economy of labor and time effected by them. 2500 w. Foundry—April, 1896.

Trolley Systems. F. O. Farwell. Illustrated description of a single rail trolley in a foundry with a switch thought to be as safe as any double track switch. 700 w. Foundry—Aug., 1896.

Trolley Systems—Their Value in Foundry Work. Herbert M. Ramp. Presented at the Cincinnati meeting of the Am. Foundrymen's Assn. Calling attention to some of the good points and advantages of this system. 1900 w. Am Mfr & Ir Wd—June 24, 1898.

**Furnace Cover Handling.**—A Suspended Beam Electric Tramway. A modern method of handling furnace covers in a carbon plant. Ill. 1000 w. Elec Rev—Jan. 1, 1896.

**OXYGEN.**

The Industrial Preparation of Oxygen (Préparation Industrielle de l'Oxygene). P. Crépy. A description of the Garuti process of making oxygen on a commercial scale by the electrical decomposition of water. 1000 w. La Rev Tech—July 10, 1898.

**Liquefied.**—See **LIQUEFACTION.**

**Stuart Process.**—The Stuart Process for the Production of Oxygen. Romyn Hitchcock. Describes the development of this process and the application of oxygen to the manufacture of coal gas. Part first is an account of the various processes that have been tried for the economical production of oxygen on a large scale. Serial. Eng & Min Jour—Jan. 21, 1899.

**OZOKERITE.**

See also **HYDROCARBONS—Utah.**

Ozokerite. J. Ohly. Information where this mineral is found and account of the only two mines of any magnitude. 2200 w. Min & Sci Pr—July 7, 1900.

**OZONE.**

An Ozonizer for Industrial Purposes (Un Ozoniseur pour les Applications Industrielles). E. Andreoli. The apparatus consists of plates studded with sharp points between which the electric discharges take place, a pressure of 3000 volts is used. 3500 w. Electricien—June 11, 1898.

I. Electrical Production of Ozone. II. Purification and Sterilization of Water by Ozone. The first article is an illustrated description of apparatus devised by Mr. Andreoli, for producing ozone. The second describes the treatment of the water of the river Seine. 2500 w. W Elect'n —May 28, 1898.

Ozone: Its Production and Applications. A description of the Andreoli "ozoniser," which consists of grids bearing numerous points between which electrical discharges take place. 1200 w. Elec Rev, Lond—Aug. 26, 1898.

Ozone and Its Technical Applications (Ozon und seine Technische Verwendung). A review of the discovery and history of ozone, and an account of its modern applications in bleaching, sterilization, and other oxidizing uses. Two articles. 4500 w. Die Elektrizität—Oct. 28, Nov. 11, 1899.

The Ozone Industry (L'Industrie de l'Ozone). M. H. Otto. An exhaustive discussion of the generation of ozone and its applications, especially in the sterilization of water. 10000 w. Mem Soc Ing Civ de France—Feb., 1900.

The Industrial Production of Ozone. From "La Nature." Illustrated description of the Otto Rotary Ozonizer. 900 w. Sci Am Sup—March 10, 1900.

The Production of Ozone, and a Comparison of Its Cost with That of Other Oxidizing Agents. John B. C. Kershaw. A brief description of each of the different forms of ozoniser now before the public, with an examination of the financial aspects of the use of ozone for various purposes. 2300 w. Elec Rev, Lond—July 29, 1898.

# P

**PACKING.**

Packings for Pistons and Valves (Garnitures de Pistons et de Tiroirs). M. Haas. Discussing especially piston packings for marine engines operating with high-pressure steam, with many illustrations of actual packings. 3500 w. Revue de Mecanique—Sept., 1898.

Piston Rod and Valve Stem Packing. C. B. Conger. Describes the two general types of metallic rod packing in use, and the care it needs. 1500 w. Loc Engng—July, 1900.

Something about Packing. W. H. Wakeman. A practical dissertation, giving many useful hints. 2800 w. Safety V—June, 1896.

**Friction.**—Friction of Steam Packings. Charles Henry Benjamin. Describes experiments made at the laboratories of the Case School. Ill. 1500 w. Trans Am Soc of Mech Engs, No. 839—Dec., 1899.

**Locomotive Piston Rods.**—Packing for Piston Rods and Valve Stems. A review of a paper by T. Purves, Jr., before the New England Railroad Club. The conclusions are favorable to metallic packing in preference to hemp, and some figures of maintenance cost are given. 1200 w. Ry Rev —May 16, 1896.

**Metallic.**—Metallic Stuffing-Box Packing. Edwin N. Wiest. A two-ring packing, illustrated and described, with composition of alloy, for such packings. 450 w. Am Mach—July 2, 1896.

**Piston.**—Piston Packing. F. F. Hemenway. Reviews the progress of piston packing, and the different materials used. Ill. 1300 w. Mach, N. Y.—May, 1897.

See also **PISTON RING.**

**Piston Rods.**—Packing Piston Rods. W. H. Wakeman. Gives points on the packing and oiling of piston rods. 800 w. Am Mach—June 23, 1898.

**Rubber.**—Packing as a Product of the Rubber Factory. Gives history of the use of packing with illustrated description of types. 3300 w. Ind Rub Wld—Sept. 10, 1897.

**PADDLE WHEEL.**

See also **MARINE ENGINE—Paddle Steamer.**

Paddle Wheels. A. S. Mills. Read at meeting of the Bristol Channel Centre of the Inst. of Marine Engs., at Cardiff. Abstract of paper and discussion. Discusses the early forms of these wheels and their development. 2800 w. Steamship—April, 1898.

Paddle Wheels. A. E. Mills. Paper read before the Inst. of Marine Engs. Traces the development from the earliest form used, and analyzes their working. Ill. 2000 w. Mech Wld—Oct. 28, 1898.

**PAGODA.**

Building an Indian Pagoda. J. Donnan, in "Indian Engineering." A description of the work, with illustration. 2300 w. Stone—Sept., 1899.

**PAINT.**

See also **METAL PROTECTION; PAINTING.**

**Air Blast.**—See **Compressed Air.**

**Anti-Fouling Compositions.**—The Dangers of the Use of Metallic Copper in Anti-Fouling Compositions. Reviews the various attempts made to protect the hulls of vessels, and the trouble with metal sheathing, explaining the need of demanding a guarantee that anti-fouling paint contains no metallic copper. 1600 w. Engs' Gaz —Aug., 1899.

Paint Tests. Max Goltz. Recommendations, based on study and careful examinations, for painting iron and steel bridges, and other metallic structures. Also discussion. 5500 w. Jour Assn of Engng Soc—June, 1897.

Painting Railroad Bridges. Hunter McDonald. Extracts from a paper before the Engng. Assn. of the South. Describes a recent laboratory test of twenty different kinds of paint made recently by the writer. 1300 w. R R Gaz—April 27, 1900.

Paint Tests. Discussion by W. J. Wilgus of paper by Max Goltz, with the practice favored by the writer. 1000 w. Jour Assn Engng Socs —Nov., 1897.

Tests of Various Paints on the 155th St. Viaduct, New York City. Presents the report of Henry B. Seaman upon the condition of the various paints applied as a preliminary test before repainting the structure. 1000 w. Eng News—July 7, 1898.

Quantities of Paint Required for Bridges of Various Spans. C. E. Fowler. Quantity and cost of the various paints required for highway and railroad bridges for spans of 20 to 300 ft., varying by 20 ft. difference. 300 w. Eng News—Feb. 6, 1896.

Tests of Bridge Paint. Ira O. Baker. A summary of experiments. 1200 w. R R Gaz—March 10, 1899.

**Cars.**—Durability of Different Colors of Paints for Passenger and Freight Equipment. T. S. Lloyd. Read before the South & Southwest Railway Club. Considers yellow (or orange), Tuscan red and Pullman colors. 1500 w. R R Car Jour—Nov., 1899.

Protective Paint for Metal Parts of Cars and Trucks. Papers by J. H. Pitard and A. Hunicke, read before the American Master Car and Locomotive Painters' Assn., with discussion. 6500 w. R R Car Jour—Oct., 1897.

**Cars and Trucks.**—Protective Paints for Metal Parts of Cars and Trucks. Symposium of correspondence from M. C. B.'s foreman and paint manufacturers, giving experience and suggestions. 1200 w. R R Car Jour—Sept., 1896.

**Iron Protection.**—Paints for Iron. Gives results of experiments made to determine the best paints and pigments for ironwork, and the most effective in preventing the corrosion under conditions of great severity, showing the superiority of paints containing red lead or orange lead. 1200 w. Engr, Lond—July 14, 1899.

Paint as a Protection for Iron. Discussion at a meeting of the Engineers' Club at Phila. Practical experiences are given. 2400 w. Ry Rev—Dec. 28, 1895.

Paint as a Protection for Iron. E. A. Custer and F. P. Smith, with discussion. The principal requisites are given as adhesion, non-corrosion, toughness, elasticity, and it must be water proof. 7500 w. Pro Engs' Club of Phila—Jan., 1896.

Paints for the Protection of Ironwork. A. H.

Sabin. Condensed from a lecture delivered before the students of the Rensselaer Polytechnic Inst. Shows the danger from rust, discusses the treatment necessary, giving directions and suggestions. 2800 w. Eng News—Jan. 27, 1898.

Paints and Varnishes. A. H. Sabin. Considers methods for the protection of iron, describing briefly the pigments used for preservative paints. 5500 w. Jour Assn of Engng Socs—Feb., 1900.

Preservative Paints for Iron Chemically Considered. Explains the chemical nature and reaction of a simple red lead and red oxide of iron paint, so that the cause of incipient oxidation of the iron beneath the surface may be understood. 4000 w. Engng—Feb. 24, 1899.

The Protection of Iron by Paint. Embodies the results of investigations and remarks on the properties of a good paint and the best method of applying it. 2800 w. Engr, Lond—Oct. 22, 1897.

See also **METAL PROTECTION.**

**Kalsomining.**—See **KALSOMINING.**

**Lead vs. Zinc.**—Lead vs. Zinc Paints. G. R. Henderson. An account of a series of exposure tests on tin, galvanized iron, sheet iron, poplar, white pine, and yellow pine. Two coats of paint were given to each. Reports results. 900 w. R R Gaz—Sept. 30, 1898.

**Oil.**—Note on a Test of a New Paint Oil. William G. Raymond. Illustrates and describes the test made, giving results which were very favorable. Recommended it for car and depot painting. 1700 w. R R Gaz—April 29, 1898.

Oil Paints for the Protection of Iron, Steel, and Wooden Structures. M. F. Lindsay. The importance of a knowledge of the materials used is shown, and information concerning oils is given. 2200 w. R R Car Jour—Nov., 1897.

**Oil on Iron.**—Testing Oil Paints on Iron. Dr. H. Loisner. Gives a description of the testing method employed by the writer, which is simple and yet may be called a crucial one. 1000 w. R R Car Jour—May, 1898.

**Sanitation.**—See **PAINTING.**

**Railway.**—Paints for Railways. M. F. Lindsay. Consideration of the necessities to produce a paint that will answer the purpose of a preservative of wood and iron. 2800 w. Ry Rev—Dec. 5, 1896.

**Test.**—See **Bridge.**

### PAINTING.

See also **PAINT.**

**Bridge.**—Painting the Louisville and Jeffersonville Bridge. O. E. Selby. During the painting of this bridge by the company a careful record was kept of the cost of labor and materials for different parts of the work, and the purpose of the paper is to give an analysis of the results obtained and such data as may be of value. 2200 w. Pro Am Soc of Civ Engrs—Sept., 1897.

Painting Metal Bridges. William B. Mackenzie. Results of experiments of the writer are given, and much valuable information. 3500 w. Can Eng—July, 1897.

**Car.**—Paint Shop Staging. Description and drawings of a device to replace horses and planks in car-painting. 700 w. R R Car Jour—May, 1896.

Is it Advisable to Rub to a Dead Finish the Interior of Passenger Cars? What is the Extra Cost? Papers by Robert McKeon, R. G. Barinowski and C. A. Bruyere read at meeting of the American Master Car and Locomotive Painters' Assn., with discussion. 6000 w. R R Car Jour—Oct., 1897.

Repainting Old Cars. Charles Koons. Hints and directions for the work, with introductory remarks. Serial. St Ry Rev—May 15, 1897.

See also **Compressed Air.**; **Railway Equipment.**

**Car and Locomotive.**—Official Report of the 27th Annual Convention of Master Car and Locomotive Painters' Association. Full report of officials, committees, etc., and discussions. The topics include compressed air for burning off cars, flatting of varnishes, painting locomotive jackets and galvanized iron, the enamel process, locomotive painting, spontaneous combustion in paint shop, painting super-heated parts, etc. 60000 w. R R Car Jour—Oct., 1896.

**Car Surfacing.**—What Methods of Surfacing Will Give Fairly Good Results Without the Use of Either Sandpaper or Lump Pumice-stone for Passenger Cars or Locomotive Tenders. Papers by C. E. Koons and C. A. Cook read before the American Master Car and Locomotive Painters' Assn., with discussion. 5500 w. R R Car Jour—Oct., 1897.

**Compressed Air.**—Bridge Painting by Air Blast. Description of the apparatus and its operation used in painting the One Hundred and Fifty-fifth Street viaduct, New York. 1100 w. Eng Rec—Nov. 13, 1897.

Painting Railway Equipment with Compressed Air. Papers by Messrs. McMasters, Kahler and Copp, read before the American Master Car and Locomotive Painters' Assn., with discussion. 9000 w. R R Car Jour—Oct., 1897.

Compressed Air in Car Painting. W. O. Quest. Illustrations and descriptions of the practice. 1000 w. R R Car Jour—Sept., 1896.

Painting Freight Cars by Compressed Air. Charles E. Copp. Abstract of a report read at meeting of New England R. R. Club, the result of a visit to Pittsburg for the purpose of investigating the subject. 1000 w. R R Car Jour—March, 1897.

Pneumatic Painting Criticized. Gives reason for objecting to this method of painting. 900 w. R R Car Jour—March, 1897.

**House.**—Talks on House Painting. Calls attention to the fact that it pays to have painting done as well as possible. 1800 w. Can Arch & Builder—July, 1896.

**Locomotive.**—Ornamentation in Locomotive Painting. A. Ashmun Kelly. The writer discourses upon the aesthetic effect on the enginemen and cleaners. 900 w. Ry Mas Mech—April, 1896.

Painting a Locomotive in Ten Days. A. Ashmun Kelly. A review of an old discussion in the Master Car Painters' Assn. Several plans are given and a symposium of opinion upon results. 1600 w. Ry Mas Mech—May, 1896.

Painting Locomotive Engines. Historical review giving early and modern practice, particularly in England, with discussion of methods and constitutents. 3200 w. Engr, Lond—Oct. 6, 1899.

Painting of Pennsylvania Railroad Locomotives. C. H. Caruthers. Describes the practice of this road. 1000 w. R R Gaz—Aug. 31, 1900.

**Metallic Structures.**—The Painting of Metallic Structures. Comments on information given by A. H. Sabin, formerly professor of chemistry in the University of Vermont, on the constitution of paints, and the results of important experiments. 1500 w. Engng—May 14, 1897.

**Railway Equipment.**—Economy in Railroad Equipment Painting. Extracts from a paper by Charles E. Cropp, read before the New England R. R. Club. Describes the main points of economy and the treatment now given the equipment. 1500 w. R R Gaz—Oct. 14, 1898.

**Sanitary.**—Sanitary Painting. A. G. White. An address delivered at the convention of the Master House Painters of England and Wales. On the sanitary, aesthetic and protective value. 2200 w. Jan. 6, 1899.

Sanitary Painting. A. G. White. Address before the Master House Painters of England and Wales. The relation of painting to the health and life of buildings. 2000 w. Sci Am Sup—May 6, 1899.

The Painter as a Sanitarian. John Dewar. Calls attention to the impurities that accumulate on the walls and ceiling, and the use of paint in restoring a more healthful condition than is possible in papered rooms. 1600 w. Plumb & Dec—March 1, 1897.

**Water Color.**—See **KALSOMINING.**

### PALACE.

**Baroda, India.**—Baroda Palace: the Town Residence of H. H. Sir Syaji Rao, G. C. S. I., Maharaja Sahib Gaekwar. Robert Fellowes Chisholm, with discussion. Description of a palace in India, probably the most costly structure erected by a private individual during the present century. 10000 w. Jour Roy Inst of Brit Archts—May 21, 1896.

**Durbar Hall, India.**—Durbar Hall and Recreation Rooms for His Highness, Sawai Mahindra, Maharaja. Sir Pretap Singhjee, Sar-Amad Rajgan of Bundelkhand, K. C. I. E. Illustrated description. 900 w. Ind Engng—Nov. 2, 1895.

**Hampton Court.**—Hampton Court Palace. John Belcher. Read at meeting of the Architectural Assn., London. The building is considered from the architectural standpoint, giving history of the work from its beginning. Discussion. 7800 w. Builder—Feb. 12, 1898.

**Herrenchiemsee, Bavaria.**—The Palace of Herrenchiemsee, and Its Ornaments and Decorations (Schloss Herrenchiemsee, seine Decorative Ornamentik und Figurale Plastik). A descriptive account of this show palace of Bavaria, with several views of the interior decorations. 2500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—April, 1898.

**Japan.**—A Japanese Imperial Palace. Illustrated description of the details of the palace of the Crown Prince, the highest building in the country, noteworthy for the elaborate details of the steelwork to prevent distortion by earthquakes. 2000 w. Eng Rec—April 7, 1900.

**Kensington.**—Kensington Palace. From the London "Times." An account of this noted palace, the birthplace of Queen Victoria, and description of some parts of it. It is to be put in order and opened to the public. 2000 w. Arch, Lond—Feb. 18, 1898.

**Wilhelmsthal.**—The Rococo Palace of Wilhelmsthal (Rococo-Schloss Wilhelmsthal). With interior views and details of this rococo palace of the middle of the 18th century. 3500 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1899.

**PANAMA CANAL.**

See **CANAL—Panama.**

**PAN-AMERICAN EXPOSITION.**

Views of the Pan-American Exposition. Illustrates the Park Lake, the North Bay, the art palace, and the New York State building, with brief descriptions. 1700 w. Sci Am Sup—Aug. 4, 1900.

**PANTHEON.**

**Paris.**—The Pantheon, Paris. Historical account of the building of this beautiful edifice, with some reference to its defects. 3000 w. Arch, Lond—Aug. 6, 1897.

**Rome.**—The Paradox of the Pantheon. A. D. F. Hamlin. A study of ancient Roman vault construction, giving the writer's theory and the reasons that led him to adopt it. Ill. Serial. Sch of Mines Quar—July, 1899.

**PANTOGRAPH.**

See also **PLANIMETER.**

A New Pantograph. A. H. Cleaves. A description of the machine with illustrations; also a note from the inventor regarding the principles upon which the machine is based. 800 w. Am Mach—Aug. 4, 1898.

**Electric.**—An Electric Pantograph. F. Jarvis Patten. Illustrates and describes the device and its use. 1400 w. Elec Wld & Elec Engr—Aug. 12, 1899.

Electric Engraving Machine. F. Jarvis Patten. Illustrates and describes a valuable application of the pantograph, which seems destined to make machine engraving in wood · or metal a reliable process at great speed and small cost. 1600 w. Elec Wld & Elec Eng—Aug. 26, 1899.

**Mine Map.**—The Pantograph and Planimeter. Charles E. Bowron. A description of some of the advantages attained by their use in the making of mine maps. 1000 w. Mines & Min—July, 1898.

**PAPER MANUFACTURE.**

See also **PULP MACHINE.**

The Manufacture of Paper. Description of materials and processes employed in paper manufacture. 1500 w. Sci Am—April 4, 1896.

The Recent History of Paper Making. Clayton Beadle. Traces briefly some of the important changes in paper making during the past hundred years. Ill. 7500 w. Jour Soc of Arts—March 18, 1898.

**Cardboard.**—Machines for Testing Paper (Outillage qui Transforment le Papier). An illustrated description of improved machines, principally for cutting, and embossing cardboards, etc. 1500 w. 1 plate. Rev Tech—June 10, 1897.

**Niagara.**—Electricity in Paper Making at Niagara Falls. Orrin E. Dunlap. Illustrated description of the plant of the Cliff Paper Co., of Niagara Falls. 900 w. W Elec—July 25, 1896.

See also **NIAGARA.**

**Exhaust Steam.**—See **STEAM—Exhaust Utilization.**

**PAPER MILL.**

**Wood-Pulp.**—American Wood Cutting and Pulping Mills (Amerikanische Schneidemühle und Entrindungsanlage). F. Stallmaier. A description of the arrangement of mills for grinding wood into paper-pulp as practiced in Canada and the United States. 1000 w. Zeitschr d Ver Deutscher Ing—April 22, 1899.

See also **PULP MACHINE.**

**PAPER TEST.**

**Charlottenburg Laboratory.**—Old Paper (Altes Papier). W. Herzberg. An account of investigations made by the chief of the paper testing department of the Charlottenburg laboratory, showing that paper of former times was inferior to that now made. 8000 w. Mitt a d Kgl Tech Versuchsanstalt—Part II., 1897.

Normal Paper (Normal Papier). Tabulated data and results of tests of paper made by Prof. Herzberg at the Royal Testing Laboratory at Berlin. 10000 w. Mitt aus d Kgl Tech Versuchsanstalt—Part V., 1897.

**PARAFFIN.**

See also **INSULATION.**

**Russian Petroleum.**—Paraffin in Russian Petroleum. A. A. Shukoff and N. S. Pantjucoff. From the "Petroleum Review." A report of investigations made by the writer. 900 w. Auto Jour—Oct., 1900.

**PARIS EXPOSITION.**

See also under specific titles such as **BRIDGE; DYNAMO; ELECTRIC STATION; MINING AND METALLURGY,** etc.

A Trip About Paris and the Exposition (Ein Rundgang durch Paris und die Weltausstellung). H. Koestler and P. Kortz. From an address before the Oest. Ing. und Arch. Verein by H. Koestler, giving a general description of the Exposition, with illustrations. 3500 w. Zeitschr d Oest Ing u Arch Ver—July 6, 1900.

A Visit to the Works of the Exposition of 1900 (Visite aux Chantiers de l'Exposition Universelle de 1900). Max de Nansouty. An account of the visit to various portions of the Exposition grounds by a party of members of the Society of Civil Engineers of France. 5000 w. Mem Soc Ing Civ de France—June, 1899.

Exposition of 1900, Paris (Exposition de 1900). Giving the final plans and arrangement of buildings adopted for the Esplanade des Invalides and the Champ de Mars. 800 w. 1 plate. Génie Civil—March 5, 1898.

Paris Exposition of 1900. Albert Shaw. A general review of the Exposition, with illustrations, making some comparisons with the Chicago Exposition, and others held in Paris. 5000 w. Rev of Revs—June, 1900.

The Exposition Palaces on the Esplanade des Invalides (Exposition de 1900. Les Palais de l'Esplanade des Invalides). Louis David. A well illustrated description of the Palace of Manufactures and the neighboring buildings, and their construction with a steel skeleton. 3000 w. 1 plate. Génie Civil—Aug. 4, 1900.

The French Universal Exposition of 1900. Count Alphonse de Calonne. An account principally of the difficulty in securing a suitable site, followed by a description of the locality decided upon, and the location of the exhibits. 4000 w. Arch Rec—Jan.-March, 1896.

The International Exposition at Paris, 1900 (Die Weltausstellung, Paris, 1900). The first portion of a general description of the grounds and buildings of the Exposition. Serial. Zeitschr d Ver Deutscher Ing—June 10, 1899.

The Paris Exhibition; Its Lessons and Suggestions for Engineers. Abstracts of papers read at meeting of the Manchester (Eng.) Assn. of Engs. 2000 w. Col Guard—Oct. 19, 1900.

The Paris Exposition (Die Pariser Weltausstellung). A general illustrated description, with particulars of some engineering features. Two articles. 4500 w. 1 plate. Stahl und Eisen—April 15, May 1, 1900.

The Paris Exposition (Die Weltausstellung in Paris). An illustrated general description of the Exposition grounds and buildings. Serial. 1 plate. Oest Monatschrift f d Oeff Baudienst—June, 1900.

The Paris Exposition of 1900. Andrew D. Fuller. Illustrated description of some of its general features. 2000 w. Mach, N. Y.—June, 1900.

The Paris Exposition of 1900. A report on the coming international exposition, setting forth its general scope and character, its organization, the financial arrangements, the special features, systems of classification and awards adopted, and regulations affecting foreign exhibitors. 6500 w. U S Cons Repts—Feb., 1897.

The Paris Exposition of 1900. Francis E. Drake. Illustrates the general plan of arrangement and location of the buildings, and describes the features of machinery and electricity. 5500 w. W Elect'n—Dec. 10, 1898.

The Paris Exposition of 1900. Francis S. Drake. Plan and illustrations with description, and general conditions and special features. 5000 w. St Ry Jour—Jan., 1899.

The Paris International Exhibition. A critical review of the exhibition at the opening, with plans. 6500 w. Engng—April 20, 1900.

**Architecture.**—Architecture at the Paris Exposition of 1900 (Die Architektur auf der Pariser Weltausstellung des Jahres 1900). Albert Hofmann. A general descriptive and critical article, with illustrations and plans. Serial. 1 plate. Deutsche Bauzeitung—May 26, 1900.

**Art Palace.**—Progress of Work on the Champs-Elysées Palace of the Exposition of 1900 (Le Grand Palais. Chantiers de Construction). A. da Cunha. Illustrated description of methods of work on this building. 2000 w. La Nature—Dec. 3, 1898.

The Exposition of 1900 (L'Exposition de 1900). Plans and elevation of the new palace of the Champs-Elysées. 3500 w. Two articles. Le Génie Moderne—March 15 and April 1, 1897.

The New Palaces of the Champs-Elysées (Les Nouveaux Palais des Champs-Elysées). Plate and brief description of the new buildings being erected on the site of the former Palace of the Champs-Elysées. 500 w. and plate. La Rev Tech—March 10, 1897.

The Palaces on the Champs-Elysées (Les Palais des Champs-Elysées). E. Rouyer. Describing the progress of the construction of the large and small palaces of fine arts for the Paris Exposition. 2 articles. 6000 w. 2 plates. Génie Civil—Sept. 2, 9, 1899.

**Austrian Building.**—The Austrian Government Building at the Paris Exposition (Das Oesterreichische Repräsentationshaus in der Weltausstellung, Paris, 1900). A description of the building, with plates showing the external and internal construction. 1200 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1899.

The Austrian Government Building at the Paris Exposition of 1900 (Das Oesterreichische Reichhaus auf der Weltausstellung, Paris, 1900). With elevation, plans and section of the building from the drawings of the architect, Herr L. Baumann. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 6, 1899.

See also **Foreign Nations; Palaces.**

**Building Construction.**—Exposition of 1900. Civil Engineering and Transportation Buildings (Exposition de 1900. Palais du Génie Civil et de Moyens de Transport). R. Weil. Especially devoted to the methods of raising the frames and erecting the structural work of these important portions of the Exposition buildings. 3500 w. 1 plate. Génie Civil—March 18, 1899.

The Machinery Hall and the Building for Chemical Industries (Palais de la Mécanique et Palais des Industries Chimiques). René Weil. Devoted especially to a description of the structural framework and the methods of erection of these important buildings of the Paris Exposition. Two articles. 2 plates. 4500 w. Génie Civil—Dec. 30, 1899, Jan. 6, 1900.

See also **Construction; Metal Construction.**

**Buildings.**—Notes on the Palaces of the Paris Exposition, 1900. Charles Lucas. Exposition of works in course of completion, with illustrations and brief discussion. Both in French and English. 7500 w. Jour Roy Inst of Brit Archts—Feb. 24, 1900.

The Buildings of the Paris Exposition of 1900. Jacques Boyer. The first paper describes the buildings on the Champs-Elysées and the Champ de Mars, giving many illustrations showing the methods of erecting the structural framings. 3000 w. Eng Mag—June, 1899.

The Buildings of the Paris Exposition. Jacques Boyer. Prof. Boyer's second paper describes with many handsome illustrations the structures now being erected on the banks of the Seine and on the Esplanade des Invalides. 3000 w. Eng Mag—July, 1899.

**Commercial Effects.**—The Paris Exhibition, 1900. Prospects and probable effects upon commerce editorially considered. 1000 w. Mach, Lond—April 15, 1896.

**Construction.**—A Visit to the Works of the Exposition (Une Visite aux Chantiers de l'Exposition). Describing the present condition of the work upon the Paris Exposition of 1900. 1800 w. La Rev Tech—Aug. 25, 1897.

Review of the Works of the Exposition (Revue des Travaux de l'Exposition). An excellent illustrated description of the present condition of the work upon the buildings for the Exposition of 1900, devoted to the buildings in the Champs-Elysées. Two articles. 4000 w. Génie Civil—May 28, June 4, 1898.

Review of the Works of the Exposition of 1900 (Exposition de 1900, Revue des Travaux). Describing and illustrating the demolition of the old Palais de l'Industrie and the construction of the foundations of the new buildings in the Champs-Elysées. 2000 w. Génie Civil—Aug. 14, 1897.

The Exposition of 1900 (Exposition de 1900). A review of the present condition of the work on the Champs-Elysées and the Champ-de-Mars. 2000 w. Le Génie Moderne—Nov. 15, 1897.

The Paris Exhibition of 1900. An account of preparations being made by the removal of buildings and the contracting for the new structures. 2000 w. Engng—Dec. 3, 1897.

The Paris Exhibition of 1900. A statement of some of the delays and difficulties attending the preparation. 3700 w. Engng—Feb. 3, 1899.

The Paris Exhibition of 1900. General description of plan, the buildings and means of conveying material, the Alexander Bridge, etc. Ill. Serial. Engr, Lond—Feb. 17, 1899.

The Paris Exposition of 1900, and Its Leading Features. Data relating to the progress thus far in preparation for this great exposition, with illustrations and general plan. 2300 w. Elec Eng, N. Y.—Oct. 27, 1898.

The Paris International Exhibition of 1900. Notes of the preparations, the foundations of the buildings, especially the work for the new bridge over the Seine—the Pont Alexander III. Ill. 2200 w. Engng—Aug. 20, 1897.

The Preliminary Work of the Exposition (Les Premiers Travaux de l'Exposition). Giving illustrations of the present condition of the work on the Champs-Elysées and notes concerning the general progress of the various portions of the Paris Exposition of 1900. 3000 w. Génie Civil—June 5, 1897.

The Present Condition of the Work at the Champ-de-Mars (Etat Actuel des Travaux du Champ-de-Mars). A description of the progress of the work upon the main buildings of the Paris Exposition of 1900, with plan of grounds. 1200 w. Génie Civil—Jan. 21, 1899.

The Present Condition of Preliminaries for the Paris Exposition of 1900 (Ueber den Heutigen Stand der Vorarbeiten für die Weltausstellung in Paris, 1900). A discussion by Prof. Exner before the Austrian Society of Engineers of the best method of making an exhibit under the special classification adopted for this Exposition. 5000 w. Zeitscher d Oesterr Ing u Arch Ver—Sept. 10, 1897.

The Progress of the Works on the Champ-de-Mars (Etat d'Avancement des Travaus du Champ-de-Mars). Ch. Dantin. With numerous views of the partly completed buildings, including the chimney of the great power house. 2500 w. Génie Civil—Sept. 16, 1899.

The Works on the Esplanade des Invalides, the Seine and the Trocadero (Etat d'Avancement des Travaux de l'Esplanade des Invalides, des Berges de la Seine et du Trocadero). Ch. Dantin. Reviewing the present condition of the numerous buildings, with many illustrations. 2500 w. 1 plate. Génie Civil—Sept. 23, 1899.

The Universal Exposition of 1900 (Exposition Universelle de 1900). Giving an account of the present state of the works, and especially of the false works for the erection of the superstructure of the Alexander III. bridge without obstructing travel on the Seine. 3000 w. La Rev Tech—Oct. 10, 1898.

The Universal Exposition of 1900 (Exposition Universelle de 1900). A review of the present status of the work, with illustrations of some of the models of the buildings, and a plan of the area selected for the colonial exhibit. 2500 w. La Rev Tech—April 25, 1898.

Universal Exposition of 1900 (Exposition Universelle de 1900). A review of the present condition of affairs, including the various systems proposed for the transportation of visitors within the Exposition grounds. 4000 w. La Rev Tech—June 25, 1898.

**Creusot Pavilion.**—See **Schneider Pavilion.**

**Electrical and Mechanical.**—The Paris Exposition of 1900. C. L. Durand. An account of the opening ceremonies and a sketch of the main features of the electrical and mechanical sections. Ill. 8500 w. Elec Rev, N. Y.—May 2, 1900.

**Electrical Exhibits.**—See also **DYNAMO; ELECTRICAL EXHIBITION; ELECTRICITY BUILDING; ELECTRIC STATION.**

**Entrance.**—The Monumental Entrance at the Place de la Concorde (Entrée Monumentale de la Place de la Concorde). Alfred Boudon. A description of the main entrance to the Paris Exposition, with a plate showing details of construction, and numerous views, giving the present condition of the work. 2000 w. 1 plate. Génie Civil—Dec. 16, 1899.

The Monumental Entrance at the Place de la Concorde (L'Entrée Monumentale de la Place de la Concorde). G. Leugny. An illustrated account, with details of construction, of the main entrance to the Exposition. 2400 w. Rev Tech—March 25, 1900.

**Foreign Nations' Palaces.**—The Palaces of Foreign Nations at the Paris Exposition. Illustrations of a number of these buildings. 900 w. Ir Age—Dec. 7, 1899.

See also **Austrian Building.**

**History of Site.**—The Sites of the Exposition of 1900 (Les Emplacements de l'Exposition de 1900). An historical account of the portions of Paris which are to be used for the Exposition, with plans at various periods from 1609. An interesting account of a part of old Paris. Serial. Le Génie Moderne—Nov. 15, 1897.

**Mechanical Achievement.**—The Paris Exposition as a Mechanical Achievement. Edmund Mitchell. A review of the system, organization and plan of this stupendous undertaking, and a survey of the general result. 3600 w. Eng Mag—June, 1900.

**Metal Construction.**—Metal Work Details of the Paris Exposition Buildings, Paris. Illustrated account of the general features of the grounds and the steel framing of the Palace of Civil Engineering and Transportation; explains the erection methods. Serial. Eng Rec—March 17, 1900.

See also **Building Construction.**

**Mines and Metallurgy Building.**—The Building of Mines and Metallurgy (Palais des Mines et de la Métallurgie). René Weil. A description of the building now under construction for the Paris Exposition, with plans and views of the present state of the work. The computation of the stresses on the frames is given. 3500 w. 1 plate. Génie Civil—July 1, 1899.

**Regulations.**—The Paris Exhibition of 1900. Editorial on the conditions, privileges, and restrictions that will attend the admission of exhibits. 2500 w. Engng—April 15, 1898.

**Schneider Pavilion.**—Construction of the Metallic Dome of the Schneider Pavilion at the Paris Exposition (Exposition de 1900. Pavillion de MM. Schneider & Cie. Construction de la Coupale Metallique). Ch. Dantin. A very well illustrated account of the construction of this building, in which movable staging and travelling cranes were used. 2 plates. 3500 w. Génie Civil—June 30, 1900.

The Schneider Pavilion at Paris. An illustrated description showing the numerous conditions that had to be fulfilled and the way the work was carried out. 3000 w. Engng—Aug. 24, 1900.

**Swiss Representation.**—The Universal Exposition of 1900 (Exposition Universelle de 1900). A review of the present state of exposition matters, with especial reference to the preparations being made by Switzerland for a full representation. 4000 w. La Rev Tech—Sept. 10, 1898.

**Textile Building.**—The Textile Building of the Exposition of 1900 (Palais des Fils Tissus et Vêtements au Champ-de-Mars). L. Bourdain. A general description of this important structure of the Exposition, with plate of details, and scaffolds for erection. 4000 w. 1 plate. Génie Civil—May 13, 1899.

**Tour of the World.**—The Tour of the World at the Exposition of 1900 (Le Tour du Monde à l'Exposition de 1900). An illustrated description of the monster globe which it is proposed to construct to outdo the Eiffel Tower. 2500 w. La Rev Tech—Nov. 10, 1896.

**Transportation.**—See **Construction; TRANSPORTATION—Paris Exposition.**

**United States Machinery Building.**—The U. S. Machinery Building at the Paris Exposition. Illustrated description of the building designed to furnish a true idea of an American shop. 1100 w. Eng Rec—Dec. 16, 1899.

**United States Representation.**—American Exhibits at the Paris Exposition. A statement of the importance of a good display from the United States, and an explanation of the arrangement of exhibits and of the jury system. 1500 w. Eng Rec—April 15, 1899.

American Exhibits at the Paris Exposition of 1900. Part first gives an account of the Department of Electricity and Transportation, by James S. Anthony; and the Transportation Exhibits, by George S. Wilkins. Ill. Serial. St Ry Jour—Jan. 6, 1900.

American Representation at the Paris Exposition of 1900. Ferdinand W. Peck. Address delivered before the Nat. Assn. of Mfrs. at Cincinnati. On the commercial benefit and patriotic duty involved. 2000 w. Elec Eng, N. Y.—Feb. 9, 1899.

The United States at the Paris Exposition in 1900. Ferdinand W. Peck. The importance to American trade of a fine exhibit and the value of this opportunity. 3500 w. N Am Rev—Jan., 1899.

The United States Sections at the Paris Exposition (Exposition Universelle de 1900. La Participation des Etats-Unis). Aym. de Marolles. A general account of the space occupied by, and the officials of the United States. 2400 w. Rev Tech—April 25, 1900.

## PARK.

See **BOULEVARD; LANDSCAPE ARCHITECTURE; MUNICIPAL IMPROVEMENT; ROAD.**

Essential Features of a Park System. Abstract of a report suggesting plans for a park system, in which essential features are outlined by a distinguished firm of landscape architects. 2500 w. Pav & Mun Eng—March, 1896.

Park Lands and Their Boundaries. Editorial suggested by an article by Charles Eliot, in the "New England Magazine," giving a sketch of the park system of Boston. The need of public parks in our large cities. 1800 w. Gar & For—Oct. 21, 1896.

Park Making. Editorial suggestions and criticisms. 1000 w. Gar & For—Dec. 15, 1897.

Parks and Roads. J. F. Foster. Discusses the requirements of an attractive park, the construction, preparation of the ground, designing of necessary structures, construction of walks and roads, etc. 8000 w. Jour of W Soc of Engs—Oct., 1896.

The Need of More Public Pleasure Grounds. Editorial urging that some attention be given to this need of the people, both in city and country. 1500 w. Gar & For—Jan. 27, 1897.

**Boston.**—A River Parkway. Editorial comment on report recently issued by the Metropolitan Park Commission, and review of the landscape architects, discussing projected improvements in the lower Charles River, in the limits of Greater Boston. 1300 w. Gar & For—Sept. 23, 1896.

How Boston Has Systematized Its Parks. Sylvester Baxter. A description of the system which comprises a series of public spaces, related to each other, and each possessing a marked individuality. Highest praise is given the work. 2200 w. Century Mag—Oct., 1897.

The Metropolitan Reservations of Boston. Review of the report of Charles Eliot on the treatment of vegetation for scenic effects. 1000 w. Eng Rec—July 16, 1898.

The Park Systems of Boston and Vicinity. A statement of the radically different plans followed by the city and state commissions. 900 w. Eng Rec—Dec. 2, 1899.

The Park System of Greater Boston. Editorial on information from the lately issued report of the Metropolitan Park Commission. 1100 w. Gar & For—June 23, 1897.

**Boulevards.**—Parks and Boulevards. A. C. Schrader. Suggestions for their construction and maintenance. General discussion. 12400 w. Jour W Soc of Eng—June, 1900.

See also **BOULEVARD; SPEEDWAY.**

**Chicago, Jackson.**—The Revised Plan for Jackson Park, Chicago. A reduced sketch of plan prepared by Messrs. Olmsted, Olmsted & Eliot; also plan for the World's Fair site, which covered the same area. The sketch is explained and the intended treatment described. 1500 w. Gar & For—May 20, 1896.

**Chicago Lake Front.**—Chicago's Lake Front Parks. An account of the improvements being made, at great expense, along the shore of Lake Michigan. 2000 w. Harper's Wk—April 3, 1897.

**County.**—County Parks. Editorial giving reasons why such parks are desirable, as set forth by Prof. T. H. Macbride in a bulletin from the Natural Hist. Laboratories of the State Univ. of Iowa. 1200 w. Gar & For—June 3, 1896.

**Dangers.**—New Dangers to Public Parks. Editorial discussion of the various dangers which threaten parks. 1500 w. Gar & For—Nov. 10, 1897.

**Maintenance.**—One Way to Reduce the Cost of Park Maintenance. Urging the making of parks less pretentious and constructing them in the outset in the most thorough manner, and in such a way that they may be cared for more cheaply. Editorial. 1000 w. Gar & For—July 14, 1897.

**Minneapolis.**—The Park Systems of Minneapolis and St. Paul, Minnesota. Mary C. Robbins. An account of the scheme outlined by the landscape architect, W. S. Cleveland, of the important beginning made at Minneapolis, and the neglect of St. Paul. 1800 w. Gar & For—April 28, 1897.

**Orchard Knob, Tenn.**—Park Work at the Orchard Knob Battle Field. Describes the methods followed in building streets and gutters, ornamental walls, surface drains, etc. 1500 w. Eng Rec—June 24, 1899.

**Playgrounds.**—Municipal Playgrounds. Editorial comment on the movement of the population towards the city in both Europe and America, and the efforts being made to secure open spaces in the congested districts for the amusement and recreation of the children. 1100 w. Gar & For—Dec. 16, 1896.

**Playgrounds, New York.**—Small Parks and Public School Playgrounds. Jacob A. Riis. Discusses the movement to give parks and playgrounds to New York City, giving map of existing and proposed parks. 2200 w. Harper's Wk—Sept. 11, 1897.

**Reservoir.**—See **RESERVOIR—Park.**

**Roads.**—Parks and Park Roads. H. C. Alexander. The most important salient points are discussed, confined mostly to Lincoln Park, Chicago. Followed by discussion. 6000 w. Jour of W Soc of Engs—Oct., 1896.

See also **BOULEVARD; ROAD; SPEEDWAY.**

**St. Paul.**—See **Minneapolis.**

**Vienna Suburb.**—See **RESIDENCE PARK.**

**Zoological, New York.**—New York Zoological Park. William T. Hornaday. Brief account, with illustrations, of some of the noted zoological gardens of Europe, with statement of New York's prospect of a fine zoological park, and some particulars relating to the proposed plan. 2700 w. Harper's Wk—March 20, 1897.

**PARK BUILDING.**

**New York.**—Corlears Hook Park Overlook. Illustrates and describes a building 149 by 34 ft. for recreation and toilet purposes in a New York park. 1200 w. Eng Rec—Feb. 12, 1898.

**PARLIAMENT BUILDINGS.**

See also **PUBLIC BUILDINGS.**

**Budapest.**—The New Parliament Buildings at Budapest (Das Neue Parlamentsgebäude in Budapest). A fully illustrated account of the rather ornate structure recently completed at Budapest for the Hungarian Parliament. 3 articles. 3000 w. Schweizer Bauzeit—Jan. 7, 14, 21, 1899.

The Parliament Buildings in Budapest, Compared with other Parliament Buildings (Das Parlamentsgebäude in Budapest in Parallele mit anderen Parlamentsbauten). August Prokop. A valuable comparative discussion of many of the legislative buildings of Europe with ground plans and photographic views. Two articles. 5000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—April 1, 8, 1896.

**PATENT.**

See also **INVENTION;** and under specific titles.

Are Patents Worth Anything? C. D. Frost. A reply in part to an article in "Electrical Engineering" (Chicago), and giving the writer's views on the valuelessness of letters patent. 1400 w. Ind Rub Wld—Feb. 10, 1896.

Patents. James W. See. Deals with questions on which inventive mechanics and manufacturers should be posted. 10300 w. Am Soc of Mech Engs, No. 779—June, 1898.

The Protection of an Invention. W. Clyde Jones. The object of the paper is to present some of the facts relating to the U. S. patent system, in a manner to be of service as working knowledge to electrical engineers and others engaged in inventive pursuits. 4500 w. Elec Engng—Feb., 1896.

The Protection of Industrial Property. J. F. Iselin. Considers, from an international point of view, the protection of patents, trade marks, designs, and other rights of the same kind. Gives history of protection of these rights in England. Also discussion. 5400 w. Jour Soc of Arts—Feb. 18, 1898.

**Austrian Law.**—The Important Features of the New Austrian Patent Law (Die Wichtigsten Bestimmungen des neuen Oesterr. Patent-Gesetzes). An abstract of the salient features of the law of January 11, 1897, referring both to patents and trade marks. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 29, 1898.

**Bechman vs. Wood.**—An Important Patent Decision. Arthur F. Kinnan. A criticism on a decision rendered by the United States Court of Appeals for the Dist. of Columbia, in the case of Bechman vs. Wood. 2800 w. Elec Wld & Engr—Jan. 20, 1900.

**British Law.**—Patent Laws and the Trading Community. Editorial discussion of a debate at the Article Club, London, especially considering the views of Mr. Fletcher Moulton. 4000 w. Engng—Dec. 16, 1898.

Patent Law Reform. A criticism of present English patent law and a demand for a reform that shall in some measure approximate in liberality, the United States patent laws. 1000 w. Mach, Lond—April 15, 1896.

**British Office.**—The Work of the Patent Office. A review of the report of the Comptroller of Patents (English), suggesting some improvements in the existing practice. 1500 w. Jour Gas Lgt—Aug. 30, 1898.

**Coagulant.**—See **FILTRATION—Coagulant Patent.**

**German.**—Decision of the Imperial Court on the Invalidity of Patents on Inventions Which Have Been the Subject of an Earlier Patent (Entscheidung des Reichsgerichts über Nichtigkeit von Patenten auf Grund des Sec. 10 Abs. 2 des Patentgesetzes). Full text of the decision, declaring void patents on inventions which have been covered by earlier patents, even though the earlier patent has expired. 4500 w. Glaser's Annalen—April 1, 1900.

Protection to Mechanical Industries (Maschinen Fabrikanten und Schutzvorrichtungen). K. Specht. Showing the insufficiency of the existing German patent laws, especially in view of the privileges of the government for the free use of inventions. 2500 w. Zeitschr d Ver Deutscher Ing—June 19, 1897.

The German Patent Law and the German Patent No. 80974 (Das Deutsche Patentgesetz und das Deutsche Reichspatent Nr. 80974). Hr. Lüders. A discussion of the suit for the annulment of the Schlick patent for balancing steam engines, including a review of the policy of the German courts in such cases. Two articles. 18000 w. Zeitschr d Ver Deutscher Ing—Aug. 19, 26, 1899.

The German Patent Law, and the Proper Remedy of the Engineer (Das Deutsche Patentgesetz und die Wissenschaftlichen Hülfsmittel des Ingenieures). Prof. A. Riedler. A discussion of the scope of the German patent law, with an elaborate examination of the recent decision in connection with the Schlick system of balancing engines. 9000 w. Zeitschr d Ver Deutscher Ing—Nov. 26, 1898.

**German Statistics.**—Comparative Statistics of the German Patent Office for 1899 (Vergleichende Statistik des Kaiserlichen Patentamtes für das Jahr, 1899). Tables giving general statistics, with some details of the mining and metallurgical classes. 700 w. Stahl und Eisen—May 1, 1900.

**Infringement.**—Functional Equivalents versus Mechanical Equivalents. Commenting upon the recent air-brake decision the editor says that it is an application of the idea that in determining questions of patent infringement, functional equivalents deserve prior consideration over mechanical equivalents. 1200 w. R R Car Jour—Dec., 1895.

**International Law.**—Some Comparative Points of International Patent Law. J. Sinclair Fairfax. A review of the leading international features of patent law, with especial reference to the practice in England and America. 3500 w. Eng Mag—Sept., 1898.

**Invention.**—See **INVENTION—Patent Law.**

**Iron Mixer.**—See **IRON MANUFACTURE—Mixer Patent.**

**Japan.**—Japan's Patent Requirements. Information concerning the obtaining of patents in Japan furnished by Jokichi Takamine. Illustration of patent office. 1800 w. Ry Rev—July 10, 1897.

**Process.**—The Extension of a Process Patent to Include the Product made Elsewhere (Das für ein Verfahren Ertheilte Patent erstreckt seine Wirkung auf die durch das Verfahren unmittlebar Hergestellten Erzeugnisse). A very full discussion of the question under the German and Austrian patent law. Two articles. 9000 w. Glaser's Annalen—Aug. 1, 15, 1897.

**Rights.**—The Nature and History of Patent Rights. E. L. Thurston. A consideration of those rights respecting an invention which are created by the grant of a patent. Also discusses changes made in the patent laws of the United States, with general discussion by members. 5800 w. Jour Assn of Engng Socs—Dec., 1898.

**Russian.**—The New Russian Patent Law. Statement of the principal provisions of the law. 800 w. Mach, Lond—Sept. 15, 1896.

**Trade Mark.**—See **TRADE MARK.**

**United States.**—Reforms in the Patent Laws. From report issued by a committee of the National Assn. of Mfrs. of the U. S. Part first considers annuities on U. S. patents; and requiring working and annuities from foreigners, with opinions from letters in relation to this subject. Serial. Ir Age—Jan. 13, 1898.

**U. S. and Foreign.**—Prior Foreign and Later United States Application for Patent on the Same Invention. D. Walter Brown. Discussing the amendments to the patent statutes that went into effect Jan. 1, 1898, in the United States. 700 w. Am Mach—Feb. 17, 1898.

**United States Development.**—The Patent System as a Factor in National Development. William C. Dodge. Showing how invention and production have increased under the United States patent laws. 4200 w. Eng Mag—July, 1897.

**United States Legislation.**—Amendments to the Patent Statutes. The old statutes and the new are given with editorial comment. 3500 w. Sci Am—March 20, 1897.

Proposed Changes in the Patent Laws. Editorial. An able and just criticism of some of the proposed changes in the United States patent laws now under consideration by the House Committee on Patents. Lurking dangers are pointed out, particularly the clause of the bill providing for the termination of a patent by act of Congress. 1800 w. Ir Age—Feb. 6, 1896.

Proposed Patent Legislation. Editorial review of bill No. 3014, in the House of Representatives comprising amendments of the present U. S. patent laws. 1500 w. Sci Am—April 18, 1896.

**U. S. Office.**—The Need of a New Building for the United States Patent Office. George L. Morton. Reviews the history of this department, and shows the urgent need of a new fire-proof building. 3500 w. R R Gaz—April 13, 1900.

The United States Patent Office. An editorial criticism of this department of the United States government. 1200 w. Engng—Sept. 30, 1898.

## PATTERN.

See also **CASTING; FOUNDRY; MOLDING; PATTERN MAKING; PATTERN SHOP.**

Patterns and Castings as Witnesses. John M. Richardson. Calls attention of young patternmakers to marks on castings and their causes. 1600 w. Am Mach—Dec. 15, 1898.

**Brass Casting.**—A Pattern for a Difficult Brass Casting. Charles H. Allmond. Describes the casting of a very thin receiver pipe for a triple-expension engine. 800 w. Am Mach—Feb. 18, 1897.

**Cam.**—See **CAM—Cylinder.**

**Car Wheel.**—See **CAR WHEEL—Pattern.**

**Crane Center.**—A Pattern for a Crane Center. Joseph Horner. General remarks on heavy castings in crane work, with detailed description of the pattern work involved. Ill. 2500 w. Mech Wld—April 15, 1898.

**Crane Cheeks.**—Patterns for Crane Cheeks. Joseph Horner. Illustrates and describes methods of constructing. 1800 w. Am Mach—March 16, 1899.

**Gears.**—An Odd Gear Pattern. John M. Richardson. Describes a pattern for a gear, made by the writer, used on a special machine for wrapping paper about oranges. 400 w. Am Mach—Oct. 20, 1898.

**Gusset Sheet, Locomotive Jacket.**—Pattern for Gusset Sheet for Locomotive Jacket. Answer to correspondent giving full explanation of method. 1000 w. Met Work—May 2, 1896.

**Index.**—A System of Pattern Keeping. G. H. Hall. Describes a system applicable to small shops. 1000 w. Mach, N. Y.—Oct., 1899.

Storing and Indexing Patterns. Oscar E. Perrigo. Describes the system in use by the writer, giving many suggestions for the storing of patterns of various sizes, the materials to be used, etc. 900 w. Am Mach—April 14, 1898.

**Molder.**—Pattern Work that Helps the Molder. John M. Richardson. Calls attention to points in the making and use of patterns which cause annoyance to the molder. 1500 w. Am Mach—Sept. 29, 1898.

**Piston.**—A Piston Pattern. G. H. Willard. Describes and illustrates a quick and cheap pattern and a successful way of molding. 400 w. Am Mach—Dec. 16, 1897.

**Propeller.**—Screw-Propeller Pattern. I. McKim Chase. Illustrates and describes a method of making a pattern for a screw propeller with separable blades. 2000 w. Mach, N. Y.—Aug., 1898.

**Turned.**—Turned Foundry Patterns. Herbert Aughtie. Practical hints upon the making of this kind of patterns and the lathe-work involved in them. 1000 w. Prac Eng—Aug. 21, 1896.

## PATTERN MAKING.

See also **PATTERN; PATTERN SHOP.**

A Few of the Snares of Pattern Making. John M. Richardson. A plain practical discussion. Hints towards the avoidance of mistakes in pattern shop and foundry. 1800 w. Mach—April, 1896.

Pattern Making—Using Loose Pieces Instead of a Core. John M. Richardson. Illustrated description, showing how loose pieces can be used to advantage. 600 w. Am Mach—March 22, 1900.

Practical Pattern Making. I. McKim Chase. Part first refers to the materials that have been used in pattern making, and the various methods of molding. Serial. Mach, N. Y.—June, 1897.

**Gasoline Motors.**—Pattern Making for Gasoline Motors. W. O. Anthony. The first of a series on pattern making for small gas engines intending to fully cover the subject. Ill. Serial. Horseless Age—July 18, 1900.

**Pine Selecting.**—Selecting Pine for Pattern Making. John M. Richardson. Directions for detecting undesirable qualities. 800 w. Am Mach—Aug. 19, 1897.

## PATTERN SHOP.

See also **PATTERN; PATTERN MAKING.**

**Cost Keeping.**—Pattern Shop Costs. A. Sorge, Jr. A method of ascertaining cost of pattern shop work, classified and in a readily comparable form, and one which also indicates the efficiency of the department. The method, though restricted in this article to wood patterns, can easily be extended to metal pattern work. 6000 w. Ir Age—June 18, 1896.

See also **COST KEEPING.**

**Supplies.**—Pattern Shop Supplies. John M. Richardson. A series of practical hints and suggestions, relating to supplies and appliances for pattern shop use with information gained from experience as well as from other sources. Serial. Mach—Feb., 1896.

**PAVEMENT.**

See also **ASPHALT PAVEMENT; BRICK PAVEMENT; MUNICIPAL ENGINEERING; MUNICIPAL IMPROVEMENT; PUBLIC WORKS; ROAD; SIDEWALK; STREET.**

Economics of Street Paving. S. Whinery. An outline of things to be considered in deciding upon a street pavement, with the investigations that should be made. 7300 w. Trans Assn of Civ Engs of Cornell Univ—1900.

Modern City Roadways. Nelson P. Lewis. Illustrates and discusses the different kinds of paving in general use and the kinds most favored in various cities. 3500 w. Ap Pop Sci M—March, 1900.

What Pavements Do for a City. J. W. Howard. Extract from an address before the Board of Trade of Lowell, Mass. Notes some of the benefits of good pavements and their importance. 1800 w. Munic Engng—June, 1900.

**America.**—American Street Paving. Report of the committee of the American Society of Municipal Improvements, with letters and editorial. 5000 w. Eng Rec—Dec. 11, 1897.

Kinds of Pavement in American Cities. Tabulated statement of the kinds and extent of each kind of pavement used in some sixty-five cities in the United States and Canada. 200 w. Pav & Mun Engng—June, 1896.

**Artificial Stone.**—Artificial Stone Pavements. Robert Grimshaw. Describing the present state of the art in Europe. 1000 w. Munic Engng—Oct., 1897.

**Asphalt.**—See **ASPHALT PAVEMENT.**

**Asphalt and Cement.**—See **STREET—Grades and Cross-Sections.**

**Asphalt-Granite.**—See **Granite-Asphalt.**

**Asphalt-Wood.**—See **Wood-Asphalt.**

**Assessments.**—A Decision as to Front-Foot Assessments. A review of a decision by the Wisconsin Supreme Court as to the legal forms which must be followed to make such assessments binding. 900 w. Eng Rec—May 28, 1898.

**Australia.**—The Pavements of an Australian City. F. A. Campbell. Illustrated general description. 1000 w. Pav & Mun Engng—May, 1896.

**Automobiles.**—See **AUTOMOBILE—Pavement.**

**Bacteria.**—Bacterial Studies of the Healthfulness of Street Pavements of Lafayette, Ind. Daniel B. Luten and Severance Burrage. An illustrated account of investigations to determine the relative number of bacteria liable to be inhaled by breathing the air over the various pavements. 2500 w. Eng News—Oct. 11, 1900.

**Bituminous Rock.**—Bituminous Rock Paving in San Francisco, California. Information concerning this material and its use. It is being used to pave Market St., the principal thoroughfare of San Francisco. 1500 w. Eng News—Dec. 22, 1898.

**Brick.**—See **BRICK PAVEMENT.**

**Brooklyn.**—From Cobblestones to Asphalt and Brick. N. P. Lewis. Specially condensed from official report to the chief engineer of Brooklyn. 2800 w. Pav & Mun Engng—April, 1896.

**Cathedral, Siena.**—The Pavement of the Cathedral of Siena. Illustrated description and historical account of this unique pavement. 900 w. Sci Am—Feb. 11, 1899.

**Cement.**—How to Lay "Cement" Street Paving. Plain practical directions for paving, with illustrations of kinds of work, description and cuts of tools. 1700 w. Ill Car & Build—July 10, 1896.

See also **SIDEWALK—Cement.**

**Cement Grout.**—Cement Grout for Pavements. Report of tests at Albany to determine best way of making grout. 800 w. Eng Rec—May 28, 1898.

**Concrete.**—Specifications for Concrete Sidewalks and Driveways. Specifications employed in laying walks around the grounds of the Univ. of Kansas. Abstract. 1000 w. Eng News—Nov. 9, 1899.

See also **SIDEWALK.**

**Construction.**—Pavement Construction and City Growth. Stevenson Towle. Discussing the various types of pavement in their relations to health, wealth and comfort. 4900 w. Eng Mag—Oct., 1896.

**Creosoted Wood.**—See **Wood Creosoted.**

**Curbs.**—The Proper Curbing of Streets. Horace Andrews. Abstract of paper presented at meeting of Am. Soc. of Munic. Imp. Mainly a description of experience at Albany, N. Y. 1200 w. Eng Rec—Oct. 29, 1898.

**Denver, Colo.**—See **SEWER—Denver, Colo.**

**European Cities.**—Pavements, Confined Rivers and the Water Supply of Ancient Rome. Francis W. Blackford. A report of the pavements of Paris, London, Rome and other foreign cities; the river walls within the cities; and a study of the ancient water supply of Rome. Ill. 4000 w. Jour Assn of Engng Socs—Dec., 1896.

Pavements, Confined Rivers and the Water Supply of Ancient Rome. Francis W. Blackford. An account of the water supply of ancient Rome is given; also some details and technicalities of the pavements of Paris, London, Rome and other foreign cities and the well-built river walls. Ill. 4000 w. Jour Assn of Engng Socs—Dec., 1896.

**German.**—Street and Road Paving in Germany. Robert Grimshaw. General description. 1700 w. Munic Engng—Sept., 1896.

**German "Hit and Miss."**—German "Hit and Miss" Paving. Robert Grimshaw. Illustrated description of this form of pavement. 800 w. Munic Engng—Feb., 1897.

**Granite.**—Construction of Granite Block Pavements. Josiah A. Briggs. Read before the Am. Soc. of Munic. Imp. Describes the standard granite-block pavement in use in city streets, giving the materials used, and details and methods of construction. 3000 w. Munic Engng—Sept., 1900.

**Granite-Asphalt.**—Granite-Asphalt (Le Granite-Asphalte). A combination of asphalt and crushed granite, furnishing a paving having all the advantages of asphalt, without its slipperiness. 1200 w. Génie Moderne—Feb. 15, 1897.

**Granite, Berlin.**—Granite Paving in Berlin. Robert Grimshaw. Illustrated description, as per instructions of the city inspector. 2000 w. Munic Engng—Oct., 1896.

**Hard Wood.**—See **Wood, Australia.**

**Indianapolis.**—Notes on Indianapolis Pavements. Gives the experience with brick, wood and asphalt pavements. 1000 w. Eng Rec—Aug. 5, 1899.

See also **Wood, Indianapolis.**

**Iron Slag.**—American Iron-Slag Paving. George W. Hayes. An account of the use of this material on the roads around Lebanon, its wearing qualities, manner of laying, etc. 800 w. Munic Engng—June, 1897.

**Lafayette, Ind.**—See **Bacteria; Smoothness.**

**Life.**—The Life of Pavements. George W. Tillson. Read before the Am. Soc. of Munic. Imp. A study of the conditions affecting the life of city pavements. 5000 w. Munic Engng—Nov., 1899.

The Life of Pavements. Review of a paper by G. W. Tillson on the relative destructive action of various agents, and the life to be expected of different paving material. 2600 w. Eng Rec—Oct. 21, 1899.

**Macadam.**—See **Tar-Macadam; Wood, Rangoon; ROAD; ROAD CONSTRUCTION.**

**Maintenance.**—The Importance and Economy of Pavement Maintenance. S. Whinery. Showing that municipal pavements should be protected properly and repaired promptly under the supervision of responsible contractors. 3800 w. Eng Mag—Nov., 1896.

See also **Wood, Maintenance.**

**Materials.**—About Paving Materials. A consideration of the wearing qualities and general excellence of various kinds of materials, concluding that the experimental stage is not yet passed. 1000 w. Can Arch & Build—Dec., 1895.

A Study of Paving Materials. An analysis of the value of different pavements, by G. W. Tillson, made by representing an ideal pavement as having 100 per cent. of value and ascribing to each property of such a pavement a certain percentage of influence. The relative merits of each actual paving material expressed in the same manner, enable its advantages for any given street to be discussed. 3500 w. Eng Rec—Nov. 26, 1898.

A Study of Paving Materials. Edward P. North. Reviews the advantages of different materials. 700 w. Eng Rec—Dec. 3, 1898.

**Medina Block.**—The Construction of Standard Medina

Block Stone Pavements. E. A. Fisher. Paper presented to the Milwaukee convention of the American Society of Municipal Improvements, giving a detailed description of methods of construction used in Rochester, N. Y. 3000 w. Eng Rec—Sept. 15, 1900.

**Michigan.**—Street Paving in Michigan. A summary of the work done in 1898, with costs and methods. 1200 w. Eng Rec—Dec. 2, 1899.

**New Orleans.**—History and Selection of Street Paving in the City of New Orleans. A. C. Bell. Gives Geo. W. Cable's description of the site and origin of the city, and reviews the progress of street-paving. 5000 w. Jour Assn of Engng Soc's —Feb., 1899.

**Omaha Specifications.**—The New Paving Specifications of Omaha. Copy of the forms for submitting bids and the classification of work, as prepared by the city engineer. 3500 w. Munic Engng—Sept., 1897.

**Paris.**—The Pavements of Paris. Information concerning the street pavements, which consist of stone, macadam, asphalt and wood. 800 w. U S Cons Repts, No. 380—March 22, 1899.

See also **Wood, Paris.**

**Rail.**—See **Tracks; RAIL—Street; TRACK—Street.**

**Rangoon.**—See **Wood, Rangoon.**

**Redwood.**—See **Wood-Asphalt; Wood, California.**

**Roads.**—See **BRICK PAVEMENT; ROAD—Paving.**

**Rome.**—See **European Cities.**

**St. Louis.**—Pavements for City Streets. Sectional views of streets in St. Louis, showing the method of construction, adopted in laying the various forms of pavement. Also specifications. From a pamphlet issued by the street commissioner of St. Louis, Missouri. 4000 w. Sci Am Sup—Oct. 9, 1897.

Streets of St. Lopis. Information of the paving used in the improved streets, with the specifications for the brick paving. Ill. 1000 w. Brick—Sept., 1897.

**San Francisco.**—See **Bituminous Rock.**

**Siena Cathedral.**—See **Cathedral, Siena.**

**Smoothness.**—Smoothness of Pavements. Daniel B. Luten. Illustrated description of examinations made of various kinds of pavements in Lafayette, Ind. 3000 w. Eng Rec—March 31, 1900.

**Specifications.**—Some Neglected Points in Municipal Work. H. K. Landis. Defective specifications for street paving are held responsible for faults in work. 800 w. Munic Engng—Sept., 1896.

See also **Omaha Specifications.**

**Stone Block.**—Stone Block Street Pavements. Charles Carroll Brown. The importance of a good foundation, and care in selecting blocks of uniform size. While the first cost is high, the pavement is almost indestructible. 800 w. Stone—June, 1898.

See also **Granite; Medina Block.**

**Street Cleaning.**—See **STREET CLEANING—Paving.**

**Street Railway Franchises.**—See **STREET RAILWAY—Franchise Paving.**

**Street Tracks.**—See **Tracks; RAIL—Street; TRACK—Street.**

**Tar-Macadam.**—See **ROAD.**

**Toronto, Ont.**—Paving in Toronto. Experience with different kinds of paving and conclusions derived from results. 1200 w. Eng Rec—Aug. 29, 1896.

Street Paving Materials. J. J. Bell. General review of the materials that have been used in various localities, with statement of the cost per sq. yd. of the pavements in use in Toronto, Can. 1200 w. Can Engr—July, 1898.

See also **ROAD—Tar-Macadam; Toronto.**

**Tracks.**—Pavements Between Street Railway Tracks. Charles H. Rust. Read before the A. S. M. I. Illustrated description of the construction employed by Toronto, Ont., where the tracks are built, and owned by the city. 1300 w. Eng Rec —Oct. 14, 1899.

Street Railways and Street Pavements. Summary of a report by a committee of the Am. Soc. of Munic. Imp. on the means of keeping pavements about tracks in repair. 2100 w. Eng Rec—Oct. 14, 1899.

Car Tracks and Pavements. James Owen. Discusses the relation of the owner of the railway to the authorities in charge of the highway, and the general subject, both in city and suburbs. 2500 w. Am Soc of Civ Engs—Nov., 1896.

The Paving Question. T. J. Nicholl. Read before the N. Y. St. Ry. convention. Considers the injustice in requiring the street railways to keep the pavement in repair. 2200 w. St Ry Rev—Sept. 15, 1899.

See also **RAIL—Street; STREET RAILWAY—Franchise Paving; TRACK—Street.**

**Value to City.**—Why Good Paving is Essential to the Success of a City. J. W. Howard. Facility of traffic which can only be secured by good paving, is assigned as the reason. 1800 w. Pav & Mun Engng—April, 1896.

**Vancouver, B. C.**—Pavements in Vancouver, B. C. A. K. Stuart. Read before the Canadian Soc. of Civ. Engs., Feb. 2, 1899. A comparison of the two kinds of pavement used, bituminous rock and wood blocks, discussing their relative merits and adaptability to this humid climate. 3800 w. Adv. Proof. Proc Can Soc Civ Engs.

**Washington, D. C.**—Pavements and Vitrified Brick in Washington, D. C. Discusses asphalt and vitrified brick as materials for paving. 2000 w. Brick—May 1, 1900.

**Wood.**—A Hygienic View of Wood Paving. Translated for "Hardwood" from "L'Echo Forestier." A. Petsch. Thinks wood paving has not interfered with sanitary conditions. 900 w. Sci Am Sup—March 20, 1897.

The Sanitary Aspects of Wood Pavements. Charles Mason. Brief reference to the kinds of wood employed, their treatment and method of laying, with discussion of the sanitary conditions, showing that the writer considers complaints of this pavement to be due to improper methods of laying and maintaining, with faulty systems of scavenging. 1500 w. Jour of San Inst—April, 1898.

**Wood-Asphalt.**—Redwood Block Paving with Asphalt Carpeting, at Oakland, Cal. From the report of M. K. Miller, Supt. of Streets. Describes the work of paving with redwood blocks with a thin asphalt carpet, giving particulars regarding the dipping and laying of the blocks. 1200 w. Eng News—July 20, 1899.

**Wood, Atlanta.**—Wood Block Pavements in Atlanta. Describes the process invented by H. F. Williams, of San Francisco, that is to be used here, and also gives report on the way in which similar pavements in San Francisco are wearing. 1300 w. Eng Rec—Jan. 1, 1898.

**Wood, Australia.**—A Defense of Australian Hard-Wood Pavements. From a pamphlet by Sir Edward H. Wittenoom, in reply to disparaging remarks made by D. J. Ross. 2500 w. Eng News —Aug. 23, 1900.

Hardwood Pavements in Sydney, New South Wales. R. W. Richards. Abstract of paper read before the English Assn. of Munic. and Co. Engs. on the latest experience with hardwood pavements in Sydney. Favorable to its use. 1000 w. Eng News—March 18, 1897.

Hard-Wood Paving. From the London "Standard." Brief account of the growth of this industry, important changes, use of Australian hard woods, etc. 1600 w. Ill Car & Build—May 7, 1897.

Hard-Wood Pavements in Sydney, New South Wales. R. W. Richards, in "The Surveyor." A short paper with discussion. 4800 w. Ind & East Eng—April 17, 1897.

**Wood, California.**—California Redwood for Street Pavements. Ernest McCullough. Some account of paving experiments in San Francisco, with description of the use of redwood, manner of preparation and laying. Also remarks on other kinds of pavement. 2800 w. Munic Engng——June, 1897.

**Wood Creosoted.**—Creosoted Wood Block Pavements in Indianapolis. M. A. Downing. Read before the Am. Soc. for Munic. Imps. Gives an account of the use of this pavement in city named and considers it a success from every point of view. 1500 w. St Ry Rev—Feb. 15, 1900.

Defects of Creosoted Wood Block Pavements. F. A. Hetherington. Describes the experience in Indianapolis, Ind. The article is answered by Clarence A. Kenyon and Mr. Hetherington replies. Ill. 4200 w. Munic Engng—Sept., 1898.

See also **TIMBER PRESERVATION.**

**Wood, Indianapolis.**—Wood Pavements in Indianapolis. M. A. Downing. A description of the creosoted wood blocks and the manner of laying them. Read before the A. S. M. I. 1000 w. Eng Rec—Oct. 14, 1899.

**Wood, Ipswich, Eng.**—Experience with Wood Pavements at Ipswich, England. Describes the foundations, character of blocks and wearing properties. 900 w. Eng Rec—July 1, 1899.

**Wood Maintenance.**—Maintenance of Wood Pavement in European Cities. Robert Grimshaw. Brief reports from London, Paris and Germany. 500 w. Munic Engng—April, 1897.

**Wood, Paris.**—Street Wood-Pavement in Paris. Report of the high favor in this city, discussing the kind suitable for street paving; the qualities desirable, accounts of tests made, and much other information. Ill. 13000 w. Ap. Series of Indian Forester—Part I.

Wooden Pavement and Public Health in Paris. Describes the construction and comments on the sanitary excellence. 1400 w. San Rec—June 11, 1897.

**Wood, Rangoon.**—Notes on Wood Paving vs. Macadam. J. Stirrat. A statement of experiments made in Rangoon, using teak and pyinkadoe laid on a cement concrete foundation. Ill. 1000 w. Ind Engng—Sept. 10, 1898.

**Wood, Switzerland.**—Pavements in Switzerland. Report of experiments made in Basle with wood pavements, including American pitch pine. 700 w. U S Cons Repts, No. 772—July 5, 1900.

**PAVING.**

See **PAVEMENT.**

**PEAT.**

The Use of Peat as Fuel. Gives a brief account of efforts to turn bog lands to account, and the uses for which peat is adapted, and its proper preparation. 1400 w. Col Guard—Jan. 5, 1900.

**Coking.**—Coking Peat. Dr. Holtz, in "Zeitschrift für Angewandte Chemie." Describes the Ziegler-Stiemer process of preparing the pressed peat; coking; and utilizing the products. 800 w. Col Guard—Jan. 7, 1898.

**Compressed.**—Compressed Peat as Fuel. A description of the peat bogs of Ontario, Canada, and the operations there conducted of compressing peat for steam-raising fuel. Comparative evaporative tests with peat and coal are given. 1200 w. Can Elec News—Sept., 1898.

**Distillation.**—The Distillation of Peat in a Closed Retort (La Tourbe et sa Distillation en Vas Clos). Fr. Miron. An investigation of the composition of the various kinds of turf fuel found in France, and the products resulting from destructive distillation. 1200 w. La Revue Technique—April 10, 1898.

**German.**—The Application of North-German Peat in Electric Power Stations (Ueber die Verwertung der Norddeutschen Moore Insbesondere für Elektrische Kraftstationen). A paper by Dr. Frank, showing the value of these deposits of turf, the heating value of which is about one-third that of an equal quantity of coal. 1500 w. Glückauf—April 16, 1898.

**PEN.**

**Manufacture.**—The Manufacture of Steel Pens (Die Stahlfederfabrikation). P. T. Richter. An address delivered before the Verein für Eisenbahnkunde, Berlin, giving a full and well illustrated account of the manufacture of steel pens as carried on at the works of Messrs. Heintze and Blanckertz. 8000 w. Glaser's Ann f Gew u Bauw—April 1, 1900.

**PENSION OFFICE.**

Largest Brick Building in the World. The Pension Office at Washington. Illustrated description of a building said to be the best ventilated and most sanitary of all the great federal offices. 1300 w. Brick—June, 1897.

**PENSTOCK.**

See also **HYDRO-ELECTRIC PLANT; TURBINE; WATER PIPE; WATER POWER; WATER WHEEL.**

**Design.**—See **WATER PIPE—Design.**

**PERMANENT WAY.**

See **RAILWAY PERMANENT WAY.**

**PERMEABILITY.**

See **MAGNETIC TESTING; MAGNETISM.**

**PERMEAMETER.**

See **MAGNETIC TESTING.**

**PERSIA.**

The Development of Persian Trade. Considers the trade routes connecting Persia with the outer world, and the division of trade between Russia and Great Britain. Map. 2000 w. Bd of Trd Jour—March, 1898.

**PETROLEUM.**

See also **LIQUID FUEL; SHALE OIL.**

Petroleum. Where found, and how obtained, and the manner of using it, with illustrations. 1800 w. Mach, Lond—July 15, 1896.

The Distribution and Production of Mineral Oil (Ueber die Verbreitung und die Produktion des Erdöls unter besonderer Berücksichtigung der für Deutschland Wichtigsten Produktionsgebiete). Prof. Oebbeke. Abstract of an address before the Munich Polytechnischer Verein, in which the subject is treated generally, and particular attention called to the Carpathian oil fields in Central Europe. 2400 w. Glückauf—July 28, 1900.

The Production of Petroleum. Particulars derived from official and other sources, showing the state of the industry in some of the principal petroleum-producing countries. 2800 w. Bd of Trd Jour—Sept., 1897.

**Baku.**—See **Russia.**

**Berea Grit Chemistry.**—Chemistry of the Berea Grit Petroleum. Charles F. Mabery and Orton C. Dunn. Besides a description of the results obtained by chemical analysis of petroleum, the Ohio region named and the geology of the oil-bearing strata is discussed. 4800 w. Am Chem Jour—March, 1896.

**British Empire.**—The Petroleum Sources of the British Empire. Boverton Redwood. Abstract of a paper read before the Imperial Institute. Information of the various fields in the British Empire, and the value of the deposits. 4500 w. Col Guard—Feb. 4, 1898.

**California.**—Characteristics of California Petroleum. A. S. Cooper. Information regarding the constituents, characteristics, and other matters of interest. 3800 w. Min & Sci Pr—Oct. 13, 1900.

Notes on the Oil-Yielding Formations of California. W. L. Watts. A portion of a report to be published by the State Mining Bureau. Information of the value, geological features, depth affected, etc. Ill. Serial. Min & Sci Pr—Aug. 5, 1899.

Petroleum Fields of California. Statistics of production in Southern California, during 1897. 1100 w. Am Mfr & Ir Wld—May 13, 1898.

Petroleum in California. W. L. Watts. Address delivered at Los Angeles, Cal. Reviews the history of this mineral product in the state, describing the oil-fields. 2400 w. Trans Am Inst of Min Engs—Oct., 1899.

Prospecting for Petroleum in California. A. S. Cooper. Abstract from "Bulletin No. 16," California State Mining Bureau. Directions for prospectors, indications of the presence, tests, etc. 1200 w. Eng & Min Jour—May 12, 1900.

Some Notes on the Petroleum Deposits of California. Harold W. Fairbanks. States the conditions under which petroleum occurs in California and which seem to differ from Prof. Orton's statements concerning eastern fields in respect to migration. 1200 w. Min & Sci Pr—May 20, 1899.

Some Chemical and Physical Characteristics of California Petroleum. A. S. Cooper. Read before the Pacific Coast Gas Assn. Also brief discussion. 5000 w. Am Gas Lgt Jour—Aug. 20, 1900.

Southern California Petroleum. A. S. Cooper. Describes the Summerland oil-field. Nearly all the oil found in California is in dunes. Petroleum is pumped from under the sea. Ill. 600 w. Min & Sci Pr—Oct. 15, 1898.

The California Oil Industry. Ernest Horsfall Rydall. An account of the oil wells at Los Angeles and other points, and the excitement attending this discovery. Ill. 1300 w. Min & Sci Pr—March 17, 1900.

The Genesis of Petroleum and Asphaltum in California. A. S. Cooper. Part first discusses the origin of hydrocarbons. Serial. Min & Sci Pr—Feb. 4, 1899.

See also **PETROLEUM WELL.**

**Canada.**—Petroleum Industry of Canada. John D. Noble. Paper before the International Petroleum Congress, Paris, on the oil wells in the Petrolia district, and methods of boring, storage and drilling. 2400 w. Am Gas Lgt Jour—Sept. 24, 1900.

**Caspian.**—See **Russia.**

**Caucasus.**—See **Russia.**

**China.**—Boring for Gas and Petroleum in China. From the "Petroleum Industrial and Technical Review." Information concerning the methods used, the products, and their uses in China. 1300 w. Sci Am Sup—Nov. 18, 1899.

**Colombia.**—See **COAL REGION.**

**Colorado.**—Prospecting for Oil in an Untried Region. Arthur Lakes. How oil was found in Colorado, where there were no direct indications on the surface. 1700 w. Mines & Min—May, 1899.

See also **COAL REGION—Colorado.**

**Dutch East Indies.**—See **Sumatra; GOLD MINING.**

**1899.**—Petroleum in 1899. Reports an improvement in the production in the United States, and encouraging features of the industry. 1000 w. Eng & Min Jour—Jan. 6, 1900.

**Europe.**—Petroleum in Europe (Le Pétrole en Europe). H. Neuberger and H. Noalhat. With especial reference to the wells in Central Galicia, in which American methods of working have been introduced. 4000 w. Revue Technique—Jan. 10, 1900.

**Fire-Tests.**—The Fire Danger from Petroleum (Ueber die Feuergefährlichkeit des Petroleums). E. Priwoznik. A discussion of the safe fire-tests for various petroleums, giving the practice in different countries, and the statutes regulating the subject in Austria. Two articles. 3000 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 24, July 1, 1899.

**Fuel.**—See **LIQUID FUEL.**

**Flash Point.**—See **OIL.**

**Geology.**—The Geology of Petroleum (Zur Geologie des Erdöles). H. Höfer. An examination of the theory of Carll and a comparison of the conditions in Pennsylvania with those in various parts of Europe. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—Oct. 13, 1900.

**Japan.**—The Petroleum Industry in Japan. Editorial on the value of the oil industry in Japan and the effects on the markets of China and India. 600 w. Ind Engng—June 13, 1896.

**Japan and China.**—I. Some Facts Regarding Japanese Petroleum. From the Kobé "Chronicle." II. Petroleum in China. The first article is a statement of the location and output of the oil wells in Japan. The second is the importance of having active agents to protect the American oil interests in China. 1700 w. Cons Repts—April 5, 1898.

**Lighting System.**—See **INCANDESCENT GAS LIGHTING; LIGHTING—Petroleum "Arc"; PETROLEUM VAPOR.**

**North Carolina.**—See **COAL REGION.**

**Ohio.**—See also **Berea Grit Chemistry.**

**Ohio and Canada.**—See **Sulphur.**

**Peru.**—Petroleum in Peru. Dr. H. Polakowsky. A detailed description of the rich oil deposits which exist in certain parts of Peru. 1800 w. Am Mfr & Ir Wld—June 26, 1896.

**Roumania.**—The Petroleum Fields of Roumania (Les Pétroles de Roumania). A description of the petroleum fields as yet very imperfectly worked or developed, with some account of the geological formation in which they occur. 1500 w. La Revue Technique—May 10, 1897.

Roumanian Petroleum (Rumänisches Erdöl). J. Tanasescu. An account of the physical and chemical properties of Roumanian petroleum. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 18, 1900.

Roumanian Petroleum. Comparison of the analyses of oils from the nine principal oil fields of the world, showing the Roumanian oil to be very rich. 250 w. Am Mfr & Ir Wld—Nov. 15, 1895.

**Russia.**—Russia's Petroleum Export to Germany and Austria-Hungary, and New Caucasian Oil Fields. F. Thiess. Translation from the German. Shows that Germany imports almost exclusively from the United States, and states that Russian oil men are making every effort to secure this market for their products. Gives information of new oil discoveries. 500 w. Am Mfr & Ir Wld—Dec. 31, 1897.

The Development of the Russian Petroleum Industry (Die Entwicklung der Erdöl Industrie in Russland). A general review of the past 30 years with commercial statistics from official reports. Three articles. 7500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 27, Dec. 4, 11, 1897.

The Petroleum Industry in Russia (Die Erdölindustrie in Russland). A general review of the official Russian report made for the Nijni-Novgorod Exposition, giving data from 1882 to 1895 inclusive; chiefly statistical. Two articles. 7000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 16-23, 1897.

The Russian Petroleum Trade. An account of the production, consumption, cost, extension of territory, etc., with statistics of trade. 5000 w. U S Cons Repts, No. 706—April 17, 1900.

Russian Petroleum Trade in 1897. Statistics giving an idea of the progress made in the past year, showing that it was an active one, but that the financial results were not as satisfactory as in 1896. 4000 w. U S Cons Repts—April 6, 1898.

Baku and Its Oil Industry. W. F. Hume. Interesting account of the rapid growth of the town due to its excellent harbor and the oil supply. Historical account of the growth of the naphtha industry, description of the wells and method of working, with other interesting information. 2400 w. Nature—July 9, 1896.

The Baku Petroleum District of Russia. David A. Louis. A fully illustrated account of the Russian oil fields as seen at the time of the visit of the International Geological Congress. 3500 w. Eng Mag—Sept., 1898.

The Manufacture of Illuminating Oil at Baku in 1897. W. Latkin. Report of the production, methods used, quality, etc. 1400 w. Am Mfr & Ir Wld—June 24, 1898.

The Russian Petroleum Industry in 1897 (Die Russische Erdölindustrie im Jahre, 1897). A review of the progress of the Baku oil fields during the past year; monthly comparisons being made with the years 1895 and 1896. 2000 w. Oesterr Zeitschr f Berg u Hüttenwesen—July 23, 1898.

Development of the Oil Industry in the Apsheron Peninsula. Notes and data gathered in connection with a recent visit to the Russian oil fields, especially those situated in the Apsheron Peninsula, near Baku, on the Caspian Sea. Ill. 2800 w. Engr, Lond—April 8, 1898.

The Caucasus Oil Field in 1897. Report of the adverse conditions which have so greatly affected the export trade. 700 w. Am Mfr & Ir Wld—Nov. 12, 1897.

The Development of the Petroleum Industry in the Caucasus (Développement des Enterprises de Pétrole au Caucase). A review of the commercial side of the subject, with data about the various companies engaged in the industry. 1800 w. Moniteur Industriel—Feb. 3, 1900.

**Russia, Illuminating Value.**—The Illuminating Value of Russian Petroleum. Dr. M. Albrecht's defense of Russian petroleum, in reply to an unfriendly article published in Hamburg. 1300 w. Am Mfrs & Ir Wld—Nov. 4, 1898.

**Shale Oil.**—See **SHALE OIL.**

**Sulphur.**—On the Composition of the Ohio and Canadian Sulphur Petroleums. Charles F. Mabery. Presented to the Am. Acad. of Arts and Sciences. The oils are considered peculiar by reason of the sulphur constituent. The chemical examinations into their composition is fully described. Serial. Am Chem Jour—Dec., 1895.

**Sulphuric Acid Action.**—The Action of Sulphuric Acid on Mineral Oils. R. Zaloziecki. Translated from the German. Gives results of investigations. Serial. Am Mfr & Ir Wld—Oct. 15, 1897.

**Sumatra.**—The Petroleum Industry of Sumatra. F. Stampfel. General description of field stated to be very rich in petroleum. 1500 w. Am Mfr & Ir Wld—Aug. 21, 1896.

See also **GOLD MINING—Dutch East Indies.**

**Supply.**—See **GASOLINE.**

**Texas.**—The Recently Developed Oil Field of Texas. Thomas D. Miller. Paper presented to the Engs.' Club of St. Louis. All the petroleum in Texas yet examined has an asphaltum base. An account of the oil-producing field, the production and quality. 1000 w. Eng & Min Jour—June 18, 1898.

**United States.**—The Growth of Our Oil Trade. William Gilbert Irwin. A detailed account of the opening and production of the oil fields of the United States. 2500 w. Sci Am—Jan. 14, 1899.

**Wyoming.**—The Salt Creek Oil Field, Wyoming. Wilbur C. Knight. A description with seven illustrations. The probable production in 1896 is put at 5000 barrels. 1200 w. Eng & Min Jour—Jan. 25, 1896.

The Wyoming Oil Fields. Arthur Lakes. Brief review of what has been done in these fields, and a description of the geology of the Salt Creek fields. 900 w. Mines & Min—Sept., 1898.

The Wyoming Petroleum Oil Fields. Wilbur C. Knight. An account of the early history and development, oil districts, nature of the oils, geology, etc. 1600 w. Am Mfr & Ir Wld—May 29, 1896.

**PETROLEUM ACCIDENT.**

See also **PETROLEUM—Fire Tests.**

The Report of the Petroleum Committee. Sharp criticism of the findings of the Parliamentary committee appointed to investigate the legislation affecting petroleum storage and the sale and use of mineral oil lamps. Serial. Jour Gas Lgt—Aug. 30, 1898.

**PETROLEUM ENGINE.**

See **GASOLINE ENGINE; OIL ENGINE.**

**PETROLEUM FUEL.**

See **LIQUID FUEL.**

**PETROLEUM LAND.**

**Law of Title.**—Scrip and the Law of Title to Oil Lands. A. H. Ricketts. An examination of the term "scrip" and the names by which it is known are given in part first. Serial. Min & Sci Pr—April 7, 1900.

**PETROLEUM MOTOR.**

See **GASOLINE ENGINE; OIL ENGINE.**

**PETROLEUM REFINERY.**

**Germany.**—Against Petroleum Refineries in Germany. Reviews the opposition of the brown coal mining industry. 1000 w. Am Mfr & Ir Wld—Aug. 14, 1896.

**Waste Products.**—How to Utilise the Waste Products of Petroleum Refineries. R. Zaloziecki. Calls attention to the money loss from failing to utilise this waste, also the harm from allowing it to poison water-courses. Gives various methods employed in different places. 2000 w. Am Mfr & Ir Wld—Feb. 25, 1898.

See also **FACTORY WASTE; RIVER POLLUTION.**

**PETROLEUM VAPOR.**

See also **INCANDESCENT GAS LIGHTING; LIGHTING—Petroleum Arc.**

Petroleum Vapor: Its Production and Use. J. S. V. Bickford. Results of experience in the fields of petroleum Bunsen burner, and petroleum blow-pipe work. Ill. 4200 w. Eng, Lond—July 15, 1898.

**PETROLEUM VEHICLE.**

See **GASOLINE VEHICLE.**

**PETROLEUM WELL.**

See also **PETROLEUM; WELL BORING—Graphical Record.**

**California Sea.**—Boring Oil Wells at Sea. Illustrated description of these wells on the seashore near Santa Barbara, California. 800 w. Sci Am—Nov. 27, 1897.

**Los Angeles.**—Petroleum Wells in the Suburbs of Los Angeles, California. Illustration with brief account of the disfiguring of a pretty suburb by the needlessly numerous and unsightly oil derricks, with some information of the yield and value. 1100 w. Sci Am—July 17, 1897.

**PHASEMETER.**

See **ELECTRIC METER—Phasemeter.**

**PHILIPPINES.**

See also **COAL REGION; GOLD REGION; MINERAL REGION.**

Facts about the Philippines. Frank A. Vanderlip. Treats of their importance as a base for commercial operations, their products, mineral resources, etc. Ill. 5200 w. Century Mag—Aug., 1898.

The Philippine Islands. Information regarding the area, population, exports and general trade. 1800 w. U S Cons Repts, No. 107—May 7, 1898.

The Philippine Islands. John A. Osberne. An account of these islands, describing their characteristics, inhabitants, and the value of their products. 2300 w. Chau—July, 1898.

The Philippine Islands. Frank F. Hilder. An outline sketch of these islands, noting their commercial advantages, natural resources, and their value to the United States. 5500 w. Forum—July, 1898.

The Philippine Islands. Discusses the importance of these islands because of their geographical position, their trade, and the difficulties likely to arise in solving the question of their fate. 1300 w. Engng—Aug. 12, 1898.

Trade and Industry of the Philippines. Information with regard to the economic condition of these islands, taken from the most recent reports of the British Consular officials at Manila and other ports. 700 w. Bd of Trd Jour—May, 1898.

**PHONOGRAPH.**

See also **GRAMOPHONE; GRAPHOPHONE.**

The Phonograph. Illustrated description of the most modern phonograph and its possible future. 2500 w. Engng—Oct. 9, 1896.

**History.**—The Phonograph. An illustrated historical sketch. 1400 w. Sci Am—July 25, 1896.

**Microphonograph.**—See **MICROPHONOGRAPH.**

**Phonogram Archives.**—The Phonogram Archives of the Vienna Academy of Sciences (Das Phonogramm-Archiv der Academie der Wissenschaften in Wien). An account of a plan for forming a large, scientific collection of phonograph records, and discussion of methods for their permanent preservation. 1600 w. Electro Techniker—July 15, 1900.

**PHONOPLEX.**

The Edison Phonoplex. Illustrated description with diagram of the connections for a terminal office. 1200 w. R R Gaz—Jan. 1, 1897.

**PHOSPHATE.**

**Alabama.**—The Phosphates and Marls of Alabama. Eugene A. Smith. Geological relations with description of deposits. 4300 w. Trans Am Inst of Min Engs—Feb., 1896.

**Arkansas.**—The Phosphate Deposits of Arkansas. John C. Branner. Describes position, appearance and origin of the deposits, with local details, value and method of mining. 6800 w. Trans Am Inst of Min Engs—Dec., 1896.

**Dressing Plant.**—Phosphate Dressing Plant. A dressing plant composed of screens, jigs, tables, etc., designed to enrich a poor phosphate rock 20 to 30 per cent. A full-page plate shows the arrangement of the plant. 1000 w. Engng—Nov. 22, 1895.

**Florida.**—The Florida Pebble-Phosphates. E. W. Codington. Description of method of mining and preparing for market. 3300 w. Trans Am Inst of Min Engs—Nov., 1895.

**Magnetic Iron Ore.**—A New Competitor for Basic Slag (Ein Neuer Wettbewerb für die Thomasschlacke). The magnetic separation of certain Swedish magnetic ores furnishes a quantity of apatite, which as a phosphate fertiliser bids fair to compete with slag from the Thomas basic steel process. 2000 w. Stahl und Eisen—Nov. 1, 1897.

See also **MAGNETIC SEPARATION—Sweden.**

**South Carolina.**—The Phosphate Mines of South Carolina. George Leighton. A description of the peculiar deposits and the methods of mining, with a history of their discovery; the nature of the rock, its appearance, and some of the theories in regard to the animal life from which it was originally formed. 3500 w. Mines & Min—Dec., 1897.

**Sweden.**—See **Magnetic Iron Ore.**

**Tennessee.**—A New and Important Source of Phosphate Rock in Tennessee. James M. Safford. Describes the rock, which is Trenton, and is the result of long-continued leaching of the rocks by atmospheric and aqueous agencies. 1000 w. Am Geol—Oct., 1896.

Phosphates in Tennessee. H. D. Ruhm. Interesting survey of present operation in the new field. 2200 w. Mfrs Rec—May 28, 1897.

The American Phosphate Company's Plant Near Mount Pleasant, Tenn. George F. Blackie. Abstract of paper read before the Engng. Assn. of the South. Illustrates and describes the plant and its operation. 2000 w. Eng & Min Jour—July 7, 1900.

The Mount Pleasant Phosphate District, Tennessee. H. D. Ruhm. An account of this field, where somewhere near $600,000 have been invested. 2200 w. Eng & Min Jour—June 10, 1899.

The Phosphate Deposits in Maury County, Tennessee. J. B. Killebrew. An account of the discovery and character of the rock; the locality covered and the work in progress. 1500 w. Eng & Min Jour—Nov. 14, 1896.

The Phosphate Deposits of Tennessee. J. B. Killebrew. The first paper deals with the subdevonian phosphates, reviewing their discovery, extent, and mining. Serial. Mfrs Rec—July 8, 1898.

The Phosphate Rock Deposits of Tennessee. Lucius P. Brown. Showing the extent, character and methods of phosphate mining in Tennessee. Ill. 4500 w. Eng Mag—Oct., 1896.

**PHOSPHOR BRONZE.**

See **BRONZE.**

**PHOSPHORIC ACID.**

**Estimation.**—On the Estimation of Phosphoric Acid by Titration of the Ammonium Phosphomolybdate Precipitate with Standard Alkali. B. W. Kilgore. The results of comparative analyses are given, with the idea of finding the best method, at the laboratory of the N. Carolina Experiment Station. 4800 w. Jour Am Chem Soc—Dec., 1895.

**PHOSPHORUS.**

See also **COAL ANALYSIS; IRON ANALYSIS; IRON ORE ANALYSIS; STEEL ANALYSIS.**

**Coal and Coke Ash.**—Estimation of Phosphorus in the Ash of Coal and Coke. L. Campredon, in "Moniteur Industriel." Gives the results of comparative tests made by the author on the ash of English coals. 700 w. Col Guard—Feb. 5, 1897.

**Electro-Thermal Process.**—The Electro-Thermal Process for the Manufacture of Phosphorus. John B. C. Kershaw. A brief historical review, with description of the electro-thermal method, and reasons why the phosphorus industry is in a very unsettled state. 900 w. Elec Rev, Lond—Oct. 7, 1898.

**PHOTOCHROMY.**

**Metals.**—The Photochromy of Metals. Translated from "La Revue Technique." Brief account of investigations of the color effects of thin electrically deposited metallic films, by Edmund Becquerel, and Joseph Girard. 1000 w. Eng & Min Jour—Oct. 29, 1898.

**PHOTO-CHRONOGRAPH.**

See also **SYNCHRONOGRAPH.**

Note on a Photographic Method of Determining the Complete Motion of a Gun during Recoil. Albert Cushing Crehore and George Owen Squier. Describes a method applied to the investigation named, whereby any moving body, may be made to trace its own path mechanically, upon a surface prepared to receive and retain the trace. 2500 w. Ind & Ir—Dec. 13, 1895.

Apparatus for Measuring the Speed of Projectiles. Illustrated description of an instrument designed to measure very minute intervals of time developed at the United States Artillery School and used for measuring the velocity of projectiles from the new 3.2 inch B. L. field rifle adopted by the army. 1300 w. Sci Am—May 2, 1896.

Experiments with the Polarizing Photo-Chronograph to Determine the Motion of Projectiles Inside the Bore of a Gun. Albert C. Crehore and George O. Squier. Experiments described which were carried out at the U. S. Artillery School, Aug., 1895, with the objects of perfecting a practical chronograph suited to the needs of the military service, and to determine the adaptability of this instrument to the study of the motion of projectiles inside the bore. Serial. Elec Wld—June 27, 1896.

The New Polarizing Photo-Chronograph at the United States Artillery School, Fort Monroe, Va. Albert Cushing Crehore and George Owen Squier. Illustrated description of this instrument and its installation, with some of the further tests and experiments with it which were carried out in the electrical laboratory of the school where the new instrument was installed. 9000 w. Sci Am Sup—Jan. 2, 1897.

**PHOTO-ENGRAVING.**

See **PRINTING.**

**PHOTOGRAPHY.**

See also **PRINTING.**

**Animal Mechanics.**—See **ANIMAL MECHANICS.**

**Color.**—Color Photography. Prof. Lippmann. Read before the Royal Society. Description and demonstration of researches in color photography. 2500 w. Nature—April 30, 1896.

Practical Advice for the Direct Photographing of Colors According to the Lippmann Method. Full detailed directions for making solutions, preparing the plates, regulating the exposure; description and illustrations of the apparatus, etc. 1300 w. Sci Am Sup—Nov. 9, 1895.

**Data Collections.**—Use of Photography in Data Collections. Reginald A. Fessenden. Illustrated description of apparatus and rapid method for the photographic copying of indexed data from books, pamphlets and periodicals, with list of material needed. 3000 w. Elec Wld—Aug. 22, 1896.

**Electric Action on Plates.**—See **ELECTRO-CHEMISTRY—Photographic Action.**

**Electric Light.**—Electricity and Photography. Details of electrical apparatus used in a studio making it possible to take photographs at any time, irrespective of the state of the atmosphere. Ill. 1300 w. Elec Eng, Lond—March 26, 1897.

Night Photography by Electric Light. Joseph F. Mullander and Sidney Sprout. An account of researches in this field and highly satisfactory results. Ill. 3300 w. Jour of Elec—Oct., 1895.

**Electro.**—See **ELECTRO-PHOTOGRAPHY; RADIOGRAPHY; ROENTGEN RAYS.**

**Engineering.**—Photography for Engineers. John W. Alvord. Giving the experience, amusing and instructive, of an engineer with a camera, and how he uses it to illustrate his reports, etc. 1800 w. 10th An Rept of Ill Soc of Eng & Surv., 1895.

Technical Applications of Photography (Ueber die Anwendung der Photographie für Technische Zwecke). Special appliance for photographing rail and bridge deflections; also photogrammetric apparatus, for photographic surveying. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 5, 1897.

See also **SURVEYING—Photographic.**

**Enlarging.**—Apparatus for Copying and Enlarging by Photography. A. P. Wire. Comprehensive description and explanation of processes and apparatus required, with numerous diagrams. 2500 w. Sci Am Sup—March 7, 1896.

**Interior.**—Interior Photography. Louis Allen Osborne. The difficulties of photographing interiors of breakers and mills and how they may be overcome. Ill. 3800 w. Mines & Min—Nov., 1899.

**Light.**—A New Light for Photographers. C. F. Townsend. Illustrated description of the new light "La Lampe Caton." 1100 w. Sci Am—Aug. 15, 1896.

**Mechanical Engineering.**—See **MECHANICAL ENGINEERING—Sketches and Photographs.**

**Plate Manufacture.**—Manufacture of Photographic Plates. From "La Nature." Interesting illustrated description. 1400 w. Sci Am Sup—Dec. 21, 1896.

**Surveying.**—See **SURVEYING—Photographic.**

**Technical.**—See **Engineering; SURVEYING—Photographic.**

**Underground.**—Underground Photography. James Underhill. Directions showing how with simple appliances, easily carried into a rough country, valuable photographs may be secured. Ill. 1100 w. Eng & Min Jour—July 31, 1897.

**Vacuum.**—Photography in Vacuo. Joseph Cottier. Notes intended to throw light on this subject. The bulk of evidence is to the effect that a sensitive plate retains its impressibility after removal of the air. 1600 w. Elec Wld—May 23, 1896.

**PHOTOMETER.**

See also **PHOTOMETRY.**

How to Make and Use a Photometer. Arthur J. Rowland. Gives directions for the construction and use. Ill. 3700 w. Am Elect'n—May, 1899.

**Arc Lamps.**—An Instrument for Directly Measuring the Mean Spherical Candle-Power of Arc Lamps or Other Luminous Sources. Edwin J. Houston and A. E. Kennelly. Description of an apparatus capable of giving direct measurements of the mean spherical candle-power of a luminous source. By the use of this instrument it becomes possible to measure at one observation the total quantity of light emitted by an arc lamp at any given electric activity. 1500 w. Elec Wld—May 9, 1896.

**Bunsen.**—See **PHOTOMETRY.**

**Cheap.**—An Inexpensive Photometer. From "Electrical Industries." Illustrated description of a form of photometer, suggested by E. P. Roberts, which is cheap, and, it is claimed, gives satisfactory results. 900 w. Pro Age—March 16, 1896

**Flicker.**—See **PHOTOMETRY.**

**Gas Standard.**—A Standard Photometer. W. J. Dibdin. A form of photometer suitable for adoption as a standard. 2200 w. Gas Wld—June 13, 1896.

**Graduation.**—The Graduation of a 100-Inch Photometer Bar. W. Lincoln Smith. Presents a table of scale readings in inches and corresponding ratios of unknown to standard, which, when multiplied by the value of the standard in candle-power, gives the value of the unknown directly. Also explains the method by which the table has been obtained. 350 w. Tech Quar—March, 1896.

**Hollow Sphere.**—Determination of the Average Spherical Intensity of a Light by a Single Reading (Die Bestimmung der Mittleren Räumlichen Lichtintensität durch nur eine Messung). R. Ulbricht. Illustrated description of apparatus and experiments. The source of light is placed inside a hollow sphere with reflecting interior surface, with a window through which the illumination is observed. 1800 w. Elektrotech Zeitschr—July 19, 1900.

**Illumination.**—A Simple Illumination Photometer. Describes interesting examples of modern illumination, and notes the need of a means of measuring. Illustrates and describes the construction of a simple photometer and the method of using. 2000 w. Sci Am Sup—April 14, 1900.

**Portable.**—An Improved Form of Portable Photometer. Illustrates and describes a simple and reliable instrument. 500 w. Eng News—Aug. 10, 1899.

**Portable, Standard Oil Co.**—Portable Photometer as Used in the Standard Oil Company's Test. Views and descriptions of an interesting and unique instrument. 600 w. Eng News—Sept. 7, 1899.

**Recording.**—A Device for Recording Photometer Settings. Charles P. Matthews. Illustrated description of a simple and ingenious device greatly improving both the speed and accuracy of photometer work. 1200 w. Phys Rev—Nov., 1898.

**Spectro.**—How to Make and Use a Simple Spectro Photometer. W. H. Birchmore. Illustrated detailed description. 1100 w. Pro Age—May 1, 1896.

See also **PHOTOMETRY.**

**Weber.**—The Weber Photometer and the Measurement of Daylight. Describes an apparatus for measuring the intensity of light given off by illuminated surfaces, also to measure the intensity of the light source. Ill. 1000 w. Gas Wld—Jan. 8, 1898.

**PHOTOMETRY.**

See also **LIGHT—Ideal; PHOTOMETER.**

Address by Dr. Henry Morton, of Stevens Institute of Technology. Delivered at Madison Sq. Garden, Feb. 4, "The Measurement of Light." 2800 w. Pro Age Sup—March, 1897.

Candle Power and Luminosity. W. M. Birchmore. The article discusses the Bunsen photometer, and shows that it measures emissive power only, and that it is not at all adapted to the comparison of high temperature lights such as have latterly come into use. 4000 w. Pro Age —April 15, 1896.

Photometry. J. Violle. Abstract of a report to the International Elec. Cong., at Paris. 4800 w. Elect'n, Lond—Sept. 28, 1900.

Practical Photometry. Alten S. Miller. The Bunsen photometer is illustrated and described and a mode of using it effectively is set forth. 2800 w. Stevens Ind—April, 1896.

**Acetylene Standard.**—An Acetylene Standard for Photometry. Translation of a paper by M. Violle in "Comptes Rendus." Acetylene is considered as possessing certain advantages as a photometric standard. 500 w. Pro Age—March 16, 1896.

A New Standard of Luminosity (Sur un Nouvel Etalon Lumineux). Ch. Féry. Describing a method of obtaining a flame of acetylene of constant and uniform brilliancy, suitable for use as a standard of comparison for photometric measurements. 1200 w. Comptes Rendus—April 25, 1898.

The Acetylene Standard of Light. H. E. Clifford and J. S. Smyser. A statement of results obtained in a recent investigation of some of the photometric properties of the acetylene gas flame, with an explanation of the apparatus used. Ill. 1500 w. Tech Quar—Dec., 1898.

**Am. Inst. Elec. Eng. Report.**—Standards of Light. Edward L. Nichols, Clayton H. Sharpe, and Charles P. Matthews. Preliminary report of the sub-committee of the Am. Inst. of Elec. Engs., presented at the general meeting, New York, May 20, 1896. 4500 w. Pro Age—July 15, 1896.

Standards of Light. Edward L. Nichols, Clayton H. Sharpe, and Charles P. Matthews. The report shows the unreliability of standards in use, and the desirability of a standard consisting of an electrically heated incandescent surface. The committee also reports that it is engaged in experiments looking toward the solution of the difficult problem of definition of degree of incandescence of heated carbon, hoping thereby to reach the desired standard. Discussion follows. 23500 w. Trans Am Inst of Elec Engs—April, 1896.

**Arc.**—On the Photometry of Arc Lamps. F. W. Carter. Gives results of experience in testing, showing how to carry out the tests, and giving details of devices for overcoming the difficulties and placing the results on a rational basis. Ill. Serial. Elec Rev, Lond—July 13, 1900.

The Photometry of the Arc. Abstract of a progress report by Prof. C. P. Matthews, of Purdue University, on a series of investigations being made, and presented at the annual meeting of the Nat. Elec. Lgt. Assn. Ill. 1800 w. Eng News—Aug. 9, 1900.

See also **Electric Lamp.**

**Arc, Alternating.**—A New Method of Studying the Light of Alternating Arc Lamps. W. L. Puffer. Abstract of a paper read before the Am. Inst. of Elec. Engs. Describes experiments. 600 w. Elec Eng—April 1, 1896.

Luminous Efficiency of the Alternating Current Arc. A. E. Blondel, assisted by E. Jigouzo. Extract from a forthcoming publication upon the efficiency of the electric arc. Sets forth the first results of a study of the alternating current arc. Serial. Elec Wld—Feb. 13, 1897.

**Arc, Enclosed.**—The Photometry of the Enclosed Alternating Arc. Charles P. Matthews, W. H. Thompson, and J. E. Hilbish. Experimental data of the behavior of this type of illuminant. Apparatus used, results, and comments. Ill. 3300 w. Trans Am Inst of Elec Engs—Aug. and Sept., 1898.

The Photometry of the Enclosed Alternating Arc. Charles P. Matthews, W. H. Thompson and J. E. Hilbish. Paper presented at the New York meeting of the Am. Inst. of Elec. Engs. Discusses the three reasons why the results, in so far as they involve the determination of luminous intensity, are unsatisfactory, giving tests and their results. 2500 w. Elec Wld—Oct. 8, 1898.

**Argand Burner.**—See **GAS BURNER—Argand.**

**Atmospheric Influence.**—Influences of the Atmosphere upon the Hefner Lamps. E. Boistel. From "L'Industrie Electrique." Information concerning the luminous intensity of the Hefner lamp, and of the pentane lamp having been reported, the object of the paper is to analyze these reports and make a comparison of the two standards. 4000 w. Pro Age—Feb. 1, 1897.

The Effect of Atmospheric Conditions on the Hefner and Pentane Standard Lamps. Atmospheric conditions noted as adversely effecting the illumination of the lamps named are presence of moisture and carbonic acid, diminution of atmospheric pressure, and diminution of oxygen. Experiments to determine quantitatively these effects are described, and the results are given. 3000 w. Jour Gas Lgt—Jan. 21, 1896.

**Center of Light.**—Experimental Method of Determining the Effective Center of the Light Emitted from a Standard Photometric Burner. D. S. Jacobus. Presented at the N. Y. meeting of the A. S. M. E. Describes and illustrates apparatus and photometric method employed at the Stevens

Institute Department of tests, in testing car lamps. 800 w. Trans Am Soc of Mech Engs—Dec., 1895.

**Dibdin Standard.**—Report on the Dibdin Standard of Light. First report of a committee appointed by the Institution of Gas Engineers (England) to examine and report concerning the accuracy of the Dibdin 10-candle pentane standard. Also Mr. Dibdin's opinion. 3000 w. Gas Wld—Jan. 15, 1898.

**Differential.**—A Contribution to the Literature of Differential Photometry. W. H. Birchmore. An able article containing a table showing the differential areas in the spectra of sunlight, ethane flame, gasoline air-gas flame, and the same whitened; and a diagram of illumination curves of sunlight, ethane flame, gasoline air-gas flame, and of the latter passed through "neutral tint" to whiten it. 1800 w. Am Gas Lgt Jour—Dec. 2, 1895.

**Edgerton Standard.**—Some Experiments with the Edgerton Standard. Rollin Norris. Read before the Am. Gas Lgt. Assn. Detailed account of experiments made to find out how reliable is this standard. 4800 w. Am Gas Lgt Jour—Nov. 6, 1899.

**Electric Lamp.**—The Candle Power of Arc and Incandescent Lamps. Wilbur M. Stine. Considers the leading standards of illuminating power proposed. 1400 w. Am Elect'n—June, 1899.

See also **Arc**; **Incandescent**; **Spectro.**

**Electric Station.**—Photometry for Central Stations. Lyman C. Reed. Part first describes various photometers. Serial. Am Elect'n—May, 1900.

Station Photometry. Buckner Speed. Detailed directions for the construction and operation of a central station photometer department. 3000 w. Elec Wld—April 9, 1898.

**Flicker.**—On the Photometry of Differently Colored Lights and the "Flicker" Photometer. Frank P. Whitman. Interesting account of the development of a new photometric instrument and method, based on Prof. Rood's "flicker principle." Diagrams of the new apparatus and curves of the relative luminosities of nineteen different colors are presented, as illuminated by a kerosene lamp, a grey sky, and a bright blue sky. 2800 w. Phys Rev—Jan.-Feb., 1896.

The New Flicker Photometry. F. L. Tufts. Presented as a graduation thesis to the faculty of Columbia University. Outlines the general method of comparing luminosities, giving history of work of various investigators. Also describes apparatus used in the study of flicker phenomena. Serial. Pro Age—Jan. 15, 1898.

**Gas.**—A French Review of Photometry. Review of the address of M. Vautier, president of the Société Technique de l'Industrie du Gaz en France, dealing with photometry in England, Germany, and France. 2700 w. Jour Gas Lgt—Jan. 9, 1900.

A Suggested Remedy for a Source of Error in Official Photometry. Lewis T. Wright. The question of varying temperature as affecting not only the measurement of volume but also photometric tests, is discussed in this article which proposes a nominal standard of rate of consumption as a remedy for these inaccuracies. 2000 w. Jour Gas Lgt—June 2, 1896.

Candle Power: Its Present Relation to the Gas Industry. John R. Lynn. Read before the Western Gas Assn. Also discussion. Considers the various uses of gas and the units of measurement in use, and the measuring of the term "candle-power." 7700 w. Am Gas Lgt Jour—June 11, 1900.

Gas Companies and Peripatetic Gas Testing. Norton H. Humphreys. A discussion of the objections to the portable photometer system. 2500 w. Jour Gas Lgt—March 13, 1900.

German Views of Gas Photometry. On gas testing in Germany, Austria and France, showing diversity of methods, even among different cities of Germany. 1700 w. Jour Gas Lgt—Jan. 30, 1900.

Some Labor-Saving Methods in Photometrical Testing. Henry O'Connor. Read at the annual meeting of the North British Assn. of Gas Managers. The use of the graphic method of photometrical work, and the substitution of mechanical means for this method. Also discussion. 3000 w. Gas Wld—July 25, 1896.

The Commercial Value of Photometry. A. C. Humphreys. Discusses photometry as applied to measuring the illuminating power of gas as an article of commerce. Serial. Jour Gas Lgt—Nov. 5, 1895.

See also **Germany**; **Standard**; **GAS—Temperature.**

**Germany.**—Photometry in Germany. Digest of the instructions issued by the committee of the German Assn. of Gas and Water Engs., for testing the illuminating power of gas. 3400 w. Jour Gas Lgt—Jan. 24, 1899.

Report of the Committee on Photometry of the German Gas and Waterworks Association (Bericht über die Arbeiten der Lichtmess-Kommission des Deutschen Vereins von Gas-und Wasser Fachmännern). A review of the bulky report of this important committee dealing with the subject of photometric units and methods, and the comparison of various illuminants. 1200 w. Gesundheits Ingenieur—Aug. 31, 1897.

**Hefner Standard.**—The Hefner Standard Lamp. Conditions of test of the lamp, with its description in the form in which it is admitted to standardization, etc. Serial. Pro Age—Jan. 1, 1897.

See also **Atmospheric Influence.**

**Incandescent Lamp.**—The Photometry of Incandescent Lamps. Arthur J. Rowland. Describes a special plan for readily procuring results, and the apparatus necessary for the purpose. Ill. 2200 w. Jour Fr Inst—Nov., 1899.

See **Electric Lamp**; **Electric Station**; **Spectro**; **INCANDESCENT LAMP—Candle Power**; **Efficiency**; **Test.**

**Law of Inverse Squares.**—The (Alleged) Law of Inverse Squares. B. E. Chollar. This law is treated as geometrical, not physical, and its relation to the commercial value of artificial lights is considered. Practical exceptions to the operation of the law are noted. Paper criticised in discussion. 10000 w. Am Gas Lgt Jour—June 1, 1896.

**Methven Standard.**—On the Use of the Methven Standard with Blackened Chimney. R. A. Fessenden. Calls attention to the error arising from this practice. 500 w. Elec Wld—Feb. 25, 1899.

**Mine Illuminant.**—Photometric Value of Various Illuminants Employed in the Lighting of Mines. A. H. Stokes. Read before the Federated Inst. of Min. Engs., England. Experiments made to determine the relative amount of light obtained from the illuminants used in mines, to define their economical value, to point out certain adjuncts used for increasing their lights and to call attention to defects and dangers which occasionally accompany their use. 3000 w. Am Gas Lgt Jour—Jan. 25, 1897.

**Pentane Standard.**—A Two-Candle Pentane Standard. E. Llewellyn Pryce. Read at meeting of Inc. Inst. of Gas Engs. Describes the Simmance 2-candle standard, which is a modification of Harcourt's portable pentane lamp. Discussion. 9300 w. Gas Wld—June 18, 1898.

The Pentane Ten-Candle Standard Lamp. A. Vernon Harcourt. Read at meeting of the Inc. Inst. of Gas Engs. An account of this lamp and the improvement made, manner of adjusting, etc. 2300 w. Gas Wld—June 18, 1898.

**Platinum Standard.**—The Determination of a Light Unit. D. W. Murphy. Description of construction and use of an instrument devised by Prof. Lummer and Dr. Kurlbaum of the Physikalische Reichsanstalt, called the balometer and based upon the quantity of light emitted by one square centimeter of platinum kept at constant temperature. 2500 w. Am Gas Lgt Jour—May 11, 1896.

**Reflection Spectrum.—See Spectro; LIGHT—Ideal.**

**Spectro.**—Studies in the Spectrum of Reflection. Dr. W. H. Birchmore. This paper is intended to make clear some obscure points in a previous article published in this paper Sept. 30. 1300 w. Elec Eng—Nov. 11, 1896.

The Spectrophotometry of Electric Lights (Sur la Spectrophotométrie des Lumières Electriques). Fernand Gaud. A communication to the French Academy giving the results of photometric measurements of the intensity of various parts of the spectra of different lights. 600 w. Comptes Rendus—Nov. 13, 1899.

The Spectrophotometry of Incandescent Lamps. W. R. Turnbull. Criticism of articles by Dr. W. H. Birchmore and M. A. Edson, with an effort to make clear the composition of light from different sources, and the meaning of the term "luminosity." 1600 w. Elec Eng—July 8, 1897.

See also **PHOTOMETER.**

**Spherical.**—See **PHOTOMETER—Hollow Sphere.**

**Spherical Candle Power.**—Mean Spherical Candle-Power. Wilbur M. Stine. An examination of the theory of mean spherical and mean hemispherical candle-power, and the methods of calculating those qualities. 2000 w. Elec Wld & Engr—Nov. 18, 1899.

**Standard.**—A Comparison of the Hefner and Carcel Lamps as Standards of Light. Relates to the researches of M. Laporte, and the conclusions drawn from his results. 900 w. Jour of Gas Lgt—Oct. 11, 1898.

Photometers and Standards of Light. W. Sugg. A broad treatment of the subject pointing out defects in instruments and methods, and a résumé of the history of photometry, with numerous illustrations. Discussion includes Mr. Dibdin's paper on the same subject. 10000 w. Gas Wld—June 13, 1896.

Photometric Standards. W. Grafton. Gives experimental results in the hope of clearing up existing difficulties. Explains in part first what is meant by a standard light of a candle, and gives tests of candles to ascertain normal light. Serial. Jour Gas Lgt—June 14, 1898.

Plea for a Working Standard of Light. S. Everett Doane. Note and discussion. 4200 w. Trans Am Inst of Elec Engs—Aug. and Sept., 1899.

Some Remarks on Standards of Light. Remarks on the difficulties in photometry and the need of a more reliable standard by which to have the public gas supply valued. 1500 w. Jour Gas Lgt—Feb. 1, 1898.

Some Fantastic Standards of Light. Résumé of paper by J. E. Petavel. An account of investigations made. 2000 w. Jour Gas Lgt—Feb. 20, 1900.

Standards of Light. Edward L. Nichols, Clayton H. Sharpe, and Charles P. Matthews. Abstract of a preliminary report of the Sub-Committee of the Amer. Inst. of Elec. Engs. 1000 w. Elec Wld—May 30, 1896.

The Standards of Light. W. J. Dibdin. Reviews a report made by a committee of the Board of Trade, and given after three years of careful work, recommending the adoption of Harcourt's pentane standard as preferable to any and all others that have been used or proposed. The faults of the other standards are impartially stated. Long discussion by the members of the Soc. of Arts. 7800 w. Gas Wld—Feb. 1, 1896.

See also **Acetylene Standard; Am. Inst. Elec. Eng. Report; Atmospheric Influence; Center of Light; Dibdin Standard; Edgerton Standard; Methven Standard; Pentane Standard; Platinum Standard; Unit; ELECTRIC LAMP; GAS; GAS—Temperature.**

**Standard Candles.**—A Method for the Use of Standard Candles in Photometry. Clayton H. Sharpe. A series of experiments for the investigation of the relation between flame height and intensity, and to determine whether such a relation would not enable more consistent results to be obtained than by the method of correcting for rate of consumption, is described, illustrated by diagrams and the results tabulated. 2500 w. Phys Rev—May-June, 1896.

**Units.**—The Question of Photometric Units (Zur Frage der Photometrischen Einheiten). An argument for the establishment of international units of strength, brilliancy, efficiency, etc., of light, similar to the electrical units already in use. 3500 w. Elektrotech Zeitschr—Feb. 18, 1897.

**PHOTO-SURVEYING.**

See **SURVEYING—Photographic.**

**PHYSICS.**

See also **CHEMISTRY; ELECTRO-PHYSICS; MAGNETISM; MATHEMATICS; MECHANICS; THERMODYNAMICS.**

**Absolute Zero.**—See **THERMOMETRY.**

**Address.**—Address by the President of the British Association for the Advancement of Science. J. J. Thomson's address at the Liverpool meeting beginning Sept. 16. A general review of progress during the year in mathematics and physics. 5800 w. Sci Am Sup—Oct. 17, 1896.

**Atoms and Molecules.**—Atoms and Molecules. Abstract from article in N. Y. "Sun," by Robert S. Ball. Facts which should be understood by mechanics. 1800 w. Am Mach—Nov. 12, 1896.

**Capillary Tubes.**—Viscous Flow in Capillary Tubes. R. M. Deeley and C. E. Wolff. Mathematical investigation of values in mechanics. 2200 w. Eng, Lond—Jan. 1, 1897.

**Classification of Experiments.**—The Classification of Physical Experiments. E. E. Fournier-D'Albe. The object of the paper is to specify the characteristic types of experimental elements, and to find a simple and comprehensive classification and notation for the various physical experiments. 2200 w. Elect'n—March 27, 1896.

**Elasticity.**—The Variation of the Modulus of Elasticity with Change of Temperature as Determined by the Transverse Vibration of Bars at Various Temperatures. The Acoustical Properties of Aluminum. Alfred M. Mayer. Read before the British Association, at Oxford. An important and laborious research is described, which is accompanied by extensive tables of data. Many diagrams, illustrating by the graphic method variations of the modulus of elasticity at various temperatures, etc., and engravings, illustrating description of apparatus and method. 6000 w. Stevens Ind—April, 1896.

**Electro.**—See **ELECTRO-PHYSICS.**

**Engineering.**—Physical Experiment in Relation to Engineering. Alexander Blackie, William Kennedy. The "James Forrest" lecture delivered at the Inst. of Civ. Engs. Physical experiment is regarded not only as an essential part of engineering work, but as an important aid to engineering instruction. 7500 w. Engng—May 15, 1896.

See also **ENGINEERING—Science.**

**Heat Waves.**—See **HEAT RADIATION; RAY.**

**Ice Crystals.**—The Plasticity of Ice Crystals. Brief review of an experimental study by Dr. O. Mudge, which shows that the bending of ice, acts in the direction of its optic axis, and that plastic translation without bending is only possible in a plane perpendicular to the optic axis. 300 w. Science—May 8, 1896.

**Living Force.**—See **LIVING FORCE.**

**Matter.**—The Manner of Changes in Matter (Das Wesen Stofflicher Veränderungen). An address by Prof. Klaudy, dealing with the molecular theories, and the relation of chemical, thermal and mechanical forces in the transformations of matter. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 10, 1897.

**Mercury Vapor.**—The Viscosity of Mercury Vapor. A. A. Noyes and H. M. Goodwin. Read at the Buffalo meeting of the Am. Assn. for the Adv. of Science and at the meeting of the Am. Acad. of Arts and Sciences. Investigations undertaken to determine whether a marked difference in value exists in the case of gases with monatomic and those with polyatomic molecules. 2200 w. Phys Rev—Nov.-Dec., 1896.

**Molecular.**—Some Recent Work on Molecular Physics. Reginald A. Fessenden. The behavior of metals which are in every day use, and an attempt to explain this behavior by certain theories, original with the author. Illustrated by numerous diagrams. 10000 w. Jour Fr Inst—Sept., 1896.

**Photochromy of Metals.**—See **PHOTOCHROMY.**

**Quartz Fibres.**—Quartz Fibres. C. Vernon Boys. The method of making and applying quartz fibres. Instruction with practical details. Serial. Elect'n—Dec. 11, 1896.

**References.**—How to Look Up References in Physics. Edward L. Nichols. Abstract of some remarks made in the Physics Seminary of Cornell University. An admirable guide to those who wish to explore the literature of physics with reference to any particular subject or topic. Within what dates, how to look, where to look, and what to look for are very clearly presented, thus outlining a systematic investigation which in its nature will be thorough instead of discursive. 2000 w. Sib Jour of Engng—Feb., 1896.

**Review, 1846-1896.**—Physics. Review of progress in physical sciences for the last half century. 1500 w. Sci Am—July 25, 1896.

**Solids and Vapors.**—Solids and Vapors. Wilder D. Bancroft. An interesting study of the phenomena of deliquescence and efflorescence, showing that these phenomena are influenced by variable conditions of temperature and vapor tension, and stating the conditions under which crystals of anhydrous and hydrated salts will be permanent or otherwise. All the conclusions are concisely stated at the end of this able paper. 6000 w. Phys Rev—May-June, 1896.

**PIANO.**

**Electric.**—The Electric Self-Playing Piano. Illustrated description of an apparatus for attachment to any ordinary piano, enabling it to be played by electricity without the intermediation of any performer. 800 w. Sci Am—Dec. 28, 1895.

**PIECE WORK.**

See **WAGES—Piece Work.**

**PIER.**

See also **BREAKWATER; BULKHEAD; CAISSON; DOCK; FOUNDATION; HARBOR; LANDING STAGE; PIER SHED; PILE; PILE DRIVING.**

**Atlantic City, N. J.**—The Atlantic City Steel Pier. Illustrated description of a structure 1600 ft. long and 40 to 120 ft. wide, carried on shoe piles of novel form. 1700 w. Eng Rec—July 1, 1899.

**Brick.**—Brick Piers. Results of Tests made in the Laboratory of Cornell University, 1897-98. Ill. 800 w. Trans Assn of Civ Engs of Cornell Univ—1898.

See also **BRICKWORK.**

**Bridge.**—See **BRIDGE PIER.**

**Clacton-on-Sea, Eng.**—Clacton-on-Sea Pier and Pavilion. Illustrated description. 2000 w. Engng—March 20, 1896.

**Concrete.**—See **Duluth Ship Canal; CAISSON—Madras.**

**Duluth Ship Canal.**—Concrete Pier Superstructure for the New Ship Canal Entrance to Duluth Harbor, Minn. Illustrates the revised designs and describes the general construction. 3500 w. Eng News—July 26, 1900.

See also **BREAKWATER—Marquette.**

**Fire, Hoboken.**—See **FIRE—Hoboken Piers.**

**Old Orchard, Me.**—Construction of the Old Orchard Pier. Illustrated description of the construction of a steel pier 1800 feet long, supported on jet-piles. 2000 w. Eng Rec—Feb. 11, 1899.

**Pauillac, Bordeaux.**—Landing Pier at Pauillac (Appontement de Pauillac, Gironde). Ch. Talansier. Illustrated description of the new pier on the Gironde, forming a deep-sea port for the city of Bordeaux. 1 plate. Serial. Génie Civil—Nov. 4, 1899.

The Public Pier of Pauillac. Illustrated description of a fine piece of engineering work which has made it possible for Bordeaux to stand third in rank among the great commercial ports of France. 1800 w. Sci Am Sup—May 15, 1897.

**Recreation.**—Recreation Piers. Edward C. O'Brien. Describing the opening of one such pier, and plans concerning others. 2200 w. Munic Aff—Sept., 1897.

The New Recreation Pier, New York City. Illustrated description of the changes made in the pier at foot of East Third St., which is the first of four piers for recreation which have been projected. 600 w. Eng Rec—July 3, 1897.

The Third Street Recreation Pier. A description of the most important features, with drawings of this New York pier, which combines commercial uses and free popular pavilions that will benefit the residents of the crowded tenement districts. 2000 w. Eng Rec—Oct. 30, 1897.

**PIER ACCIDENT.**

**St. John, N. B.**—The Sinking of a Wharf at St. John, N. B. Account taken from the "Daily Sun" and "Daily Telegraph," of St. John, N. B. 1300 w. Eng News—Dec. 3, 1896.

**PIER SHED.**

See also **PIER.**

**Collapse, New York.**—Collapse of a Pier Shed, New York City. Detailing the circumstances under which a partially completed pier shed was blown down during a severe storm. 1200 w. Eng Rec—Sept. 10, 1898.

**New York.**—The Construction and Erection of a New York Pier Shed. Illustrated description of the freight and passenger shed for pier No. 13, North River, New York. 500 w. Eng Rec—Jan. 18, 1896.

**Steel, New York.**—A Large Steel Pier Shed. Illustrates and describes the design and methods of construction of the 736x120-ft. pier shed of the White Star Line in New York, one of the last to be built prior to the fire on the piers of the North German Lloyd line in Hoboken. 2500 w. Eng Rec—July 28, 1900.

**PIG IRON.**

See also **BLAST FURNACE; CAST IRON; FOUNDRY IRON; IRON; IRON INDUSTRY;** and Iron Compound Titles.

Commercial Progress as Influenced by the Development of the Pig Iron Industry. John Birkinbine. Read before the Federated Canadian Mining Inst. Discusses the production of pig iron, and the reliance of the more advanced stages of manufacture upon the crude metal, as illustrated by the record made in the United States. 3000 w. Can Min Rev—March, 1898.

Distribution of the World's Production of Pig Iron. John Birkinbine. A statement giving a general idea of amounts as compiled from latest official records, of ores, iron, and metals produced in the various countries that contribute to the output. 6000 w. Trans Am Inst of Min Engs—Aug., 1900.

Pig Iron Production, Prices and Prospects. Tables and curves showing statistics for the last three years, and also a comparison, with statistics, for 1879-80. 2200 w. Eng News—Sept. 20, 1900.

**Analysis.**—See **Grading; Sampling; CAST IRON—Physics; FOUNDRY IRON; IRON ANALYSIS.**

**Anthracite.**—Recollections of the Anthracite Pig Iron Industry. E. Roberts. Information on some points, with remarks relative to the costs and yields of actual workings at Guiscedwyn and in America. 2700 w. Ir & Coal Trds Rev—Nov. 20, 1896.

Reminiscences of the Early Anthracite Iron Industry. Samuel Thomas. Reviews the use, growth and development of anthracite coal in the manufacture of pig iron. Ill. 7500 w. Trans Am Inst of Min Engs—June, 1900.

**Breakers.**—Pig Iron Breakers. T. E. G. Marley describes the machine at the works of the Whitehaven Hematite Iron & Steel Co., Ltd., and Enoch James the hydraulic machine used at the Dowlais Works. Ill. 2800 w. Col Guard—April 20, 1900.

**British.**—The Production of Pig Iron. From the London "Times." The improvement in this industry in Great Britain, calling attention to prominent features of progress. 1800 w. Col Guard—Oct. 30, 1896.

**British, 1899.**—The Make and Stocks of Pig Iron in the First Half of 1899. Statistics concerning the production of pig iron, and pig iron stocks, with a statement of the condition of the furnaces in the United Kingdom. 1000 w. Ir & Coal Trds Rev—Sept. 8, 1899.

**Casting Machine.**—See **CASTING MACHINE.**

**Charcoal By-Products.**—Influence of the By-Products of Charcoal Manufacture on the Charcoal Pig Iron Industry. H. O. Chute. Shows the dependence of one industry upon another, and the present development of charcoal iron manufacture. 1500 w. Ir Age—Oct. 5, 1899.

**Cleveland, Eng.**—The Late "Rig" in Cleveland Pig Iron. A discussion of the iron trade of this English district. 1300 w. Col Guard—Dec. 2, 1898.

**Cost.**—Comparative Costs of Producing Pig Iron. New figures presenting the subject in a new light, from the 1894 Report of the Bureau of Industrial Statistics of Penna. 700 w. Ir Age—March 19, 1896.

The Costs of Pig Iron in Relation to the Ore. Walter J. May. Considers the reasons why America can deliver pig iron in England at a lower price than the British product, and offers suggestions to mine owners and iron smelters. 900 w. Mech Wld—Dec. 2, 1898.

See also **IRON INDUSTRY; IRON MANUFACTURE.**

**Cost, Alabama.**—The Cost of Producing Pig Iron in Alabama. William B. Phillips. From advance sheets of "Iron Making in Alabama." Statistics of cost of raw material, and of manufacture, with related matter of interest. 2500 w. Am Mfr & Ir Wld—Dec. 2, 1898.

**Famine.**—The Position of Pig Iron. Editorial discussion of the present situation, which threatens a famine of pig iron supplies. 2500 w. Engr, Lond—April 21, 1899.

Will There Be a Pig Iron Famine? C. Schoenhof. Facts bearing on this subject are presented.

pointing to an affirmative answer for America. 2200 w. Ir Trd Rev—April 21, 1898.

See also **IRON INDUSTRY.**

**Fracture.**—See **Grading.**

**France.**—Notes on the French Pig Iron Industry (Mittheilungen über die Fransösische Roheisenindustrie). A tabular review of French iron production by departments, compared with that of other countries. 6000 w. Stahl und Eisen—Jan. 15, 1898.

The French Pig Iron Industry. From an article by Oscar Simmersbach in "Stahl und Eisen." Information of the scarcity of material and inferior quality, etc. 1300 w. Am Mfr & Ir Wld—Feb. 11, 1898.

**France and World.**—Production of Pig Iron in France and in the World. H. K. Landis. Statistics from an article by M. Pourcel with notes. Tables and diagrams. 350 w. Ir Trd Rev—Nov. 5, 1896.

**Grading.**—Indications of Fracture in Pig Iron. Edward Kirk. How the chemist can utilise knowledge of fracture indications. 1700 w. Am Mfr & Ir Wld—June 21, 1900.

The Fracture of Pig Iron. Edward Kirk. Concerning some points of grading by this method. Considers the characteristics indicated as accurately as by chemical analysis, but only when judged by experts. 2000 w. Ir Trd Rev—Feb. 15, 1900.

Pig Iron Fractures and Their Value in Foundry Practice. J. W. Miller. On the unreliability of grading based on fracture and the value of chemical analysis. 3300 w. Ir & Coal Trds Rev—Aug. 18, 1899.

The Grading of Cast Iron by Its Composition (Die Bewerthung des Roheisens auf Grund seines Verhaltens beim Gattiren mit Brucheisen). Dr. Wüst. An important paper, showing that irons may be graded satisfactorily by their chemical composition and that test results may be repeated by proper selection of pig and proportion of scrap; with large table of actual examples. 5000 w. Stahl und Eisen—Oct. 15, 1897.

Scrap Carrying and Pig Iron Values. Translation of a paper by Dr. Wuest, read at meeting of German Foundrymen's Assn. Shows the present status of German foundry knowledge. Serial. Ir Trd Rev—Dec. 2, 1897.

The Valuation of Pig Iron in Foundry Practice. Dr. Wüst. Read at the meeting of the German Foundrymen's Assn., at Goslar, Prussia. Condensed translation. Showing that the value depends on the chemical composition. 2500 w. Am Mfr & Ir Wld—Nov. 12, 1897.

The Purchase of Foundry Iron on Analysis and a Standard System of Grading Pig Iron. A circular letter was sent out with the view of ascertaining the sentiment of foundrymen, and the first twenty replies are given in part first. 2300 w. Am Mfr & Ir Wld—Jan. 13, 1899.

Selling of Pig Iron on Analysis. C. R. Baird & Co. Response to a letter from William R. Webster, asking C. R. Baird & Co. to give the results of their experience in selling pig iron on analysis. Presented at the Pittsburg meeting of the American Inst. of Min. Engs., as part of the discussion on "The Physics of Cast Iron." 900 w. Ir Trd Rev—Feb. 27, 1896.

Southern Export Iron. William B. Phillips. The importance of the question of composition in connection with iron to be exported, urging great care in grading. 1300 w. Ir Trd Rev—Aug. 26, 1897.

The Grading of Southern Coke and Charcoal Iron. The purpose of the paper is to point out the fallacies and show wherein the present system of grading, as practiced, lacks the uniformity and exactness which should be expected, and to urge the necessity of a standard based on chemical inspection. Serial. Tradesman—June 15, 1897.

The Yard Grading of Pig Iron. William B. Phillips. Read before the Pittsburg Foundrymen's Assn., Dec. 27, 1898. Defines the various grades, and ways of grading, giving proposed improvements. 3800 w. Ir Trd Rev—Dec. 29, 1898.

See also **Sampling; CAST IRON—Physics; FOUNDRY IRON; IRON ANALYSIS.**

**Inferior Ores.**—Pig Iron from Inferior or Dirty Ores. Walter J. May. Suggesting the use of a sodium-iron alloy in furnace practice to remove oxygen and injurious impurities from the iron. 1100 w. Col Guard—Nov. 8, 1895.

**Sampling.**—A Device for Sampling Pig-Iron. Porter W. Shimer. Illustrated description. 400 w. Trans Am Inst of Min Engs—Feb., 1900.

A Device for Sampling Pig Iron. Porter M. Shimer. A paper read before the American Institute of Mining Engineers, giving an illustrated description of a small cup, fitted to a breast-drill, to catch the drillings. 400 w. Eng News—Sept. 27, 1900.

Sampling Pig Iron for Analysis. Albert Ladd Colby. A discussion of the methods of sampling pig iron with the object of showing how accuracy can be obtained without unnecessary complications. 5500 w. Ir Age—June 2, 1898.

**Sandless.**—Sandless Pig Iron. Thomas D. West. On the advantages of sandless pig iron. 2400 w. Am Mach—Dec. 28, 1899.

See also **CASTING MACHINE.**

**Siliceous Efflorescence.**—A Peculiar Silicious Efflorescence upon Pig Iron. B. F. Fackenthal, Jr. Descriptions and analyses of an efflorescence that appeared when the pigs were broken hot from the sow. 1500 w. Trans Am Inst of Min Engs—Feb., 1900.

**Sulphur.**—Sulphur in Embreville Pig Iron. Guy R. Johnson. An explanation of the pitted appearance of pig iron, generally supposed to indicate the absence of silicon, claiming that it is due to the giving-off of included gases, particularly sulphurous oxide. 900 w. Trans Am Inst of Min Engs—March, 1897.

**United States.**—The Location of Pig Iron Production in the United States. Gives figures showing that the center of pig iron production has passed to the Central West—the district of Pittsburg, Cleveland and Chicago. 1200 w. Eng & Min Jour—Feb. 26, 1898.

**U. S., Southern.**—Pig Iron, Southern. Extract from the London "Iron and Steel Trades Journal," with letters from James Bowron, of the Tenn. Coal & Iron Co. Remarkable growth of the foreign demand for it; countries to which it is exported; outlook for a continuation of the movement. 2400 w. Bradstreet's—Feb. 6, 1897.

The Pig Iron Trade. T. P. Wells. A retrospect of its movements in the South in the past year. 1000 w. Tradesman—Jan. 1, 1897.

See also **Grading; IRON INDUSTRY.**

**Warrant System.**—Comments on Pig Iron Selling. George H. Hull. Read at Am. Foundrymen's Assn. Discusses the Syndicate System of Germany, the Warrant System of Great Britain, and selling methods in the United States. 4400 w. Am Mfr & Ir Wld—Feb. 8, 1900.

Industrial Depressions and the Pig-Iron Reserve. Geo. H. Hull. Points out the difference between a panic, caused by low prices, and a depression, caused by high prices, and presents statistics showing a close connection between abnormal prices for iron and reasons of great depression. Proposes reduction of iron prices and the creation of a reserve supply as efficient means for recovering stability. 7000 w. Eng Mag—Aug., 1900.

The Cost of Iron as Related to Industrial Enterprises. George H. Hull. Urging the advantages of exchange dealings in pig iron by the warrant system. 2600 w. Eng Mag—Dec., 1896.

## PILE.

See also **BREAKWATER; BRIDGE; BULKHEAD; DOCK; FOUNDATION; HARBOR; PIER; PILE DRIVING; PILE SCREWING; TALL BUILDING.**

**Life.**—See **BRIDGE—Wooden.**

**Supporting Power.**—"A New Method for Determining the Supporting Power of Piles." Franz Kreuter. Explains a new method which the author considers simple and reliable. 1200 w. Ind & East Eng—Aug. 22, 1896.

New Method for Determining the Supporting Power of Piles. Franz Kreuter. Read before the foreign Inst. of Civ. Engs. The method is described as consisting in making two consecutive sets of blows with differing energy; and the formulae deduced from the data are said to be much superior to those generally in use. 1000 w. Ry Rev—May 9, 1896.

**Teredo Protection.**—Protection of Piles Against the Teredo. The piles of a railway trestle were encased in vitrified culvert pipe, the joints being made with a pitch and sand cement, and the space inside filled in with sand and gravel. The plan has been very successful. Ill. 800 w. Ry Rev—Nov. 16, 1895.

**Wood-Borers.**—Marine Wood-Borers. Charles H. Snow. Illustrated description of the animals and their manner of working, their reproduction and development, some of the methods of protection which have proved most successful, etc. 12000 w. Pro Am Soc of Civ Engs—May, 1898.

**Worm-Eaten.**—Worm-Eaten Piles. Onward Bates. A report of investigations made, and of the writer's experience with southern timber. 1500 w. Jour W Soc of Engs—Oct., 1899.

### PILE DRIVER.

See also **PILE; PILE DRIVING; PILE SCREWING.**

On Pile-Driving Machines. F. J. Rowan. A survey of various machines for driving piles, with discussion. Ill. 9000 w. Trans Inst of Engs & Shipbuilders in Scotland—Feb. and March, 1900.

**Portable.**—A Portable and Collapsible Pile Driver. Illustrated description of a driver with 40-ft. leads capable of working vertical or inclined piles on the sides or ends of its cars, which can be folded up into a very small space for transportation. 700 w. Eng Rec—Feb. 17, 1900.

**Railway.**—A Railway Pile Driver. G. W. Smith. Describes the important work done in the maintenance of bridges, and in emergencies, and describes a recently constructed pile driver for the Chicago, Milwaukee & St. Paul Railway Co. Ill. 5000 w. Jour W Soc of Engs—June, 1899.

Best and Most Economical Railway Track Pile Driver. Report of G. W. Hinman to the Convention of Ry. Supts. of Bridges and Buildings, with discussion. 2400 w. Pro Assn of Ry Supts—Oct., 1896.

A New Pile Driver. L. S. & M. S. Ry. Five views and descriptive notes of a pile driver possessing many features of interest. 800 w. Ry Mas Mech—Sept., 1898.

Pile Driver Car, L. S. & M. S. Ry. Detailed drawings with brief description. 600 w. Ry Mas Mech—Oct., 1898.

Two Railway Pile Drivers. Illustrates and describes the machine designed by G. W. Smith, giving extracts from his paper in the "Jour. of W. Soc. of Engs." Also another pile driver built for the G., C., & S. F. Ry. 2400 w. Eng News—Nov. 16, 1899.

### PILE DRIVER CAR.

See **PILE DRIVER—Railway.**

### PILE DRIVING.

See also **PILE; PILE DRIVER; PILE SCREWING.**

Pile Drivers and Pile Driving. Perry F. Nursey. A consideration of this subject showing why a heavy ram with a short fall does the most efficient work. 2000 w. Ind & Ir—Dec. 17, 1897.

Some Instances of Piles and Pile Driving, New and Old. Horace J. Howe. A record of facts and experiments from the experience of the writer, with quotations from many authorities, and discussion. 2350 w. Jour Assn of Engng Socs—April, 1898.

**Formulas.**—Pile Driving Formulas: Their Construction and Factors of Safety. Charles H. Haswell. Deductions and opinions given are the results of observations of a varied and extensive experience of pile driving in every variety of soil. 3700 w. Pro Am Soc of Civ Engs—May, 1899.

Pile Driving Formulas. Discussion of the reasonings and citations given in a paper by Charles H. Haswell in the Pro. of the Am. Soc. of Civ. Engs. 2800 w. R R Gaz—Sept. 1, 1899.

Pile Driving Formulas: Their Construction and Factors of Safety. Discussion of paper by Charles H. Haswell. 4200 w. Pro Am Soc of Civ Engs—Sept., 1899.

### PILE SCREWING.

See also **PILE.**

**Hydraulic.**—A Hydraulic Screwing Machine for Driving Screw Piles. Charles William Anderson. Abstract of a paper presented to the Institution of Civ. Engs. Describes the machine and its operation under varying conditions. 1000 w. Eng News—Aug. 9, 1900.

A New Hydraulic Pile Screwing Plant. Illustrated description. 600 w. Ind Engng—Feb. 27, 1897.

Hydraulic Pile Screwing. C. W. Anderson, before the Inst. of Civ. Engs. Illustrating and describing water motors for screwing piles into hard material and giving results of work with these machines. 1700 w. Eng Rec—June 16, 1900.

### PILLAR.

See **COLUMN.**

### PILOT BOAT.

**"Haidamak," Crimea.**—See **ICE BREAKER.**

**Humber.**—The Humber Steam Pilot Yacht "Commander Cowley." Brief description with illustrations. 500 w. Engng—Dec. 29, 1899.

**New York.**—The Pilots and Pilot Boats of New York. Gives the history of this service and outlines the changes that have added to the comfort and lessened the peril of the pilot's life. Ill. 1800 w. Sci Am—Oct. 22, 1898.

### PINE.

See also **BEAM; BUILDING MATERIAL; MATERIALS' STRENGTH; TIMBER; WOOD.**

**Georgia.**—The Strength of Georgia Pine. Harry H. Miles. Experiments investigating the transverse and compressive strength of pine. 1300 w. Southern Archt—Sept., 1896.

**Norway.**—Transverse Strength of Spruce Beams, and of Norway Pine Beams. Tabulated data obtained in the laboratory of Massachusetts Institute of Technology. 200 w. Tech Quar—June-Sept., 1896.

**Oregon.**—Transverse Tests of Beams of Oregon Pine (Douglas Fir). Letter from William Hood, chief engineer of the Southern Pacific Co., with a memorandum concerning transverse tests of 60 beams of Oregon pine, and a table giving a summary of results and figures of moduli of elasticity and fibre stress. 2000 w. Eng News—June 25, 1896.

**Southern.**—Southern Pine—Mechanical and Physical Properties. Relating to investigations carried on by the Division of Forestry in the laboratory at St. Louis, under J. B. Johnson and in the laboratory at Washington, by Filibert Roth. The data presented are condensed from not less than 20000 tests, and a similar number of measurements and weighings. 5800 w. U S Dept of Agri—Cir. 12, 1896.

**White.**—Notes on Overloaded White Pine. Justin Burns. Showing that a higher allowable unit stress could be used in designing. 500 w. Ry Rev—March 28, 1896.

**Wind Cracks.**—Investigations on the Influence of Wind Cracks upon the Strength of Pine Timber (Untersuchung über den Einfluss des Blauwerdens auf die Festigkeit von Kiefernholz). A very thorough series of tests upon the strength of wind shaken timber, with numerous illustrations, made by the Royal testing laboratory at Berlin. 25000 w. Mitt aus d König Tech Versuchsanstalten—Part I., 1897.

### PINTSCH GAS.

See also **CAR LIGHTING; GAS MANUFACTURE—Oil.**

The Pintsch Gas System of To-Day. F. H. Shelton. Describes the Pintsch gas producing plant at Washington, D. C., as typical of the large number extending from the Atlantic to the Pacific, and gives interesting facts in connection with its extensive use in railway lighting. 2500 w. Am Gas Lgt Jour—May 30, 1898.

**Hütteldorf Works.**—The Oil-Gas Plant at Hütteldorf-Hacking (Die Oelgas-Anstalt in Hütteldorf-Hacking). Franz Grobben. A plant for the manufacture of oil-gas for use on the Vienna local railway. Both the generating and compressing apparatus are described. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—April 21, 1899.

The Oil Gas Plant at Hütteldorf, near Vienna (Die Oelgas-Anlage in Hütteldorf bei Wien). Franz Walter. Including a general discussion of the manufacture of illuminating gas from oil, and a fully illustrated description of this modern plant for producing and compressing the gas for use in train lighting. 4500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1900.

**Manhattan Elevated Ry. Plant.**—Pintsch Gas Plant, Manhattan Elevated Railroad, New York. Illustrated detailed description of the plant installed at 159th St., New York City, for supplying daily 1100 cars of the Manhattan Elevated Railroad. 2200 w. Am Eng & R R Jour—Jan., 1899.

**New Haven, Conn.**—The Manufacture of Pintsch Gas. Illustrates a typical plant installed at New Haven, Conn., for supplying the cars of the N. Y., N. H. & H. R. R. R. 1800 w. Sci Am—July 9, 1898.

**PIPE.**

See also **GAS PIPE; PIPE MANUFACTURE; STEAM PIPE; WATER PIPE.**

**Area and Discharging Power.**—See **WATER FLOW—Pipes.**

**Cast Iron.**—See **WATER PIPE.**

**Coatings.**—See **WATER PIPE.**

**Concrete Reinforced.**—Cement Pipes with Metal Skeleton. Illustrated description, translated from "La Nature." 300 w. Brick—June, 1896.

**Concrete Reinforced Test.**—Test of Concrete Iron Pipe. Ernest L. Ransome. Describes test by hydraulic pressure of a pipe 7 feet in diameter. 600 w. Eng Rec—May 28, 1898.

**Flanges.**—See **FLANGE; PIPE FLANGE.**

**Incrustation.**—See **WATER PIPE.**

**Lead.**—How Lead Pipe is Made. Account of the manufacture. 1700 w. San Plumb—March 15, 1898.

See also **PLUMBING.**

**Material.**—See **BOILER.**

**Obstruction Location.**—See **PNEUMATIC TUBE; WATER PIPE.**

**Overflow.**—See **OVERFLOW PIPE.**

**Sewer.**—See **SEWER—Pipe.**

**Specification.**—Notes on Specifications for Cast Iron Water and Gas Pipes. C. A. Meissner. Read before the Min. Soc. of Nova Scotia. Calls attention to points in the average specification that seem very unnecessary, and submits a concise specification covering all points. 2200 w. Can Min Rev—April 29, 1899.

**Steam.**—See **STEAM PIPE.**

**Steel vs. Wrought Iron.**—The Relative Strength of Wrought Iron and Steel Pipe. Report of tests made by Henry M. Howe, at the instance of the National Tube Works Co., the results showing a very great superiority of the steel pipe over the wrought iron. 1000 w. Am Mfr & Ir Wld—April 29, 1898.

**Test.**—See **Concrete Reinforced Test.**

**PIPE COUPLING.**

Pipe Coupling. Describes a coupling brought out by Andrew J. Avery, of Dunkirk, N. Y., which is both gas and water tight under all pressures. 600 w. Bos Jour of Com—June 4, 1898.

**PIPE FITTING.**

See also **PIPING; STEAM PIPING.**

Pipes and Fittings. Tecumseh Swift. Calls attention to some particulars needing improvement, offering suggestions. 1200 w. Am Mach—Aug. 11, 1898.

**Nipples.**—Nipple-Cutting and Threading. Orion Tutt. Illustrates and describes the work. 3000 w. San Plumb—Jan. 1, 1900.

**PIPE FLANGE.**

See also **FLANGE—Pipe.**

**Standard.**—Standard Pipe Flanges. A table of standard flanges, from the report of a committee of the American Society of Mechanical Engineers. 500 w. Am Mach—Sept. 27, 1900.

**Strength.**—The Calculation of the Strength of Loose and Fast Flanges (Berechnung der Festigkeit Loser und Fester Flanschen). An analytical discussion of the strength of pipe flanges, when cast in one piece with the body, and when considered separately. 6000 w. Zeitschr d Ver Deutscher Ing—Sept. 4, 1897.

**Tool.**—The Attachment of Flanges to Pipes (Befestigung von Flanschen an Leitungsröhren). Describing a form of roller expanding tool for securing flanges to copper steam pipes. 1000 w. Zeitschr d Ver Deutscher Ing—Nov. 13, 1897.

**PIPE FOUNDING.**

See **PIPE MANUFACTURE.**

**PIPE FOUNDRY.**

**Chattanooga.**—The Chattanooga Pipe Foundry. Illustrated description of a new plant recently erected by the Chattanooga Foundry and Pipe Company. 1000 w. Am Mach—Aug. 12, 1897.

**PIPE JOINTS.**

See **PLUMBING; WATER PIPE.**

**PIPE LAYING.**

**Submerged.**—See **GAS PIPE—Harlem River; Under Water; SEWER—Reading, Pa.; WATER MAIN; WATER PIPE.**

**PIPE LINE.**

See **WATER PIPE.**

**PIPE MANUFACTURE.**

See also **PIPE; PIPE FOUNDRY; WATER PIPE.**

**Casting.**—Casting Pump Pipes. Illustrated description of Scotch practice which differs in some respects from English practice. 1600 w. Eng, Lond—Jan. 24, 1896.

**Founding.**—Pipe Founding. Eliot A. Keeler. Read at meeting of the Foundrymen's Assn. A review of American practice. Ill. 1600 w. Foundry—Oct., 1900.

Some Notes on Pipe Founding. E. Kebler. Read before the Foundrymen's Assn., England. Illustrated description of modern practice. 1600 w. Ir & Coal Trds Rev—May 25, 1900.

**Lap-Welding.**—Making Lap-Welded Pipe. Describes the process of manufacture as carried out at the plant of the National Tube Works Company, at McKeesport, Pa. 1200 w. Am Mfr & Ir Wld—Feb. 19, 1897.

**Lead.**—See **PIPE.**

**Welded Iron and Steel.**—The Manufacture of Welded Iron and Steel Pipes. Discussion of paper read before the Inst. of Engs. and Shipbuilders, in Scotland. 4000 w. Engs Gas—Aug., 1896.

**PIPE THREAD.**

See also **SCREW THREAD.**

**Standardization.**—The Unification of Pipe Threads (Unification des Filetages sur Tubes). A communication from the Royal Institute of Engineers of the Netherlands, urging united action to secure uniformity, and providing blank forms for replies. 1000 w. Bull de la Soc d'Encour—Feb. 28, 1900.

**PIPING.**

See also **STEAM PIPE; STEAM PIPING.**

**Electric Stations.**—The Arrangement of Steam and Other Pipes, and Their Fittings. J. E. Edgcome. Read before the Munic. Elec. Assn. Also discussion. Views concerning the arrangement especially in central stations of small or moderate size. Ill. 5000 w. Elect'n, Lond—July 21, 1899.

The Arrangement of Steam and Other Pipes and Their Fittings. J. E. Edgcome. Read at the Bristol Convention of the Munic. Elec. Assn. Information from experience, relating to the arrangement of piping for small or moderate sized stations. Ill. 4000 w. Elec Eng, Lond—June 30, 1899.

The Arrangement of Central Station Piping. William D. Ennis. Considers the arrangement in a small lighting plant, and also for a 500 h. p. station. Ill. 3000 w. Am Elect'n—June, 1900.

The Design of Piping for Electric Power Houses. Illustrated description of the best methods of piping and of faults to be avoided. 6000 w. Eng Rec—Dec. 17, 1898.

**High Pressure.**—Fittings and Joints for High Pressure Piping. John Platt. Discusses various methods of making tight joints in pipes with illustrated descriptions of joints which have proved eminently serviceable and durable; also presents a table of proposed standard flanges for hydraulic packing for the adoption of which an effort is now being made. 1100 w. Eng News—March 19, 1896.

**Power Plant.**—Power Plant Piping and Accessories. William D. Ennis. Considers the principles of design and discusses the high pressure steam pipes, in the present article. Ill. 3000 w. St Ry Rev—Jan. 15, 1900.

**Steam Heating.**—See **STEAM HEATING—Piping.**

**Steamship.**—The Piping of a Modern Steamship. A. B. Willits. Description of the systems of piping necessary to the proper action of the machinery, with suggestions for arranging. 2200 w. Engr, N. Y.—May 2, 1898.

**PISTOL.**

**Borchardt.**—Borchardt Automatic Repeating Pistol. Illustrated description of the pistol and its action, with report of the trial by United States authorities. 1300 w. Engr, Lond—Aug. 19, 1898.

**Colt Navy Revolver.**—The Manufacture of the Colt Navy Revolver, Model 1895. Describes the revolver and the manufacture of the several parts, especially the operations that are novel. Ill. 3000 w. Ir Age—May 27, 1897.

**Mauser.**—The New Recoil Pistol (Ner Neue Pistole Rückstosslader). A paper by H. Mauser upon a new magazine pistol which is reloaded automatically by the action of the recoil. Details fully illustrated. 3500 w. Zeitschr d Ver Deutscher Ing—May 1, 1897.

**PISTON RING.**

**Packing.**—Piston Packing Rings of Modern Steam Engines. Otto C. Reymann. Investigates the methods of securing a steam-tight piston, and how packing rings are to be designed in order to exert the required pressure on the cylinder walls, devises formulae for ring types generally used. Serial. Jour Fr Inst—Aug., 1897.

See also **PACKING.**

**Snap.**—Snap Piston Rings. F. A. Halsey. Directions for fitting, with diagrams. 1200 w. Am Mach—July 30, 1896.

**PISTON ROD.**

**Buckling.**—Investigations Into the Buckling of Piston Rods (Untersuchung der Knickfestigkeit von Kolbenstangen). G. Huguenin. A mathematical investigation of the forces and their action upon a piston rod in a steam engine, with diagrams deduced from the equations. A practical example is given. 1800 w. Schweizer Bauzeit—March 3, 1900.

See also **BUCKLING.**

**Carbon Contents.**—Note on the Carbon Contents of Piston Rods as Affecting Their Endurance under Fatigue. Joseph E. Johnson, Jr. Data showing the superior endurance of high-carbon steel. 1300 w. Am Soc of Mech Engs, No. 776—June, 1898.

**Steam Hammer.**—Some Interesting Piston Rods. H. K. Landis. A most interesting description of hollow piston rods that failed on the great steam hammer at Bethlehem, Pa., and of a final one of nickel steel that has stood since 1892. 1000 w. Ir Age—June 11, 1896.

**PIT.**

See **COAL MINE.**

**PITCH-BLENDE.**

See **URANINITE.**

**PITTSBURG.**

See also **COAL INDUSTRY; IRON INDUSTRY.**

Pittsburg, With Its Black Diamonds. A. P. Kirtland. An account of this city and its industries, all of which is attributed to the coal in that locality. Ill. 5800 w. Pro Engs Soc of W Penna—May, 1899.

The Agricultural, Mineral, Industrial and Commercial Resources of Pittsburg and Vicinity. Thomas Bruce. The wonderful resources of this section are shown and its influence in the fields named. Ill. 22500 w. Am Mfr & Ir Wld—Oct. 7, 1898.

**PLACER.**

See **GOLD PLACER.**

**PLANE.**

**Optical Verification.**—See **SURFACE.**

**PLANER.**

See also **MACHINE SHOP; MACHINE TOOL.**

**Armor Plates.**—Machine for Planing Armor Plates (Hobelmaschine zur Bearbeitung von Panzerplatten). L. M. Schechter. A brief description of powerful planing machine constructed by the Charkow Machine Works, Russia, for use in the Russian naval workshops at Kolpina, near St. Petersburg, with plate of working drawings. 800 w. 1 plate. Zeitschr d Ver Deutscher Ing—Dec. 31, 1898.

**Concave Surfaces.**—Peculiar Planing. John Randol. Illustrated description of a method for finishing concave surfaces on a planer, and of a method for planing rod-straps on the inside. 1400 w. Am Mach—June 25, 1896.

**Drive.**—A New Planer Drive. John Randol. Describes and approves the Whitcomb planer and pronounces the "bull wheel" an unwarranted construction expense, apparently serving no useful purpose. Ill. 1100 w. Am Mach—May 13, 1897.

How the Planer Was Driven. John Randol. Describes the drive of a planer in the Builders' Iron Foundry Machine Shop, Providence, R. I. 1200 w. Am Mach—June 17, 1897.

See also **ELECTRIC DRIVING.**

**Extended.**—A Much Extended Planer Tool. Oberlin Smith. Illustrated description of a special tool with a "nose" about 8 feet long. 1000 w. Am Mach—Dec. 21, 1899.

**Gauge.**—See **GAUGE—Planer.**

**Gear.**—Notes on the Driving of Machine Tools (Zur Kenntnis der für Werkzeugmaschinen Gebräuchlichen Wendegetriebe). H. Fischer. Especially devoted to improved driving and reversing gear for planers, with reference to increased cutting speeds. 6000 w. Zeitschr d Ver Deutscher Ing—May 7, 1898.

**Key-Seating.**—Key-Seating on the Planer. John F. McNutt. Illustrated description of method in which the cutting is done by broaching tools. 400 w. Am Mach—July 2, 1896.

**Pneumatic Reverse.**—Something New in Planers. Illustrates and briefly describes a pneumatic reverse planer, the invention of Alexander Gordon, and brought out by the Niles Tool Works. 600 w. Am Mach—May 13, 1897.

**Post.**—A Large Post Planing Machine. Illustrated description of a machine made by Bement, Miles & Co., for the Bethlehem Iron Works. 700 w. Am Mach—Oct. 21, 1897.

**Special Jobs.**—Special Planing Jobs. John Randol. Shop-work with the planer is described, with illustrations of different makes of planers and explanations. 2000 w. Am Mach—Jan. 28, 1897.

**Stone.**—A Stone Planer. Illustrated detailed description of construction and operation. 1000 w. Am Mach—April 2, 1896.

**Time Saving.**—Time Saving in Planing. Henry Hess. Gives methods and shows the importance of the highest possible cut-rate and the small value of further increase of speed on the return stroke. 1000 w. Am Mach—Feb. 24, 1898.

**Tool Holder.**—A Gang Tool Holder for the Planer. Illustrates a design for such a tool, and remarks on its use. 400 w. Am Mach—March 22, 1900.

**PLANIMETER.**

See also **CALCULATING MACHINE; COMPUTER; PANTOGRAPH.**

A Simple Explanation of the Construction and Uses of the Planimeter. Cecil H. Peabody. A brief illustrated description of various forms of this instrument, with a simple but complete discussion of its principle. Serial. Marine Engng—April, 1900.

**Goodman's Hatchet.**—Goodman's Hatchet Planimeters. An improved form by Prof. Goodman, of Leeds, Eng., is illustrated and described. 2000 w. Engng—Aug. 21, 1896.

Goodman's Hatchet Planimeters. Illustrated detailed description. 2000 w. Sci Am Sup—Sept. 26, 1896.

**Integrator.**—A New Integrator. A Russell and H. H. P. Powles. Description of a cheap appliance to be used with an Amsler planimeter for performing integration. 1000 w. Eng, Lond—Jan. 24, 1896.

**Integrator, Kohlmorgen.**—The Panintegrimeter, an Instrument for Measuring Curves and Surfaces (Panintégrimètre, Instrument pour Mesurer les Courbes et les Surfaces). Describing the new integrator of Kohlmorgen, a combination of the pantagraph and the planimeter, and of much wider range of uses than the latter instrument. 2500 w. Rev Tech—July 10, 1897.

**Lippincott.**—The Lippincott Planimeter. A. G. Greenhill. Illustrated description of the instrument and its use. 1800 w. Engr, Lond—Dec. 22, 1899.

**Mine Maps.**—See **PANTOGRAPH.**

**Moment.**—A New Moment Planimeter (Ein Neues Momentenplanimeter). A new form of planimeter by means of which the statical moment or the moment of inertia may be determined by mechanical integration. 3500 w. Schweizer Bauzeit—May 8, 1897.

**Polar.**—A Simple Theory of the Polar Planimeter (Einfache Theorie des Polarplanimeters). Prof. Robert Land. A geometrical study of the planimeter, demonstrating the principle upon which its action depends. 1800 w. Zeitschr d Ver Deutscher Ing—Sept. 2, 1899.

Some Observations on the Use of Polar Planimeters. Walter W. Patch. Notes collected during several years' experience furnishing facts relating to the degree of accuracy of results obtained. 2000 w. Eng News—April 13. 1899.

**Prytz vs. Scott.**—The Prytz Planimeter. Letters from H. Prytz, criticising some points in the planimeter as recently improved by Scott, and claiming that Scott is not the inventor of improvements claimed by him. 1300 w. Engng—Sept. 11, 1896.

**Stang.**—An Improved Stang Planimeter. Ernest Kilbourn Scott. Illustrated description. 900 w. Engng—Aug. 14, 1896.

**PLASTERING.**

A Plasterer on His Craft. Editorial review of a book by William Millar, "A Practical Treatise on the Art and Craft of Plastering and Modelling." 2800 w. Builder—Sept. 18, 1897.

Plastering Methods and Materials. Thomas Jones. Substance of a paper read before the Illinois Chapter of the American Inst. of Architects, at Chicago. A scientific dissertation on the ingredients of mortar for plastering, their mixture, tempering, application, etc. 4200 w. In Archt—Aug., 1896.

Plastering, Plain and Ornamental. W. J. Hynes. Presented before the Ontario Assn. of Architects. Reviews the materials, their use and application. Discussion. 5700 w. Can Arch—Feb., 1899.

**Decorative.**—Decorative Plaster Work. E. Prioleau Warren. Read before the London Archts. Assn. Suggestions as to the treatment of plaster work, its uses and abuses. 7800 w. Builder—Jan. 23, 1897.

**PLATE.**

See also **ARMOR PLATE; IRON PLATE; MATERIALS' STRENGTH; STEEL PLATE.**

**Boiler.**—See **BOILER PLATES.**

**Circular.**—Stresses in Circular Plates. Edward Godfrey. A letter discussing this subject and aiming to show that some of the formulas in use are wrong. 1800 w. Eng News—Jan. 4, 1900.

**Curved.**—Investigations into the Stresses and Deformations of Curved Plates (Untersuchungen über die Formänderungen und die Anstrengung Gewölbter Böden). C. Bach. A very complete record of measurements made upon convex and concave cylinder-heads of wrought and cast iron, giving tabulated and graphical results. Two articles, two plates. 10000 w. Zeitschr d Ver Deutscher Ing—Dec. 23, 30, 1899.

The Thickness and Form of Curved Sheet-Iron Plates (Sur l'Epaisseur et la Forme à Donner aux Tôles Embouties). Maurice Levy. An analytical and graphical investigation into the resistance of curved plates of various forms and thicknesses; applicable to boiler construction and similar work. 5000 w. Génie Civil—Dec. 30, 1899.

**Grooved.**—The Strength of Grooved Plates. C. E. Wolff. Shows what the results would be in the case of a perfectly elastic and a perfectly ductile plate respectively. 550 w. Prac, Eng—Jan. 29, 1897.

**PLATE GIRDER.**

See **GIRDER.**

**PLATE GLASS.**

See **GLASS—Plate.**

**PLATELAYING.**

See **TRACKLAYING.**

**PLATEWAY.**

See **TRACKWAY.**

**PLATINUM.**

See also **PRECIOUS METALS; RARE METALS.**

Platinum. David T. Day. From the U. S. Geological Survey. Information concerning the production, localities of occurrence, and refining establishments. 2200 w. Min & Sci Pr—Jan. 28, 1899.

**Assay.**—The Assay of Platinum. Edmund H. Miller. After reviewing the known methods in detail a "proposed method" is given for the assay of platinum in alloys or ores. 2000 w. Sch of Mines Quar—Nov., 1895.

**California.**—The Platinum Metals of Plumas County, California. J. A. Edman. Some notes on platinum, with iridium, osmiridium, and iridosmium, found in several of the deep gravel channels, and in some surface gravels. 1000 w. Min & Sci Pr—Oct. 22, 1898.

**New South Wales.**—The Occurrence of Platinum in New South Wales. J. B. Jaquet. Abstract of reports. Account of discovery and work. 900 w. Eng & Min Jour—Aug. 8, 1896.

**North America.**—Notes on the Occurrence of Platinum in North America. David T. Day. Gives results of careful examination and inquiry, the conditions of occurrence, etc. 1900 w. Trans Am Inst of Min Engs—Aug., 1900.

**Nugget.**—A Large Nugget of Platinum. Cyrus O. Baker. Interesting facts relative to the supply and consumption of this rare metal. Ill. 1500 w. Elec Rev—March 24, 1897.

See also **GOLD NUGGET—Structure.**

**Ural.**—The Occurrence of Platinum in the Oural Mountains. R. Helmhacker. Generally descriptive of the several districts, the character of the places, the methods of working, and of the yields, and the occurrence of associated minerals. Serial. Min & Sci Pr—Sept. 10, 1898.

The Platinum Deposits of the Tura River System, Ural Mountains, Russia. C. W. Purington. Illustrates and describes the principal platinum-producing district of the world, its discovery, the value of the deposit, manner of working, etc. 4500 w. Trans Am Inst of Min Engs—Feb., 1899.

See also **MINERAL REGION—Russia.**

**Yukon.**—Platinum in Yukon. Clipping from a local paper giving a report of a recent discovery, which may prove of great value. 1000 w. U S Cons Repts, No. 344—Feb. 7, 1899.

**PLOW.**

**Asia.**—The Plow in Asia (La Charrue en Asie). H. Chevalier. A historical study of the development of plowing devices of the East, this paper being devoted to the plow in China and Japan. 1200 w. Génie Civil—Nov. 11, 1899.

**Electric.**—An Electric Motor Plow (Ein Elektrischer Motorpflug). Dr. E. Müllendorff. A very complete description of a system using electric power to haul gang plows back and forth. Two articles. 6000 w. Glaser's Annalen—Aug. 1, 15, 1899.

Electrically Driven Plows (Elektrisch Betriebene Pflüge). Describing especially the Zimmermann system, with gang plow hauled by a chain operated by electric motor mounted on the plow. Two articles. 7000 w. Die Elektrizität—July 17 and 31, 1897.

Electric Motor Plows (Der Elektrische Motorpflüg). Dr. Müllendorff. A very fully illustrated description of the Zimmermann system of electric plows showing a complete installation, and giving detailed tabular statements of costs of maintenance and operation. 5000 w. Elektrotech Zeitschr—June 2, 1898.

See also **ELECTRICITY—Agriculture.**

**Steam.**—Cultivation with Steam Plows. J. L. Thompson. Gives an account of experience in Australia and cost of preparing the ground as compared with horses. 1700 w. Am Mfr & Ir Wld—April 12, 1900.

**PLUMBAGO.**

See also **GRAPHITE.**

**Lubricator.**—Plumbago. Editorial on the use of plumbago as a lubricator, the best form in which to apply it, scarcity of this form, etc. 1000 w. Engng—Sept. 10, 1897.

**PLUMBER.**

See also **PLUMBING; PLUMBING REGULATIONS.**

**Architect.**—The Architect in his Relation to the Plumber. W. J. Burroughs. The importance of the plumber's work, the need of harmony between plumber and architect, and the need of wise legislation. 2500 w. Can Arch—May, 1897.

The Model Plumber, from an Architect's Standpoint. O. J. Pierce. Considers the work of the contracting plumber. 3400 w. Dom Engng—July 15, 1900.

**Association.**—The Influence of the National Association of Master Plumbers and Its Results. W. F. Taaffe. Reviews the results of the past fifteen years. 1800 w. San Plumb—Sept. 15, 1897.

The National Association of Master Plumbers, U. S. A. Part first consists of introductory remarks and an account of the creation, constitution, progress, etc., of the association. 5500 w. San Plumb—June 15, 1897.

**Education.**—Full Course of Technical Instruction for Plumbers. A series of articles by a registered teacher and first-honors silver-medallist. Part first consists of introduction, and a consideration of dudecimals and mensuration. Serial. Dom Engng—May, 1897.

Science and Plumbers' Work. P. Phillips

Bedson. From a lecture delivered before the North of England Dist. Council, Nat. Registration of Plumbers. Brief suggestion for the education of plumbers, and the need of some knowledge of the sciences to understand the problems to be worked out. 1500 w. San Plumb—Aug. 1, 1898.

The Plumbers' Craft and Education. Prof. Garnett. The remarks are directed to the better protection of the public health through the plumbers' art and to increased appreciation of the plumbers' work. 1400 w. Dom Engng—Oct., 1896.

See also **Trade Schools.**

**Registration.**—Registration of Plumbers Under the New York Building Law. Extract dealing with the registration of master plumbers. 1000 w. Eng Rec—Sept. 23, 1899.

**Sewerage.**—The Position of the Master Plumber as Regards the Sewerage of Cities and Towns. James F. Traynor. Read at the New Orleans convention. The work of the plumber in connection with water supply, sewerage, general sanitation, etc. 2500 w. San Plumb—April 15, 1899.

The Position of the Master Plumber as Regards the Sewerage of Cities and Towns. James F. Traynor. Read at convention of the N. A. M. P., at New Orleans. Discusses the influence of the plumber in relation to the public health. 2400 w. Dom Engng—June, 1899.

**Trade Schools.**—The Proficiency of the Trade School Plumber. An account of one test applied to the students in their final examination. Ill. 700 w. Met Work—Aug. 27, 1898.

**PLUMBING.**

See also **BATHROOM; BUILDING CONSTRUCTION; DRAIN; DRAINAGE; HEATING; HEATING AND VENTILATION; HOT WATER; MECHANICAL PLANT; PLUMBER; PLUMBING REGULATIONS; SANITARY; SANITARY ENGINEERING; SEWER; SEWERAGE.**

Domestic Sanitation. W. Watkins. Read at Sanitary Inspectors' Conference, England. A discussion of appliances in common use, and ways in which they should be improved. 3500 w. Plumb & Dec—Oct. 2, 1899.

Hints on Modern House Plumbing. W. F. Taaffe. An effort to simplify the application of scientific truths to the work of the plumber. Serial. San Plumb—Dec. 15, 1898.

House Plumbing. Henry N. Ogden. Read before the Tompkins County Medical Society, at Ithaca, N. Y. Illustrated discussion of sanitary plumbing. 2500 w. Dom Engng—Dec., 1896.

How to Plumb Our Houses—Theory and Practice. H. C. Patterson. What every property owner or intelligent citizen ought to know in order to decide for himself what are his necessities, and how to get them with least expense and annoyance. 2200 w. Dom Engng—April, 1896.

Plumbing and House Drainage. Reuben S. Bemis. The importance of this feature in the construction of homes, the dangers of neglect, faults in plumbing of dwellings, with important suggestions. 2700 w. San Plumb—May 1, 1897.

Plumbing Simplified. William Paul Gerhard. Drawings illustrating a simplified method are given, with discussion of the subject. 1800 w. Arch & Build—Nov. 14, 1896.

Proper Plumbing. George F. Hammond. An excellent article, in which an unusual amount of technical knowledge of the art of sanitary plumbing is displayed, considering that the author is an architect by profession, and not a plumber. Ill. 2000 w. Dom Engng—Dec., 1895.

The Old and the New. Alexander Dalrymple. Read at the opening of the tenth session of the Glasgow and West of Scotland Technical College. Deals with fittings for bathrooms. Serial. Dom Engng—Aug., 1898.

The Progress and Advancement of Plumbing. Reviews some of the improvements in the materials used and manner of executing work. 2300 w. Dom Engng—Oct. 15, 1900.

**American.**—American Plumbing in Bath Rooms and Kitchens. Dent Yates. Photogravure illustrations and description of typical work in high-class plumbing. 450 w. Dom Engng—Dec., 1895.

American Household Sanitary Appliances (Ausgeführte Beispiele von Amerikanischen Haust-Entwässerungs-Anlagen). W. P. Gerhard. An excellent description of American bathroom plumbing, for the benefit of German readers. 5000 w. Gesundheits Ingenieur—July 15, 1897.

See also **British vs. American.**

**Apartment House.**—Plumbing Details in Three Large Apartment Buildings. Illustrated detailed description of plumbing above the average for this class of buildings. 2600 w. Dom Engng—May, 1896.

An Example of High-Class Plumbing. Plans with description of plumbing in the Biltmore and the Blenheim apartment houses, New York, with specifications. 2800 w. Met Work—Jan. 23, 1897.

Plumbing in Center Court Apartments. Description, with illustrations, of the plumbing of a five story brick building on West 28th St., New York. 1100 w. Eng Rec—April 10, 1897.

**Astor Residence.**—Some Plumbing Details in the Residence of John J. Astor. An instructive illustrated description, especially to those who wish to familiarize themselves with the best examples of high-class sanitary plumbing. Serial. Eng Rec—Nov. 16, 1895.

**Asylum.**—Some Plumbing in an Insane Asylum. Illustrated description of work at the Willard State Insane Asylum at Willard, N. Y. The noticeable features are the way in which the traps are made safe against syphonage and the treatment of the trap vent pipe system. 1200 w. Eng Rec—July 17, 1897.

**Athletic Club House.**—Plumbing in the New York Athletic Club House. Illustrated description of noteworthy work, including a special form of mechanical filter. 2400 w. Eng Rec—July 29, 1899.

**Australia.**—Plumbing in Australia. Dewdney Ellis. A general description of the conditions of the plumbing trade, with illustrations of devices in common use. 2000 w. Dom Engng—June, 1898.

**Back Vent Connections.**—How Back Vent Connections Must Be Made in New York City. James J. Lawler. Calls attention to a few special requirements not usually understood by plumbers. Ill. 1000 w. Dom Engng—Aug., 1897.

See also **Peppermint Test.**

**Bad.**—A Sample of Criminal Plumbing. C. Desormeaux. An illustrated description of a shamefully botched job. 400 w. Dom Engng—Sept., 1896.

**Bank.**—Plumbing in the Bank of Commerce Building. Part first contains a general description, requirements of materials and workmanship, system of water distribution and drainage, conventional diagrams of arrangement of water service and typical riser lines. Serial. Eng Rec—April 24, 1897.

**Bathhouse.**—Plumbing a Public Bathhouse. Describes the plumbing of a new building in Newark, N. J. Illustrated. 1700 w. Met Work—March 27, 1897.

St. Marlebone New Baths and Wash-Houses. Description of the arrangement of the new baths and wash-houses recently opened. 1800 w. Arch, Lond—March 12, 1897.

**Bathhouse, Buffalo.**—The Buffalo Free Bathhouse. Illustrated detailed description. 3000 w. Eng Rec—Sept. 19, 1896.

**Bathroom.**—An Elaborate Bathroom. Illustrated detailed description of a superfine piece of work. 300 w. Dom Engng—Feb., 1896.

See also **BATHROOM.**

**Berlin.**—The Berlin System of House Sanitation. Gerard J. G. Jensen. The remarkable backwardness of this city in systems of house sanitation and drainage is in this article contrasted with its remarkable progress in other branches of engineering. 1700 w. San Rec—Feb. 14, 1896.

**Bowls.**—Fastening Bowls to Marble Slabs. Edwin S. Marsh. Good practical directions for properly doing the work. 450 w. Dom Engng—Feb., 1896.

**British.**—Plumbing and Sanitary Work. S. S. Hellyer. Read before the Architectural Assn., England. Part first discusses plumbing practice in England, with remarks on cost. Ill. Serial. Plumb & Dec—July 1, 1897.

See also **German vs. English.**

**British vs. American.**—A Comparison. F. Handover. Views on English and American plumbing. 850 w. Dom Engng—Jan., 1897.

**Business Methods.**—How Should the Plumber Conduct his Business in Order to Make a Reasonable Profit? John J. Foy. Read at convention of Nat. Assn. of Plumbers, at San Antonio, Tex. On the changed conditions and advancement in this trade, the necessity of education and needed reforms. 1700 w. San Plumb—May 1, 1898.

Pushing the Plumbing Business. C. Gill. "The Ironmonger's" second prize essay. Suggestions as to attractive display of plumbing appliances, obtaining favor of architects, real estate agents, etc. 1500 w. Dom Engng—Jan., 1897.

**By-Passes.**—By-Passes of Various Kinds. Grayson. Illustrated description of by-passes that can be used in various situations and for various purposes. 1200 w. San Plumb—Sept. 15, 1896.

**Care.**—Proper Care of Plumbing Apparatus. Rules prepared by the Plumbing Inspector and Engineer of an American city, for the purpose of showing the citizens the necessity of proper care and management of plumbing apparatus. 1100 w. Plumb & Dec—Nov. 2, 1896.

**Cars.**—The Sanitary Aspect of Railway Travelling and Rolling Stock. T. F. Strutt. Read at the Belgian Conference of Sanitary Inspectors. Criticises the accommodations of local trains in England, and other conditions needing attention. 1700 w. Plumb & Dec—Nov. 1, 1897.

**Chicago.**—How Plumbers Used to Work in Chicago. David Whiteford. Shows changes in methods caused by improved inventions and a better understanding of sanitary laws. 5600 w. Dom Engng—Oct. 15, 1900.

**Club House.**—Plumbing in the University Club, New York City. Illustrated description of elaborate work in an 8-story 160x140 ft. club house. Part first deals with the general water-supply system. Serial. Eng Rec—June 11, 1898.

See also **Athletic Club House.**

**Cologne.**—Sanitary Experiments at Cologne, Germany. W. M. Watson. Comments on the report of valuable experiments made to thoroughly investigate the whole system of plumbing, and the lessons to be learned from them. 1800 w. Can Engr—July, 1898.

**Columbia University.**—Plumbing Details in Columbia University Gymnasiums, New York. Illustrated description of filters and hot and cold water system for swimming bath. Serial. Eng Rec—Oct. 1, 1898.

See also **Gymnasium.**

**Country Residence.**—Plumbing in Mr. E. C. Benedict's Country House. Illustrated detailed description. 1200 w. Eng Rec—Sept. 26, 1896.

Plumbing in the Kunhardt Country Residence. Illustrates an elaborate installation for domestic supply, fire protection and drainage. 1600 w. Eng Rec—May 14, 1898.

Water Supply, Plumbing and Drainage System for a Country House. Illustrated description of work carried out at the country residence of Perry Tiffany, at Westbury, Long Island. 2000 w. Eng Rec—Aug. 28, 1897.

**Details.**—The Great Importance of Perfection in Details in Sanitary Work. J. Kemsley. Read at the monthly meeting of the Institute of Sanitary Engineers. Gives examples of serious troubles caused by trifling matters, or what a little attention would remedy. 3000 w. Dom Engng—Aug., 1897.

**Dumfries Exhibition.**—See **PLUMBING EXHIBITION.**

**Education.**—See **PLUMBER.**

**Electrical Work.**—Plumbing and Electrical Work. James F. Hobart. The first of a series of articles whose aim is to present the matter of simple electrical working in such a plain manner that the principles may be understood and the work executed. Serial. Dom Engng—March, 1898.

See also **Ventilation.**

**Electric Power Station, N. Y.**—Hydraulic Engineering in Metropolitan Power House. Illustrated description of the water supply and sanitary fittings of the Metropolitan power house in New York City. Serial. Met Work—June 30, 1900.

**Factory.**—Plumbing in a New York Factory. Part first gives a general description, with requirements and arrangements of pipe lines and branches, roof tanks, cold water distribution and basement drainage pumping. Ill. Serial. Eng Rec—Oct. 2, 1897.

**Fatigued Metal.**—Fatigued Metal. Edwin S. Marsh. Explains the cause of weakening of metals, which is one of the defects of house-plumbing. 800 w. Dom Engng—Oct., 1897.

**Fixtures.**—Plumbing Fixtures of the Past and Present. Describes, with illustrations, the principal plumbing fixtures and appliances of past and present time. Serial. San Plumb—Dec. 1, 1895.

**Flushing.**—A New Flushing System for Water Closets. Illustrated description of a system dispensing with the overhead tank, and substitutes the pressure of air in a vertical pipe about 3 ins. in diameter, its upper end closed. 800 w. Eng News—Oct. 21, 1897.

**Frozen Pipes.**—Frozen Boiler Connections. Describes the thawing of the connections to a kitchen boiler, and water back. 1200 w. Met Work—Jan. 13, 1900.

**German.**—German Plumbing. Robert Grimshaw. How plumbing is done in Germany. Information from personal observation and interviews, text books and illustrated catalogues of dealers. Serial. Dom Engng—Nov., 1896.

**German vs. English.**—German and English House Water Service (Deutsche und Englische Hausentwässerungen). M. Knauff. A comparison between German and English methods of house plumbing, both for water supply and drainage connections, indicating the preferable methods in each case. 6000 w. Two articles. Gesundheits Ingenieur—Jan. 31, Feb. 15, 1899.

**Gravity.**—The Law of Gravity in Plumbing Work. N. Y. P. Remarks on the effect of the laws of the universe, especially of gravity as related to plumbing. 1700 w. San Plumb—June 1, 1897.

**Grease Traps.**—Grease Traps. Reprint from "Home Study." Illustrated description of a method for intercepting grease and preventing its entrance into drainage pipes. 1300 w. Dom Engng—Sept., 1896.

**Gymnasium.**—Some Plumbing Details in Columbia University Gymnasium. Part first gives an illustrated general description of the work. Serial. Eng Rec—Aug. 27, 1898.

See also **Athletic Club House; Columbia University.**

**Header.**—A Hotel Header. Description of hot and cold water supply to eleven baths and three toilets. 200 w. Dom Engng—April, 1896.

**Health.**—Relation of Plumbing to Health. Albert E. Hyde. The important part plumbing bears to the prevention of disease is shown. Serial. Dom Engng—Aug., 1898.

**Hospital.**—Plumbing in the Long Island State Hospital. Illustrated description of the work in an asylum for 900 patients, with description of buildings. 2400 w. Eng Rec—Dec. 3, 1898.

Plumbing in the Long Island State Hospital. Illustrates and describes the arrangement of the kitchen and bathhouse plumbing, which required special treatment because of the insane patients using it. 1100 w. Eng Rec—Dec. 24, 1898.

Plumbing in the Manhattan State Hospital. Illustrates and describes the special plumbing features of a large asylum for the insane. 1400 w. Eng Rec—July 7, 1900.

The Plumbing, Water Supply and Drainage of Hospitals. William Paul Gerhard. Reprint from the "Albany Medical Annals." Calls attention to the matters of greatest importance. The necessity of plenty of light, fresh air and absolute cleanliness; discussing water supply, sewerage and plumbing. 13500 w.

See also **HOSPITAL.**

**Hotel Cecil, London.**—Drainage and Sanitary Equipment of the Hotel Cecil. A brief description of the sanitary arrangements in a hotel containing about 1000 rooms, and covering an area of 2½ acres. 1800 w. Builder—May 9, 1896.

**Hotel Jefferson, Richmond, Va.**—Plumbing in the Hotel Jefferson, Richmond, Va. Illustrated description. Serial. Eng Rec—July 25, 1896.

**Hotel, Mills.**—Plumbing in the New Mills Hotel, New York City. Illustrated description of work in a building for men earning small wages. 2000 w. Eng Rec—Oct. 15, 1898.

See also **MECHANICAL PLANT.**

**Hotel Waldorf-Astoria.**—Plumbing in the Astoria Hotel. Part first gives general description of the building and outline of water supply and drainage systems. Ill. Serial. Eng Rec—Jan. 22, 1898.

The Astoria Hotel, New York City. Gives some features of the plumbing, drainage, and water supply, describing the Continental system of filtration. Ill. 2800 w. San Plumb—March 1, 1898.

**Hotel, Wilkesbarre, Pa.**—An Extensive Plumbing Job. Account of the plumbing and heating of the Hotel Sterling at Wilkesbarre, Pa. 850 w. Metal Work—Aug. 27, 1898.

**Hot Water.**—Return Circulation in Ordinary Plumbing Work. Charles Loraine. How to obtain a supply of hot water almost instantly when faucets are opened, whether they are or are not isolated from the reservoir. Illustrated by numerous diagrams. 2000 w. San Plumb—Sept. 1, 1896.

The Computation of Hot Water Generators (Berechnung der Warmwassererzeuger). E. Brauss. Devoted to apparatus for producing warm water for bath and household use, whether heated by steam coils or by direct firing. 1800 w. Gesundheits Ingenieur—Dec. 15, 1899.

See also **HOT WATER.**

**House Drainage.**—See also **DRAINAGE; SEWERAGE.**

**Inspection.**—See **PLUMBING REGULATIONS.**

**Kitchen.**—Kitchen Plumbing. Illustrated description of high-class work. 500 w. Dom Engng—March, 1896.

**"Lancet" Commission Report.**—The "Lancet" Commission on Plumbing. Report dealing with the qualifications of architects; standard of prices, how formed; arbitration; healthy and unhealthy competition; the plumbing expert; question of cost, and plumber's profit and loss account. 2500 w. Arch, Lond—July 10, 1896.

The "Lancet" and Sanitary Plumbing. One of the examples of defective sanitary work reported by "The Lancet" (Lond.), and the scheme for remedying defects. Ill. 2300 w. Dom Engng—Sept., 1896.

**Lavatory Towers.**—Plumbing in Lavatory Towers. Illustrates towers built against outside walls of an old hospital in New York, to furnish adequate lavatory facilities and ventilation. 1200 w. Eng Rec—April 23, 1898.

**Law.**—See **PLUMBING REGULATIONS.**

**Lead Burning.**—The Process of Lead Burning. G. A. S. Gives history and advantages of the system and describes the process. From "The Building World." 900 w. Dom Engng—Dec., 1896.

**Lead vs. Iron.**—Lead vs. Iron for Supply and Vent Pipes, from a Plumber's Point of View. William Eccles, in the "Gas Light Journal." The question considered from an engineering point of view leads to the conclusion that galvanized iron will eventually almost wholly replace lead for supply pipes, while asphalt dipped black iron is better for discharge pipes in the pumbing of buildings. 1100 w. Arch & Build—Oct. 24, 1896.

Lead Pipe vs. Iron Pipe. William Eccles. Compares the several advantages of lead and galvanized iron pipe when used for water supply and vent pipes. 1000 w. Dom Engng—Feb., 1897.

**Lead Work.**—Lead. A defense of lead work as used by the plumber, and some of the physical and chemical properties of the metal are given in part first. Serial. Dom Engng—July, 1897.

**Leaks.**—Leaks in Plumbing Work in Connections of Water Front and Range Boilers. A. W. Murray. Explains the causes that produce these defects. 1700 w. Dom Engng—Oct., 1898.

Leaks in Plumbing Work. Alex. W. Murray. Considers leaks in connection beneath the surface of the ground, or under basement floors, and how to protect and repair them. Ill. 2500 w. Dom Engng—July, 1899.

**Medical College, Cornell.**—Plumbing in the Cornell Medical College. Illustrates and describes special work for a medical laboratory. 1800 w. Eng Rec—Oct. 20, 1900.

**Mills Hotel, N. Y.**—See **Hotel Mills; HEATING AND VENTILATION; MECHANICAL PLANT.**

**Mistakes.**—Some Common Mistakes in Plumbing Practice. W. F. Taaffe. A list of errors which plumbers are liable to fall into and that it would be well to avoid. 1600 w. San Plumb—Jan. 15, 1897.

**Model Installation.**—A Model Plumbing Installation. Illustrates and describes the apparatus in an engineering school to illustrate good plumbing practice and afford an opportunity for experiments of various classes. 1000 w. Eng Rec—June 9, 1900.

**New England Residence.**—Plumbing in a New England Residence. Illustrated detailed description. 1200 w. Eng Rec—June 27, 1896.

**N. Y. Residence.**—An Elaborate System of Residence Plumbing. Illustrates special features in an unusually expensive New York residence. 4000 w. Eng Rec—Oct. 21, 1899.

Plumbing in a Reconstructed New York Residence. General illustrated description. 1600 w. Eng Rec—Oct. 17, 1896.

Plumbing in a Large City House. Illustrated description of unusually elaborate work in a New York residence. 1000 w. Eng Rec—July 28, 1900.

Plumbing in Fifth Avenue Residences, New York. Illustrated description of the work in houses of the Astor estate, where the highest grade of work was required. 1200 w. Eng Rec—March 10, 1900.

See also **Astor Residence; Water Supply.**

**Office Building.**—Plumbing in the American Surety Building. Describes and illustrates in detail the plumbing installment in a building twenty-one stories in height, or 311 feet above the sidewalk. Serial. Eng Rec—March 14, 1896.

Plumbing in the Broadway Chambers Building, New York. Illustrated description of work which has no pressure tanks on the roof for the water system, using compressed air receivers instead, and employing closet-flushing apparatus without flush tanks. 1000 w. Eng Rec—April 7, 1900.

Plumbing in the Commercial Cable Building. Illustrated description of the water-supply system. 1600 w. Eng Rec—July 3, 1897.

Plumbing in the Dun Building, New York. Illustrates and describes the work in a 15-story office building in which the required pressure on the pipes is afforded by compressed air cylinders in the basement, rather than tanks on the roof. 1400 w. Eng Rec—Jan. 20, 1900.

Plumbing in the Empire Building, New York. Illustrated description of the numerous novel devices employed in plumbing a 21-story, 224x78 ft. office building. 3000 w. Eng Rec—June 24, 1899.

Plumbing in the Gillender Building, New York City. The peculiarity of dimensions led to unusual features in the disposition of the plumbing, which are herein described. 1400 w. Eng Rec—Jan. 16, 1897.

Plumbing Details in the Ivins Building, New York City. Illustrates the general water-supply system and the soil and vent pipes of a very high building. Serial. Eng Rec—July 23, 1898.

Plumbing in the St. Paul Building, New York. Part first contains general description and arrangement, diagram of risers, pipe systems, materials, waste, vent and supply lines, and pressure test. 2400 w. Eng Rec—Feb. 13, 1897.

See also **MECHANICAL PLANT.**

**Olden Time.**—Plumbing and Lead Work in the Olden Time. Paul Plimton. Part first considers the early use of lead pipe in water supply. Serial. San Plumb—June 1, 1899.

**Ordinance.**—See **PLUMBING REGULATIONS.**

**Peppermint Test.**—Back Vent Connections and the Peppermint Test in Boston. James J. Lawler. Comment on the requirements of the sanitary inspector, growing out of the use of the peppermint test, and suggesting the use of the smoke test in its stead. 800 w. Dom Engng—July, 1897.

Preparation for Peppermint Test. Suggestions for arrangements in construction which will permit frequent testing, with directions for making this test which is in most general use. Ill. 600 w. Dom Engng—July, 1897.

**Pipes.**—See **Lead vs. Iron; Water Pipes; PIPE; WATER FLOW—Pipes.**

**Pipe Joints.**—English Views on Joint Making. W. J. Maguire. Condensed from "Manchester Health Lectures." Gives the practice in making joints connecting lead and iron pipe, and connecting branches with soil pipe. 900 w. San Plumb—July 1, 1898.

**Police Station.**—Plumbing in a Police Station. Illustrated description of the work in the Ninth Precinct Police Station House, in Charles Street, New York City. 900 w. Eng Rec—Aug. 14, 1897.

**Public Convenience.**—London Public Conveniences. Illustrated description of an underground public convenience erected in London, and now generally adopted in English cities. 1300 w. Eng Rec—Nov. 7, 1896.

Public Conveniences in New York City. Illustrated description of conveniences located beneath the sidewalk. 1300 w. Eng Rec— Sept. 18, 1897.

**Railway.**—See **Cars.**

**Regulations.**—See **PLUMBING REGULATIONS.**

**San Francisco.**—Plumbing on the Pacific Coast. J. L. E. Firmin. A report of methods used in San Francisco, with comparison with eastern practice. Serial. Dom Engng—Sept., 1897.

**Sanitary.**—Modern Sanitary Appliances for Interior of Dwelling Houses. W. J. Wells. Considers closets, baths, lavatories, cisterns and sinks, with the supplies and wastes from same. Serial. Dom Engng—May, 1897.

Plumbing and Household Sanitation. J. Pickering Putnam. On the importance and the architect's responsibility, the neglect, and sources of danger. Ill. 7000 w. Dom Engng—Dec., 1899.

Plumbing and Sanitary Work. S. S. Hellyer. Read before the Architectural Assn., London. Part first discusses improvements in valve-closets, water supply, service, pipes, etc. 4800 w. Brit Arch—May 28, 1897.

Progress in Household Sanitation. From the Albany "Argus." Reviews recent advancement in sanitary plumbing. 1100 w. San Plumb—March 15, 1897.

Sanitary Appliances. W. M. Watson. Objections to sanitary rules in force in Toronto, with reasons. Ill. 2700 w. Can Eng—April, 1897.

Sanitary Plumbing. Albert E. Hyde. Written for the American edition of the Encyclopedia Britannica. Its relation to the health of the people, with a discussion of house drainage and ventilation of pipes, house water supply and fixtures. 1800 w. Dom Engng—Nov., 1896.

The Evolution of Sanitation in Relation to the Plumber. John Glaister. Extract from a paper read in Edinburgh. Calls attention to the problems that arose in the evolution of man from the barbaric to the civilized state, and to the main points to be attended to in sanitary plumbing. Serial. Plumb & Dec—March 1, 1897.

The Rise and Progress of Sanitary Plumbing. John Glaister. Inaugural address in the Glasgow and West of Scotland Technical College. Part first hastily reviews the early history of plumbing, and gives some account of the history of water-supply in Glasgow. Serial. Dom Engng—May, 1897.

See also **SANITARY ENGINEERING; SANITATION.**

**School.**—See also **HEATING AND VENTILATION.**

**School, Minnesota.**—School-House Plumbing in Cold Climates. Describes a system installed at Red Wing, Minn., devised to meet all conditions of weather. Ill. 1100 w. Met Work—Nov. 20, 1897.

**Sewerage.**—See also **SEWERAGE—Plumbing.**

**Sleeping Cars.**—See **Car; AIR BRAKES—Cylinder Lubrication.**

**Spreckels Mansion, San Francisco.**—Plumbing, Heating and Ventilating of Claus Spreckels' Mansion in San Francisco, Cal. Description of scientific sanitary improvements in one of the beautiful homes of that city. 3800 w. Dom Engng—May, 1897.

**Stables.**—Stable Plumbing. Illustrated description of the plumbing in the stable of M. F. L. Hungerford, New Britain, Conn. 1300 w. Met Work—April 16, 1898.

See also **STABLE.**

**Stand-Pipe System.**—A Stand-Pipe Plumbing System. Illustrated description of a system of distribution involving a departure from ordinary methods, by providing an artificial pressure above the street mains. 900 w. Eng Rec—June 13, 1896.

See also **HOT WATER.**

**Superintendence.**—The Superintendence of Sanitary, Hydraulic and Gas-Piping Work in Buildings. William Paul Gerhard. Discusses points intended as a help in such work. Serial. Archts' & Builds' Mag—Sept., 1900.

**Traps.**—Main Drain Traps and Their Disadvantages. F. W. Tower. An argument against the use of main drain traps. 1700 w. Dom Engng—Oct., 1896.

See also **Grease Traps.**

**United States.**—See **American.**

**Ventilation.**—How Electricity May be Utilized to Advantage for the Local Ventilation of Plumbing Fixtures. James L. Lawler. Illustrated description, showing that the electric heater is the most practical, safest and best method of producing local ventilation. 1500 w. Dom Engng—Oct., 1897.

Local Ventilation of Water Closets and Other Plumbing Fixtures. James J. Lawler. The importance of giving attention to this subject especially in the home, with illustration as a suggestion of what can be done. Serial. Dom Engng—Sept., 1897.

Sanitary Appliances and the Principles of Ventilation. A. Wynter Blyth. The fourth of a series of lectures at Carpenters' Hall. Dealing chiefly with water-closet construction and ventilation, with some remarks on dwelling ventilation. 3000 w. Arch, Lond—Nov. 29, 1895.

See also **DRAIN VENTILATION; SEWER VENTILATION.**

**Waldorf-Astoria Hotel.**—See **Hotel Waldorf-Astoria.**

**Waste Closets.**—Slop Water-Closets in England, Their Manufacture and Use. J. A. Turner. Describes what is meant by a slop water-closet and the advantages in its use over the ordinary fresh-water closet. Types illustrated. 1700 w. Brick—Aug., 1897.

Waste Water for Flushing Purposes. A. Edward Allen. Recommends the use of appliances for storing the slop and rain water for flushing. 1200 w. Ill Car & Build—Aug. 6, 1897.

**Water-Backs.**—English Water-Backs. Frederick Dye. Review of English practice. 1800 w. Heat & Ven—June 15, 1896.

**Water Pipes.**—Computation of Water-Heating and Water-Conducting Systems in an Elementary Manner (Berechnung von Wasserheizungs und Wasserleitungs-Anlagen auf Elementarem Wege). Rudolf Mewes. A very full and elaborate discussion of the practical computation of the dimensions of water pipe systems to obtain a desired capacity of flow. Two articles. 10000 w. Gesundheits Ingenieur—Jan. 31, Feb. 15, 1898.

**Water Supply.**—Water Supply in a Large New York Residence. Illustrated description of a number of special features for the hot and cold water plumbing. 1300 w. Eng Rec—Sept. 16, 1899.

**Weston Factory, Waverly Park, N. J.**—Plumbing in a Detached Manufacturing Plant. Illustrated description of special work in the Weston Electrical Instrument Works, and of a special sewage disposal system. 2100 w. Eng Rec—Oct. 6, 1900.

**Wilkesbarre Residence.**—Plumbing, Heating and Ventilating a Modern Residence. Illustrated description of many excellent features as carried out in a residence at Wilkesbarre, Penn. 2800 w. Met Work—June 5, 1897.

**Yacht.**—Novel Yacht Plumbing. Illustrates and describes the sanitary arrangements in the new steam yacht "Neaira." 1200 w. Met Work—June 17, 1899.

The Ellis System of Yacht Plumbing. Illustrated description of the plumbing which has been installed in the steam yacht "Saghaya." A cesspool tank is used which empties automatically. 900 w. Met Work—July 21, 1900.

**PLUMBING EXHIBITION.**

**Dumfries, Scotland.**—Samples of Work. Illustrated description of notable exhibits at an exhibition held in connection with the sixth annual congress of plumbers in Dumfries, Scotland. 350 w. Dom Engng—June, 1896.

**PLUMBING REGULATION.**

Law and Bad Plumbing. Some account of the work done by Mr. H. A. Desper, of Worcester, Mass., to show the effect of bad plumbing on health and so influence legislation to provide for the examination of plumbers, and the control of this work. Ill. 6400 w. Met Work—Feb. 20, 1897.

The Regulation of Plumbers' Work. Thomas S. Ainge. Remarks on this subject suggested by a bill presented to the Legislature of the State of Michigan. States briefly the existing laws, giving reasons why they are necessary. 2800 w. Dom Engng—Dec., 1897.

**British.**—See also **DRAINAGE—House, British Law.**

**Canada.**—Possibility of Simple and Safe House

Plumbing. Herbert J. Bowman. A paper read at the annual meeting of Medical Health Officers for Ontario. An examination of statutory plumbing regulations compiled in 1884, concluding that some changes and additions will be required when the statutes are revised. 2500 w. Can Arch—Nov., 1895.

Plumbing Regulations in Canada. A copy of the regulations submitted by the sanitary committee of the Nat. Assn. of Master Plumbers of Canada. 3000 w. Dom Engng—April, 1898.

**Georgia.**—The Municipal Plumbing Business of Waycross. Review of a decision of the Georgia Supreme Court prohibiting plumbing by city officials. 700 w. Eng Rec—July 30, 1898.

**Inspection.**—Duties of a Plumbing Inspector. Henry Sieben. Discusses the duties and gives the Kansas City methods. 1200 w. Dom Engng—Dec., 1897.

Most Common Defects. As an aid to inspection, the most common defects are illustrated and described. Serial. Dom Engng—Oct., 1896.

**Inspection, Baltimore.**—Baltimore Plumbing Inspection. James C. Mitchell. Records the beneficial results in that city from the intelligent supervision established. 2200 w. Dom Engng—Nov., 1897.

**London.**—London By-Laws as to the Drainage of Buildings. A copy of the proposals now under consideration, with editorial comment. 9800 w. Builder—April 1, 1899.

**Moline, Ill.**—An Excellent Set of Plumbing Regulations. Gives the plumbing ordinance in effect at Moline, Ill. 6000 w. Dom Engng—Aug., 1899.

Plumbing Regulations of Moline, Ill. A copy of these regulations which are considered in many respects a model. 5400 w. Eng Rec—Jan. 15, 1898.

**New Haven, Conn.**—New Haven Plumbing Regulations. A copy of the regulations which recently went into effect. 2800 w. Met Work—Jan. 23, 1897.

**New York.**—New York City Amended Plumbing Regulations. Full text of the regulations recently adopted by the New York Building Department. 6000 w. San Plumb—Sept. 15, 1897.

New York Plumbing Regulations. Text of the recently revised code of the building department. 5500 w. Met Work—Oct. 24, 1896.

Plumbing Regulations and Their Practical Application. W. F. Taaffe. A résumé of the code of the New York Building Department, with explanations. Serial. San Plumb—Dec. 15, 1897.

See also **PLUMBING—Back Vent Connections.**

**Ohio.**—Ohio Plumbing Law Held to be Unconstitutional. The opinion of Judge Kohler, of the common pleas court of Salem County, Ohio, which declares the Ohio State law to be unconstitutional. 4500 w. Dom Engng—Feb., 1898.

**Oswego.**—Oswego Water Regulations. A copy of the code of regulations issued for the guide of master plumbers. 1000 w. San Plumb—May 1, 1898.

**Peoria, Ill.**—New Plumbing Ordinance in Peoria, Ill. Given in full as a model for other cities. 6500 w. San Plumb—Nov. 1, 1897.

**Portland, Ore.**—New Plumbing and Drainage Ordinance, Portland, Ore. A copy of the ordinance regulating the plumbing, ventilating and drainage of buildings. 3500 w. San Plumb—Dec. 15, 1898.

**Quincy, Mass.**—Plumbing Regulations for Small Cities. Gives the ordinance of Quincy, Mass., a town of twenty thousand people. 1800 w. Dom Engng—Sept., 1899.

**Rock Island, Ill.**—Rock Island (Ill.) Plumbing Ordinance. An ordinance recently passed by the city council. 5000 w. San Plumb—April 15, 1898.

**Sacramento, Cal.**—Plumbing Ordinance in Sacramento, Cal. A copy of an ordinance that has been in force more than a year. 3500 w. San Plumb—Feb. 15, 1898.

**Savannah, Ga.**—Plumbing Regulations in Savannah, Ga. A copy of the ordinance in force in this city. 2200 w. San Plumb—July 1, 1898.

**Scotland.**—Scotch Plumbing Regulations. From the "Plumber's Review." Extracts from a pamphlet of regulations intended to be applicable to Scotland only, but containing much of general interest. 3700 w. San Plumb—Oct. 15, 1898.

**Scranton, Pa.**—Scranton, Pa., Plumbing Ordinance. Complete copy of the new plumbing ordinance proposed at Scranton, which is considered exceptionally well written and deserving of adoption without material alteration. 3000 w. San Plumb—Aug. 1, 1896.

**Washington, D. C.**—Plumbing Affairs at Washington, D. C. Annual report of the superintendent of the district plumbing service. 1400 w. San Plumb—Oct. 1, 1897.

**Wilkesbarre, Pa.**—Plumbing Ordinance in Wilkesbarre, Pa. A copy of the ordinance regulating plumbing and sanitary matters which has been in force since July 20, 1898. 3000 w. San Plumb—Oct. 1, 1898.

### PNEUMATIC.

See **COMPRESSED AIR; RIVETER; SNOW FLANGER.**

### PNEUMATIC MACHINERY.

**Grain Handling.**—See **GRAIN ELEVATOR—Pneumatic; MECHANICAL HANDLING—Grain Suction Pipe.**

### PNEUMATIC PRESS.

Pneumatic Press with Oil Resistance Cylinder—New York, Ontario and Western Railway. Engravings with description of the principal features of a portable pneumatic press used in the shops of the N. Y., O., and W. Ry. 600 w. R R Gaz—June 17, 1898.

### PNEUMATIC PROPULSION.

Pneumatic Propulsion. A brief history of this subject and the work of English inventors. 2500 w. Engr, Lond—June 2, 1899.

### PNEUMATIC RAILWAY.

A Singular Railway Experiment. Describes experiments made by John Vallance, of Brighton, Eng., in 1826 and '27. The system was patented but never attempted on a commercial scale. 1400 w. Engr, Lond—May 19, 1899.

The Transmission of Energy by a Partially Rarified Atmosphere. Sir Frederick Bramwell. Read at the Plymouth meeting of the Inst. of Mech. Engrs. Reviews the history of the development of this mode of transmission, and its application to railways, especially considering the South Devon Atmospheric Railway. 5500 w. Engr, Lond—Aug. 18, 1899.

### PNEUMATIC TOOL.

See **COMPRESSED AIR; RIVETER; SNOW FLANGER.**

### PNEUMATIC TUBE.

Pneumatic Despatch. C. A. Carus-Wilson. Gives an illustrated description of various means tried in London for conveying the mails, and discusses the pneumatic tube circuits now in use in various places. Discussion. 6600 w. Jour Soc of Arts—March 2, 1900.

Pneumatic Transmission in Underground Tubes. Harrison Stidham. Reviews the history of pneumatic transmission, and describes the present practice in New York City and some of the problems encountered. Ill. 10500 w. Trans Assn of Civ Engs of Cornell Univ—1900.

**Batcheller.**—Recent Progress in the Development of Pneumatic Dispatch Tubes. B. C. Batcheller. Brief reference is made to European systems, showing progress to 1893; an account of the 6-in. tubes put into operation in Philadelphia, and the 8-in. tubes in New York, with an explanation of the theory. Ill. 6500 w. Jour Fr Inst—Aug., 1898.

The Batcheller System of Pneumatic Tubes. Illustrations showing the main features of the mail service between the main Post-Office and the Produce Exchange office of New York. 1700 w. Am Mach—Jan. 25, 1898.

**Chicago.**—Pneumatic Mail Transmission for Chicago. Reviews the introduction of this system in the United States, and the plans for Chicago. 1200 w. Mod Mach—Dec., 1899.

**Locating Obstruction.**—Locating Obstructions in Underground Pneumatic Tubes in Philadelphia. B. C. Batcheller. An interesting account of efforts made based on the velocity of sound waves, and the degree of success attained. 1700 w. Eng News—March 4, 1897.

See also **WATER PIPE.**

**London.**—London's Post Tunnel. An illustrated account of this tunnel, constructed to carry the mails and postal parcels between the two terminal points by means of pneumatic pressure. 2500 w. Compressed Air—May, 1900.

The Pneumatic Despatch. Gives the leading features, construction and otherwise of a pneumatic despatch constructed underground in the very heart of London, nearly forty years ago. 1700 w. Engr, Lond—Oct. 13, 1899.

**Mail System.**—The Pneumatic Mail Tube System. J. Foster Symes. Gives the history of the progress of this system in different countries, describing the New York system for the transmission of mail. 2100 w. Yale Sci M—April, 1899.

**New York.**—Pneumatic Mail-Tube System, New York City. Illustrated description of the installation, and the method of operation, with historical account of its use in other cities. 3400 w. Sci Am—Dec. 11, 1897.

The Pneumatic Postal Tube, New York. Reviews briefly the history of transportation through closed tubes and gives description, with illustrations, of the pneumatic tube service in process of construction in this city. 3000 w. Eng Rec —Oct. 23, 1897.

**Philadelphia.**—The Philadelphia Pneumatic Postal System. Descriptive article. The most interesting feature of the construction is the method of reducing cast iron pipe to a uniform bore by means of extemporised boring machines, having flexible boring bars. 1300 w. Engng—Nov. 29, 1895.

**Waldorf-Astoria Hotel.**—Pneumatic Tube Delivery System at the Waldorf-Astoria Hotel. Illustrated description of a system handling often 10,000 letters, cards, etc., a day, which has never had a breakdown during the eighteen months it has been in operation. 1200 w. Sci Am—April 15, 1899.

**PNEUMATOPHORE.**

See **RESPIRATOR.**

**POINTS.**

See **RAILWAY SWITCH.**

**POLARISCOPE.**

**Acetylene Illumination.**—See **ACETYLENE—Polariscope.**

**POLARIZATION.**

See **ELECTRIC CURRENT RECTIFIER; ELECTRO-CHEMISTRY.**

**POLE.**

See also **ELECTRIC LINE; ELECTRIC TRAMWAY—Overhead Construction.**

**Arc Lamp.**—Iron Poles, Arc Lamps and Wires in Boston. Alton D. Adams. On the dangers to lamp-trimmers, the accidents and their causes, and the action taken by the Massachusetts legislature, which has led to the substitution of poles of wood for those of iron in Boston. 1500 w. Elec Wld & Engr—Sept. 23, 1899.

Poles. Considers the selection, setting, painting, and practice of different roads. Ill. 3200 w. St Ry Rev—April 15, 1898.

**Electric Tramway Decision.**—An Important Pole Decision. Upholds an ordinance permitting the use of poles against the objection of an abutting property owner. 3000 w. St Ry Rev—July 15, 1896.

**Preservation.**—Preservation of Wooden Posts. Stoneware cover suggested as a protection at the ground line for posts used for carrying electric wires, etc. 300 w. St Ry Rev—April 15, 1896.

See also **TIMBER PRESERVATION.**

**Tool.**—Pole Climber and Pole Sinking Tool on the U. S. Military Telegraph Lines. W. A. Glassford. Description of tool and its working. 1200 w. Elec Eng—June 23, 1897.

**POLE RAILWAY.**

A Pole Railway. Details of a novel road in Nova Scotia for conveying lumber. Ill. 500 w. Can Engr—June, 1898.

**POLICE BOAT.**

**Boston.**—Progressive Speed Trials of the Boston Police Boat "Guardian." Extracts from a paper by C. H. Peabody, read at the New York meeting of the Society of Naval Architects and Marine Engineers. Written with the object of inducing ship-owners and shipbuilders to make progressive speed trials and present results. 600 w. R R Gaz—Nov. 19, 1897.

**POLICE STATION.**

**New York.**—A New York City Police Station. Illustrates a building for a force of nearly 150 men, officers, calls, patrol stables, and other special features. 1800 w. Eng Rec—May 7, 1898.

**POLISHING.**

Polishing Machinery (Du Polissage). With many illustrations of general and special devices and an account of their operation. 3500 w. Revue Technique—Sept. 10, 1899.

**POLYPHASE CURRENT.**

See **ALTERNATING CURRENT—Polyphase.**

**POLYPHASE GENERATOR.**

See **DYNAMO—Polyphase.**

**POLYPHASE MOTOR.**

See **ELECTRIC MOTOR—Polyphase.**

**POMPEII.**

Pompeii before the Destruction (Pompeji vor der Zerstörung). A review of Weichhardt's recent work, with a number of reproductions of his restorations of the temples and other buildings. A valuable contribution to architecture and archaeology. Four articles, three plates. 5000 w. Schweizerische Bauzeitung—Nov. 20, 27, Dec. 4, 11, 1897.

**PONTOON BARGE.**

**Canal-Boat Carrier.**—See **CANAL BOAT—Lake Carrier.**

**PORCELAIN.**

**Insulator.**—See **INSULATOR—Porcelain.**

**Mold Making.**—Porcelain Mold Making. Jacob Henry. Describes a new art arising from the special requirements of the construction of electrical machinery. Ill. 1000 w. Am Mach—Oct. 28, 1897.

**Meissen, Saxony.**—The Porcelain Works at Meissen. An exceedingly interesting description, with excellent and numerous illustrations of processes in various stages. 2200 w. Sci Am Sup—April 4, 1896.

**PORT.**

See **HARBOR.**

**PORTABLE BUILDING.**

See also **ROTARY BUILDING.**

Knockdown and Portable Dwellings (Ueber Zerlegbare und Transportable Wohnhäuser). Devoted chiefly to the construction of portable barracks for military use. 5000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—April 23, 1897.

**Docker.**—The Docker Pavilions (Les Pavillons Docker). Several forms of portable houses are illustrated and described, those shown being especially adapted for hospitals, and for temporary purposes in hot climates. Serial. Part I. 2500 w. La Rev Tech—Oct. 10, 1897.

**PORTABLE ENGINE.**

See **STEAM ENGINE—Portable.**

**PORTABLE RAILWAY.**

**Electric.**—Portable Electric Railways. Extracts from paper by F. Zezula, in the "Zeitschrift für Kleinbahnen," discussing the value of light portable railways, with especial reference to military operations; and also from a paper by Dr. Werther, read before the German Brick Mfrs. Assn. on the use of electricity as a motive power on portable railways in brick works, etc. Ill. 1500 w. Brick—Oct., 1897.

**Single Rail.**—See **SINGLE RAIL.**

**PORTLAND CEMENT.**

See also **CEMENT; CEMENT TEST; PORTLAND CEMENT WORKS.**

Points on Portland Cement. Considers the chemical components, properties, uses, etc. 1800 w. Stone—April, 1898.

Portland Cement. Concerning cement manufacture, the materials and treatment and system of testing. 4800 w. Builder—July 14, 1900.

Portland Cement. Eugene A. Smith. Paper read before the Alabama Industrial and Scientific Society. Brief description of the raw materials used with analyses, and the chemical composition of a good Portland cement. 1200 w. Tradesman—Dec. 15, 1895.

The Growing Importance of Cement in Constructive Work. Edward Wilkins Dewey. The reduced price of German Portland cement and the improvement in the American product is causing a great increase in use. Rosedale cement and English imported are being crowded out. The relation of domestic production to imports is tabulated and a great increase in consumption predicted. 4500 w. Eng Mag—Nov., 1897.

The Portland Cement Industry of the World.

Bernard L. Green. Reviews the past and present state of the industry in each of the cement-producing countries. Discussion. 10000 w. Jour of Assn of Engng Soc's—June, 1898.

The Relation Between Tests and Use of Portland Cements. W. S. MacHarg. The detail of improvement is discussed, to make it clear that it is positive and permanent, and for the purpose of showing that economy may be safely practiced with the present quality of Portland cement. 4500 w. In Arch—Jan., 1896.

**Admixtures.**—See **Adulteration; Kentish Ragstone.**

**Adulteration.**—The Adulteration of Portland Cement. Editorial on the investigations of Messrs. Stanger and Blount, presented in a paper read before the English Society of Chemical Industry. 1600 w. Engng—Nov. 5, 1897.

See also **Kentish Ragstone; Slag Adulteration.**

**America.**—See **United States.**

**American vs. Foreign.**—Comparison of American and Foreign Portland Cements. W. W. Maclay. Comments on methods of testing and quotations from those who are considered among the highest authorities on the subject. 2200 w. Munic Engng—May, 1898.

**Belgium.**—Manufacture of Portland Cement in Belgium. An account of this extensive and important industry. Ordinary lime, best hydraulic lime, slow setting cement (Portland), and quick setting cement (Roman), are especial products of these immense quarries. 3000 w. Cons Rept Sept., 1896.

**Caustic Soda Waste.**—See **PORTLAND CEMENT WORKS—Michigan Alkali Co.**

**Chemical Constitution.** The Chemical Constitution of Portland Cement. On the experiments of Messrs. S. B. and W. B. Newberry, giving conclusions and comparing them with conclusions reached by Le Chatelier. 1800 w. Engr, Lond—Dec. 24, 1897.

**Concrete.**—Notes on Portland Cement Concrete. Andreas Lundteigen. Tests and favorable results from the admixture of silicious material. 1600 w. Pro Am Soc of Civ Engs—Feb., 1897.

**Definition.**—The Definition of Portland Cement. Jasper Whiting. Argument that slag cements should be classed as Portlands. 2200 w. Eng Rec—July 30, 1898.

**Elasticity.**—The Elasticity of Portland Cement. Describes experiments made at Liverpool by W. L. Brown. 1800 w. Eng Rec—Oct. 28, 1899.

**Europe.**—European Portland Cement Industry. Frederick H. Lewis. Notes of travel. Part first refers to the works at Grays, Essex, and the Francis works at Cliffe. 1600 w. Eng Rec—March 13, 1897.

See also **American vs. Foreign.**

**Experiences.**—See **Tests.**

**Fine Grinding.**—The Fine Grinding of Portland Cement. David B. Butler. Describes a large number of experiments to determine the effect of fine grinding. Serial. Eng Rec—Jan. 28, 1899.

**Frost Effect.**—The Effect of Frost on Portland Cement. Review of important experiments at the municipal cold-storage plant of Manchester, England. 1800 w. Eng Rec—Dec. 24, 1898.

See also **CEMENT.**

**German and English.**—The German and English Portland Cement Industry (Die Deutsche und die Englische Portland Zement-Industrie). Hr. Kaemp. Giving a comparative view of the methods of manufacture, relative growth and value of the efforts of the association of German manufacturers. 3000 w. Zeitschr d Ver Deutscher Ing—June 19, 1897.

**German Association.**—Annual Meeting of the Association of German Portland Cement Manufacturers. Abstracted by S. B. Newberry from the Official Report. 2500 w. Eng News—July 7, 1898.

The Annual Meeting of the Association of German Portland Cement Manufacturers. Abstracted by S. B. Newberry. Report of the meeting including discussions, committee reports, etc., with editorial on the report concerning the action of sea water upon hydraulic cement. 7500 w. Eng News—July 29, 1897.

Portland Cement. Spencer S. Newberry. Report of the annual meeting of the Assn. of German Portland Cement Mfrs. The subjects reported on were uniform testing, specifications, the influence of magnesia, the effect of sea water, and some tests on hardening of cement. 3500 w. Sci Am Sup—Dec. 21, 1895.

The Annual Meeting of the Association of German Portland Cement Manufacturers. S. B. Newberry. An account of the annual meeting, with reports of committees, abstracts of papers, etc. 5000 w. Eng News—Feb. 25, 1897.

**Improved.**—Improved Portland Cement. John W. Dickinson. Explains what Portland cement is, and the essentials of a perfect product, showing the great advance that has been made by the American manufacturer, with report of comparative tests, and general discussion. 5500 w. Jour W Soc of Engs—April, 1898.

**Kentish Ragstone.**—The Admixture of Kentish Ragstone with Portland Cement. The report of Dr. W. Michaelis, Berlin, to the London Chamber of Commerce, interesting as being an additional proof of the fallacy of deductions drawn from tests of neat cement. 1400 w. Engng—June 5, 1896.

The Effect of Admixtures of Kentish Ragstone, etc., upon Portland Cement. D. B. Butler. Abstract of paper read before the Soc. of Engs., London. Illustrated description of experiments by the writer, with results and conclusions. 2800 w. Engr, Lond—Nov. 6, 1896.

**Magnesia.**—Allowable Magnesia in Portland Cement. Irving A. Bachman. A review of investigations and discussions of the question of magnesia in Portland cement since 1891, looking to the maximum percentage permissible without endangering the quality of the cement. 2000 w. Munic Engng Sept., 1896.

**Qualifications.**—Qualifications of Portland Cement. J. W. Dickinson. 1200 w. Jour W Soc of Engs—Jan., 1896.

**Rotary Kiln.**—The American Rotary Kiln Process for Portland Cement. F. H. Lewis. Illustrated history of the process. 3300 w. Eng Rec—Dec. 17, 1898.

Conditions in Portland Cement Kilns. Edward Duryee. Illustrates and describes the form of rotary kiln recently used by the writer and a statement of its advantages. 1200 w. Eng News—Aug. 2, 1900.

The First Manufactures of Portland Cement by the Direct Rotary Kiln Process. E. Duryee. An account of work at Rondout, N. Y., and at Montezuma, N. Y. 700 w. Eng News—July 26, 1900.

The Influence of the Rotary Kiln on the Development of Portland Cement Manufacture in America. Interesting discussion of the cause of the United States' slow development in the manufacture of cement, and then the rapid development all at once, with much information. 3000 w. Eng News—May 3, 1900.

See also **CEMENT KILN.**

**Rotary Kiln Linings.**—Refractory Linings for Rotary Portland Cement Kilns. Edward Duryee. Explains the making of linings lasting much longer than those of the usual composition. 1000 w. Eng Rec—March 31, 1900.

**Sea Water.**—The Behavior of Portland Cement in Sea Water. Dr. William Michaelis. From "Proceedings of the Inst. of Civ. Engs. Vol. CVII. Describes researches of the writer. 2500 w. Eng Rec—Feb. 20, 1897.

The Relations of Hydraulic Cementing Materials to Sea Water (Das Verhalten der Hydraulischen Bindemittel zum Meerwasser). Nadory Nandor. A review of the investigations of Michaelis and of Tetmaier upon the resistance of Portland cement to the action of sea water. Two articles. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 26, Sept. 2, 1898.

**Silica.**—Silica Portland Cement. M. J. Butler. On the manufacture of this product, its adaptability to certain uses, testing, etc. 1600 w. Can Engr—March, 1899.

Silico-Portland Cement (Le Silico-Portland ou Silico-Cement). A fully illustrated article upon the manufacture of the improved cement in which a portion of finely ground sand is mixed with the cement. The strength is greatly increased by the more intimate union of the constituents. 5000 w. La Revue Technique—Jan. 25, 1898.

**Slag.**—The Utilization of Blast-Furnace Slag for Portland Cement Manufacture. Cecil von Schwarz. Abstract of paper read before the Iron and Steel Institute of Great Britain, describing a method in which the slag is granulated by running it into cold water, then mixed with limestone, etc., pressed and burned. 2200 w. Eng News—Sept. 27, 1900.

**Slag Adulteration.**—Slag Adulteration of Portland Cement. Halbert L. Chipps. A brief account of experimental investigations. 800 w. Tech, No. 14—1899-1900.

**Softening.**—The Softening of Portland Cement Plaster. An account of the destruction of the lining of water basin; in Leipzig and other German cities by the carbonic acid in the water. 1000 w. Eng Rec—Feb. 3, 1900.

**Specification.**—A Proposed Standard Specification for Portland Cement. Extracts from an interesting paper by William J. Donaldson urging the adoption by the United States of a standard specification for Portland cement, the use of which should be required in all works done under the direction of officers of the corps of engineers, also, by the Navy, Supervising Architects' Office, etc. Conditions, reasons, and copy of specifications, with arguments are given. 2200 w. Eng News—July 16, 1896.

Proposed Standard Specifications for Portland Cement. Letters to the editor from S. B. Newberry and Robert W. Lesley, with reply from William J. Donaldson. 900 w. Eng News—Sept. 10, 1896.

Mr. Donaldson's Proposed Standard Specification for Portland Cement. Robert W. Lesley. A letter to the editor in reply to letter of W. J. Donaldson, showing that the latter had incorrectly quoted from a previous communication. 2500 w. Eng News—Sept. 24, 1896.

Proposed Standard Specifications for Portland Cement. William J. Donaldson. A reply to article by Mr. Lesley, which criticises the proposed specifications advanced by the writer. 5000 w. Eng News—Dec. 10, 1896.

Portland Cement Specifications. Reviews article by William J. Donaldson, urging the adoption of standard specifications; gives full abstract of the paper; also the Philadelphia controversy over Portland cement. 6500 w. Munic Engng—Aug., 1896.

Specifications for Portland Cement. Review of novel requirements for both slow and quick-setting cement for a large hydraulic power station. 1600 w. Eng Rec—March 11, 1899.

See also CEMENT TESTING.

**Specification, Australia.**—Standard Cement Specifications of the South Australian Government. A copy of the standard specifications for Portland cement supplied to Australia for use on its public works, under which satisfactory material has been for some time received. 1100 w. Eng News Dec. 17, 1896.

**Specification, Russian.**—Russian Portland Cement Specifications. These are noteworthy for prescribing two sets of tests, one for the laboratory on the work, and the other for the more careful investigations possible in the laboratories of expert testing establishments. 2800 w. Eng Rec —Feb. 18, 1899.

**Tests.**—American Portland Cement Tests. A time record, from 1 day to 5 years, of tests on cement entering into the construction of five pieces of engineering work, using an aggregate of 310,000 barrels of cement. 400 w. R R Gaz—Feb. 14, 1896.

Some Experiences with Portland Cement. W. K. Eldridge. Read before the Am. Soc. of Munic. Imp. An account of experiments and results. 3000 w. Munic Engng—Nov., 1899.

See also CEMENT TESTS.

**United States.**—Development of the American Portland Cement Industry. Frederick H. Lewis. Considers the conditions which prevail in manufacturing, in using, and in testing cements in this country, and discusses the course which it is advisable to follow in dealing with cements. Serial. Munic Engng—Dec., 1896.

History of the Portland Cement Industry in the United States. Robert W. Lesley. A brief account of the development from its inception, showing that the industry owes much to the application of American methods and processes; discussing also the methods in use in the United States and in Europe. Discussion. 6500 w. Jour Fr Inst—Nov., 1898.

Progress of the American Portland Cement Industry. Robert W. Lesley. Read before the Boston Society of Civil Engineers. Notes upon the general properties of cement and the later developments in manufacture in the United States. 7500 w. Jour of Assn of Eng Soc—Nov., 1895.

Progress in the Manufacture of American Portland Cement. John W. Dickinson. Brief history of this industry in the United States, with remarks on quality and cost. 1700 w. Munic Engng—March, 1896.

The Development and Future Prospects of Portland Cement Manufacture in America. Considers the recent and rapid growth of this industry in the United States, to what it is due, and the probability of its enduring. 3500 w. Eng News—July 26, 1900.

See also American vs. Foreign; Tests.

**Volume Constancy.**—Report on the Constancy of Volume of Ten Portland Cements (Bericht über die Raumbeständigkeit von Zehn Portland cementen). M. Gary. A very full report by the Berlin Testing Laboratory and the German Society of Cement Manufacturers, upon the general properties of the cements, including the changes in volume under various conditions. An important document. 18000 w. 2 plates. Mitt aus d Kgl Tech Versuchsanstalt, Part I—1899.

**Weights.**—Weights of Portland Cement and Capacity of Cement Barrels. Sanford E. Thompson. Information compiled from tests made by the Boston Transit Commission. 500 w. Eng News—Oct. 4, 1900.

## PORTLAND CEMENT WORKS.

See also CEMENT WORKS; PORTLAND CEMENT.

**Bronson, Mich.**—The New Plant of the Bronson Portland Cement Company, Bronson, Mich. Frederick H. Lewis. Illustrates and describes features of plant where European methods of handling clay and marl are combined with distinctive American practice of calcination. 3500 w. Eng Rec—April 30, 1898.

**Buckeye, Bellefontaine, O.**—Buckeye Portland Cement Plant Near Bellefontaine, O. Illustrated description of a plant which began with Dietzch kilns and the semi-humid process and now uses wet grinding and continuous rotary kilns burning powdered coal. 1400 w. Eng Rec—Oct. 15, 1898.

**Coplay Co.**—New Portland Cement Plant of the Coplay Cement Company. Frederick H. Lewis. An illustrated description of a plant producing 500 bbls. daily. The latest types of kilns and mills are used, and both processes and machinery are explained. 3000 w. Eng Rec—Dec. 18, 1897.

The New Works of the Coplay Cement Company. Illustrated description of a plant making 1600 bbls. of Portland cement daily. Traces the progress of the material from the quarry to the storehouse for the finished product, and describes the apparatus and its arrangement. 2400 w. Eng Rec—Feb. 27, 1900.

**Empire, Warners, N. Y.**—The Empire Portland Cement Plant at Warners, N. Y. Frederick H. Lewis. Illustrated description of a large plant running on the semi-humid process. 1600 w. Eng Rec—July 16, 1898.

**Lawrence, Siegfried, Pa.**—Plant of the Lawrence Cement Company of Pennsylvania. Illustrated description of Portland cement works recently started near Siegfried, Pa., Where particular attention was paid to the arrangement of the machinery and the plans for handling the materials, so as to avoid the use of labor as far as possible. 4800 w. Eng Rec—May 12, 1900.

**Michigan.**—The Plant of the Michigan Portland Cement Company, Coldwater, Mich. Frederick H. Lewis. Illustrated description of a plant of 4000 bbls. daily capacity, using wet processes and rotary kilns. 1500 w. Eng Rec—Feb. 25, 1899.

**Michigan Alkali Co.**—The Michigan Alkali Co.'s Plant for Manufacturing Portland Cement from Caustic Soda Waste. B. B. Lathbury. Illustrated description of the interesting features of this plant, which uses lime waste from a caustic soda plant. Also editorial. 5700 w. Eng News —June 7, 1900.

**Nazareth, Pa.**—The Works of the Nazareth Portland Cement Company. Illustrated description of a 1000-bbl. plant containing considerable special machinery, including a new type of rotary dryer using powdered coal as fuel. 2000 w. Eng Rec—Dec. 16, 1899.

**Virginia, Craigsville, West Virginia.**—The Virginia Portland Cement Company's Works. Watson Vredenburg, Jr. Illustrated description of a plant at Craigsville, W. Va., in which both shafting and electricity are employed to transmit power. The course of the materials from the quarries to the bags and barrels ready for shipment is followed in detail. 2700 w. Eng Rec—July 28, 1900.

**Volsk, Russia.**—The Portland Cement Works at Volsk, on the Volga (Die Portlandsementfabrik Wolsk a. d. Wolga). With plans, sections and elevation of the large buildings, and an account of the plant. The output is 300,000 barrels, of 375 pounds each, per year. 1500 w. Zeitschr d Ver Deutscher Ing—Nov. 27, 1897.

**Vulcanite, N. J.**—The Vulcanite Portland Cement Company's Works. Frederick H. Lewis. Illustrates and describes a new plant for the manufacture of Portland cement, containing many new features for economical working, proved desirable by experience with an older plant at the same site, of which plans are also published. Particular attention is paid to the power plant details, which affect the cost of cement in a marked degree. 2000 w. Eng Rec—May 6, 1899.

**Western, Yankton, S. D.**—Western Portland Cement Company's Plant, Yankton, S. D. Frederick H. Lewis. Illustrated description of works using chalk and clay and following the general scheme of English works on the Thames and Medway, with the exception of the methods of working the slurry. 1600 w. Eng Rec—Nov. 19, 1898.

**Whitehall, Cementon, Pa.**—The Whitehall Portland Cement Works. An illustrated description of the large cement mill at Cementon, Pa., with rotary kilns, and electric driving for the major portion of the plant. 2200 w. Eng Rec—Sept. 15, 1900.

**PORTO RICO.**

See also **CUBA; SAN JUAN; WEST INDIES.**

Porto Rico's Commerce. Some statistics of the foreign trade of the island, the leading products, exports and imports. 1000 w. Sci Am—Aug. 20, 1898.

Puerto Rico and Its Resources. Quotation from Mr. Austin, Chief of the U. S. Treasury Bureau of Statistics, descriptive of the population, finances, topography, trade, and industrial opportunities of the island. 4500 w. Arch & Build—Sept. 17, 1898.

The Engineering Development of Porto Rico. Herbert M. Wilson. A review of the commercial engineering possibilities of the island, with especial regard to the utilization of the numerous water powers available. 4000 w. Eng Mag—July, 1899.

The Material Development of the Island of Porto Rico. Albert W. Buel. Suggestion of immediate needs—chiefly good roads—and warning against undue expectations until education and emulation have wakened the people to a higher plane of living, with its larger demands. Finely illustrated. 3900 w. Eng Mag—Aug., 1900.

**POSITION FINDER.**

See also **ARTILLERY; BALLISTICS; RANGE FINDER.**

An Apparatus for Automatically Finding Concealed Position. Froissart. An illustrated outline of apparatus, stating the object sought and the results obtained. 7500 w. Jour U S Artillery—March-April, 1898.

**POST.**

**Rail.**—See **RAIL—Posts.**

**POSTAGE DISTRIBUTOR.**

Postage Stamp and Postal Card Distributer. Illustrates and describes an apparatus invented by M. de Janisch, which has overcome the many difficulties and provided for the automatic supply of stamps and postal cards. 1700 w. Sci Am Sup—June 30, 1900.

**POST OFFICE.**

**Berlin.**—The Enlargement of the Imperial Post Office, Berlin (Der Erweiterungsbau des Reichspostamtes). With effective illustrations of this important public building. Two articles. 2500 w. 1 plate. Deutsche Bauzeitung—April 2, 9, 1898.

**POTASH.**

**Electrolytic.**—Manufacture of Potash by Electrolysis. Orrin E. Dunlap. Illustrated description of process and plant at Niagara Falls. 1500 w. W Elec—Sept. 12, 1896.

The Production and Properties of Potassium Percarbonate (Ueber die Darstellung und die Eigenschaften des Kalium-Percarbonats). An account by Prof. Hansen, of the electrolytic production of percarbonate of potassium, in the laboratory of the Zurich Polytechnic. 3000 w. Zeitschr f Elektrochemie—April 20, 1897.

See also **ELECTRO-CHEMICAL WORKS; ELECTRO-CHEMISTRY.**

**Germany.**—Mining Potassium Salts in Germany. E. Mackey-Heriot. A short description of the deposits, geology, etc. 1000 w. Eng & Min Jour—Sept. 1, 1900.

**Slag.**—See **SLAG—Potash and Soda.**

**POTENTIOMETER.**

See also **ELECTRIC INSTRUMENT; ELECTRIC MEASUREMENT; ELECTRIC METER.**

A Wide Range Potentiometer. L. H. Fry. Describes a potentiometer designed by Herr Thiermann of the Hanover Polytechnikum, devised especially for the calibration of voltmeters, but which is also adapted for all current and resistance measurements. 1200 w. Elec Rev, Lond—Aug. 20, 1897.

The Direct Reading Potentiometer. Description of instrument made by Messrs. Elliott Bros., with illustrations. The method of making tests and measurements with it is also described. 3000 w. Elec Rev, Lond—June 11, 1897.

**Crompton.**—The Crompton Potentiometer. Its Use and Capabilities. W. C. Fisher. Notes and suggestions upon the working and capabilities of this special type of instrument. Serial. Elect'n—Nov. 29, 1895.

**POTTERY.**

**Seger Cone.**—See **PYROMETRY.**

**POTTERY KILN.**

**Staffordshire.**—New Staffordshire Pottery Kilns. Illustrated description. 1800 w. U S Cons Repts—Sept., 1896.

**POWER.**

See also **ELECTRIC POWER; POWER TRANSMISSION; STEAM POWER; WATER POWER.**

The New Epoch and the Currency. George S. Morison. Ascribes all the great advances of the nineteenth century to the capacity to manufacture power, and traces the effects. Traces the changes in business and shows the effect upon the currency. 4700 w. N Am Rev—Feb., 1897.

**Chemical Works.**—Steam, Gas, and Electrical Energy as Applied to Chemical Works. F. H. Bowman. Read before the Manchester Section of the Society of Chemical Industry. Abstract of views on each power named is given. 1200 w. Gas Wld—Dec. 11, 1897.

Steam, Gas and Electricity as Sources of Energy in Chemical Works. F. H. Bowman. Read before the Manchester Section of the Society of Chemical Industry, England. Discusses the advantages and disadvantages of each of the sources named. 2200 w. Jour Gas Lgt—Jan. 25, 1898.

**Comparative Sources.**—The Power of the Future. Thomas Frood. Steam is considered as having had its day. Gas and electricity are now contending for supremacy and at present the author believes gas has the lead, but he thinks electricity will win in the long run. 1500 w. Can Eng—July, 1896.

The Power Problem. J. C. Ranson. A consideration of the available sources of motive power, including steam, electricity, forces of nature, compressed air, and the gas engine. 2500 w. Tradesman—May 1, 1897.

See also **ELECTRIC TRANSMISSION—Economics; Limits; Steam Power; GAS ENGINE—Steam Engines—Compared; RAILWAY MOTIVE POWER.**

**Cost.**—Can the Cost of Power be Reduced? F. Riddell. The answer to the question is affirmative for many mills now operating, and hints at methods for stopping small leaks are given. 1700 w. Am Miller—Feb., 1896.

Power Generation—Comparative Cost by the Steam Engine, Water Turbine and Gas Engine. John B. C. Kershaw. Abstract of paper read before Section G of the British Assn. The writer has collected and arranged in comparable form some of the most important data bearing on the cost of power generation. Serial. Engr, Lond—Sept. 29, 1899.

Power Generation. The Comparative Cost of Generating Power by the Steam Engine, Water Turbine and Gas Engine. J. B. C. Kershaw.

Paper before the British Association, with elaborate data and tables. Serial. Engng—Sept. 14, 1900.

The Cost of the Generation of Power (Kosten der Krafterzeugung). N. Holz. A supplement to Eberle's recent work on the same subject, with diagrams showing the cost of power generated by a variety of heat motors, as compared with water power. 2500 w. Zeitscher d Ver Deutscher Ing—March 18, 1899.

See also **ELECTRIC TRANSMISSION—Economics; Limits; Steam Power.**

**Electricity, Gas and Steam.**—Small Motive Power Selection. Alton D. Adams. Discusses the comparative advantages of electric motors, gas engines and steam engines. 1200 w. Am Arch—Oct. 14, 1899.

**Electric vs. Steam.**—The Comparative Cost of Steam and Electric Power. Irving A. Taylor. Discussion of how to supply and distribute power with the best economy and convenience. Serial. Elec Eng, N. Y.—Nov. 25, 1897.

See also **ELECTRIC TRANSMISSION—Steam Power.**

**Future.**—The Future of Power Development. Wm. D. Ennis. Considers the probability of displacement of the steam engine by other motors, or its radical improvement in the matter of economy. 2300 w. Eng Mag—Aug., 1900.

**Gas and Electricity.**—Twentieth Century Energy. Alton D. Adams. Arguing that gas and electricity are the forms of energy that will prevail. 2200 w. Sci Am—July 14, 1900.

**Gas vs. Steam.**—The Cost of the Generation of Power (Kosten der Krafterzeugung). Chr. Eberle. A very full investigation into the relative cost of steam and gas motors as sources of power. Computations are given for units from 200 to 1000 h. p. A valuable paper. 8000 w. Zeitschr f Elektrochemie—Oct. 5, 1897.

**Measurement.**—Watt and the Measurement of Power. W. H. Preece. The Watt Anniversary Lecture, delivered at Greenock, Feb. 5. An interesting discourse, dealing largely with Watt's measurement of power and its present use, with editorial comment. 4500 w. Elect'n—Feb. 12, 1897.

**Mechanical and Electrical.**—Mechanical and Electrical Work and Power. A discussion of the agreement between mechanical and electrical power. 1500 w. Am Mach—April 30, 1896.

**Steam vs. Water.**—The Comparative Advantages of Steam and Water Power. Discussion of the relative economy, and giving illustrations showing that every case must be determined on its merits, as these vary widely. 3000 w. Can Elec News—May, 1898.

The Comparative Cost of Steam and Water Power. William O. Webber. A comparison based upon the most recent data, showing the various items in detail and the great reductions in the cost of power both for steam and water. 3000 w. Eng Mag—Sept., 1898.

## POWER CONSUMPTION.

**Machine Tools.**—See **ELECTRIC DRIVING—Power Consumption; MACHINE TOOL—Power Consumption.**

**Punching.**—See **PUNCHING.**

**Rolling Mill.**—See **ROLLING MILL—Power Consumption.**

## POWER FACTOR.

See **ELECTRIC DISTRIBUTION—Power Factor.**

## POWER HAMMER.

See also **STEAM HAMMER.**

**Longworth.**—The Longworth Power-Hammer. Ernest Samuelson. Read before the Inst. of Mech. Engs. Drawings illustrating improvements made, with description. 2200 w. Engng—March 2, 1900.

## POWER PLANT.

See also **ELECTRIC PLANT; ELECTRIC POWER STATION; MECHANICAL PLANT; STEAM PLANT.**

Power Plant Arithmetic. W. H. Wakeman. The first of a series of articles aiming to give needed enlightment to the men who operate power plants. Serial. Engr, Cleveland, O.—Sept. 15, 1898.

**Columbia University.**—The Power Plant of a University. Edward A. Darling. Describes the design and installation of the plant, showing in outline the building equipment it serves, and its operation. Ill. 15500 w. Trans Am Soc of Mech Engs—May, 1899.

**Factory.**—A Factory Power Plant. Description of a Newark, N. J. plant which is entirely independent of outside companies or the municipality for its water supply, electricity, fire protection and power. 1400 w. Eng Rec—April 8, 1899.

**Farr Alpaca Co.**—The Power Plant of the Farr Alpaca Company. Illustrated detailed description. Plant designed to supplement water power. 1800 w. Eng Rec—Jan. 4, 1896.

**Finance and Economics.**—Finance and Economics of Power Plants. R. H. Thurston. A detailed study of this subject. Serial. Engr, Cleveland, O.—Jan. 1, 1899.

**Hospital.**—The New Power Plant of the Massachusetts General Hospital. Illustrated description of a plant designed to furnish electric current, steam heat and hot water to a group of buildings. 1800 w. Eng Rec—Sept. 1, 1900.

Light, Heat and Power at the Kankakee Hospital. Illustrated description of a new plant recently installed. 2000 w. W Elect'n—March 3, 1900.

**Indiana University.**—See **HEATING—Centralized Plant.**

**Library, Chicago.**—Power Plant of the Chicago Public Library. Brief description, giving the boiler tests and engine tests. Ill. 2000 w. Engr, Cleveland, O.—Oct. 15, 1898.

**Marine.**—See **MARINE ENGINE—Central Power Plant.**

**Paris Exposition.**—Power Features of the Paris Exposition. W. H. Donner. A well illustrated description of boiler and engine plants characteristic of continental practice, with text explanations of the striking features of the several installations. 3000 w. Eng Mag—July, 1900.

Power Plant at the Paris Exhibition. A well illustrated account of the exhibits in Machinery Hall. 10000 w. Ir & Coal Trds Rev—Sept. 7, 1900.

Prime Movers at the Paris Exposition. A review of the various exhibits. Serial. Engr, Lond—June 8, 1900.

The Mechanical Plant of the Universal Exposition of 1900 (Le Service des Installations Mécaniques à l'Exposition Universelle de 1900). Ch. Dantin. Showing the present condition of work on the Champ-de-Mars and describing the manner in which the boilers, engines, electric generators and piping of the exposition power plant are to be installed. 3000 w. 1 plate. Génie Civil—Oct. 1, 1898.

The Power Plant of the Exposition of 1900 (Le Service des Installations Mécaniques a l'Exposition de 1900). G. Leugny. A general view of the great power house of the exposition, with especial details of the flues leading to the great chimneys and the subways for steam and water pipes. 2000 w. Revue Technique—Dec. 10 1899.

The Power Plant of the Paris Exposition. An illustrated description. 1400 w. Power—Dec., 1899.

The Universal Exposition of 1900 (Exposition Universalle de 1900). The official specifications for the steam and electrical power plant, including the concessions to exhibitors for furnishing power. 4500 w. La Revue Technique—Sept. 25, 1898.

See also **BOILER; DYNAMO; ELECTRIC STATION; STEAM ENGINE.**

**Railway Station.**—The Power Plant of the Philadelphia and Reading Terminal Station. Joseph M. Wilson. Extract from a paper presented to the Am. Soc. of Civ. Eng. Description with drawings. 4500 w. Eng Rec—Nov. 16, 1895.

See also **MECHANICAL PLANT.**

**Soda Fountain Co.**—The Power Plant of the American Soda Fountain Company, Boston, Mass. H. W. Weller. A combination of electrical and mechanical transmission designed with careful attention to first cost and economy. Ill. 3500 w. Elec Eng, N. Y.—Jan. 26, 1899.

**Tennessee Exposition.**—Power Plant of the Tennessee Centennial and International Exposition at Nashville, Tenn. Brief illustrated description. 500 w. Power—May, 1897.

**Verity Plow Co.**—See **HEATING—Verity Plow Co.**

**Washington Mills, Lawrence, Mass.**—Power Plant of the Washington Mills Company, Lawrence, Mass., U. S. A. Explains the need of increasing the power, and gives illustrated description of the specially designed boilers, and report of the engine trials. 3500 w. Engng—Oct. 21, 1898.

**POWER STATION.**

Cable Railway.—See CABLE RAILWAY—Power Station.

Electric.—See ELECTRIC POWER STATION.

**POWER TRANSMISSION.**

See also BELTING; ELECTRIC DRIVING; ELECTRIC TRANSMISSION; POWER; ROPE DRIVING; SHAFT; WIRE-ROPE DRIVING.

Transmission of Power. H. R. Sutton. Deals mainly with ways to overcome and to utilise the friction between working parts. 1500 w. Prac Eng—March 18, 1898.

**Belt and Pulley.**—The Transmission of Power by Belts and Pulleys. C. L. Redfield. Discusses the causes of waste of power in belt transmission and shows how choice of proper sizes of pulleys, and belt speeds, together with judicious opposing of strains, will enable large economies to be effected. 4500 w. Eng Mag—Jan., 1898.

**Coal Mine.**—See Mine; COAL MINING MACHINERY; ELECTRIC EQUIPMENT.

**Comparative Systems.**—The Transmission of Power. A discussion of the subject of the modes of transmitting power concluding with three facts that point strongly to the ultimate triumph of electrical transmission for a large portion of industrial conditions. 3900 w. Eng, Lond—June 4, 1897.

The Transmission of Power. William Henry Preece considers its transmission by electricity, Edward Bayzand Ellington, by water, and John Hopkinson all other methods, in papers read before the Civil Engineers' Conference, and these are discussed by the members. 5500 w. Elec Eng, Lond—May 28, 1897.

See also POWER.

**Compressed Air.**—Long Distance Transmission of Power. W. O. Amsler. Information regarding the use of compressed air for this purpose. 3500 w. Sib Jour of Engng—April, 1897.

See also COMPRESSED AIR—Power Transmission.

**Compressed Air vs. Electricity.**—See Comparative Systems; Electricity vs. Compressed Air.

**Cotton Mill.**—Power Transmission. F. H. Underwood. A paper read before the Profile meeting of the New England Cotton Mfr. Assn. A general dissertation upon power transmission in a modern mill, say of 400,000 spindles, operated by steam power. 1000 w. Eng Rec—Oct. 3, 1896.

**Electric.**—See also ELECTRIC DISTRIBUTION; ELECTRIC DRIVING; ELECTRIC EQUIPMENT; ELECTRIC POWER; ELECTRIC TRANSMISSION.

**Electric vs. Rope.**—See also ELECTRIC DRIVING—Cotton Mills.

**Electricity vs. Compressed Air.**—Air vs. Electricity in Long Distance Transmission. W. S. Norman. From British Columbia "Mining Record." Aiming to show that for the uses of a mining camp, compressed air under the Taylor system is cheaper in its first cost of installation and much cheaper in operation in comparison with electric power. Ill. 4000 w. Compressed Air—Sept., 1898.

Electricity—Including a Short Review of Transmission of Power by Electricity and Compressed Air. F. B. Griffith. A non debatable paper. Presents a few rules and principles which were evolved by experiments made by eminent electricians, points out some of the uses and advantages of electricity in railroad shops, etc. Ill. 1600 w. Pro of Cent R'way Club—March, 1897.

See also Mine; POWER.

**Electricity vs. Shafting.**—Experiments Upon Friction in Electric Motors and Transmission Shafting. Review of article published in the Inst. Civ. Engs. Foreign abstracts, giving an account of experiments made in electric motors and transmission shafting in the electro-mechanical laboratory of the Ecole Spéciale d'Industrie et des Mines, at Hainaut. 800 w. Mech Wld—April 17, 1896.

Power Transmission by Shafting vs. Electricity. Abstract of a committee report presented at the convention of the Am. Mas. Mechs.' Assn., concluding that the latter is more effective in large shops. 5800 w. Eng News—July 12, 1900.

**Elliptical Arms.**—Diagram of Proportions of Elliptical Arms. Diagram for determining the dimensions of elliptical arms for belt or rope pulleys, or similar wheels used for power transmission. From the reference book of S. E. Freeman, of the Todd & Stanley Mill Furnishing Company, St. Louis, Mo. 500 w. Am Mach—Dec. 3, 1896.

**Engine to Dynamo.**—See MECHANICAL CONNECTIONS.

**Factories.**—A Topical Discussion Upon Electrical, Pneumatic and Mechanical Power Transmission in Manufacturing Establishments. Ill. 12000 w. Jour W Soc of Engs—June, 1898.

See also Machine Shop; ELECTRIC DRIVING.

**Friction Losses.**—Friction Horse-Power in Factories. C. H. Benjamin. Tabular data, with explanations, secured in a series of experiments made to determine the ratio of the power required to drive shafting and belts in various factories to the total power consumed. 1800 w. Am Soc of Mech Engs—Dec., 1896.

"Friction Horse Power in Factories." Samuel Webber. Notes called forth by Mr. Benjamin's paper on same subject. 1300 w. Mach—Feb., 1897.

Power Consumed by Shafting and Belts. C. H. Benjamin. An account of experiments made by senior students of Case School of Applied Sciences under the direction of the writer. 1200 w. Ir Trd Rev—June 8, 1899.

Loss of Power in Mills. M. W. Danielsen. Calls attention to conditions that affect belts and so cause loss of power, and suggests remedies. Ill. 1400 w. Age of St—June 5, 1897.

See also Electricity vs. Shafting.

**Friction Wheels.**—See also Paper Friction Wheels; FRICTION WHEEL.

**Gas.**—Gas Power Transmission. Editorial review of Mr. Perry's plan for utilization of culm in generating gas for power transmission. 1500 w. Ry Rev—Aug. 15, 1896.

See also CULM.

**Gas vs. Electricity.**—The Comparative Economy of Power Transmission by Gas and by Electricity. Questioning statements made in a paper by Nelson W. Perry. 1500 w. Eng News—May 13, 1897.

Gas versus Electricity for Power Transmission. Nelson W. Perry. Analyzing the disadvantages that attend local transmission by electricity. Serial. 1st part. Eng Mag—Oct., 1896.

Power Transmission by Gas and Electricity. Alton D. Adams. Discusses the efficiences of steam and gas engines for generating electric power; the relative losses and expenses in transmitting power for long distances by electric wires and by gas in pipes, and the commercial limits to the practicability of each. 3200 w. Mines & Min—May, 1900.

**Hydraulic.**—The Use of Water Under Pressure for Transmitting Power. M. Martin. Letter to the Société de l'Industrie Minérale. Presents the advantages and defects of the deviation system, and a system almost exempt from those disadvantages. 1300 w. Col Guard—Jan. 8, 1897.

Hydraulic Power Transmission. Gustave Kaufman. From a paper read before the Engs.' Soc. of W. Penn. Describes briefly a system of power transmission which is largely in use in England. It is the distribution of water at very high pressures from 700 to 2000 pounds per square inch. 8000 w. Ir Age—Nov. 12, 1896.

See also HYDRAULIC MACHINERY; HYDRAULIC POWER.

**Machine Shops.**—Shafts, Belts, and Pulleys. W. Barnet Le Van. Directions and statements helpful in securing the best results. 2200 w. Eng, N. Y.—July 24, 1897.

Special Drives. John Randol. Presents the convenience and economy of arranging some means by which power can be delivered at any place on the shop floor where it is required. 2300 w. Am Mach—Dec. 31, 1896.

See also Factories; ELECTRIC DRIVING.

**Mechanical.**—The Mechanical Transmission of Power. W. E. Buck. Contains little that is new. The first part is a fairly good review of general practice, so far as possible to carry the discussion. Other succeeding parts will doubtless cover the remaning ground. Serial. Mech Wld—April 3, 1896.

**Mechanical Connections.**—See **MECHANICAL CONNECTIONS.**

**Mine.**—Distribution of Power in Collieries. Llewelyn B. Atkinson. A paper read before the South Wales Inst. of Engs. Dealing with the question of the economical production of power, with some remarks on the mechanical power in collieries. 4500 w. Elec Eng, Lond—Dec. 27, 1895.

Electricity vs. Compressed Air—Actual results in a Mine of the Colorado Fuel and Iron Co. Lewis Searing, with editorial. An illustrated account of tests favorable to electricity. 2400 w. Elec Eng—Nov. 25, 1896.

Electricity vs. Compressed Air. Actual Results in a Mine of the Colorado Fuel and Iron Company. Lewis Searing. Practical tests of both systems made under the direction of the writer. Favorable to electricity. 2200 w. Min Ind & Rev—Dec. 10, 1896.

The Comparative Advantages and Disadvantages of Steam, Compressed Air and Electricity for Power Purposes in Coal Mining, with Special Reference to Coal-Cutting and Haulage. Charles Chetwynd Ellison. Special prize essay. Part first considers steam and compressed air, with reference to conveniences, efficiency, economy and safety. Serial. Ir & Coal Trds Rev—Feb. 12, 1897.

Transmission of Power in Mines. Rankin Kennedy. The three systems of steam, compressed air, and electricity are compared in this first paper, and special conditions favoring one or another of the systems are pointed out. Serial. Elec Rev, Lond—Aug. 7, 1896.

English Practice in Transmitting Power in Mines. Reviewing Mr. Rankin Kennedy's discussion of steam, compressed air and electricity as motive powers for transmission purposes. 3700 w. Eng Mag—Dec., 1896.

See also **COAL MINING MACHINERY; COMPRESSED AIR PLANT; COMPRESSED AIR—Power Transmission; ELECTRIC EQUIPMENT; MINING MACHINERY.**

**Paper Friction Wheels.**—Paper Friction Wheels. W. F. M. Goss. Some applications of the paper friction wheel are presented diagrammatically, with brief description of their action, experiments and a summary of results. 1800 w. Am Soc of Mech Engs—Dec., 1896.

Paper Wheels for Transmission of Power. George D. Rice. Report on a series of experiments which were undertaken with the view of determining the practicability and efficiency of paper wheels for the transmission of power. 1000 w. Ir Age—Feb. 11, 1897.

See also **FRICTION WHEEL—Paper.**

**Pneumatic.**—See **PNEUMATIC PROPULSION; PNEUMATIC RAILWAY.**

**Reeves Variable Speed.**—See **Variable Speed.**

**Rope.**—See also **ROPE—Power Transmission; ROPE DRIVING.**

**Rope and Belt.**—The Limiting Velocity in Belt and Rope Gearing. George R. Bale. The proposition is stated and demonstrated. 800 w. Prac Eng—Jan. 29, 1897.

Transmission of Power by Means of Ropes and Belts. G. H. Thurston. Abstract of paper read before the Mech. Engs.' Assn., Johannesburg. A report of the writer's experience. 2700 w. Ir & Coal Trds Rev—Sept. 1, 1899.

**Rope Driving.**—See also **ROPE DRIVING.**

**Shafting.**—See also **Electricity vs. Shafting; Friction Losses; SHAFT.**

**Shafting, Vertical.**—See **Vertical Shafting.**

**Variable-Speed.**—A Variable-Speed Power Transmission Apparatus. Illustrated description of the Reeves device. 500 w. Eng News—March 1, 1900.

See also **BICYCLE—Gear; CONE WHEELS; GEAR—Variable Speed; PULLEY—Cone.**

**Vertical Shafting.**—Power Transmission by Vertical Shafts in a High Building. Illustrated description of power transmission by means of vertical shafts extending from the basement to the top floor. 700 w. Ir Age—Oct. 8, 1896.

**Warships.**—See also **AUXILIARY ENGINE.**

**Wire Rope.**—See **WIRE ROPE DRIVING.**

**PRECIOUS METAL.**

See also **GOLD; PLATINUM; RARE METAL; SILVER.**

The Precious Metals. An estimate of the quantity in use in the world at various times, with suggestions as to what becomes of it and the use in manufactures and the arts. 3300 w. Min Ind & Rev—Dec. 31, 1896.

**PRECIOUS STONE.**

See also **DIAMOND; RUBY; SAPPHIRE.**

Gem Fields of the World. George F. Kunz. Information of the localities where different gems are found and of the methods of mining. 2200 w. Sci Am Sup—Jan. 2, 1897.

Geography of Precious Stones. George F. Kunz. An interesting lecture considering the subject in several aspects. The famous gem regions, their influence on discovery and exploration, the building up of cities through this industry, commerce, etc. Serial. Jour Fr Inst—Jan., 1898.

**Australia.**—Australian Gems. An account of the diamond field at Bingara, New South Wales, with information regarding other gems found in Australia. 1800 w. Aust Min Stand—Feb. 11, 1897.

Precious Stones of New South Wales. J. Milne Curran. Information based on the writer's personal observations, illustrated by original photographs. Serial. Aust Min Stand—Jan. 14, 1897.

**Identification.**—How to Identify Precious Stones. Leopold Claremont. Abstract of article in the London "Mining World." Reviews the various tests usually applied, advising that the prospector be guided by the result of all, as a single test is apt to mislead. 1400 w. Eng & Min Jour—Nov. 19, 1898.

**Science.**—Precious Stones and Recent Science. F. G. S. in "Mining World." Notes giving some idea of the value of recent researches. 1800 w. Aust Min Stand—June 3, 1897.

**PREMIUM PLAN.**

See **WAGES—Premium Plan.**

**PRESS.**

**Hay and Straw.**—Presses for Bailing Hay and Straw (Presses pour le Foulage du Foin et de la Paille). Illustrating and describing improved portable screw presses for agricultural purposes. 1000 w. 1 plate. Génie Civil—July 17, 1897.

**Hydraulic.**—See **HYDRAULIC PRESS.**

**Pneumatic.**—See **PNEUMATIC PRESS.**

**Power.**—Early Power Presses. Work of a Vermont man in this line with some information from N. C. Stiles. Ill. 800 w. Mach, N. Y.—Feb., 1898.

**Sub.**—Proportions of Sub-Presses. L. B. Charles. Illustrates and describes designs of this useful tool. 600 w. Am Mach—April 26, 1900.

Punching and Shearing Small Spring Steel. C. E. Quimby. Illustrated description of a sub-press and set of dies for punching and cutting off flat spring-tempered steel about ½-inch wide and 1-64 inch thick. 900 w. Am Mach—Sept. 7, 1899.

Sub-Presses and Compound Dies. A. H. Cleaves. The utility of the sub-press for watch work is set forth and illustrated by examples and engravings. 3300 w. Am Mach—Sept. 10, 1896.

See also **DIE—Compound.**

**PRESSURE GAUGE.**

See also **ANEROID; HYDRAULIC PRESSURE; MANOMETER.**

**Aneroid.**—See **ANEROID.**

**Atwood.**—A Direct-Reading Power Gauge for Steam Engines. Illustrates and describes an invention of G. F. Atwood, for the direct measurement of the pressure in the cylinder. 1200 w. Eng News—Oct. 20, 1898.

**Brush-McLeod.**—The Measurement of Small Gaseous Pressures. Charles F. Brush. Read before the Am. Assn. for the Advancement of Science. Discusses a modified form of McLeod gauge used by the author in investigations requiring measurement of slight pressures. Ill. 1800 w. Science —May 27, 1898.

**Draft and Blast.**—A Draft and Blast Pressure Gauge. J. H. Kinealy. Read before the Am. Soc. of Heat & Ven. Engs. Describes a new instrument by which pressures can be indicated to within 0.01 inch of water column. 750 w. Discussion. Heat & Ven—Feb., 1896.

**Locomotives.**—Some Notes on Locomotive Steam Gauges. Theo. H. Curtis. How steam gauges may be in error even when shown to be correct by the test-gauge. 1000 w. Ry Mas Mech—Feb., 1898.

**Reading.**—How to Read Gauges. Alfred Siebert. Considers pressure gauges, glass gauges, the oil receiver, and the liquid receiver, and how trouble was located. 2200 w. Ice & Refrig—Aug., 1898.

**Standardizing.**—Concerning Mercury Columns. From "The Locomotive." Method used in standardizing gauges is explained. Serial. Mas St Fit—July, 1897.

**PRESSURE REGISTER.**

See **GAS DISTRIBUTION—Pressure Register.**

**PRIMARY BATTERY.**

See **ELECTRIC CELL; ELECTRO-CHEMISTRY.**

**PRIME MOVER.**

**Paris Exposition.**—See **POWER PLANT.**

**PRINTING.**

Recent Advances in the Graphic and Photographic Arts (Ueber einige Neuere Arbeiten im Gebiete der Graphischen Künste und der Photographie). Ottomar-Volkmar. Describing especially improved methods of photo-engraving and printing from aluminum plates, with illustrations of presses. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 22, 1899.

**Review, 1846-1896.**—Fifty Years in the Printing Business. Illustrated historical sketch. 1700 w. Sci Am—July 25, 1896.

**Severy Impression Process.** Melvin L. Severy. Describes a new method of printing. 4300 w. Jour Fr Inst—March, 1898.

**PRINTING MACHINERY.**

Machinery for Book and General Printing. William Powrie. Read before the Inst. of Mech. Engs., England. Deals with the leading types of machines used for book and job printing. Ill. Serial. Engng—March 10, 1899.

**Electric Driving.**—See **ELECTRIC DRIVING—Printing.**

**Movements.**—Some Printing Press Movements. Franklin Sweet. Describes the vital movements of a press showing how difficult are some of the problems. Ill. 3800 w. Wis Engr—May, 1899.

**Paris Exposition.**—Some Printing Machines at the Paris Exhibition. Illustrates and describes the exhibits of printing machinery. 2400 w. Engng —June 29, 1900.

**PRISON.**

**Construction.**—The Steel Cell and Central Corridor System of Prison Construction. Illustrated description of method adopted in the Erie County Penitentiary at Buffalo, N. Y. 1100 w. Sci Am —Nov. 27, 1897.

**Georgia.**—The Fulton County, Georgia Jail. Part first consists of general description, giving floor plans, elevation and sections. Serial. Eng Rec—Nov. 13, 1897.

**Philadelphia.**—Engineering Features of the Philadelphia City Prison. Illustrated description of the plumbing, ventilation and heating of a prison for 600 inmates. 2000 w. Eng Rec—June 18, 1898.

**Seine Department.**—The New Prison Buildings of the Department of the Seine (Les Nouvelles Prisons du Département de la Seine). P. Basquin. A well illustrated description of new penal buildings constructed on modern principles. 1 plate. Génie Civil—March 17, 1900.

**Wronke, Prussia.**—The Central Penitentiary for the Province of Posen, in Wronke (Das Centralgefängniss fur die Provinz Posen). Details of plans with many diagrammatical illustrations. 2700 w. Zeitschrift fur Bauwesen—No. X-XII.

**PRIZE.**

**French Academy.**—The Public Session of the French Academy of Sciences (Séance Publique de l'Académie des Sciences). The annual volume published by the Academy, containing the minutes of the public meeting, the award of prizes for the year past and notices of the prizes to be awarded next year. 60000 w. Comptes Rendus —Dec. 19, 1898.

**Société d'Encouragement.**—Program of Prizes Offered by the Société d'Encouragement in 1901 and the Following Years (Programme des Prix Purposés par la Société d'Encouragement pour l'Industrie Nationale a Décerner dans les Années 1901 et Suivantes). A long list of general and special prizes and medals offered in various departments of science and art. 10000 w. Bull de la Soc d'Encour—May 31, 1900.

**PRODUCER GAS.**

See **GAS ENGINE; GAS FUEL; GAS PRODUCER; WOOD GAS—Riché.**

**PRODUCTION.**

See also **INDUSTRY; MANUFACTURING.**

**Uncertainty.**—Uncertainty as a Factor in Production. E. A. Ross. The causes of uncertainty and the range of variation in the output of many industries, with their social and economic effects. 9000 w. An Am Acad—Sept., 1896.

**PROFIT SHARING.**

See **WAGES—Profit Sharing.**

**PROJECTILE.**

See also **ARMOR PLATE; ARTILLERY; BALLISTICS; GUN.**

The Making of Large Projectiles. Jas. A. Murphy. Illustrated description. 1300 w. Foundry—Dec., 1899.

**Air Waves.**—Photographs of Air Waves Formed by Flying Projectiles. An article following in the main, a paper which Colonel von Obermayer contributed to the "Mittheilungen über Gegenstände des Artillerie- und Genie- Wesens." Describes investigations in this field, giving illustrations. 3000 w. Engng—Aug. 12, 1898.

**Armor-Piercing.**—American Armor-Piercing Projectiles. Drawings of some of the latest designs of projectiles for which contracts have been recently awarded by the United States with official particulars of the requirements and tests specified. 2000 w. Engr, Lond—Nov. 19, 1897.

**Cast Steel.**—Tests of Cast Steel Projectiles. A description of some cast steel, armor-piercing projectiles made by Messrs. Isaac G. Johnson & Co., that have shown remarkable results in government trials. 900 w. R R Gaz—March 13, 1896.

**Johnson.**—See **ARMOR PLATE—Harvey Tests.**

**Manufacture.**—Making of Projectiles. J. A. Murphy. Describes the making of shells and gives hints on the construction of patterns, core boxes, flasks, etc. 1200 w. Foundry—May, 1899.

The Manufacture of Shell for the United States Navy. Rudolf E. Bruckner. Illustrates and describes the work, showing the exactness necessary, and describing the method of inspection. Considers the manufacture of the 5-inch cast iron shell. 2000 w. Am Mach—Dec. 29, 1898.

**U. S. Navy.**—A Group of Navy Projectiles. Illustrates and describes the shells, of various dimensions, used by the U. S. navy. 800 w. Sci Am —Aug. 6, 1898.

**PROJECTOR.**

See **SEARCH LIGHT.**

**PRONY BRAKE.**

See **DYNAMOMETER—Prony Brake.**

**PROPELLER.**

See also **MARINE ENGINEERING; NAVAL ARCHITECTURE; SHIP PROPULSION.**

Something About Screw Propellers. John H. Meyer. A study of the action and the effect is given in part first. Ill. Serial. Engr, N. Y.—Dec. 1, 1897.

**Atlas Bronze.**—See **ATLAS BRONZE.**

**Canal Boat.**—See **CANAL BOAT.**

**Design.**—The Basis of Propeller Design. J. Denholm Young. Read at meeting of the Liverpool Engng. Soc. Discusses the things that effect the performance of propellers. 2500 w. Steamship —Jan., 1899.

The Construction of Propellers (Konstruktion von Schiffsschrauben). Giving a graphical solution by the projection of points from a hyperbola. 1200 w. Zeitschr d Ver Deutscher Ing—May 22, 1897.

**Geometry.**—The Screw Propeller, with Some Notes on the Geometry of the Subject. Part first gives definitions of terms used and refers to the conditions that determine the dimensions and performance generally. Serial. Prac Eng—Oct. 7, 1898.

**High Speed.**—High-Speed Screw Propellers. Sydney W. Barnaby. Read at the International Congress of Naval Architects and Marine Engineers. An explanation of the theory of the formation of cavities in water by screw propellers at high speeds. 2200 w. Engng—July 16, 1897.

Screw Propulsion. Editorial regretting that Mr. S. Barnaby's paper on "Cavitation" was not adequately discussed, with a criticism of the views set forth by the writer. 1500 w. Engr, Lond—July 23, 1897.

On the Formation of Cavities in Water by Screw Propellers at High Speeds. Sydney W. Barnaby. 2000 w. Jour Am Soc of Nav Engs —Nov., 1897.

**Law of Similarity.**—The Application of the Law of Similarity to Marine Propellers. J. Denholm Young. Abstract of paper read before the North-east Coast Institution of Engineers and Shipbuilders. An exhaustive review of principles and practice in the construction of screw propellers. An appendix is supplied, which contains a reduction of Mr. Froud's Constants under the law of comparison. 4000 w. Ind & Ir—Nov. 22, 1895.

**Model Tank.**—See **NAVAL ARCHITECTURE.**

**Pendulum.** The Pendulum Propeller. H. C. Vogt. An able exposition of principles of propulsion as exemplified in fishes, and a mathematical discussion of those principles. Ill. 3800 w. Steamship—Jan., 1896.

**Pitch.**—How to Measure the Pitch of a Screw Propeller. Describes a method employed in Scotland. 500 w. Am Mach—June 21, 1900.

**Reversing.**—Notes on Reversing Screw Propellers. The good qualities of propellers with reversible blades are presented and points discussed. 2400 w. Prac Engr—April 6, 1900.

**Sheathed.**—The Sheathed Propeller. Describes a small propeller of peculiar construction, lately put on the market by the Sheathing Propeller Company of London. Ill. 890 w. Sci Am Sup —Aug. 7, 1897.

**Surface.**—On the Influence of Surface on the Performance of Screw Propellers. W. F. Durand. Read before the Society of Naval Architects and Marine Engineers, New York. Illustrated description of investigations, the essential feature being the relation of the amount of area of the blade to the performance as a whole. 6000 w. Marine Engng—Dec., 1897.

**Theory.**—The Theory of Propulsive Screws (Théorie des Helices Propulsives). M. Ratedie. A communication to the French Academy, reviewing the theory of Drzewiecki, in which the surface of each blade of a propeller is decomposed into its elements in order to enable its action to be investigated. 1200 w. Comptes Rendus—Feb. 19, 1900.

**Triple.**—See **WARSHIP**—Triple-Screw.

**Twin-Screws.**—Experiments on the Effect of Direction of Turning in Twin-Screws. R. E. Froude. Read before the Inst. of Naval Archt's. Gives results of model experiments on the comparative efficiency of the two directions of turning. 1200 w. Engng—April 1, 1898.

Experiments on the Effect of Direction of Turning in Twin Screws. R. E. Froude. Gives results of model experiments in the comparative efficiency of the two directions of turning. Discussion follows. 2400 w. Jour Am Soc of Naval Engs—May, 1898.

**PROPELLER SHAFT.**

See **SHAFT.**

**PROSEPNY.**

Biographical Notice of Franz Prosopny. R. W. Raymond. A short history of this specialist in ore deposits. 5300 w. Trans Am Inst of Min Eng—Nov., 1895.

**PROSPECTING.**

See also **GOLD GEOLOGY; GOLD MINE; GOLD MINING; GOLD PLACER; GOLD REGION; MINING LAW**—Locating Claims.

A Few Points for Prospectors. Dan De Quille. Directions for guidance in exploring new regions. 2200 w. Min & Sci Pr—Nov. 28, 1896.

A Guide for Prospectors. W. C. Wynkoop. The first of a series of articles intended to aid prospectors, and giving such information as will enable one to recognize valuable ore when discovered. Serial. Min Repts—July 7, 1898.

Exploring and Exploiting a Gold Country. Albert Williams, Jr. Reflections and counsel suggested by the Klondike craze. 2800 w. Eng Mag —Oct., 1897.

Notes on Prospecting. Jno. W. Gray. Directions for prospecting, with suggestions, appliances needed, things to be observed, etc. 3500 w. Min & Sci Pr—Sept. 11, 1897.

Notes on Indicators, Feeders, etc. W. Pearce. Results of observations in prospecting. Ill. 1800 w. Aust Min Stand—Nov. 10, 1898.

Prospecting. Arthur Lakes. Extracts from an instructive lecture recently delivered before the Miners' National Bureau, of Denver, Colo., describing the formations most likely to be productive. 2300 w. Col Eng—Aug., 1897.

Prospecting Experiences. Arthur Lakes. General thoughts upon prospecting, with descriptions of the peculiarities of several promising but undeveloped economic deposits of minerals which are valuable though not so commonly sought after. Ill. 4000 w. Mines & Min—April, 1898.

**Auger and Drill.**—The Hand Auger and Hand Drill in Prospecting Work. Charles Catlett. A brief account of the work of this device in the practice of the writer. 2000 w. Trans Am Inst of Min Engs—March, 1897.

**Coal.**—Prospecting for Coal in Colorado. Arthur Lakes. How to distinguish the strata in which it may be found. Ill. 1900 w. Mines & Min—Nov., 1899.

**Density Rule.**—A Prospector's Density Rule. J. Holms Pollock. Illustrates and describes the device and its use. 900 w. Trans Am Inst of Min Engs—Feb., 1899.

**Diamond Drill.**—Value of the Diamond Drill for Prospecting. H. M. Lane. On the amount of dependence which can be placed upon the record furnished by it. Ill. 1900 w. Mines & Min—Sept., 1899.

See also **DIAMOND DRILLING.**

**Drilling.**—Cost of Prospecting by Drilling in Joplin District. Harold A. Titcomb. Describes the method employed, giving report of cost, which is largely dependent on the speed. 1000 w. Eng & Min Jour—April 7, 1900.

**Indications.**—Indications of Ore Deposits. E. Lidgey. Some of the indications in various places that lead a prospector to know whether he is on the right track of a lode, reef, or ore deposit. Serial. Aust Min Stand—May 5, 1898.

**Magnetic.**—See **MAGNETIC PROSPECTING.**

**Mistakes.**—Prospectors' Mistakes. The first of a series of articles on this subject. Serial. Min & Sci Pr—March 31, 1900.

**New Gold Districts.**—The Discovery of New Gold Districts. H. M. Chance. Calls attention to valuable accidental discoveries, and to investigations which have led prospectors to decide that the only safe way is to assay everything. 2500 w. Trans Am Inst of Min Engs—Feb., 1899.

See also **GOLD REGION.**

**New Guinea.**—Gold Prospecting in New Guinea. John Plummer. Brief account of conditions and the vicissitudes accompanying the work. 700 w. Eng & Min Jour—Aug. 20, 1898.

**Nova Scotia.**—An Incident in Systematic Prospecting Connected with the Discovery of the "Rose." Lead, Montague, N. S. George W. Stuart. Read before the Min. Soc. of Nova Scotia. Showing that a knowledge of glacial geology is a great help in prospecting, if not a necessity. 900 w. Can Min Rev—April 29, 1899.

**Placer.**—Placer Prospecting. Arthur Lakes. Notes and suggestions for those starting to prospect for placer deposits. Ill. 5000 w. Col Eng—June, 1897.

See also **GOLD PLACER.**

**Scientific.**—Scientific Prospecting. Thomas Smith. Part first calls attention to misleading teachings of geologists, and gives some directions based on facts found in the camp under investigation. Serial. Min & Sci Pr—Aug. 21, 1897.

**U. S. Southern.**—The Methods of Prospecting for Gold in the South. William M. Brewer. Methods used in determining the extent of the deposits, and considerations affecting the method of mining and treatment of ore. Serial. Tradesman—Jan. 15, 1896.

**Valuation.**—The Valuation of Prospects. Howard West. Responsibility of Prospectors, and points of interest. 2500 w. Can Min Rev—Oct., 1896.

See also **MINE VALUATION.**

**Victoria.**—Border Prospecting. Stanley Hunter. Report to the Victorian Secretary for Mines, upon the work done on the Victorian side of the frontier in prospecting the border country between

Cape Howe and Forest Hill. 2800 w. Aust Min Stand—Nov. 4, 1897.

**PROTECTION WALL.**

**Bridge Supports.**—Concrete Protection Walls for Bridge Supports. An illustrated description of the protection against dislodgment by derailed cars furnished for the depressed tracks in Chicago. 600 w. Ry & Engng Rev—Oct. 14, 1899.

**PROTRACTOR.**

See also **DRAWING; DRAWING INSTRUMENT.**

**Mapping Mine Surveys.**—An Improved Form of Protractor for Mapping Mine Surveys. W. S. Ayres. Illustrated description. 600 w. Trans Am Inst of Min Engs—Nov., 1896.

**PUBLIC BUILDING.**

See also **MUNICIPAL ART; MUNICIPAL BUILDINGS; MUNICIPAL IMPROVEMENT; PARLIAMENT BUILDINGS; PENSION OFFICE; PUBLIC WORKS.**

The Collaboration of the Architect, the Painter, and the Sculptor. The subject from the view of an architect was discussed by E. W. Mountford; the view of the painter, by W. B. Richmond; and the view of the sculptor, by E. Roscoe Mullins. Three papers and discussions before the Roy. Inst. of Brit. Archts. 9000 w. Builder—June 23, 1900.

**Architectural Competition.**—See **ARCHITECTURAL COMPETITION.**

**British War Office.**—The Proposed War Office. Report of a select committee appointed to inquire into the manner in which the sites available for the erection of the new buildings required for government offices may best be appropriated for that purpose. 3500 w. Arch, Lond—Sept. 18, 1896.

**Century, St. Louis.**—The Century Building, St. Louis. An illustrated detailed description of a marble palace for business and amusement. Contains stores, offices and a theatre. 8000 w. In Arch—Aug., 1897.

**Colombo, Ceylon.**—The Victoria Buildings, Colombo. Description, with illustration, of new buildings of architectural pretensions, recently erected. 2000 w. Ind Engng—Aug. 28, 1897.

**London.**—Parliamentary Debate on the New Government Buildings. Reprint from the London "Times." Deals with the expenses for new public buildings in London. Debate in the House of Commons. 4600 w. Brit Arch—March 25, 1898.

**Stafford County, Eng.**—Stafford County Council Buildings. Descriptive. 3000 w. Brit Arch—May 1, 1896.

**U. S. Commission.**—United States Public Buildings Commission. A. F. Tennille. Bill recommended with view to securing better methods and to give the country a better type of architecture in its public buildings. 2700 w. Arch & Build—March 21, 1896.

**PUBLIC WORKS.**

See also **ENGINEERING WORKS; MUNICIPAL ART; MUNICIPAL BUILDINGS; MUNICIPAL IMPROVEMENT; PUBLIC BUILDINGS.**

**Civil vs. Military Engineer.**—The Civil Engineer and National Public Works. George Y. Wisner. A discussion of the gradual passage of public works from civil to military control, giving the history of the change and considering its wisdom. 4500 w. Jour Assn of Engng Soc's—Dec., 1898.

**History.**—Traditions and Superstitions Regarding Public Works. Paul Sébillot. Part first consists of introductory remarks, and a chapter on the rites of construction of roads. Serial. Ry Mag—June, 1897.

**Kansas City.**—Public Works in Kansas City. Describes recent street work, trouble with smoke, and the reconstruction of a reservoir with partially fallen walls. 900 w. Eng Rec—June 17, 1899.

**Municipal Laws.**—An Outline of Municipal Laws Governing Public Works. An outline by David Molitor, of what in his judgment, would be the best form of municipal government for conducting public works. 6000 w. Munic Engng—Jan., 1898.

**Talienwan, China.**—Public Works at Talienwan. A clipping from the "North China News" in regard to the extensive public works undertaken at this new Russian port. 1000 w. U S Cons Repts, No. 584—Nov. 20, 1899.

**U. S. National.**—National Public Works. George Y. Wisner. Read at a recent meeting of the Detroit Engng. Soc. Criticism of the policy of the United States which has kept the public funds under the control of the army engineer corps, with a history of the work. 3800 w. Marine Rev—May 11, 1899.

**PUBLIC WORKS MANAGEMENT.**

See also **MUNICIPAL ADMINISTRATION; MUNICIPAL WORK.**

**New York.**—The Management of Public Works in Greater New York. Reports concerning the provisions of the new charter for the administration of the public works of this great municipality. 4500 w. Eng Rec—Oct. 30, 1897.

**PUDDLING.**

See **IRON MANUFACTURE — Puddling; WROUGHT IRON.**

**PULLEY.**

See also **BELTING; FLYWHEEL; POWER TRANSMISSION—Belt and Pulley; SHAFT; SHEAVE WHEEL.**

Pulley and Fly-Wheel Construction. Theodore F. Scheffler, Jr. Part first explains the method of calculation by an example. Tables will be given compiled from actual practice. Ill. Serial. Power—March, 1898.

**Arm.**—The Evolution of the Pulley Arm. R. D. Moore. Discusses the motives which actuated the designer of the curved arm, and strongly advocates the straight form. Ill. 1400 w. Foundry—Sept., 1898.

**Arm Tests.**—The Strength of Pulley Arms. C. H. Benjamin. Illustrates and describes a series of experiments on pulley arms, carried on in the mechanical laboratory of the Can. School of Applied Science. The tests were made on cast-iron pulleys, and steel-rim pulleys. General conclusions are given with tabulated results. 2300 w. Am Mach—Sept. 22, 1898.

**Cone.**—Proportioning Cone Pulleys. John E Sweet. Presents the writer's method, of value to all who deal with cone-pulley design. Diagrams. 1500 w. Am Mach—Oct. 13, 1898.

On the Design of Speed Cones: A New Formula. James J. Guest. Explanation of method. 700 w. Trans Am Soc of Mech Engs, No. 861—May, 1900.

Step or Cone Pulleys. Samuel Webber. Explains how to determine the diameter of a set of step or cone pulleys when a number of different speeds are constantly required. 1000 w. Clay Rec—June 14, 1897.

Stepped Pulleys and Back Gears. Dexter S. Kimball. Describes mechanisms useful in obtaining all speeds in the running of machines. 1800 w. Sib Jour of Engng—Oct., 1899.

The Computation of Cone Pulleys for Machine Tools (Zur Berechnung der Stufenscheiben für Werkzeugmaschinen). Heinrich Weiss. An analytical and graphical discussion of the problem, resulting in general equations, and diagrams adapted for the proportioning of cone pulleys for lathes and similar machines. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 23, 1898.

The Computation of Cone Pulleys (Zur Berechnung des Stufenscheiben-Antriebes). Heinrich Weiss. A development of a graphical method for designing cone pulleys for machine tools for any given series of speeds. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—May 26, 1899.

The Designing of Cone Pulleys. Walter K. Palmer. Discussion of the problem, with the deduction of a practical method. 8800 w. Kansas Univ Quar—April, 1898.

**Cone Diagram.**—A Geometrical Solution of the Problem of Finding the Radii of Different Pulleys, so that the Same Open Belt Shall Fit Each and Every Pair. W. J. Varley. Solution illustrated by seven diagrams. 700 w. Elec Rev, Lond—Dec. 4, 1896.

A New Cone Pulley Diagram. From a pamphlet by Walter H. Palmer. Diagram for open belts with description of its application. 1100 w. Am Mach—July 14, 1898.

Design of Stepped Cones. Klein's Diagram, which is convenient and sufficiently accurate, is illustrated and the method of using it explained. 1800 w. Am Mach—Oct. 29, 1896.

See also **Speed Diagram.**

**High Side.**—The High Side of a Pulley. Points on the running of belts and the action of pulleys. Ill. 1300 w. Am Mach—Aug. 19, 1897.

**Key.**—See also **KEY.**

**Keys and Split Hubs.**—Keys and Split Hubs. Illustrates and describes some methods of keying pulleys to their shafts. 1200 w. Mach, N. Y.—July, 1900.

**Speed Diagram.**—A Pulley Speed-Ratio Diagram. Gives a diagram and method of using, of service in all problems relating to the diameter and speed of wheels, rims, pulleys, etc. 150 w. Mech Wld —April 7, 1899.

See also **Cone Diagram.**

**Steel.**—See **Wrought Steel.**

**Test.**—See **Arm Test; Wooden-Rim Test.**

**Wooden-Rim Test.**—A Remarkable Test of a Wooden-Rim Pulley. Illustrated description of the construction of a pulley, and its test to a rim-speed of 5¼ miles per minute without destruction. 800 w. Eng Rec—Oct. 13, 1900.

**Wrought Steel.**—A Belt Pulley Made Entirely of Wrought Steel. Illustrated description. 500 w. Eng News—Feb. 4, 1897.

An All-Wrought Steel Pulley. Edward G. Budd. Describes an ordinary belt-wheel made entirely of steel and representing the highest development of the sheet metal workers' art. Ill. 1500 w. Jour Fr Inst—June, 1897.

The American All Wrought-Steel Pulley. Illustrated detailed description of how it is manufactured. 2500 w. Ir Age—Jan. 6, 1898.

The All-Wrought Steel Pulley. Report of the Franklin Inst., through its committee on Science and Arts, on the invention of Thomas Corscaden, of Philadelphia. Ill. 700 w. Jour Fr Inst—April, 1898.

**PULLEY ACCIDENT.**

See also **FLYWHEEL ACCIDENT.**

**Fredonia, N. Y.**—Pulley Accident at Fredonia, N. Y. John E. Sweet. Describes the accident, giving illustrations showing fractures. 700 w. Power—Dec., 1898.

**PULP MACHINE.**

See also **PAPER MANUFACTURE.**

Machines for the Manufacture of Wood Pulp (Machines à Fabriquer la Pate de Bois et le Carton). With illustrations of wood-grinding and pasteboard machines. 1200 w. 1 plate. Génie Civil—Dec. 2, 1899.

**PUMICE STONE.**

**Nebraska.**—The Deposits of Volcanic Ash in Nebraska. E. H. Barbour. From a paper published in the report of the Nebraska State Board of Agriculture for 1896. Gives information of the extent, deposits, chemical composition, etc. Ill. 800 w. Eng & Min Jour—Nov. 6, 1897.

**PUMP.**

See also **AIR LIFT; MINE DRAINAGE; PUMPING ENGINE; PUMPING ENGINE TEST; PUMPING STATION; WATER RAISING; WATER WORKS.**

Pumping Machinery. Abstract of a paper by Charles A. Hague, read before the Denver meeting of the American Water Works Assn. The importance of adapting pumping machinery more closely to the work it is to do. 2000 w. Eng Rec—July 3, 1897.

Pumping Machinery (Les Pompes). M. Masse. A comprehensive essay, beginning with the hydraulic ram, and including hand and steam pumps, both vertical and horizontal, with a mathematical analysis of the discharge from a number of connected pumps. Five articles. 28000 w. Revue de Mécanique—Feb., Mar., June, Sept., Nov., 1897.

The Pump. J. W. Hughes. Lecture delivered before the plumbing class of the Montreal Council of Arts and Manufactures. Part first explains the principle of operation, and the action of the lift pump. Serial. San Plumb—Aug. 15, 1897.

**Air.**—See **AIR PUMPS.**

**Air Leaks.**—Handling Air in a Tube Well Pumping Plant. D. N. Tower. A brief description of the Cohasset water works, near Boston, and the writer's experience in fighting air leaks in the wells and suction mains of a driven well supply. 2400 w. Jour of N Eng Water Works Assn—March, 1898.

**Air Lift.**—Air Lift Pumps. Tests of Pohle Air Lift Pumps at the Rockford (Ill.) Water Works. Charles C. Stowell, in a paper read before the Ill. Soc. of Engs. & Survs. Description of trials and experiments continued over a period of nearly two years. Ill. 1600 w. Eng News—March 4, 1897.

The Air Lift Pump. C. C. Stowell. Deals with the early history of raising water by air lift, its general principles, and with an installment at Rockford, Ill., with illustrations and discussion. 2800 w. Ill Soc of Engs & Surv, 11 An Rept—1896.

See also **AIR LIFT.**

**Artesian.**—Some Pump Problems. W. H. Booth. Reports some of the writer's investigations in connection with the design of artesian pumps. 2000 w. Am Mach—Feb. 2, 1899.

See also **Deep Well; ARTESIAN WELL; IRRIGATION; WELL.**

**Auxiliary Suction.**—Auxiliary Suction Pumps. Describes a centrifugal pump driven by Pelton wheel used to lift water when the section of main pumps has increased beyond practicable limits. 500 w. Eng Rec—April 2, 1898.

**Balancing.**—Pump Balancing. W. H. Booth. The subject is discussed and an illustrated description of arrangement of pump given. 1800 w. Am Mach—Nov. 12, 1896.

**Blast Furnace.**—The Jeansville Modern Furnace Pump. A short illustrated description of a pump for blast furnace purposes. 700 w. Ir Age—Sept. 20, 1900.

**Bucket.**—A Novel Type of Bucket Pump for Mines, Wells, Boreholes, etc. Illustrated description of an invention of Herbert Ashley, and a statement of its advantages. 1600 w. Ir & Coal Trds Rev —Feb. 2, 1900.

**Centrifugal.**—Centrifugal Pumping. J. Richards. Review of progress. 1200 w. Eng News—July 2, 1896.

Centrifugal Pumps. W. H. Booth. On the work of these pumps, their speed, efficiency, etc. 3000 w. Am Mach—March 2, 1899.

Electrically-Driven Centrifugal Pumps. Lewis A. Hicks. Read before the Pacific Coast Electric Transmission Assn. Describes experiments made by the Kern County Land Co., and methods of investigating centrifugal pumps. Ill. 5000 w. Jour of Elec—July, 1899.

On the Electrical Operation of Conoidal Centrifugal Pumps. John Richards. Read before the Pacific Coast Electric Transmission Assn. Presenting the advantages and disadvantages met, and showing that the latter may be removed. 2400 w. Jour of Elec—July, 1898.

Recent Improvements in Centrifugal Pumps. J. Richards. Explains and illustrates the conoidal system as used for the drainage works at New Orleans. 900 w. Eng News—Dec. 1, 1898.

The Design of Centrifugal Pumps. J. Richards. An article in two parts treating the subject from the standpoint of a practical builder and designer, and containing much valuable information. Ill. Serial. Eng News—July 29, 1897.

The Present Status of the Centrifugal Pump. Henry P. Jones. Gives a study and comparison of collected data, discussing the class of pumps not built for particular conditions, but intended to satisfy the general demand. 2800 w. Eng News—March 9, 1899.

See also **Auxiliary Suction; Electric; Fan; Sewage, Chicago; FAN—Centrifugal; PUMPING STATION—Peoria; Rockford, Ill.**

**Centrifugal Emulsion.**—The Centrifugal Emulsion Pump (Note sur les Pompes Centrifuges Emulsives). A. H. Courtois. A description of a modified form of centrifugal pump by which air may be introduced and mixed with the liquid. 2000 w. Revue de Mécanique—Aug., 1900.

**Centrifugal Schabaver.**—The Schabaver Centrifugal Pumps (Rapports de M. Léon Masson, sur les Pompes Centrifuges Schabaver). Report on a special type of centrifugal pumps, for elevating liquids to great heights, with illustrations, and curves and tables of tests. 2000 w. Bull d l Soc d'Encouragement—June 30, 1900.

**Centrifugal Test.**—Tests of Centrifugal Pumps Under High Heads. Slightly condensed from a paper read before the Pacific Coast Elec. Trans. Assn. Describes the experimental tests of the pumps of the Kern County Land Co., explaining methods of testing and giving results. 4800 w. Eng News—Aug. 9, 1900.

**Coal Mine.**—See **Electric Mine; Mine; Kaselowsky; PUMPING ENGINE—Mine.**

**Compressed Air.**—Driving Pumps by Compressed Air. William Cox. Presents the conditions which must be fulfilled so that the best results may be obtained. Serial. Compressed Air—Jan., 1899.

The Uses and Advantages of a Public Supply of Compressed Air for Pumping or Raising Water. Frank Richards. It is pointed out that a pump could be made exactly proportionate for this purpose, and that compressed air in a well designed pump may be economically used for pumping. Considerations which should influence design follow. 1800 w. Am Mach—May 7, 1896.

**Conoidal.**—See **Centrifugal.**

**Deep Mine.**—See **Mine Deep.**

**Deep-Well.**—A New Continuous Flow Deep-Well Pump. E. E. Johnson. Describes briefly the direct-acting steam deep-well pump and the air-lift pump as the two methods now in use, and gives illustrated description of a new continuous-flow deep-well pump, tests of actual plants, etc. 1500 w. Eng News—Jan. 20, 1898.

A New Deep Well Pump. Illustrated description of a new form of differential water end having unusually large valve areas. 5000 w. Eng Rec—March 4, 1899.

Deep-Well Pumping. E. E. Johnson. Considers the subject of deep-well water-supply, and various types of pumps, with illustrated description of a continuous flow deep-well pump, giving tests of plants where it is used. Discussion. 9000 w. Ill Soc of Engs & Surv—1898.

Deep-Well Pumping. E. E. Johnson. Discusses from an engineering and practical standpoint, the various types and kinds of pumping machinery applied to this service. Illustrations and discussions. 18800 w. Jour of W Soc of Engs—April, 1897.

Details of Deep-Well Pumps—Geological Conditions in England. W. H. Booth. Showing how English practice differs from American, and the conditions affecting it. 1200 w. Am Mach—Nov. 24, 1898.

Experiences with Deep-Well Pump Rods. G. W. Bissell. Describes experiences in connection with the deep well which constitutes the principal water supply of the Iowa State College. 1000 w. Trans Am Soc of Mech Engs—May, 1899.

Repairing a Deep-Well Pump. Describes a mishap that occurred in lowering a pump and the means taken to set matters right. 1700 w. Engr, Lond—March 31, 1899.

The Iowa Agricultural College Deep Well and Pump. Ames, Ia. A. Marston. Gives results of tests of well and pump under different conditions. 1200 w. Eng Rec—April 2, 1898.

See also **Artesian; Mine Deep; ARTESIAN WELL.**

**Deep Well, Waukesha, Wis.**—A Deep-Well Pumping Plant at Waukesha, Wis. J. W. Ledoux. Describes and illustrates the plant and reports tests made. Discussion. Ill. 4800 w. Pro of Engs' Club of Phila—April, 1898.

Deep Well Pumping Plant at Waukesha, Wis. Describes the plant and gives results and tests. 2200 w. Fire & Water—March 18, 1899.

**Dry Dock.**—See **PUMPING ENGINE.**

**Dubiau Circulating.**—Steam Boilers with the Dubiau Circulating Pump (Dampf Kessel mit Dubiauscher Rohrpumpe). Describing a syphon pump arrangement for use with boilers to maintain a positive circulation, with illustrations and numerous tables of tests. 5000 w. Zeitschr d Ver Deutscher Ing—July 10, 1897.

**Duplex.**—Duplex Pumps. Their action, and why positively closed water valves permit of high speeds. Serial. Bos Jour of Com—Aug. 7, 1897.

**Duplex Hydraulic.**—A Duplex Hydraulic Pumping Engine. Stuart McMurtrie. From the "Journal of the British Society of Mining Students." Describes the principle and working of a Hathorne Davey pumping-engine installed at Radstock. Ill. 1200 w. Col Guard—Jan. 7, 1898.

**Electric.**—An Electrical Pumping Plant. Charles A. Hague. The incidental benefits that may attend the use of electricity for pumping are noted, and it is shown that for some situations, electrical power pumping may be cheaper than the direct use of steam. The data given and conclusions drawn will however fail to obtain general acceptance. An interesting discussion that exposes some vulnerable points accompanies the paper. 7000 w. Jour New Eng Water Works—March, 1896.

Electric Pumping. A. T. Maltby. Electric power as available for pumping is considered under three heads, based on the nature of the generating power, with illustrations of various plants. An account of the present stage of advancement of this branch of electrical application. 1700 w. Am Elect'n—May, 1897.

Electric Pumps and Pumping. A. W. K. Pierce. Deals with the disposal of underground water in mining, assuming that electric pumps are to be used; discusses the type, the system of transmission, apparatus, size, capacity, etc. Ill. 4000 w. Ir & Coal Trds Rev—Feb. 17, 1899.

Some Data on Pumping by Electricity. Lewis A. Hicks. On the success of the centrifugal pump, and the cost of the plants and their operation. 1800 w. Jour of Elec—July, 1900.

The Application of Electric Power to Pumping Machinery. S. H. Bunnell. A fully illustrated description of all the modern forms of electrically operated pumps, for mining and other purposes. Shows the opportunity for further development of electric pumps. 3000 w. Eng Mag—Dec., 1898.

See also **Centrifugal; Riedler; ELECTRIC EQUIPMENT—Coal Mine; Mine; PUMPING STATION—Berlin Exhibition.**

**Electric, Dillingen, Bavaria.**—Waterworks with Electric Driving (Wasserwerk mit Elektrischem Antrieb). Illustrated description of the plant at Dillingen, Bavaria. A high-service system, the pressure being regulated by accumulators controlling the electric motors. The double-acting pumps have mechanically operated valves. 1500 w. Zeitschr d Ver Deutscher Ing—March 20, 1897.

**Electric Mining.**—A Mammoth Electric Pumping Plant. Illustrates and describes the largest electrical pumping plant in the United Kingdom—at the Gorebridge Collieries. 1700 w. Col Guard—Nov. 4, 1898.

An Electric Pumping Installation. Philip R. Bjorling. Illustrated description of an electric pumping installation which has been working without intermission since 1891. 1200 w. Col Guard—Jan. 10, 1896.

A New Form of Electric Pump for Underground Use. Emerson Bainbridge. Read before the Brit. Inst. of Min. Engs. Describes the Hatfield Electric Pump, stating its advantages. 900 w. Col Guard—June 22, 1900.

Colliery Pumps and Pumping Operations. The rapid progress made in late years in this branch of colliery engineering, with examples especially of the application of electricity. 2500 w. Ir & Coal Trds Rev—June 5, 1896.

Electrical Pumping in South Staffordshire, England. W. H. Booth. Describes methods used for keeping the water out of the mines. 2300 w. Mines & Min—Oct., 1899.

Electrically Driven Mining Pumps (Elektrisch Betriebene Bergwerkspumpen). A well illustrated account of various electric pumps at mines in Germany and Austria. Two articles. 3000 w. Glückauf—April 28, May 5, 1900.

Electricity for Mine Pumping. William Baxter, Jr. Considering the advantages of electricity as compared with compressed air and steam, both from the mechanical standpoint and efficiency. 1700 w. Eng & Min Jour—April 25, 1896.

Electric Mine Pumping. F. C. Whitmore. Read before the Engineers' Club of Scranton, Pa. A comparison of the relative efficiencies of steam and electric pumps, with some reasons why electric pumps admit of greater economy than steam pumps. 2000 w. Mines & Min—Jan., 1898.

Electric Mine Pumping Plant (Elektrisch Betriebene Wasserhaltung). A description of a 750 h. p. underground electric pumping plant in the Maria Anna and Steinbach mines at Hontrop. 3500 w. Glückauf—Dec. 24, 1898.

Electric Pump at the Lambrecht Pit (Pompe Electrique de la Fosse Lambrecht). Illustrated description of 100 h. p. motor operating triple-cylinder pump at the d'Anzin Mines; an Efficiency of 70 per cent. is attained. 1800 w. 1 plate. Génie Civil—July 30, 1898.

Electric Underground Drainage Plant of 800 Horse Power (Elektrischer Antrieb einer Unterirdischen Wasserhaltung von 800 P. S.). O. Lasche. A very full account of the electric pumping plant of the "Maria," "Anna," and "Steinbank" mines at Höntrop near Bochum, Westphalia. 4500 w. 1 plate. Zeitschr d Ver Deutscher Ing—Dec. 3, 1898.

New Electric Pumping Plant at Arniston Colliery, Gorebridge, N. B. Describes the plant, which, exclusive of the building of the power stations, has cost about £12,000. 900 w. Col Guard—Sept. 23, 1898.

Underground Electric Pump at the Anzin Colliery. M. Barry, and M. Baudot. From a communication to the Société de l'Industrie Minérale. Illustrated description of a pump installed at the Lambrecht pit of the Anzin Colliery. The distinguished features are the use of the continuous current with a tension of 500 volts, and of a dynamo and motor with moderate speed. 3500 w. Col Guard—July 15, 1898.

**Electric, Paris Exposition.**—Two Electrically Driven Pumps at the Paris Exposition. Illustrated descriptions of the Riedler pump, and the Ehrhard and Sehmer pump. 1100 w. Elec Wld & Engr—Aug. 25, 1900.

**Electric vs. Steam.**—Comparative Cost of Steam and Electric Pumping in New Orleans, La. The results of a study of detailed estimates which have led B. M. Harrod, chief engineer of the Drainage Commission, to report in favor of a central power station with electrical transmission in carrying out a drainage scheme for this city. 1000 w. Eng Rec—March 20, 1897.

**Elevator, Buffalo.**—A High-Duty Pump for Elevator Service in Buffalo, N. Y. Illustrated detailed description, with data of duty tests and dimension table. 1800 w. Eng Rec—Nov. 7, 1896.

**Emulsion.**—See **Centrifugal Emulsion.**

**Fan.**—The Fan Pump. F. C. Hooper. Illustrates and describes a special instance of its use for mill water supply. 900 w. Sch of Mines Quar—Jan., 1898.

**Feed-Water.**—Boiler Feed Pumps. C. A. Collett. The abuses of the steam pump, with explanation of its construction and functions. 1600 w. Am Elect'n—March, 1897.

Economy Test of a Unique Form of Feed Pump. F. Meriam Wheeler. Data and results of test of vertical compound feed pump intended for use as a marine auxiliary of a less wasteful type than now generally in use. 2500 w. 2 plates. Trans Soc N A & M E—1898.

See also **Dubiau Circulating; AUXILIARY ENGINE; STEAM PLANT—Auxiliaries.**

**Fly-Wheel Regulation.**—Speed Variations in Fly-Wheel Pumps (Der Ungleichförmigkeitsgrad von Schwungradpumpen). F. Wimbersky. A graphical analysis of the action of the fly-wheel in regulating the speed of single, double, and triple acting pumps. 1200 w. Zeitschr d Ver Deutscher Ing—Jan. 27, 1900.

**Gas, Gasoline and Oil.**—The Application of Gas, Gasoline and Oil Engines to Pumping Machinery. Freeman C. Coffin. Considers the general characteristics of these engines, tests, cost, etc. 3800 w. Jour New Eng Water Wks Assn—March, 1899.

**Gasoline Engine.**—A Gasoline Pumping Plant for a Town Water Supply. Description of the plant installed at Gibsonburg, Ohio, giving the form of guarantee accepted. 1100 w. Eng News—Dec. 23, 1897.

A Gasoline Pumping Plant for the Waterworks of Toms River, N. J. Information concerning this installation. Ill. 700 w. Eng News—March 30, 1899.

Some Recent Installations of Power Pumps in Small Waterworks Pumping Plants. Illustrated descriptions of waterworks pumps, driven by gasoline engines. 1800 w. Eng News—May 28, 1896.

See also **GASOLINE ENGINE—Pumping Plant; Pumps.**

**Governor.**—Control of Pumps by Means of Dynamometric Indicator (Contrôle des Pompes au Moyen de l'Indicateur Dynamométrique). Emile Colmant. With numerous indicator diagrams showing how the fluctuations of pressure in the water cylinder may be used to govern the action. 4500 w. Rev Univ des Mines—July, 1899.

**Helical.**—A New Apparatus for the Elevation of Liquids (Sur un Nouvel Appareil Destiné à l'Elevation des Liquides). A new form of gyratory or helical pump, of small size and high efficiency. 1000 w. Comptes Rendus—April 12, 1898.

See also **Propeller.**

**Holst Constant Discharge.**—An Improved Pump with Constant Discharge (Nouvelle Pompe à Débit Constant). The Holst pump is made with a peculiar lever motion by which the plunger moves at a uniform velocity throughout the entire stroke, and two such pumps give a practically constant discharge. 2500 w. Génie Civil—June 12, 1897.

The Holst Pumping Engine. Illustrates and describes a new system of pumping engine designed by C. P. Holst, of Amsterdam, Holland. The water flows in a constant stream. 1000 w. Am Mach—June 9, 1898.

**Hydraulic.**—See also **Kaselowsky; Water Power.**

**Inside Connected.**—Pumps—Inside Connected and Inside Packed. Walter Ferris. Favoring outside packed pumps. Ill. 1600 w. Am Mach—Jan. 6, 1898.

**Kaselowsky.**—Mine Pumping with Hydraulic Transmission of Power. M. Griot and M. Rodde. From a communication to the Société de l'Industrie Minerale, Saint-Etienne. Description of Kaselowsky pumping engine, its principle, method of pumping, plant on the surface and under ground, with examples of working in different plants. 2800 w. Col Guard—Oct. 9, 1896.

The Kaselowsky Drainage Pump (La Machine d'Epuisement Système Kaselowsky). C. François. Describing a subtarranean pump operated by hydraulic pressure and used for mine drainage. 3000 w. 2 plates. Rev Univ des Mines—Aug., 1899.

The Kaselowsky Pumping Engine at Westphalian Collieries. Abstracted from a paper by C. François, in the "Revue Universelle des Mines." Illustrated description of the system used. 800 w. Col Guard—Aug. 17, 1900.

The Kaselowsky Pumping System. Charles François. Abstract of paper in the "Revue Universelle des Mines." Illustrates and describes a subterranean pump operated by hydraulic pressure. 700 w. Eng & Min Jour—Dec. 23, 1899.

**Kley.**—See **PUMPING ENGINE.**

**Lemaire.**—The Lemaire Pump (La Pompe Lemaire). An illustrated description of an improved form of chain pump of high efficiency, especially adapted for agricultural and colonial use. 1200 w. La Rev Tech—May 25, 1899.

**Lewiston (Me.) Waterworks.**—The New Pump at the Lewiston Waterworks. Charles L. Newcomb. Illustrated detailed description of pump driven by water power. The whole question of design in a pump of this kind, with its special requirements, was dealt with. 1400 w. Eng Rec—April 4, 1896.

**Mammoth.**—The Mammoth Pump. From "Ingenioren," Copenhagen. Abstract. Describes a method of raising water without any bucket or pump work, explaining the principle and gives several applications. 2300 w. Col Guard—Aug. 3, 1900.

**Marine.**—See **PUMPING ENGINE.**

**Mine.**—Care of Mining Pumps. George D. Rice. Considers the various things that cause trouble and means of remedying them. 1800 w. Min Rept—April 13, 1899.

Hydraulic and Electrical Pumps for Mines. Translated abstract from "Glückauf." Illustrates and describes these types. 1700 w. Ir & Coal Trds Rev—Oct. 21, 1898.

Mine Pumping Machinery (Les Machines d'Epuisement Souterraines). P. Habets. A general discussion of self contained mine pumps as distinguished from those mechanically driven from the surface. 5500 w. Rev Univ des Mines—Dec., 1898.

Mine Pumps. Philip R. Bjorling. Part first consists of introductory remarks and a description of the action of an ordinary bucket pump. Ill. Serial. Mech Wld—March 26, 1897.

Modern Underground Mine Pumping Machinery (Neuere Unterirdische Wasserhaltungsmaschinen für Bergwerke). B. Gerdau. A very fully illustrated account of some recent mine pumps, driven by steam, hydraulic pressure, and electricity, and placed in the mine, instead of at the surface. 2 articles. 1 plate. 7000 w. Zeitschr d Ver Deutscher Ing—Jan. 14, 1899.

Pumping Machinery. R. S. B. On the necessity of some system of surveillance over the operation and working of mining plants, especially the pumping arrangements. 1800 w. Col Guard—June 23, 1899.

Pumping Plant at Houghhead Colliery. Illustrates and describes a plant recently erected near Glasgow, and the trial. 1200 w. Engr, Lond—April 7, 1899.

See also **Electric Mine; Kaselowsky; Prospectors; OIL ENGINE—Mine Pump; PUMPING ENGINE; PUMPING STATION—Rockford, Ill.**

**Mine, Deep.**—Deep Mine Pumping. W. M. Epton. Abstract of a paper read before the Johannesburg Mech. Engs. Assn. Enumerates several systems, giving the writer's views on each. 2100 w. Am Mfr & Ir Wld—Oct. 26, 1899.

Deep Pumping at Elliot Colliery. New Tredegar, Monmouthshire. E. M. Hann. Read before the South Wales Inst. of Engs. States existing conditions and gives an illustrated description of the main features of the plant. 2800 w. Col Guard—Sept. 22, 1899.

Systems for the Raising of Water from Deep Mines. W. M. Epton. Read before the Johannesburg Mech. Engs. Assn. Enumerates several systems and discusses the loss in getting the power from boilers on the surface to the pump underground. 2500 w. Ir & Coal Trds Rev—Oct. 6, 1899.

See also Deep Well.

**Mine, Germany.**—See **PUMPING ENGINE.**

**Oil Engine.**—See Gas, Gasoline and Oil; **OIL ENGINE—Mine Pump.**

**Principles.**—The Pump and Its Principle. Describes and illustrates the construction and mode of action of the common suction pump. 1800 w. Ill Car & Build—May 6, 1898.

**Propeller.**—Propeller Pumps. Describes an apparatus for raising water in wells by means of horizontal wheels working like the propellers of a steamship. 1000 w. Eng Rec—April 22, 1899.

See also Helical.

**Prospectors.**—Pumps for Prospectors and Small Mines. F. W. Van Ness. States the conditions required in such pumps, and briefly discusses some on the market. 800 w. Eng & Min Jour—July 8, 1899.

**Railway Shops.**—See **RAILWAY SHOP—Pumps vs. Compressors.**

**Riedler Express.**—Riedler Express Pumps (Riedler-Expresspumpen). Prof. Karl Habermann. An illustrated description of these high-speed pumps, which are often directly coupled to electric motors, with a list of pumps installed in Germany, Austria and Denmark. 1 plate. 2500 w. Oest Zeitschr f Berg u Hüttenwesen—June 23, 1900.

The Riedler Express Pump with Electric Power (Riedler-Expresspumpen mit Elektrischem Antrieb). The application of the mechanically actuated valves of Prof. Riedler's design enables electrically driven pumps to be operated at high speed. 1000 w. Elektrizität—Feb. 17, 1900.

See also **PUMPING ENGINE—Sewage, Budapest; PUMPING STATION—Vienna, Riedler.**

**Rittinger.**—See also **PUMPING ENGINE—Mine, Westphalia.**

**Sewage.**—See also **PUMPING ENGINE; PUMPING STATION; SEWAGE—Pumping Station.**

**Sewage, Chicago.**—Test of Centrifugal Pump and Calibration of Weir at the Bridgeport Pumping Station, Chicago, Ill. R. C. Carpenter. Description of plant and of test made to determine the efficiency and capacity of the various pumps at the Sewerage Pumping Station at Bridgeport, Chicago, Ill. 5500 w. Trans Am Soc of Mech Engs—Dec., 1897.

Test of a Centrifugal Pump and Calibration of Weir at the Bridgeport Pumping Station, Chicago, Ill. R. C. Carpenter. Description of plant and method of testing, with results of the test of various pumps and of the calibration of the large weir. Ill. 4500 w. Sib Jour of Engng—March, 1898.

**Steam.**—See Electric vs. Steam; **PUMPING ENGINE.**

**Strainer.**—See **FILTRATION—Well Water.**

**Suction.**—About Suction Pumps. Remarks on the construction and functions of a steam pump, the suction pipe and its proper size. 1700 w. Bos Jour of Com—July 31, 1897.

See also Auxiliary Suction.

**Suction or Pressure?**—Suction or Pressure? Considers the principle which underlies the mode of action of pumps, siphons, barometers, etc. 2000 w. Mines & Min—Jan., 1899.

**Suction Pipes.**—The Mechanics of Suction and Suction Pipes. Daniel W. Mead. Considers in detail the local conditions and mechanical arrangements which determine the height at which the pump cylinder may be set above the water level. 1200 w. Jour W Soc of Engs—Feb., 1899.

**Test.**—See also Centrifugal Test; Sewage, Chicago; **PUMPING ENGINE TEST.**

**Triplex Torque.**—The Torque of the Triplex Pump. Cyrus T. Brown. Showing the advantage in using the triplex pump, rather than the single plunger or double-acting pump when driven by an electric motor. 1000 w. Am Mach—March 4, 1897.

**Underground.**—See Electric Mine; Kaselowsky; Mine; **PUMPING ENGINE—Mine.**

**Warehouse, St. Louis.**—See **ELEVATOR.**

**Water Power.**—Hydraulic Pumping Plant on the Snake River, Idaho, for Power, Irrigation, and the Treatment of Gold Sands. John Birkinbine. Notes suggesting the application of available water power. 2000 w. Trans Am Inst of Min Engs—Aug., 1900.

Pumping Engines Driven by Water Power. Charles A. Hague. The article is confined to pumping engines wherein the pinion shaft is driven by gears from a turbine shaft. 2000 w. Eng News—July 6, 1899.

See also Kaselowsky.

**Well.**—See Artesian; Deep Well.

**Well to Reservoir.**—Cost of Pumping Water from Well to Reservoir. R. G. Young. Of practical interest to engineers of works where wells are the source of supply. Discussion. 3500 w. 10th An Rept of Ill Soc of Eng & Surv., 1895.

**Worthington.**—Some Recent Improvements in Worthington Pumping Machinery. Edward C. R. Marks. From a paper read before the Birmingham Assn. of Mechanical Engs. Illustrated description of these improvements, with a statement of the advantages. 2000 w. Prac Engr—Feb. 9, 1900.

The Latest Designs in Worthington Pumping Machinery, Comparing Them with the Practice of Twenty Years Ago. Charles C. Worthington. Describes the means by which the economic efficiency has been more than doubled, with but few changes in the principles of operation and details of construction. Ill. 2800 w. Jour New Eng Waterworks Assn—March, 1899.

See also **PUMPING ENGINE—Compound vs. Triple Expansion; Mine; PUMPING ENGINE TEST—Hampton, Eng.; PUMPING STATION.**

**PUMPING ENGINE.**

See also **MINE DRAINAGE; PUMP; PUMPING ENGINE TEST; PUMPING STATION; WATER-WORKS.**

About Steam Pumps. Thomas Shelton. Extract from a lecture before an engineer's association discussing the various kinds and their valves. 1800 w. Bos Jour of Com—May 15, 1897.

Pumping Engines. Arthur J. L. Loretz. A survey of the subject with the conclusion that the lifting process is far preferable to forcing. Discussion. 7500 w. Jour N E Waterworks Assn—March, 1897.

Pumping Engines. R. J. Worth. Read at Cleveland Inst. of Engineers, at Stockton-on-Tees. Abstract giving points on engines in general, and briefly considering special types. Short discussion. 2000 w. Col Guard—Jan. 21, 1898.

Steam Pumps. J. C. Smith. A discussion of direct-acting pumps, in which the pressure on the steam piston is transmitted through the piston-rod to the water-piston direct, without the intervention of a crank, fly-wheel, or any rotating piece. 4500 w. Engr, Cleveland, O.—March 1, 1899.

**Allis.**—An Engine Builder's View of Present Pumping Practice. Reviews a paper by Irving H. Reynolds, of the Edward P. Allis Co. 3000 w. Eng Rec—Jan. 21, 1899.

Present Pumping Engine Practice of the Edward P. Allis Co. Compared with that of Twenty-five Years Ago. Irving H. Reynolds. An engineer's review of the causes that have brought about the great advance of economy and decrease in cost. Ill. 8800 w. Jour New Eng Waterworks Assn—March, 1899.

See also **PUMPING ENGINE TEST.**

**Berlin.**—The Pumping Machinery for the Berlin Waterworks at Müggelsee (Pumpmaschine für die Berliner Wasserwerke am Müggelsee). Illustrated description of horizontal compound pumping engines, with plans, elevations, and photographic view of interior of engine room. 1200 w. 1 plate. Zeitschr d Ver Deutscher Ing—Dec. 17, 1898.

**Brighton, Eng.**—Pumping Engines, Brighton Waterworks. Brief illustrated description of a triple-expansion pumping engine. 900 w. Engr, Lond—Jan. 22, 1897.

**Brooklyn.**—See **Ridgewood.**

**Cambridge, Mass.**—See **STEAM ENGINEERING—United States.**

**Chestnut Hill, Boston.**—See **PUMPING ENGINE TEST; PUMPING STATION.**

**Cleveland, O.**—Triple Expansion Pumping Engine for the Cleveland, O., Waterworks. Illustrates and describes the new 20,000,000 gallon engine recently erected. It is of the vertical triple-expansion type. 1200 w. Power—July, 1899.

**Coal Mine.**—See **Mine; PUMP—Electric Mine; Kaselowsky; Mine.**

**Comparative Data.**—See **PUMPING ENGINE TEST—Hackensack, N. J.**

**Compound vs. Triple-Expansion.**—A Comparison of Compound and Triple-Expansion Engines for Small Waterworks Plants. J. M. Betton. Illustrates and describes the design of the Standard Horizontal Triple-Expansion Engines, brought out by Henry R. Worthington, examining the results obtained by those now in use. 1600 w. Jour New Eng Waterworks Assn—March, 1899.

**Corliss.**—The Original Corliss Pumping Engine. Lester G. French. Illustrated description. 1000 w. Mach, N. Y.—Sept., 1896.

See also **Mine, Germany.**

**Corliss, Providence.**—The Corliss High-Service Low-Duty Pumping Engine of the Providence Waterworks. Illustrated description of an engine of novel and peculiar design, built for pumping directly into high-service mains. 2000 w. Eng Rec—March 14, 1896.

**Cornish.**—Cornish Engine, Basset Mines. Illustrates and describes a compound, high-pressure Cornish engine, which has been recently erected at Cornwall, with an account of the trial. 1000 w. Engr, Lond—May 12, 1899.

**D'Auria.**—The D'Auria Pumping Engine. Illustrated description of an engine which is a development in the direct-acting duplex type, and report of tests. 1100 w. Engng—Oct. 8, 1897.

**Dry Dock.**—Dock Gates and Pumping Machinery. An interview with a contractor as to the more recent appliances in use. 2000 w. Trans—Nov. 1, 1895.

Performances of Pumping Machinery: Clyde Trustees' No. 3 Graving Dock. George H. Baxter. Extract from a paper read before the Inst. of Engs. and Shipbuilders in Scotland. Facts and analyses as to the performances of the machinery of one of the largest graving docks in the world. 900 w. Engr, Lond—April 28, 1899.

**Dry Dock, Brooklyn.**—The Old and New Pumping Engines of Dry Dock No. 1, Brooklyn Navy Yard. Illustrated description, showing the advance made in this class of machinery. 1500 w. Sci Am—March 24, 1900.

**Duplex.**—See **PUMP.**

**East Indies.**—Engines and Pumps for Water, Sewage, and Irrigation Works. Philip R. Bjorling. Part first consists of introductory remarks and commences the description of suitable plants of each class for countries like India and the East. Serial. Ind & East Engr—Sept., 1898.

**Economy.**—Possibilities of Economy in Pumping Engines. George H. Barrus. Condensed abstract of paper read at meeting of the New England Waterworks Assn. Reviews a comparative examination of five tests of triple-expansion pumps. 800 w. Eng Rec—Jan. 28, 1899.

**Fairhaven, Mass.**—Pumping Engine, Fairhaven, Massachusetts. Illustrated description. 1500 w. Fire & Water—Oct. 30, 1897.

**Gasoline.**—See **PUMP.**

**German.**—Examples of Pumping Engine Construction (Beispiele aus dem Gebiete des Pump-maschinenbaues). Th. v. Bavier. Illustrating and describing a number of pumping engines of recent construction for use in German cities and mines, giving especial attention to those with mechanically actuated pump-valves. 4000 w. 2 plates. Zeitschr d Ver Deutscher Ing—Jan. 6, 1900.

**High Bridge, N. Y.**—The Pumping Engines at the New High Bridge Pumping Station, New York City. An illustrated description of a modern high-pressure pumping plant. 700 w. Power—Aug., 1897.

**High Duty.**—High Duty Pumping Engines. Thomas Downs. A lecture given before the Robert Fulton Assn., Illinois, N. A. S. E. A good study in this department of mechanical engineering, and an able discussion of the principles that should guide construction and design. 2000 w. Sta Eng—Jan., 1896.

**High vs. Low Duty.**—Comparison Between High and Low Duty Pumping Engines on a Small Waterworks Plant. John E. Smith. Facts from the reports of the Andover Water Commissions for 1895, 1896 and 1897. Describes the conditions and system with improvements. 3400 w. Jour N E W Wks Assn—Dec., 1899.

**Holst, Amsterdam.**—See **PUMP.**

**Improvements.**—Improvement in Pumping Engines. F. F. Forbes. Reviews recent changes showing the marvelous growth in the use of engines of this class, and the results of tests. 1600 w. Jour New Eng Waterworks Assn—March, 1899.

**Kaselowsky.**—See **PUMP.**

**Kley.**—Kley Pumping Engine at the Franz Shaft at Idria (Die Kleysche Wasserhaltungs-Dampfmaschinenanlage am Franzschachte in Idria). Karl Habermann. A description and analysis of the operation of this compound beam pumping engine, together with data and results of tests. Serial. 2 plates. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 21, 1899.

Kley Steam Pump at the Franz Shaft (Idria). Karl Habermann. "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Illustrated description. Serial. Col Guard—Jan. 27, 1899.

The Kley Steam Pumping Engine for Mine Drainage (Die Kley'sche Wasserhaltungs-Dampfmaschinenanlage). Carl Habermann. A description of the compound mining pump used at the Idria Mines, with details of construction and data and results of test. Three articles. 12000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—Sept. 23, 30, Oct. 7, 1898.

**Liverpool.**—A Special Waterworks Pump—Liverpool, England. Joseph Parry. Illlustrated description of this unique 7½ million-gallon engine. 1600 w. Eng Rec—Feb. 26, 1898.

Pumping Machinery. Alfred Fowler. Abstract of paper read before the British Assn. of Waterworks Engs. Describes a plant that has replaced an old Cornish engine at the Everton pumping station of the Liverpool Corporation. 1600 w. Jour Gas Lgt—Aug. 10, 1897.

The William Radcliffe Pumping Engine, Aubrey Street, Liverpool. Alfred Towler. Read before the British Assn. of Waterworks Engineers. Illustrated description of an up-to-date pumping engine, with a summary of results of the official duty trial. 4700 w. Engr, Lond—Oct. 15, 1897.

**Lynn, Mass.**—See **WATER SUPPLY.**

**Marine.**—Recent Improvements in Pumping Machinery for Marine Service. John A. Drew. Read at meeting of Consolidated Association of Marine Engineers. History of the direct-acting steam pump. Ill. 3000 w. Steamship—Aug., 1897.

Steam Pumping Arrangements in Screw Steamers. Illustrated description. Serial. Eng, Lond—July 31, 1896.

**Mexico City.**—Triple-Expansion Pumping Engine for the City of Mexico. Front and side elevation of the engine and pumps, with brief description and report of fine record made in the shipment from Lockport, N. Y. 700 w. Eng News—Dec. 2, 1897.

**Mine.**—Underground Steam Appliances and Temperature of the Strata. Robert Martin. Abstract of a paper read before the Mining Inst. of Scotland. Illustrates and describes the steam pumping system at Niddrie collieries. 1200 w. Col Guard—Aug. 19, 1898.

See also **ELECTRIC EQUIPMENT—Coal Mine; Mine; PUMP.**

**Mine, Bohemia.**—See **STEAM ENGINE—Bohemian Mine.**

**Mine, Bruay, France.**—See **COAL MINE—Bruay, France.**

**Mine, Germany.**—Improved Underground Pumping Engines for Mines (Neuere Unterirdische Wasserhaltungsmaschinen für Bergwerke). B. Gerdau. Devoted especially to recent German pumping engines for underground mine work and hydraulic power transmission, with computations of efficiency. 7500 w. 2 plates. Glückauf—March 26, 1898.

An Underground Pump at the Preussen I. Mine (Unterirdische Wasserhaltungsmaschine der Zeche Preussen I.). F. Schulte. An illustrated description of a compound Corliss steam pump, of novel construction. 2 plates. 1200 w. Glückauf—May 19, 1900.

New Underground Pumping Engines for Mines. B. Gerdau, in the "Zeitschrift des Vereines Deutscher Ingenieure." An account of several underground pumping engines recently supplied to deep mines in the Westphalian coal field and elsewhere. 1400 w. Col Guard—Aug. 4, 1899.

**Mine, Hungary.**—Underground Compound Pumping Engine at the Ettes Mine, Hungary (Unterirdische Compound-Wasserhaltungsmaschine am Etteser-Schachte). Stefan Steuer. A combination pump with Riedler pump valves, and Corliss steam gear for forcing water a height of 220 meters, as used in the Salgo-Tarjan mines in Hungary. 3000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 15, 1899.

Underground Pumping Engine at a Hungarian Colliery. Stefan Steuer. "Oesterr. Zeit. für Berg. und Hüttenwesen." Illustrated description. 1500 w. Col Guard—July 21, 1899.

**Mine, Llanbradach.**—Pumping Engine at Llanbradach Colliery. W. Galloway. From a paper read before the Federated Inst. of Min. Engs. Description with sectional side elevation through the pump chamber and the shaft. A triple-expansion, direct-acting Worthington engine. 1700 w. Col Guard—March 5, 1897.

**Mine, Silesia.**—Recent Silesian Mining Machinery (Neuere Bergwerksmaschinen Schlesischer Werke). H. Dubbel. Especially describing and illustrating some large underground pumping engines of recent design, with details of the valves, and indicator cards from the steam and water cylinders. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 9, 1899.

**Mine, Westphalia.**—Pumping Engine at a Westphalian Colliery, Bergassessor von Sobbe. From "Zeitschrift für Berg-Hütten-und Salinenwesen." Illustrated description of engines used in recovering the Royal Ibbenbüren Colliery. 1200 w. Col Guard—Feb. 9, 1900.

See also **Kaselowsky.**

**Mine, Zinc.**—A Triple-Expansion Mine Pumping Engine. Illustrated description of a mine pumping engine for the New Jersey Zinc Co., showing some novel features. 600 w. Eng News—May 5, 1898.

**New Kensington, Pa.**—See **Nordberg.**

**Nordberg.**—Nordberg Compound Pumping Engine, New Kensington, Pa. Illustrated detailed description. 2500 w. Eng News—Feb. 27, 1896.

Triple-Expansion Pumping Engine. Illustrated description of pumping plant, designed by B. V. Nordberg, to do certain work outlined by the Commissioners of the District of Columbia, U. S. A. Serial. Engng—Dec. 18, 1896.

See also **PUMPING ENGINE TEST.**

**Ogdensburg, N. Y.**—Triple-Expansion Pumping Engine at Ogdensburg, N. Y. Charles A. Hague. An illustrated detailed description of a low-duty triple-expansion engine recently installed in the waterworks of the city named, and representing the most advanced practice of this type. 2000 w. Eng News—Nov. 24, 1898.

**Philadelphia.**—The Pumping Engines in the City of Philadelphia. Henry G. Morris. A brief description of the different styles and types of pumping engines that have been and now are in use. Also discussion. 6000 w. Pro Engs' Club of Phila—July, 1900.

**Radcliffe.**—See **Liverpool.**

**Railway Water Stations.**—Pumping Engines for Water Stations. Extracts from a report presented at the Detroit meeting of the Assn. of R. R. Supts. of Bridges and Buildings. 2200 w. R R Gaz—Oct. 27, 1899.

See also **RAILWAY WATER STATION.**

**Ridgewood, Brooklyn.**—A Curious Pumping Engine at the Ridgewood Pumping Station of the Brooklyn, N. Y., Waterworks. Illustrated detailed description. 1500 w. Power—July, 1897.

**Rotterdam.**—Pumping Engines for Rotterdam. Illustrates and describes engines recently constructed for the waterworks. They are of the surface-condensing triple-expansion type, with three cranks at 120 deg., each piston-rod driving a double acting pressure pump. Serial. Eng, Lond—April 13, 1897.

**St. Louis Specifications.**—Recent Specifications for Pumping Engines for the Waterworks of the City of St. Louis, Mo. F. W. Dean. The specifications are given and discussed briefly. 10000 w. Jour New Eng Waterworks—Dec., 1896.

**Sewage.**—see also **PUMP—Sewage, Chicago; PUMPING STATION—New Orleans; SEWAGE—Pumping Station.**

**Sewage, Budapest.**—Sewage Pumping Machinery at Budapest, Hungary. O. N. Mueller, Jr., in "Zeitschrift des Vereines Deutscher Ingenieure." Abstract translation by O. J. Marstrand. Illustrated description with results of official tests. 1000 w. Eng News—Nov. 4, 1897.

The Pumping Plant of the Sewerage System of Budapest (Pumpmaschinen der Budapester Allgemeinen Kanalisationswerke). A description of the high and low pressure pumping machinery for the sewerage of Budapest. 3000 w. and 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 2, 1897.

**Sewage, Charlottenburg.**—A Sewage Pumping Engine at Charlottenburg, Germany. From "Zeitschrift d. Ver. Deutscher Ingenieure." Illustrated description. 500 w. Eng News—Feb. 24, 1898.

The Pumping Engines of the Charlottenburg Sewage System (Die Pumpmaschinen der Kanalisation von Charlottenburg). Illustrated description of fine compound pumping engine on the Riedler system, at Charlottenburg, near Berlin, with plate of working drawings, and data of tests. 1000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Nov. 18, 1897.

**Water Pipes.**—The Steam Pump and Water Pipes. C. A. Collett. Methods of computing flow and delivery, horse power needed, etc. 5000 w. Safety V—June, 1896.

**Westphalia Coal Mine.**—See **Mine, Westphalia; PUMP—Kaselowsky.**

**Worthington.**—See **Compound vs. Triple-Expansion; Mine; PUMP; PUMPING ENGINE TEST—Hampton, Eng.; PUMPING STATION.**

**Zinc Mine.**—See **Mine, Zinc.**

### PUMPING ENGINE TEST.

See also **PUMP; PUMPING ENGINE; PUMPING STATION; WATER-WORKS.**

Tests Upon Steam Pumps and Injectors. A collection of valuable data upon pumps of different styles and sizes. H. E. Walton and William Wallace Christie. 1200 w. Mach, N. Y.—March, 1899.

**Allis.**—See also **Chestnut Hill, Boston; Economy; Hackensack; St. Paul; PUMPING ENGINE.**

**Aurora, Ill.**—Test of the Aurora Pumping Engine. L. P. Breckenridge. Gives method of making the tests and the principal results. 1700 w. Pro of Ill Soc of Engs & Surv—1899.

**Boston, Mass.**—See **Chestnut Hill, Boston.**

**Buffalo, N. Y.**—Duty Trial of a 30,000,000 Gallon Pump at Buffalo. Trial of a triple-expansion fly-wheel pump which gave a duty of 158.6 million foot-pounds per 1000 lbs. of dry steam. 600 w. Eng Rec—March 4, 1899.

Test of a 30,000,000 Gallon Pumping Engine at Buffalo, N. Y. Description, with front elevation, of the vertical triple-expansion pumping engine, built for the Buffalo City Waterworks, and report of the high duty obtained on the official test. 1200 w. Eng News—Sept. 30, 1897.

Thirty Million Gallon Hammond Waterworks Engine at Buffalo, New York. Illustrated description. 700 w. Power—Oct., 1896.

**Chestnut Hill, Boston.**—Description and Computation of Twenty-four Hour Duty Test on the Twenty Million Gallon Leavitt Pumping Engine at Chestnut Hill. Edward F. Miller. Illustrated description of engine with extensive tabulated data. 6000 w. Tech Quar—June-Sept., 1896.

Record Making Pumping Engine, Chestnut Hill Pumping Station, Boston, Mass. Illustrated detailed description, dealing exhaustively with an exceedingly instructive and interesting design, and tabulated data obtained from an exceedingly thorough test. The extraordinary result of one steam horse power per hour, on a consumption of 1.146 lbs. of coal is recorded. 3300 w. Power—April, 1896.

Allis Triple-Expansion Pumping Engine, Chestnut Hill Station, Boston Waterworks. A brief illustrated description of a notable large high-duty engine. 1 plate. 250 w. Eng News—Sept. 27, 1900.

Test of a 30,000,000 Gallon Pump at Chestnut Hill, Boston. Gives the leading results of a 24-hour test of a triple-expansion engine, which developed 178,497,000-ft.-lbs. per thousand pounds dry steam. 600 w. Eng Rec—Aug. 4, 1900.

The Chestnut Hill Pumping Stations of the Metropolitan Waterworks, Boston. Alfred D. Flinn. The first article illustrates and describes a high-service station and gives a report of a pumping engine test, in which a duty of 157,000,000-ft.-lbs. per million B. T. U. was furnished. Serial. Eng Rec—Oct. 18, 1900.

Trial of an Allis Triple-Expansion Pumping Engine; Chestnut Hill Station, Boston Waterworks. Describes the plant and method of conducting the trial. Of interest because of the exceptional high duty attained. 2200 w. Eng News—Aug. 23, 1900.

See also **Hackensack, N. J.; PUMPING STATION.**

**Detroit.**—Test of the Detroit Pumping Engine. Report of George H. Barrus, with diagrams of steam engine performance, and tables of data and results. 6400 w. Eng Rec—Nov. 30, 1895.

**Duty.**—The Duty of Pumping Engines. Dugald Baird. Read before the Mining Inst. of Scotland. Easy method of finding duty, with a few examples. 3500 w. Can Min Rev—June, 1896.

**Economy.**—The Conditions of Maximum Pumping Engine Economy. A discussion of some recent tests of Allis and Nordberg engines, giving remarkable duty records; with tables. 4000 w. Eng News—Sept. 27, 1900.

The Possibilities of Economy in Pumping Engines as Based on the Latest Accomplishments. George H. Barrus. An examination of trials during the past five years, with a view to showing what it is reasonable to expect of the duty of a pumping engine under the best obtainable conditions. 2200 w. Jour New Eng Waterworks Assn—March, 1899.

**Grand Rapids, Mich.**—A Test of a Fifteen Million High-Duty Pumping Engine at Grand Rapids, Mich. M. E. Cooley and F. C. Wagner, and J. R. Allen. Describes the boiler, engine, pumps, preparations for tests, apparatus used, etc., the tests and results. Ill. 20000 w. Trans Am Soc of Mech Engs, No. 855—May, 1900.

**Hackensack, N. J.**—Performance of the Twelve Million Gallon Allis Pumping Engine at Hackensack, N. J., and Comparative Data from Tests of the Best Three Contemporary Pumping Engines. James E. Denton. Gives a general description of the engine, states requirements, and gives results of tests. 3800 w. Stevens Ind—Oct., 1900.

**Hammond.**—See **Buffalo, N. Y.**

**Hampton, Eng.**—Triple-Expansion Vertical High-Duty Worthington Pumping Engine. Report of two trials recently carried out by W. C. Unwin, at Hampton Pumping Station for the West Middlesex Waterworks. Gives a general description of the engines. Ill. 5500 w. Engr, Lond—Sept. 24, 1897.

**Indianapolis.**—A Pumping Engine Test. An account of the second test made by W. F. M. Goss of the 20,000,000 gal. triple expansion pumping engine built for the Indianapolis Water Co. Gives a summary of the engine's dimensions and of facts derived from the test. 1700 w. R R Gaz—Feb. 23, 1900.

Test of a Snow Pump at Indianapolis. Report of trial of a 20,000,000 gal. triple-expansion pump giving 150,100,000-ft.-lbs. per million heat units supplied. 1300 w. Eng Rec—Oct. 15, 1898.

Tests of the Snow Pumping Engine at the Riverside Station of the Indianapolis Water Company. W. F. M. Goss. Illustrated description of the engine, with account of the test and results. 6500 w. Trans Am Soc of Mech Engs, No. 862—May, 1900.

The New 20,000 Gallon Pumping Engine of the Indianapolis Water Company. Illustration and report of test made by W. F. M. Goss. 1200 w. Fire & Water—Sept. 9, 1899.

**Leavitt.**—See **Chestnut Hill, Boston.**

**Leeds, Eng.**—Trials of Two Pumping Engines. Report of two trials made by Prof. Wm. Cawthorne Unwin of a pair of triple-expansion vertical pumping engines supplied to the Leeds waterworks. 5000 w. Engr, Lond—Feb. 9, 1900.

**Nordberg.**—See **Economy; Hackensack, N. J.; Pittsburg.**

**Omaha, Neb.**—Test of a Twenty Million Gallon Pumping Engine. Gives the leading results of tests by R. W. Hunt & Co., of a vertical compound condensing fly-wheel engine at Omaha. 600 w. Eng Rec—June 16, 1900.

**Peoria, Ill.**—Test of High-Duty Pumping Plant. Dabney H. Maury, Jr. Describes the test of the plant of the Peoria Water Co., with brief description of changes made and the results obtained. Ill. 2500 w. Fire & Water—Sept. 4, 1897.

Test of High Duty Pumping Plant Under Ordinary Working Conditions. Dabney H. Maury, Jr. Reports the test of the plant of the Peoria, Ill., Water Company, made under ordinary working conditions. Describes plant, apparatus and tests, giving results. Ill. 8000 w. An Rept of Ill Soc of Engs & Surv—1897.

See also **PUMPING STATION.**

**Pittsburg.**—Quadruple-Expansion Pumping Engine at the Wildwood Station, Pittsburg, Pa. Three views, with side and front elevations, detailed description, and report of test. 3000 w. Power—Sept., 1899.

Test of a Nordberg Pumping Engine in the Pumping Station of the Pennsylvania Water Company, at Wildwood Station, Pittsburg, Pa. R. C. Carpenter. Describes the engine and tests, giving the general results. 4200 w. Sib Jour of Engng—April, 1899.

See also **Hackensack, N. J.**

**St. Albans, Eng.**—Pumping Engine Test with Superheated Steam. E. H. Foster. Describes a duty test of a small pumping engine at the city waterworks in St. Albans, England, giving results. 1000 w. Trans Am Soc of Mech Engs, No. 865—May, 1900.

**St. Gall, Switzerland.**—Four Days' Tests on a Sulzer Triple Steam Pumping Engine. Summary by Bryan Donkin, of an interesting set of tests made by Prof. Stodola, of Zürich. 500 w. Engr, Lond—July 1, 1898.

Test of a Triple-Expansion Steam Pumping Engine at the St. Gall Waterworks (Versuche an einer Dreistufigen Dampfpumpmaschine im Wasserwerk der Stadt St. Gallen). A. Stodola. Full details of the test of this Sulzer engine are given, with a complete table of data and results. 3500 w. Schweizer Bauzeit—Feb. 19, 1898.

Test of the Triple-Expansion Pumping Engine at the St. Gall Waterworks (Versuche an einer Dreistufigen Dampfpumpmaschine im Wasserwerke der Stadt St. Gallen). A full account of the tests made by Prof. Stodola of this fine Sulzer pumping engine; a steam consumption as low as 11.2 pounds per h. p. hour was attained. Three articles. 10000 w. Zeitschr d Ver Deutscher Ing—Feb. 19, 26, March 5, 1898.

**St. Louis.**—Official Duty Tests of Pumping Engines Nos. 9 and 10, High-Service Station No. 3, St. Louis Waterworks, February 15-16 and 26, 27, 1900. Nils Johnson. A summary of the results obtained and methods employed during the official duty tests of two 15,000,000 gallon, triple-expansion engines. 4400 w. Jour Assn of Engng Socs—July, 1900.

Test of Two Ten Million Gallon Pumping Engines at the Baden Pumping Station, St. Louis Waterworks, June, 1899. John A. Laird. Illustrated detailed description with results of test. 2400 w. Trans Am Soc of Mech Engs, No. 840—Dec., 1899.

**St. Paul, Minn.**—Test of an Allis Pumping Engine at St. Paul, Minn. Reports a 72-hour test of an engine at the McCarron Lake pumping station, and the satisfactory results. 800 w. Eng News—Dec. 29, 1898.

**Snow.**—See **Indianapolis.**

**Sulzer.**—See **St. Gall, Switzerland.**

**Waltham, Mass.**—Test of a Steam Pumping Engine. Gives the results of a test of a 5,000,000 gal. compound fly-wheel pump. 450 w. Eng Rec—Jan. 21, 1899.

**Water Valve.**—Test of a High Speed Pumping Engine with a New System of Water Valves. Report of two tests recently made by H. W. Spangler and Edward T. Child. Shows that the capacity and speed of a pump may be increased 50 per cent. by simply changing the water valves. 2400 w. Eng News—Aug. 5, 1897.

**Wildwood, Pittsburg.**—See **Pittsburg.**

**Worthington.**—See **Hampton, Eng.**

## PUMPING STATION.

See also **PUMP; PUMPING ENGINE; PUMPING ENGINE TEST; WATERWORKS.**

**Allegheny City, Pa.**—New Pumping Station, Allegheny City, Pa. Illustrated description. 600 w. Fire & Water—March 21, 1896.

**Baltimore.**—The Mount Royal Pumping Station, Baltimore, Md. Illustrated description of a pumping station designed by Henry Brauns, architect, and A. M. Quick, engineer, which is said to be the most elaborately constructed plant of the sort in service, its decorations being on the style of a modern high-class apartment house. 2000 w. Eng Rec—March 24, 1900.

**Berlin Exhibition.**—The Pumping Plant for Condensing Water at the Berlin Exhibition, 1896 (Kondenswasser-Pumpenanlage auf der Berliner Gewerbeausstellung, 1896). An account of the performance of two electrically driven centrifugal pumps, with table of data and efficiency. 1200 w. Zeitschr d Ver Deutscher Ing—Feb. 6, 1897.

**Breitensee.**—See **Vienna.**

**Chain of Rocks, St. Louis.**—The Chain of Rocks Pumping Station, St. Louis. Illustrated detailed description. 1700 w. Eng Rec—May 16, 1896.

**Chestnut Hill, Boston.**—Chestnut Hill Pumping Station, Boston. Illustrated description. 3500 w. Fire & Water—Oct. 16, 1897.

See also **PUMPING ENGINE TEST.**

**Chicago.**—See **INTAKE.**

**Cincinnati, O.**—See **PUMP PIT.**

**Dillingen, Bavaria.**—See **PUMP—Electric.**

**East Jersey Company.**—See **Little Falls, N. J.**

**Gasoline.**—See **PUMP.**

**Gibsonburg, O.**—See **PUMP—Gasoline Engine.**

**Little Falls, N. J.**—The Pumping and Power Station of the East Jersey Water Co., at Little Falls, N. J. Illustrates and describes the plant which is a combination of water and steam power, and the works connected. 2500 w. Eng News—Aug. 3, 1899.

**New Orleans.**—The Jourdan Avenue Drainage Station, New Orleans, La. Don Y. Dyer. The peculiar topography necessitated the raising of the surface drainage from receiving basins by the use of the pumps, over and outside the levees surrounding the city. The plant is described. 1100 w. Fire & Water—April 10, 1897.

See also **DRAINAGE.**

**Peoria, Ill.**—Supplemental Pumping Plant of the Peoria Water Co., Peoria, Ill. Dabney H. Maury, Jr. Describes the method adopted to secure an additional water supply. The system consists of Pelton wheel driving centrifugal pumps. The construction of the plant was attended with great difficulties. Ill. 2700 w. Eng News—Jan. 13, 1898.

The Auxiliary Hydraulic Pumping Plant of the Peoria Waterworks Co., Peoria, Ill. Dabney H. Maury, Jr. Illustrated detailed description of the plant, with account of the tests and operation. 4000 w. Eng News—April 26, 1900.

See also **PUMPING ENGINE TEST.**

**Philadelphia.**—The Queen Lane Division of the Waterworks of Philadelphia. Part I. The Boilers. John E. Codman, gives an illustrated description of the boiler installment. Part II. The Pumping Engines. Thomas H. Mirkil, Jr. Part III. The Engine and Boiler Houses. F. L. Hand. Are illustrated, described and discussed. 2800 w. Pro Engs' Club of Phila—April, 1896.

The Queen Lane Pumping Station. Illustrated detailed description. 1200 w. Eng Rec—June 6, 1896.

**Richmond, Va.**—New Pump House at Richmond, Va. Illustrated description of this recent improvement, and the system generally. 900 w. Fire & Water—Aug. 20, 1898.

**Rockford, Ill.**—The New Rockford Pumping Plant. Illustrated description of a 7,000,000 gal. plant having centrifugal pumps at the bottom of a shaft and driven by ropes from vertical engines. 2500 w. Eng Rec—March 18, 1899.

**Sewage.**—See **New Orleans; PUMP; PUMPING ENGINE; SEWAGE—Pumping Station.**

**Snake River, Idaho.**—See **PUMP—Water Power.**

**Spain.**—Pumping Station at Sierra Almagrera. Gustave Charles Reinbold. Contributed to the Inst. of Civ. Engs. (England). This line of hills is in southeast Spain, and reaches a height of 3000 ft. above sea level. Describes the scheme of the various mining companies for the drainage of this region, giving illustrations of the work. 5700 w. Col Guard—Nov. 11, 1898.

**Toms River, N. J.**—See **PUMP—Gasoline Engine.**

**Vienna, Riedler.**—The Pumping Machinery of the Breitensee Waterworks (Die Maschinenanlage des Wasserwerkes von Breitensee). C. Budil. A very fully illustrated account of this important station of the Vienna water supply system, showing especially the application of the Riedler system of mechanically operated water valves. 3500 w. 2 plates. Zeitschr d Ver Deutscher Ing—Jan. 7, 1899.

The Pumping Station of the Vienna Waterworks at Breitensee (Das Wiener Städtische Schöpfwerk in Breitensee). A brief description of an 8,000,000 gallon pumping station, with Riedler pumps. 2000 w. Wiener Bauindustrie Zeitung—Jan. 14, 1897.

**Worthington, Paris Exposition.**—Exposition of 1900. Pumping Station of the French Worthington Company (Exposition de 1900. Usine Elevatoire de la Société Française des Pompes Worthington). E. Cayla. A fully illustrated account of the Worthington pumping plant at the Paris Exposition. 3000 w. 2 plates. Génie Civil—Aug. 18, 1900.

## PUMP PIT.

**Cincinnati, O.**—The California Pump Pit, Cincinnati Waterworks. Illustrated description of a circular caisson, 129 ft. in diameter, 20 ft. high, and 12½ ft. thick in the roof. 900 w. Eng Rec—Nov. 12, 1898.

## PUNCHING.

See also **METAL WORKING; PRESS—Sub.**

**Gears and Racks.**—Making Gears and Racks by Punching. Joseph V. Woodworth. Illustrated description. 800 w. Am Mach—Aug. 23, 1900.

**Power Required.**—Power Required for Punching. A reply from Wm. Sellers & Co., to an inquiry for rules or data covering the force and power required for punching iron or steel plates. 600 w. Am Mach—Sept. 21, 1899.

## PUNCHING MACHINE.

**Indexing Multiple.**—Indexing Multiple Punching Machine. Illustrates and describes a machine for punching the parts of built-up columns, girders, etc., direct from the drawings and without templates or laying-out of any kind. 2500 w. Am Mach—Nov. 9, 1899.

**Werner.**—The Werner Portable Punching and Cutting Machine. Illustrates and describes the machine and the general principle on which it works. 600 w. R R Gaz—Nov. 10, 1899.

## PYRAMIDS.

Scientist Explodes the Mystery of the Pyramids. J. D. McGuire in the "Indianapolis News." Abstract. The story of their erection, processes of construction, etc. 2000 w. Stone—March, 1898.

## PYRITES WORKS.

See also **GOLD METALLURGY; LEAD METALLURGY; SILVER METALLURGY; SMELTING.**

**Charters Towers, Australia.**—The Charters Towers Pyrites Works. Brief description. 500 w. Aust Min Stand—March 5, 1896.

## PYROMETRY.

See also **THERMOMETRY.**

Methods of Measuring High Temperatures. An exhaustive review of the subject, containing information obtained from a considerable variety of sources, and noting the advances in the art of pyrometry up to date, with editorial comment. Ill. 7500 w. Eng News—Nov. 14, 1895.

Practical Experience with Pyrometers. William H. Zimmer. Read before the Am. Ceramic Soc. Records the writer's experience with Seger cones and the Le Chatelier pyrometer. Also discussion. 7500 w. Brick—June, 1900.

Pyrometers, and Their Application. Notes of an address by Dr. Mohlke to the Polytechnic Society of Berlin. Treats of pyrometers based upon expansion by heat, of those based upon expansion by liquids, such as are based upon expansion of gases, those giving indications by radiation of light, of electrical methods, and calorimetric methods of determining high temperatures, and of definite temperature methods. It is compiled from information collected by the Imperial Physical Technical Institute, and relates to methods in use in German industrial arts. 1300 w. Gas Wld—April 12, 1896.

Pyrometers. Wallace Christie. A brief description of various methods that have been used for measuring high temperatures. Ill. 2000 w. Mach, N. Y.—Dec., 1899.

Some Registering Apparatus for the Registry of High Temperatures. Albert Granger, in "La Ceramique." Illustrated description of several instruments but slightly known. 900 w. Brick—June, 1900.

The Determination of High Temperatures. A. A. Watson. Describes some of the methods of accurately estimating high temperatures, and the scientific principles involved. 2000 w. B C Min Rec—April, 1900.

The Measurement of High Temperatures. From "Le Génie Civil." Progress and present status of the art. 2000 w. Sci Am Sup—June 6, 1896.

The Measurement of High Temperatures. T. H. Waller. Abstract of a paper read before the South Staffordshire Inst. of Iron and Steel Works Managers. Reviews the various methods, favoring the thermo-couple of platinum and rhodium platinum. 1600 w. Ir & Coal Trds Rev—March 17, 1899.

**Blast Furnaces.**—The Value of the Pyrometer in the Down Comer. Edward A. Uehling. Calls attention to the fact that an accurate record of the temperature of the waste gas of the blast furnace is a reliable indicator of what is going on inside the furnace and of what was done in the stock-house toward keeping the furnace properly filled. 2500 w. Am Mfr & Ir Wld—Jan. 22, 1897.

See also **Uehling-Steinbart.**

**Clay Oven.**—See **Seger Cone.**

**Electric.**—Applications of Electricity. Ellis H. Crapper. Part first is devoted to electrical measurement of high temperature. Serial. Elec, Lond—Oct. 23, 1896.

**Latarche Actinometric.**—The Actinometric Pyrometer (Pyromètre Actinométrique). A description of the Latarche pyrometer, which measures the difference in temperature by observing the effect of radiant heat upon two thermometers with silvered and blackened bulbs, respectively. 1000 w. La Rev Tech—April 10, 1897.

**Le Chatelier.**—Pyrometric Measurements with the Le Chatelier Thermo-element (Ueber Pyrometrische Messungen mit dem le Chatelierschen Thermoelement). L. Holborn. An account of the construction and calibration of the Le Chatelier Pyrometer. Temperatures up to 1,700 degrees C are measured with a probable error of 5$^{\circ}$. 1500 w. Zeitschr d Ver Deutscher Ing—Feb. 20, 1897.

The Le Chatelier Pyrometer (Das Pyrometer von Le Chatelier). A description of the thermo-electric pyrometer of Le Chatelier, by means of which temperature may be accurately measured up to the melting point of platinum. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 1, 1897.

Pyrometry: Calibration of the Le Chatelier Thermo-Electric Pyrometer. S. W. Holman. The usual method is described and a new and modified method explained. 4000 w. Tech Quar—Oct., 1895.

**Le Chatelier-Herāus.**—The Le Chatelier-Heräus Thermo-Pyrometer. Dr. H. Wedding. Translated from "Stahl und Eisen." Steps that led to its construction, and directions for use. 800 w. Ir & Coal Trds Rev—Sept. 11, 1896.

**Metal.**—Metal Pyrometers. J. H. Kinealy. Considers the principles on which they operate and the care and skill needed to obtain reliable results. Ill. 1400 w. Mod Mach—Oct., 1898.

**Pneumatic.**—Pneumatic Pyrometer and Gas Composimeter. Illustrated description of an instrument for indicating and recording furnace temperatures. Also a gas composimeter which indicates and records the composition of gases of combustion. 1500 w. Am Mach—Feb. 2, 1899.

See also **Uehling-Steinbart.**

**Seger Cone.**—Measurements of High Temperatures for Clay-Workers. Edward Orton, Jr. The known ways of measuring heat are classified and briefly considered and the Seger cone and its advantages are presented. 4400 w. Brick—March, 1896.

Seger Cones. What is a Seger Cone?—Its size and shape; what it is made of; a reliable test for burning that may save hundreds of dollars. The insufficiency of all other methods. 1300 w. Brick—June, 1896.

**Uehling-Steinbart.**—The Measurement of High Temperature. Alten S. Miller. Paper before the Paris Gas Congress, describing the Uehling-Steinbart pneumatic pyrometer, and advocating its use in gasworks. 1100 w. Gas Wld—Sept. 15, 1900.

The Uehling and Steinbart Pneumatic Pyrometer (Pneumatisches Pyrometer von Uehling & Steinbart). With detailed drawings and a photographic view of the apparatus. 2000 w. Stahl und Eisen—May 1, 1899.

See also **Blast Furnace; Pneumatic.**

# Q

**QUARANTINE.**

See also **DISINFECTION; SANITARY ENGINEERING; SANITATION.**

**Canada vs. England.**—Utility of Quarantines as Now Conducted—Inspection, Disinfection and Isolation Stations. F. Montizambert. Discussion at the meeting of the British Medical Assn., Montreal, concerning the points in which the regulations and usage of Canada differ from England. 1800 w. San—Nov., 1897.

**Railways.**—The Practical Phases of Quarantine as It Affects Railroads. A. W. Sullivan. Read before the International Assn. of Ry. Surgeons. Reviews the conditions and regulation of traffic, and discusses its value and effect from a railroad point of view. 3300 w. Ry Age—July 20, 1900.

**United States.**—The Quarantine System of the United States. Walter Wyman. Describes the system showing the conditions which render it necessary, and explaining the regulations. 3800 w. San—Nov., 1897.

The Relation of Federal to State Quarantine. R. M. Swearingen. Read at conference of State Boards of Health, Nashville, Tenn., Aug. 18, 1897, and reprinted from the "Texas Medical Journal." Reviews the law enacted in 1893, showing its defects. 2800 w. San—Nov., 1897.

**QUARRY.**

See also **QUARRYING; STONE.**

**Bayport, Michigan.**—The Bayport, Michigan, Quarries. Illustrates and describes these quarries, and reports on the quality of the stone. 2400 w. Stone—Aug., 1898.

**Cedar Valley, Iowa.**—The Cedar Valley Quarry. Samuel Calvin. Illustrated description of a quarry in Cedar Co., Ia., with its machinery and manner of working. 1400 w. Eng & Min Jour—June 6, 1896.

**Electric Equipment.**—See **ELECTRIC EQUIPMENT.**

**Hainaut, Belgium.**—See **ELECTRIC EQUIPMENT—Quarry.**

**Ice.**—See **ICE QUARRY.**

**Marble.**—See **MARBLE QUARRY.**

**Meriden, Conn.**—The Quarries in the Lava Beds at Meriden, Conn. William M. Davis. Three quarries in the Triassic (Newark) formation near Meriden, showing the vesicular upper surface of one lava bed under the dense basal portion of a later flow, and a number of fractures dislocating the double flow. Relation of these features to the geological structure of the district. 4600 w. Am Jour of Sci—Jan., 1896.

**Scotland.**—See **ELECTRIC EQUIPMENT—Quarry.**

**Thuringian Slate and Gray Wacke.**—Thuringian Quarries. H. J. W. in "New York Post." Describes a tour of inspection of the gray wacke and slate quarries under control of the ducal government. 1300 w. Stone—Sept., 1896.

**United Kingdom Statistics.**—See **MINE—British.**

**QUARRYING.**

See also **MARBLE QUARRY; MINING; QUARRY.**

Some Modern Appliances for Quarrying and Manipulating Stone. William L. Clements. Considers the conditions reached in the advancement of this work, by the introduction of new machinery. Ill. 3500 w. Stone—Oct., 1897.

**British.**—Quarrying. C. Le Neve Foster. A lecture at the Sanitary Institute, London, by one of Her Majesty's Inspectors of Mines. An interesting summary of methods in use in England. Serial. Stone—Nov., 1895.

**France.**—The Quarrying Industry in France. Arthur Lee. Interesting account of the quarries and their products, the amount of labor employed, etc. Ill. 3000 w. Stone—April, 1900.

**Geology.**—Geology for Quarrymen. Charles Richard Van Hise. Reprinted from the 16th Annual Rept.

U. S. Geol. Soc. Illustrated review of the causes assigned for joints, zone affected by them, their relation to stratigraphy, faults, folds, etc. 3600 w. Stone—Dec., 1896.

**Helicoidal Wire.**—Quarrying by the Helicoidal Wire. N. Pellati. From a paper prepared for the International Congress, at Paris. Describes the method and its advantages. 1000 w. Col Guard—Aug. 17, 1900.

The Quarries of St. Triphon (Les Carrières de St. Triphon). Description of marble quarries in the Rhône valley in Switzerland, with an account of the use of the endless wire saw, and electric traveling crane. 1500 w. Schweizer Bauzeit—Jan. 1, 1898.

The Helicoidal Wire System of Quarrying. N. Pellati. Abstract of a paper read before the International Congress of Mining and Metallurgy in Paris, describing a method of making cuts in marble and other stone with a wire-cord formed of three hard steel wires twisted together with a very slow pitch. 1100 w. Eng & Min Jour—Sept. 15, 1900.

**Wages.**—See also **MINER—Wages; WAGES.**

**Wedges.**—A New Method of Quarrying Without Explosives (Eine Neue Vorrichtung zum Auffahren von Gesteinsstrecken ohne Schiessarbeit). A combination of wedges and battering ram, the wedges being inserted in drill holes and spread by a ram until the rock is split. 2500 w. Glückauf—July 31, 1897.

See also **MINING.**

**QUARRY RAILWAY.**

See also **TRAMWAY—Granite.**

**Rutland, Vt.**—An Incline Quarry Railway. A 45 degree, 300 ft. long, into the side of the mountain at Rutland, Vt., for hoisting marble. Ill. 500 w. Stone—Dec., 1895.

**QUARTZ.**

See also **GOLD GEOLOGY; GOLD MINING; GOLD ORE; MINERAL VEIN.**

**QUARTZ FIBRE.**

See **PHYSICS—Quartz Fibre.**

**QUAY WALL.**

See also **BULKHEAD; HARBOR; JETTY.**

**Antwerp.**—See **HARBOR.**

**Blackpool, Eng.**—See **SHORE IMPROVEMENT.**

**QUICKSAND.**

Quicksand. A report of statements by a number of engineers, including an analysis of the physical properties of quicksand, and a statement of its true nature. 1700 w. Eng Rec—Feb. 10, 1900.

**Shaft Sinking.**—See **SHAFT SINKING.**

**QUICKSILVER.**

See **MERCURY.**

## R

**RACE TRACK.**

See also **BICYCLE TRACK; SURVEYING.**

Race Tracks. How to Build and Repair Them. W. R. Hoag. Discusses the selection of the site, best material for the track, laying out the track, drainage and resurfacing. 2300 w. Engs' Year Book, Univ of Minn—1897.

**Curves.**—Easement Curves in the Race Track. D. L. Brancher. A plan for an oval race course with mathematical calculations and cut illustrating manner of laying out. 1100 w. 10th An Rept of Ill Soc of Eng & Surv—1895.

See also **RAILWAY CURVE.**

**Laying Out.**—To Lay Out a One Mile Regulation Race Track. D. L. Brancher. Four diagrams are given with directions. 900 w. Ill Soc of Engs & Surv—11th An Rept., 1896.

**RACK RAILWAY.**

See also **MOUNTAIN RAILWAY; RAILWAY.**

Progress in the Perfection of the Rack Railway. E. L. Corthell. Tracing the origin of rack-bar railroads, and describing in detail the project of the Jungfrau road. Ill. 4700 w. Eng Mag—Oct., 1897.

Rack Railways. A review of some of the principal rack railways of the world, with illustrations of distinctive features of the line and equipment. 2000 w. Sci Am Sup—Aug. 22, 1896.

Recent Rack Railways (Neuere Zahnradbahnen). E. Brückmann. Illustrated descriptive account of some of the latest roads and rolling stock, including the Damascus, Snowdon, Berner, Wengernalp, Gaisberg, Padang, Gornergrat, Jungfrau and other roads. Serial. 3 parts. 1 plate. 6500 w. Zeitschr d Ver Deutscher Ing—Feb. 12, March 5, 12, 1898.

**Abt, Austria.**—The Development of the Abt Rack Railway System in Austria-Hungary during the past 10 years (Die Entwickelung des Zahnrad Systems Abt Während der Letzten 10 Jahre in Oesterreich-Ungarn). Roman Abt. A general review of the progress of the Abt systems since 1888, with illustrations of many types of locomotives and details of construction and operation of roads. Two articles. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—May 13, 20, 1898.

**Beirut-Damascus.**—The Combined Adhesion and Rack Railway between Beirut and Damascus (Combinirte Adhäsions und Zahnradbahn, Beirut-Damaskus). A very complete account of this interesting road, with topographical map, illustrations of construction, locomotives, etc. The Abt system is used for the steep grades. 10000 w. Mitt d Ver f d Forderung d Lokal & Strassenbahnwesens—Jan., 1897.

**Burgenstock, Switzerland.**—The Burgenstock Rack Railway. Description of a notable Swiss road. 1400 w. Ry Wld—Sept., 1896.

**Corcovado, Brazil.**—Cercovado Railway, Brazil. Lewis Gleason. A well illustrated description of a rack railway up the side of Mt. Cercovado, which overlooks Rio de Janeiro. The engine is of Swiss manufacture and the grade from 16 to 25 per cent. 1000 w. Loc Engng—Feb., 1896.

**Eisenerz-Vordernberg, Vienna.**—The Eisenerz-Vordernberg Railway (Die Eisenbahn Eisenerz-Vordernberg). An interesting illustrated description of this combined adhesion and rack railway near Vienna, with profile, topographical map and details of rolling stock. 7500 w. Glaser's Annalen—April 15, 1898.

**Electric.**—Electric Traction on Rack Railways. Frank B. Lea. The advantages are set forth, and several noted lines are briefly described. 2000 w. Elec Eng, Lond—April 3, 1896.

**Electric Locomotive.**—See **ELECTRIC LOCOMOTIVE—Rack Railway.**

**Jungfrau.**—A New Form or Rack Rail for Mountain Railways. Illustrated description of the form devised by Emil Strub for the Jungfrau Ry. 600 w. Eng News—Oct. 11, 1900.

The Track Construction of the Jungfrau Rack Railway (Der Oberbau der Jungfraubahn). With especial details of the Strub system of rack construction especially designed for this Alpine road. 3000 w. Schweizer Bauzeit—April 3, 1897.

See also **MOUNTAIN RAILWAY.**

**Locomotive.**—See **LOCOMOTIVE—Rack Railway.**

**Nilgiri, India.**—The Nilgiri Rack Railway. A plan and section, with four views of the first rack railway in India, now nearly completed. Brief description. 700 w. Engng—Sept. 16, 1898.

See also **RAILWAY.**

**Sumatra.**—See **LOCOMOTIVE—Rack Railway.**

**Switzerland.**—Swiss Rack Railways (Les Chemins de Fer Suisses à Cremaillière). Table giving data of all the rack railways in Switzerland, including permanent way, rolling stock and operation details, with short explanatory note. 1500 w. Génie Civil—Oct. 29, 1898.

See also **MOUNTAIN RAILWAY.**

**RADIATION.**

See **ELECTRO-PHYSICS; HEAT RADIATION; PHYSICS; RADIOGRAPHY; RAY.**

**RADIATOR.**

See **HEATING; STEAM HEATING.**

**RADIOGRAPHY.**

See also **CATHODE RAYS; ELECTRO-PHYSICS; ROENTGEN RAYS.**

Electric Images without Crookes Tubes. R. K. Duncan. Describes experiment. Ill. 200 w. Elec Eng—March 11, 1896.

On a Mechanical Action Emanating from the Crookes Tube Analogous to the Photographic Action discovered by Roentgen. Messrs. Gossart and Chevalier. Note communicated to "Comptes Rendus." The view is expressed that this may be a point of departure for a series of researches which the writer hopes to pursue—the study of the field of the Crookes tube with the radiometer. 800 w. Sci Am Sup—April 11, 1896.

Photography of the Invisible Without the Aid of a Crookes Tube. William James Morton. Results attained by the writer, showing that effects similar to those attained by Crookes' tubes, are not impossible without the employment of highly vacuous enclosures. Ill. 800 w. Elec Eng—Feb. 5, 1896.

Radiography and Radioscopy (Radiographie et Radioscopie). E. Wallon. A review of the present status and most recent developments in connection with radiography and allied subjects. Serial. Génie Civil—May 7, 1898.

**Arc and Sunlight.**—Shadow Pictures from the Arc and Sunlight. W. H. Freedman. Tests made which show that shadow photographs obtained by means of the arc and sunlight are not X-ray pictures. Ill. 500 w. Elec Eng—March 11, 1896.

**Arc Light.**—Photographing Hidden Objects by the Arc Light. J. Hart Robertson. Description of an experiment made by the writer. 700 w. Elec Eng—Feb. 19, 1896.

Shadow Pictures by Arc Light Rays. W. W. Ker. Experiments made which add a few facts concerning the production of X-Rays. 700 w. Elec Eng—March 25, 1896.

**Becquerel Rays.**—A Résumé of the Experiments Dealing with the Properties of Becquerel Rays. Oscar M. Sewart. A summary of the present state of knowledge of the subject, with its bearing on the subject of X-rays. 5000 w. Phys Rev—April, 1898.

Becquerel Rays. An illustrated account of these rays and their effect, and a comparison with the Röntgen rays. 1100 w. Elec Rev, Lond—March 9, 1900.

On Hyperphosphorescence. Silvanus P. Thompson, in "Philosophical Magazine" and "Journal of Science." Explains why the writer gives this name to the new phenomenon observed by M. Becquerel and by himself. 600 w. Elec—July 15, 1896.

Sources and Properties of Becquerel Rays. G. H. Bryan. A general account of a few of the more striking phenomena, including some of the recent developments. 4000 w. Nature—June 14, 1900.

See also **New Rays**; **ROENTGEN RAYS.**

**Davis Chemical Solution.**—Opaque Objects Made Transparent by Rays Passing Through Chemical Solutions. An account of an alleged remarkable discovery, by Mr. A. G. Davis, of Parkersburg, consisting of an arrangement of chemical solutions, the effect of which is to make opaque bodies transparent to light. 500 w. Elec Eng—April 1, 1896.

**Disruptive Discharges.**—Cathodographs by the Discharge of Leyden Jars and Other Disruptive Discharges of Static Electricity. William James Morton. An experiment which demonstrates that cathodography can be accomplished simply by the aid of charged Leyden jars alone. Ill. 800 w. Elec Eng—Feb. 19, 1896.

**Electric Discharge.**—X-Rays and Discharge (Rayous et Décharge). G. Sagnac. A communication to the French Academy discussing the relations of the X-rays to the electric discharge, and giving a generalization of the notion of cathodic rays. 1500 w. Comptes Rendus—Feb. 5, 1900.

**Electrographs.**—Electrographs. Walter H. Merrill. Illustrated account of experiments tending to show that good results can be obtained by using the electricity obtained from a charged driving belt, or any similar source, provided the connections are properly made. 600 w. Elec Wld—April 4, 1896.

**Human Rays.**—Human Rays. Ottokar Hoffmann. An illustrated account of experiments seeming to show that the human body emits rays which act on a sensitive photographic plate. 1300 w. Eng & Min Jour—June 24, 1899.

**Hyperphosphorescence.**—See **Becquerel Rays.**

**Light Rays.**—Light Rays Which, in Their Penetrating Power, Resembles Röntgen's X-Rays. N. D. C. Hodges. The purpose of this note is to call attention to the properties in common of certain radiations, which, while somewhat unusual in character, have been classed hitherto as light rays not essentially peculiar in their method of propagation, with those radiations which are now known as Röntgen's X-rays. 500 w. Elec Eng—March 4, 1896.

**"New" Rays.**—Becquerel or Uranium Rays and Other "New" Rays and Their Relation to X-Rays. O. M. Stewart. An account of experimental work and the results. 1600 w. Sib Jour of Engng—June, 1899.

**Radium.**—Note on the Transmission of the Radiation from Radium through Bodies (Note sur la Transmission du Rayonnement du Radium au Travers des Corps). H. Becquerel. A communication to the French Academy reviewing some experiments and discussing hypotheses. 1500 w. Comptes Rendus—April 9, 1900.

The Electric Charge Derived from the Divertible Rays of Radium (Sur la Charge Electrique des Rayons Déviables du Radium). M. and Mme. Curie. A communication to the French Academy discussing those rays omitted by radium which can be deviated by a magnetic field. 1500 w. Comptes Rendus—March 5, 1900.

**Secondary Emission.**—The Reflection and Refraction of Cathode Rays and of Deviable Radium Rays (Sur la Réflexion et la Réfraction des Rayons Cathodiques et des Rayons Déviables du Radium). P. Villard. A communication to the French Academy describing experiments which seem to confirm J. J. Thomson's hypothesis of a secondary emission. 600 w. Comptes Rendus—April 9, 1900.

**Secondary Rays.**—Negative Electrification of the Secondary Rays Produced by Means of Röntgen Rays (Electrisation Negative des Rayons Secondaires Produits au Moyen des Rayons Röntgen). P. Cunie and G. Sagnac. A communication to the French Academy describing experiments which show the negative electrification of the secondary rays, with illustrations. 700 w. Comptes Rendus—April 9, 1900.

**Uranium.**—Emission of New Radiations by Metallic Uranium. Henri Becquerel, in "Comptes Rendus." Study of these salts with results of scientific interest. 900 w. Elec—July 15, 1896.

**RAFT.**

**Sea-Going Lumber.**—Sea-Going Rafts on the Pacific. E. K. Bishop. Describing the construction and manipulation of the great lumber rafts, the introduction of which has caused a revolution in the transportation of lumber between Pacific Coast ports. 3500 w. Eng Mag—Oct., 1898.

**RAIL.**

See also **RAIL BOND; RAIL JOINT; RAILWAY PERMANENT WAY; TRACK; TRACKLAYING.**

Rails, Past and Present. E. C. Potter. Read before the Western Railway Club, Chicago. Reviews the early history of steel rails in America, and considers features, which, though apparently trivial, cause much annoyance and unnecessary expense. Ill. 2800 w. Ir Age—Feb. 17, 1898.

Rails and Rail Joints. Illustrated description of the types now in use. 1800 w. Sci Am Sup—June 9, 1900.

**Am. Soc. C. E. Discussion.**—Recent Practice in Rails. Abstract of the discussion on rails at the London meeting of the Am. Soc. of Civ. Engs. 2200 w. R R Gaz—Oct. 12, 1900.

Recent Practice in Rails. An informal discussion by Robert W. Hunt and A. L. Colby. 9500 w. Pro Am Soc of Civ Engs—Aug., 1900.

**Am. Soc. C. E. Section.**—The Wear of Wheels on Sharp Cornered Rails. Editorial giving the history and development of the Am. Soc. C. E. rail section, with letter of inquiry, and letters showing the practice of different roads. 4800 w. Eng News—March 29, 1900.

**America.**—Iron and Steel Rails in America. Robert W. Hunt. Read at London meeting of Am. Soc. of Civil Engs. Reviews the history of railmaking and railroad building, giving interesting information. Serial. Engng—July 6, 1900.

**Australian Works.**—An Opportunity for an American Steel Rail Plant in Australia. The opportunity here discussed is suggested by the proposals advertised for, by the Secretary of Public Works, at Sidney, for 150,000 tons of steel rails and other track materials. 2000 w. Eng News—Aug. 27, 1896.

**Basic Steel.**—Basic Steel Rails. Tests of defective basic rails discussed with some notes of European specifications and practice, both as to basic and acid Bessemer rails. 1300 w. Eng News—Aug. 27, 1896.

**Bending Tests.**—Bending Tests of Iron and Steel Rails. Alfred Chatterton. Describes experiments undertaken originally to ascertain the loads old rails could safely carry, but the experiments were extended and the conclusions reached that in iron rails there is a gradual deterioration rendering them unfit for service; and that the effect on steel rails is to decrease their ductility and diminish their power of resisting deformation. Ill. Serial. Ind Engng—Jan. 8, 1898.

**Breakage.**—The Breakage of Steel Rails. Editorial review and criticism of paper by W. G. Kirkaldy, published by the Inst. of Civ. Engs., England. 1800 w. Eng News—Aug. 31, 1899.

Why do Rails Break? A. R. V. Dormus. From a paper read before the Austrian Soc. of Civ. Engs. Condensed from the "Zeitschrift des Oest. Ing. and Arch. Vereins, by Julius Meyer. The paper goes into an extended discussion of chemical, physical and etching tests, urging the importance of the last named. The great differences in strength are attributed to segregations in the ingots, and suggestion is made that main track rails be selected from the lower two-thirds of rolled beams only. 2400 w. R R Gaz—May 8, 1896.

Why Rails Break in Track. Editorial discussion of this subject, with a statement of conditions that must be satisfied in order that a rail shall not break in service. 2200 w. Am Eng & R R Jour—Sept., 1897.

See also **Brittle**; **METALLOGRAPHY—Steel Rail**; **RAILWAY ACCIDENT—St. Neots, Eng.**

**British Board of Trade Report.**—The Qualities and Life of Rails. Synopsis of the report of a committee appointed by the British Board of Trade to inquire into this question, with brief comment. 2400 w. R R Gaz—Aug. 3, 1900.

The Deterioration of Steel Rails. Editorial review of the report of a committee appointed by the British Board of Trade "to inquire what extent of loss of strength in steel rails is produced by their prolonged use on railways under varying conditions, and what steps can be taken to prevent the risk of accidents arising from such loss of strength." 3000 w. Engng—July 13, 1900.

See also **METALLOGRAPHY—Steel Rail.**

**British Heavy.**—On the Advantage of Using Heavier Rails for Railways Laid with Flange Rails. C. P. Sandberg. On the changed conditions which make it advisable to use more steel, thus securing cheaper roads, cheaper freights, and safety for higher speeds on British railways. 2000 w. Engng—Jan. 13, 1899.

**"Brittle."**—"Brittle" Rails and Phosphorus Content. Editorial discussion of complaints and of the cause of the trouble. 2000 w. R R Gaz—March 30, 1900.

**China.**—See **Manchuria.**

**Common Roads.**—See **TRACKWAY.**

**Continuous.**—See **ALUMINOTHERMY**; **ELECTRIC WELDING—Rail**; **RAIL JOINT.**

**Creeping.**—See **RAIL CREEPING**; **RAIL JOINT—Splice.**

**Deformation.**—See **RAIL DEFLECTION**; **TRACK DEFORMATION.**

**Denver and Rio Grande.**—Rail Sections of the Denver and Rio Grande R. R. An interesting outline chart of the important sections adopted during the last twenty-five years. 600 w. Eng News—Sept. 3, 1896.

**Designing.**—Some of the Difficulties in Designing Rail Sections. P. H. Dudley. A letter from a well known expert in rail designing, describing the difficulty of designing a rail section so that it will roll well and will have the specified weight. 800 w. R R Gaz—April 17, 1896.

**Deterioration.**—See **British Board of Trade Report.**

**Earth Rotation Pressure.**—The Lateral Pressure upon Rails due to the Rotation of the Earth (Die Seitliche Verschiebung der Eisenbahnschienen in Folge der Achsendrehung der Erde). A mathematical analysis by Dr. Koller, showing that the pressure due to the rotation of the earth is so slight as to be negligible. 2500 w. Glaser's Annalen—Sept. 15, 1897.

**Electric Railways.**—Life of Rails under Electric Service. A compilation of reports from various roads. 1100 w. St Ry Rev—April 15, 1896.

See also **Girder**; **TRACK.**

**Electric Welding.**—See **ELECTRIC WELDING—Rails.**

**Girder.**—See also **Street.**

**Girder, British.**—Girder Rails for English Street-Railway Tracks. Illustrated description of rail, with the reasons for using this type as given by Joseph Kincaid, the engineer. 800 w. Eng News—Oct. 14, 1897.

**Girder, Paris.**—New Girder Rail of the General Omnibus Company of Paris (Noveau Rail-Poutre de la Campagnie Générale des Omnibus de Paris). M. Delonchant. With sections of rails and joints and drawings of fish plates. 1000 w. Rev Gen des Chemins de Fer—Feb., 1899.

**Guards.**—Rail Guards. The subject is discussed editorially, and numerous examples of both wooden and iron guards given. 2200 w. Eng, Lond—Dec. 27, 1895.

**Handling.**—Effect of Handling on the Life of Rails. H. K. Landis. Discusses the influences which affect the service of a rail, showing that high carbon steel should be carefully handled. 1500 w. Ry Age—Aug. 27, 1897.

**Hard Steel.**—The Danger of Using Too Hard Steel Rails. C. P. Sandberg. A paper before the Iron & Steel Institute showing the danger of fracture with too hard steel, especially in cold climates. 2000 w. Engr, Lond—Sept. 2, 1898.

**High Carbon.**—General Track Construction and the most Approved Method. C. Loomis Allen. Abstract of paper before the N. Y. State R'way Assn. advocating high carbon steel rails and giving recommended specifications for composition, with notes of discussion. 900 w. W Elec—Oct. 3, 1896.

**Illinois Central Ry.**—New 100-lb. Rail and Splice Bars for the Illinois Central R. R. Section, dimensions and brief description. 300 w. Eng News—Oct. 21, 1897.

**Italy.**—Life of Steel Rails in Italy. Observations on the wear of steel rails on the various lines of the Adriatic Railway of Italy. 900 w. Ry & Engng Rev—Dec. 10, 1898.

**Life.**—The Life of Steel Rails. An article giving results of experience. Discusses tramways, pavements, railways, and gives a comparison of methods of laying tramway and railway tracks. 5400 w. Engr, Lond—July 27, 1900.

See also **Handling**; **British Board of Trade.**

**Long.**—Advisability of Increasing Length of Rails and Advantages to be Derived from Use of Rails with Mitre-Cut Ends. From a report by R. Caffrey, presented at the convention of the Roadmasters' Assn. of America. 2500 w. Ry & Engng Rev—Sept. 17, 1898.

**McKenna Renewing Process.**—The McKenna Process of Renewing Steel Rails. Robert W. Hunt. Lecture delivered before the students of Sibley College. The writer reviews the history of rails, and the changes that affected their service, with the methods used to overcome the difficulties, with explanation of the named process. 3800 w. Sibley Jour of Engng—May, 1896.

**Manchuria.**—Rails for the Eastern Chinese (Manchurian) Railroad. Illustrated description from the Government specification, of the style of rail and fastenings which have been adopted. 3000 w. R R Gaz—Dec. 10, 1897.

**Manning.**—The Manning Improved Rail. W. T. Manning. Description with diagrams, and the advantages claimed. Also editorial discussion. 3300 w. R R Gaz—Jan. 27, 1899.

**Manufacture.**—Rail Making Problems. Compares old and modern practice, and discusses many points of interest. 2500 w. Ir & Coal Trds Rev—Aug. 24, 1900.

See also **Australian Works**; **Steel**; **United States**; **ROLLING MILL**; **STEEL MANUFACTURE**; **STEEL WORKS.**

**Metallography.**—See **METALLOGRAPHY — Steel Rails.**

**Minimum Dimensions.**—The Minimum Dimensions of a Rail. Results of tests showing that the least thickness ever given to webs in practice is much more than sufficient to safely stand the strains and shocks of railway service. 800 w. R R Gaz—July 24, 1896.

**Mitre.**—Mitre Rails. Jerry Sullivan. Comment on the report of committee of the Roadmasters' Association of America. Splitting of the end of the rail along the web and hammering of the head at the joint was ascribed to the rigid joint caused by too solid tamping of the adjacent ties. 1300 w. Ry Rev—Nov. 16, 1895.

See also **Long.**

**N. Y. Central.**—Specifications and Sections for

Steel Rails and Angle Splice Bars, New York Central & Hudson River Railroad. Short description of track adopted, with the specification for rails and splice bars, recently adopted. 2500 w. Am Eng & R R Jour—March, 1897.

**Old Edge.**—An Old Edge Rail, from the Eastern Railway of Massachusetts and New Hampshire. Illustrates and describes an interesting relic of railway history. 700 w. Eng News—June 16, 1898.

**Posts.**—Converting Worn Out Rails into Posts. F. G. Lynde. Describes a process by means of which rails were split and made into fence posts, at a cost of two and a quarter annas per post. Ill. 2000 w. Ind Engng—March 5, 1898.

**Re-Sawed, Matching.**—Matching Re-Sawed Rails. Method used to assort and distribute re-sawed rails in order that the joints may match. 800 w. R R Gas—Jan. 3, 1896.

**Resistance.**—Rails and Their Resistances in Railway Service (Du Rail et sa Résistance dans les Voies). G. Vinot. A discussion of the rail as a manufactured product, of its strength, and its capacity to resist the various shocks and stresses to which it is subjected. Serial. Part I. 2500 w. La Rev Tech—March 10, 1898.

**Roads.**—See **TRACKWAY.**

**Sandberg.**—Sandberg Rails. A. L. Uggla. Theoretical consideration of an 80-lb. rail section adopted by the state railways in Sweden, with brief description of others whose weights are from 100 lb. to 80 lb. per yard. 1000 w. Engng—Jan. 29, 1897.

See also **TRACK—Tie Plate.**

**Sections and Weights.**—Rail Sections and Weights Again. Editorial on the progress in increasing weights of rails and in the adoption of a standard section. 1000 w. R R Gas—Jan. 15, 1897.

**Special Steel.**—High Carbon and Special Steel in Rails. G. Whitefield Chance. Discusses the high carbon and other special steels and the effects of various elements in steel, chemical composition, heat and mechanical treatment. 4000 w. R R Gas—Aug. 27, 1897.

**Specifications.**—Specifications for Steel Rails of Heavy Sections Manufactured West of the Alleghenies. Robert W. Hunt. A revision of the author's specifications of 1888, with additional clauses covering chemical composition and drop tests. 2800 w. Trans Am Inst of Min Engs—Feb., 1896.

See also **STEEL SPECIFICATIONS.**

**Splice.**—See **RAIL JOINT—Bonzano Splice.**

**Splice Bar.**—See **Illinois Central Ry.; N. Y. Central; RAIL JOINT.**

**Steel.**—Steel Permanent Way. Richard Price-Williams. Read at meeting of the Iron and Steel Inst. (London). Shows that the enormous traffic and tractive power of the present have made steel rails a necessity; that there has been a continued decrease in cost of maintenance of way and rolling stock; calling attention to weak points needing remedy. Discussion. 10200 w. Ir & St Trds Jour—May 14, 1898.

Steel Permanent Way. Richard Price-Williams. Read before the Iron & Steel Inst., England. Shows that iron rails could not endure the enormous increase in traffic and tractive power on heavily worked lines, and discusses what has been accomplished in the way of improving and strengthening the permanent way reducing cost, etc., and what needs yet to be remedied. 3800 w. Engng—June 3, 1898.

The Manufacture and Consumption of Steel Rails. Showing that an enormous quantity of steel is used in the manufacture of rails, more than 47 million tons of rails having been produced since 1882. The accompanying statistics show the distribution of these rails and the effect of renewals on the market. 1600 w. Ir & Coal Trds Rev—April 10, 1896.

The Development of the Steel Rail in the United States. H. G. Prout. Reviewing the history of the steel rail up to 1887. Ill. Serial. 1st part. 4700 w. Eng Mag—July, 1897.

The Growth and Development of the Steel Rail in America. H. G. Prout. Reviewing the history of the steel rail since 1887. Ill. 5600 w. Eng Mag—Aug., 1897.

See also **METALLOGRAPHY—Steel Rails.**

**Steel, Early.**—Steel Rails in the United States. Robert W. Hunt. Early history and reminiscences of Bessemer practice. 2000 w. Ir Age—Jan. 2, 1896.

**Steel, 1869.**—Steel Rails in 1869. Reprinted from the "Iron Age," Nov. 11, 1869, when steel rails were being first extensively introduced. 3500 w. Ir Age—Jan. 2, 1896.

**Stiff and Heavy Sections.**—Important Results Obtained in the Past Fifteen Years with the Stiff and Heavy Rail-Sections. P. H. Dudley. Reviews the results secured on various roads, and the progress made in railway engineering. 4500 w. Trans Am Inst of Min Engs—Feb., 1899.

Important Results Obtained in the Past Fifteen Years with the Stiff and Heavy Rail-Sections. Dr. P. H. Dudley. Discussion of this paper. Ill. 2400 w. Trans Am Inst of Min Engs—Feb., 1899.

**Street.**—A New Tramway Rail. The rail adopted for surface railways in N. Y. City. The lip is raised to a level with the head, thus offering no obstruction to traffic. 400 w. Eng Rec—March 14, 1896.

Rails: Their Construction from a Scientific Standpoint. A. J. Moxham. Read at meeting of the N. Y. State Ry. Assn. Reports experiments conducted by the Lorain Steel Co., and the conclusions reached. 3300 w. St Ry Rev—Sept. 15, 1898.

Why the T Rail Is not Satisfactory on Paved Streets in San Francisco. S. L. Foster. Excessive wear of the pavement adjacent to the rail was prevented by a flat rail laid on a red-wood stringer, inside the rail, which then attracted the heavy traffic of drays. 900 w. St Ry Jour—March, 1896.

The Influence of Rails on Street Pavements. Edward P. North. Discusses the kinds of rails in use in various localities, their advantages and defects; also the satisfactory adjustment of the pavement to the rails, and the condition of the space between the rails. 2200 w. Am Soc of Civ Engs—Nov., 1896.

Report on Rails for Street Railroads. C. L. Allen. Read before the Street Railway Assn. of the State of N. Y. Recommendations for general specifications. 1000 w. Elec Rev—Sept. 23, 1896.

The Solution of an Important Street Railway Problem. The difficulty of using the two kinds of rails used in the cities and for surburban roads, without loss of speed or danger. Solved by a design of truck, and successfully tested. Ill. 800 w. St. Ry Rev—March 15, 1897.

See also **Girder; TRACK.**

**Strength Diagram.**—A Diagram for Finding the Transverse Strength of Steel Rails. Diagram for computing the transverse strength for weights up to 100 lbs. per yd., with explanation by W. M. Wicham. 500 w. Eng News—Sept. 22, 1898.

**Stresses.**—See **RAIL DEFLECTION; TRACK DEFORMATION.**

**Sweden.**—See **Sandberg.**

**Tests.**—Do the Usual Acceptance Tests of Steel Rails Answer Their Purpose (Entspricht das zur Zeit Uebliche Prüfungsverfahren bei der Uebernahme von Stahlschienen seinem Zwecke)? A. Martens. Based on articles in "Baumaterialienkunde." A long article, with illustrations and tables, criticising existing methods, and suggesting improvements. Two articles. 8000 w. 1 plate. Stahl und Eisen—March 15, April 1, 1900.

See also **RAILWAY ACCIDENT—St. Neots.**

**Tie Plate.**—See **TRACK.**

**Trimming.**—Rail Trimming on the Michigan Central and Santa Fé Roads. An illustrated detailed description of one of the plants engaged in the work of rail-trimming. 2500 w. Ry & Engng Rev—March 4, 1899.

**United States, Manufacture.**—Early Rail Making in the United States. John Frits. Extracts from an address at a meeting of the Min. and Met. Section of the Franklin Inst. Brief historical review. 2500 w. R R Gas—Oct. 20, 1899.

**United States Steel.**—See **Steel.**

**Wear.**—Rail Sections and Wheels. Abstract of a paper read by Mr. Lodge at the meeting of the Engng. Assns. of the South, at Nashville. The writer discusses the relative wear of wheel and rail head and the influence of changing the quality of each. 1100 w. Eng News—Feb. 13, 1896.

On the Wear of Steel Rails. G. Olva. Abstract published by the Inst. of Civ. Engs. (British) relating to the life of rails. 1100 w. R R Gaz—May 20, 1898.

The Wear of Rails (Schienenverschleiss). K. Beyer. A discussion of a graphical method of determining the relative wear of rails of various sections. 1500 w. Schweizer Bauzeit—Jan. 20, 1900.

See also **Am. Soc. C. E. Section; LOCOMOTIVE—Rail Wear; FIRE—Locomotive Wear.**

**Works.**—See **Australian Works; Manufacture; ROLLING MILL; STEEL WORKS.**

### RAIL BOND.

See also **ELECTRIC RAILWAY; ELECTRIC TRAMWAY; RAIL JOINT; STRAY CURRENTS; TRACK—Street.**

Bonding Electric Rail Tracks. W. G. T. Goodman. Read at meeting of the Elec. Assn. of New South Wales. Describes the various systems of bonding, and the damage and loss incurred through defective bonding. Serial. Aust Min Stand—Aug. 10, 1899.

Notes on the Electric Railway Return. G. W. Knox. Read before the Chicago Elec. Assn. Considers the plans of having a metallic return made up by heavily bonding the rails and using a supplementary wire in connection therewith, and the joining the rails in such a manner as to secure the full value of their current conducting capacity. 5000 w. St Ry Rev—Dec. 15, 1896.

Rail Bonding as a Power Saver. H. C. Chase. Read at the Texas-Mexico Convention. Considers that rail bonding as a power saver depends upon the bonds being of ample capacity, perfect connections and large contacts. 1100 w. St Ry Rev—March 15, 1898.

Railway Bonding. Walter E. Harrington. An outline of tests with conclusions favoring the Edison-Brown Bond. 900 w. Jour Fr Inst—Jan., 1898.

Rail Bonds. Calls attention to points learned by experience, and gives illustrated description of the mechanical features of many types. 4000 w. St Ry Jour—Sept., 1898.

Rail Bonds. H. P. Brown. A statement of recent experience. 700 w. Eng Rec—Oct. 21, 1899.

Rail Bonds. The best forms of bonds are described and illustrated. 2600 w. St Ry Jour—March, 1896.

Recent Experience in Rail Bonding for Electric Railways. Harold P. Brown. Condensed from a paper presented at the Toronto meeting of the Am. Soc. of Munic. Imp. Brief reports from various places, and a discussion of methods giving best results. 1000 w. Eng News—Oct. 12, 1899.

Some Further Notes on the Electric Railway Return. H. S. Newton. Relates experience in Syracuse in matter of rail bonds, explains in detail the construction of a bond which solders fast to the rail and which seems to have solved the problem of obtaining a good return. Ill. 1200 w. St Ry Rev—Jan. 15, 1897.

The Evolution of the Rail Bond. Harold P. Brown. Traces the development of these bonds as shown by the patents issued, and by the records of practical work. Ill. Serial. Elec Wld—Jan. 1, 1898.

Track Bonding. H. P. Brown and G. E. Chapin. Report of committee to the N. Y. State St. Ry. Assn., discussing the various kinds of rail bonds for electric return currents and comparing the independent bonds with the continuous welded rail. 2300 w. St Ry Rev—Sept. 15, 1898.

Track Bonding—How Can We Obtain the Best Results? H. C. Newton. Discussion of the subject with the conclusion that the really practical process is to solder the bond to the rail. 1200 w. Elec, N. Y.—Sept. 29, 1897.

**Experiments.**—Experiments on Rail Bonds. Henry H. Norris. Read before the N. Y. St. Ry. Convention. The importance of this subject is discussed, the difficulty of keeping the bonding in good condition, poor bonding, inspection, etc. 2000 w. St Ry Rev—Sept. 15, 1899.

**Geneva Convention Report.**—The Electrical Connection of Tramway Rails (Connexion Electrique des Rails de Tramways). Ch. Thonet. A report presented at the Geneva meeting of the International Union of Tramways, reviewing the principal methods of rail-bonding employed in Europe and America. Two articles. 3000 w. L'Electricien—March 11, 18, 1899.

**Test, Buffalo.**—Plastic Bond Tests at Buffalo. Some tests on the conductivity of rail joints with plastic bonds. A Weston millivolt meter was used which had just been recalibrated at the factory. 500 w. St Ry Rev—Feb. 15, 1896.

Test of Rail Bonds. Results of some tests made by Mr. Robert Bunning, Master Mechanic of the Buffalo Railway Company. All the instruments were of the Weston type, and had just been recalibrated by the Weston Co. 400 w. Elec Eng—Feb. 26, 1896.

**Test, Niagara.**—A New Method of Testing Rail Bonds. Harold P. Brown. Description of a new method employed on the Niagara Gorge Road, with comment on the extremely satisfactory results determined. 600 w. St Ry Rev—April 15, 1896.

### RAIL CREEPING.

See also **RAIL DEFLECTION; TRACK DEFORMATION.**

The Creep of Rails (Ueber das Wandern der Schienen bei Eisenbahn-Geleisen). An investigation into the causes of the creep of rails, with especial reference to the action of the locomotives in causing unequal creep. 2 articles. 10000 w. 1 plate. Zeitschr Oesterr Ing u Arch Ver—Jan. 22 and 29, 1897.

**Bonzano Splice.**—See **RAIL JOINT.**

**Eads Bridge, St. Louis.**—The Creeping of Rails on the Eads Bridge, St. Louis. Letter from N. W. Eayrs, the superintendent of the structure, concerning the amount of rail creeping and means adopted to accommodate it. 700 w. Sci Am—March 24, 1900.

### RAIL DEFLECTION.

See also **BRIDGE STRESSES; TRACK DEFORMATION; TRACK INSPECTION.**

Permanent Way. J. C. A discussion of the loss of power due to rail deflection under the car wheels, with incidental commendation of the American passenger coach. 700 w. Eng, Lond—April 10, 1896.

**Dudley.**—Undulations in Railway Tracks. P. H. Dudley. A study of the deflections of rails, the causes and remedy; the objects of permanent way construction and the success attained between New York and Buffalo, on the N. Y. C. & H. R. R. R. Ill. 5400 w. Sch of Mines Quar—Jan., 1897.

Stresses in Rails Under Moving Loads. P. H. Dudley, in a lecture before the N. Y. Academy of Sciences. Describes the principle and use of the stremmatograph, giving records obtained with it. 2500 w. R R Gaz—May 20, 1898.

Stresses in Rails Under Moving Loads. Records made during the hot weather of June and July with the "stremmatograph" devised by P. H. Dudley, with discussion. 4500 w. R R Gaz—Oct. 21, 1898.

**Vienna-Warsaw Ry.**—Investigations on the Temporary Deformations of Rails (Versuche über die vorübergehenden Formänderungen des Geleises). Alfred Birk. A résumé of experiments made upon the Vienna-Warsaw railway, with illustrations of the photographic recording apparatus employed. 5000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1899.

### RAIL FASTENING.

See also **CROSS TIE; RAIL JOINT.**

**Automatic Chair.**—Automatic Rail Chairs (Automatisch wirkender Schienenstuhl). The Chenu rail chair is arranged with an automatic clamp which utilizes the weight of the train upon the rail to tighten its hold. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 20, 1897.

**Collet Treenail.**—The Albert Collet System of Fastening Rails to Cross Ties (Rapports de M. Ed. Sauvage, sur les Attaches de Rails de M. A. Collet). A report on methods and tools used. A hardwood treenail is screwed into the tie and the fastening screw is screwed into the treenail. Well illustrated. 2000 w. Bull d l Soc d'Encour—June 30, 1900.

The Consolidation of Fastenings in Railway Cross Ties (La Consolidation des Attaches dans les Traverses de Chemins de Fer). M. Cartault. A description of the Collet system, in which a treenail is screwed into a hole tapped into the cross tie, the rail bolt then being screwed into the treenail. Used on the Paris, Lyons, & Mediterranean Railway. 2500 w. Rev Gen de Chemins de Fer—Feb., 1900.

**Wood Screws.**—Wood Screws and Spikes for Railroad Track Use. A. Morrison. Considers the movements of the several parts comprising the track that affect the spike or screw, and the relative merits of wood screws and spikes in holding the rail and cross-tie together. 1600 w. R R Gaz—Oct. 15, 1897.

## RAIL JOINT.

See also **ALUMINOTHERMY; ELECTRIC WELDING; RAIL; RAIL BOND; TRACK.**

The Construction of Rail Joints. Alfred Birk. Extract from an article published in the "Bulletin of the International Railway Congress." Illustrates and discusses the various kinds of joints, and draws conclusions from the investigations. 3500 w. St Ry Jour—May, 1897.

The Relation of Wave Motion in Track to Track Joints. George Tatnall. Discusses the requisites for a good track joint, shows the fallacy of the idea that the ties are fixed and solid supports, giving experiments confirming the facts, and other features of the designing of track joints. 3000 w. R R Gaz—June 17, 1898.

**Angle Plates.**—High Carbon Angle Plates—Continuous Rails. A letter from A. Torrey, of the Michigan Central R. R., containing valuable facts concerning elastic track. 1000 w. R R Gaz—Feb. 18, 1898.

**Austrian vs. French.**—See French vs. Austrian.

**Bearing Surface.**—Large Bearing Surfaces for Rail Joints. Extract from a communication by C. P. Sandberg upon the advantages of large bearing surfaces. 1400 w. Ry Rev—Dec. 12, 1896.

**Bonzano Splice.**—A New Rail Splice and an Anti-Creeper for Steam Railway Tracks. Illustrated description of the device for preventing rails from creeping, designed by A. Bonzano. 800 w. Eng News—Oct. 20, 1898.

**Bridge.**—Bridge Rail-Joints (Stossfugenüberbrückung). Dr. Zimmerman. A discussion before the German Railway Society, of the recent paper by Dr. Vietor, with especial reference to the influence of impact upon the rails and joints. 5000 w. Glaser's Annalen—March 1, 1899.

The Construction of Rail Joints (Ueber Stossfugen-Ueberbrückung). A paper by Dr. Vietor before the German Railway Society, discussing the action of shock upon rail joints, and the best methods of diminishing injurious action. 4000 w. Glaser's Annalen—Dec. 1, 1898.

**Casting.**—Casting Street Girder Joints Together. I. R. Newkirk. Read before the Foundrymen's Assn. The work is described and the claims for this kind of joint stated. 1500 w. Ir Age—Sept. 9, 1897.

**Cast-Weld.**—Cast-Welded Rail Joints. William Baxter, Jr. Comment on the ideas brought out in M. K. Bowen's paper, with a few extracts. 2000 w. R R Gaz—Dec. 25, 1896.

Continuous Rails. Editorial discussion of the subject of "cast-welding," not favorable to the practice, especially in England. 2000 w. Elect'n—Dec. 18, 1896.

The "Cast-Weld" Joint as a Conductor. Harold P. Brown. Illustrated description of joints and tests made, with results. 1400 w. St Ry Rev—Dec. 15, 1896.

Track and Track Joints. Construction, Maintenance and Bonding. M. K. Bowen. Read before the Am. St. Ry. Assn. at St. Louis. Discussion of how to construct and maintain a street railway track, giving special attention to the advantage of having welded joints. Discussion. 4500 w. Elect'n—Dec. 18, 1896.

Cast-Welding on the Calumet, Chicago. Illustrated description of the outfit to be used in cast-welding about 80 miles of track. 1800 w. St Ry Rev—Dec. 15, 1899.

**Cast-Weld vs. Bond.**—Cast-Weld and Surface Contact Bonds. W. E. Harrington. Illustrated account of tests and results. 2000 w. Jour Fr Inst—June, 1900.

**Clark Fisher's.**—Clark Fisher's "Triple Fish" Rail Joint. Illustrated description. 800 w. R R Gaz—Dec. 8, 1899.

**Continuous Rails.**—Continuous Rails in Unpaved Streets. Illustrations of continuous rails laid in unpaved streets, with description of construction and report of wear. 700 w. St Ry Rev—May 15, 1897.

Continuous Rails. Editorial discussion of the relation existing between a rail and a continuous beam or girder, and the advantages to be derived from the adoption of continuous rails. 1800 w. Eng, Lond—July 9, 1897.

Continuous Rails. Richard McCulloch. Illustrates and describes methods which have been used in the United States, with information concerning the kind of rails used. 3200 w. Ry Wld—June 2, 1898.

The Continuous Rail in Street Railway Practice. Richard McCulloch. A paper read before the Engs.' Club, of St. Louis, giving a description of method and apparatus in both electric and cast-welding, with the results of experiments, calculation of strains and comparison of methods. Examples of both these methods are in actual operation, furnishing a good ground line electric conductor, and costing little more than fishplate joints. 6000 w. Jour Assn of Engng Soc—Oct., 1895.

The Problem of the Continuous Rail. Ward Raymond. Suggests the best time for welding; the various types of welds are described and the practice approved. 3300 w. St Ry Jour—Feb., 1897.

Welded Rails (Les Rails Soudés). Ch. E. Guillaume. An investigation of the effects of expansion and contraction upon continuous lengths of rails with solid welded joints. 2000 w. Moniteur Industriel—Sept. 25, 1897.

See also Cast-Molding.

**Electric Welding.**—See **ELECTRIC WELDING—Rail.**

**Falk.**—The Falk Joint (Joints Falk). An account of the Falk cast-rail joints for electric tramways, as applied in France, with illustrations from photographs of the pouring of the metal. 3000 w. 1 plate. La Rev Tech—Jan. 10, 1899.

**Fastenings.**—Some Notes on Rail Joint Fastenings. F. C. Schmits. Outlines the history of the angle-bar joint, and a discussion of its constructive features. Ill. Serial. R R Gaz—July 27, 1900.

See also **RAIL FASTENING.**

**French vs. Austrian.**—The Joints of Rails (Les Joints des Rails). A comparison between French and Austrian practice. 3500 w. La Rev Tech—April 10, 1897.

**100-Per Cent.**—A 100-Per Cent. Rail Joint. M. W. Thomson. Brief discussion of the theory of the joint and splice, and illustrated description of an improved device. 500 w. R R Gaz—Oct. 9, 1896.

**Impact.**—Influence of Impact Upon Rails (Zur Schienenstossfrage). An investigation by Engineer Trautweiler, of Strasburg, upon the "hammer blow" action and pound upon rail joints. 5000 w. Schweizer Bauzeit—Jan. 23, 1897.

**Opposite.**—A Résumé of the Opposite Joint Discussion. James A. Emery. Suggesting a compromise by very slightly breaking joints. 800 w. St Ry Jour—May, 1896.

**Splice Bar.**—See also **RAIL—Illinois Central Ry.; N. Y. Central.**

**Street.**—Rail Joints, Particularly Those on Street Railways (Der Schienenstoss Insbesondere bei Strassenbahnen). Phil. Fischer. An account of improvements in rail joints, with many illustrations showing sections of rails made by the Phoenix Company, of Laar. 1300 w. Mitt d Ver f d Förderung d Local u Strassenbahnwesens—May, 1900.

The Wear of Rails and the Value of Welded Joints (Schienenverschleiss und die Oekonomische Bedeutung des Verschweissten Schienenstosses bei Strassenbahnen). K. Beyer. Discussing the wear of tramway rails, with especial reference to the impact on rail-ends at joints. 2000 w. Schweizer Bauzeit—Aug. 18, 1900.

See also **TRACK—Electric Railway; Street.**

**Testing Drop.**—Testing Drop Around Rail Joints. Franklin Sheble. The object is chiefly to urge the importance of such tests and the remedying of defects indicated thereby. 1100 w. St Ry Rev—June 15, 1896.

**Tie Plate.**—See **TRACK.**

**Triple Fish.**—See Clark Fisher's.

**Weakest Point.**—The Weakest Point in Rail Joints. John King. Explains the writer's ideas of rail joints and fastenings. He considers the strength of the two inner bolts in the splice bar and the nearness of these bolts to the rail ends are the most important points. 700 w. R R Gaz—Jan. 20, 1899.

**Welded.**—Welded Rail Joints. Editorial review of recent improvements in rail joints. 1000 w. Sci Am—Jan. 16, 1897.

See also Cast-Weld; Continuous Rail; **ALUMINO-THERMY; ELECTRIC WELDING.**

## RAIL MANUFACTURE.

See **RAIL; ROLLING MILL; STEEL MANUFACTURE; STEEL WORKS.**

**RAILROAD.**

See **RAILWAY.**

**RAIL STEEL.**

See **RAIL—Steel; STEEL—Rail.**

**RAILWAY.**

See also **RAILWAY CONSTRUCTION; RAILWAY PROJECT; RAILWAY STATISTICS.**

**Africa.**—Railways of Africa. Map showing the extent of railway development, and a statement of the feeling in France concerning the demand for more rapid building of railways. 350 w. U S Cons Repts, No. 600—Dec. 11, 1899.

The Railways of Africa (Die Afrikanischen Eisenbahnen). With map, showing the existing roads and proposed constructions. 1500 w. Stahl und Eisen—Sept. 1, 1898.

The Railways of Africa (Die Eisenbahnen in Afrika). H. Claus. An excellent review of existing and proposed railways, classified according to political conditions, accompanied by a very good map. 3500 w. Glaser's Annalen—Jan. 15, 1900.

The Railways of Africa. Gives a map showing the principal lines completed, under construction and projected, with particulars. 3500 w. Eng News—Sept. 28, 1899.

The Railways of Africa. H. L. Geissel. Describes the railways constructed and under construction, giving information relating to them. 4000 w. Ry Age—April 6, 1900.

The Railways of Equatorial Africa. Names the most important systems constructed, in course of construction, or projected in the African continent, and gives interesting information relating to them. 3000 w. Bd of Trd Jour—Aug., 1897.

The Railways of Equatorial Africa. Particulars about railway building in the Soudan, and information of other railways existing and projected. 3800 w. Trans—Sept. 17, 1897.

See also **Cape Colony; Congo; Delagoa Bay-Pretoria; Egypt; Lagos; Oriental; Rhodesia; Russia and South Africa; Senegal-Niger; Sierra Leone; South Africa; Tunis; Uganda; RAILWAY CONSTRUCTION; RAILWAY PROJECT.**

**Alaska.**—Railroad Building in Alaska. An illustrated account of the difficulties encountered. The present year will close with about 35 miles of road constructed. 1500 w. Ry Age—Nov. 11, 1898.

Railway Construction in Alaska. Particulars relating to this work with views and map. 1500 w. Ry & Engng Rev—Aug. 27, 1898.

See also **White Pass & Yukon.**

**Algeria.**—See **RIVER REGULATION.**

**American.**—American Railroads. George H. Daniels. An interesting discussion of their relation to commercial, industrial and agricultural interests. 5000 w. St. Louis Ry Club—Aug. 10, 1900.

American Railroads. George H. Daniels. Address before the International Commercial Congress, at Philadelphia. Discussing their relation to commercial, industrial, and agricultural interests. Serial. Sci Am Sup—Nov. 18, 1899.

An English View of Our Railways. W. M. Acworth. Gives impressions of a recent visit. 3300 w. Ry Age—Feb. 25, 1898.

The Great Railway Systems—Present Rank by Mileage. Gives a tabulated list of all railway companies in the United States and Canada, which control over 2000 miles of lines, with related information. 1100 w. Ry Age—Aug. 3, 1900.

See also **United States.**

**American Transcontinental.**—American Transcontinental Lines. James Douglas. A sketch of the history, geography and topography of these railways. 15300 w. Trans Am Inst of Min Engs—Sept., 1899.

The Pacific Railroads. Reviews the construction of the five roads extending to the Pacific, the competition, and the causes that have made their operation difficult. 1700 w. Engng—Nov. 5, 1897.

**American Transcontinental Profiles.**—Profiles of Transcontinental Railways. Double-page engravings showing the comparative features of the several lines reaching the Pacific coast, with tables and description. 2200 w. Eng News—June 10, 1897.

**American vs. English.**—English and American Railways. A discussion of the American side. The present article considers rates and earning capacity, first cost, operating expenses, etc. Serial. Engr, Lond—Dec. 1, 1899.

**American vs. European.**—European vs. American Railways. A comparison of advantages as shown in the report of Consul Monaghan, of Chemnitz. 700 w. Bradstreet's—Feb. 27, 1897.

Railways in America (Les Chemins de Fer en Amerique). P. Pasquier. A comparison, mainly as regards speed, between American and European railways. 6000 w. Rev Universelle des Mines—June, 1898.

**Andes.**—See **Chile; Peru.**

**Argentina.**—See **South America.**

**Arlberg.**—The Operation of the Arlberg Railway (Die Betriebs-Ergebnisse der Arlbergbahn). Alfred Berg. A discussion of the expenses of construction and operation of this famous tunnel and road up to the end of 1895. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 18, 1896.

**Asia.**—The Railways of Asia (Les Chemins de Fer de l'Asie). A general description of the present railway systems of Asia, and a discussion of lines projected and under construction. 3500 w. 1 plate. Rev Gen de Chem de Fer—July, 1899.

See also **Baluchistan; Burma; China; India; Manchuria; Oriental; Siam; Siberia; Syria; Transcaspian; RAILWAY PROJECT.**

**Asia Minor.**—Railway Construction in Asia Minor. A review of the present status, with explanatory comment on the rise of continental and decline of British interest and influence. 1300 w. Trans—May 29, 1896.

**Asiatic Turkey.**—Railways in Asiatic Turkey. Reviews the present construction and future possibilities. The situation is described as peculiarly Turkish, and not very encouraging to European capital. 2300 w. Eng, Lond—June 5, 1896.

Construction Work on the Assam-Bengal Railway. Francis Robert Johnson. Remarks referring to the section from Chittagong to Badarpur, the difficulties of construction being mentioned, but principally descriptive of the bridge work. Serial. Eng, Lond—June 11, 1897.

**Astrakhan.**—The New Railway to Astrakhan. Advantages presented with reasons for the necessity of the line. Two routes discussed. 900 w. Bd of Trd Jour—Dec., 1895.

**Atchison, Topeka & Santa Fé Celebration.**—Twenty-five Years of Progress. An illustrated account of the celebration of the Atchison, Topeka & Santa Fé's quarter century of active life, with addresses by E. P. Ripley and Aldace F. Walker. Ill. 2800 w. Ry Age—Oct. 8, 1897.

**Australia.**—Government Ownership of Railways in Australia. Extract from the Seattle "Post-Intelligencer." Information given by a citizen of Sydney, N. S. W., very unfavorable to government operation. 1400 w. Ry & Engng Rev—July 1, 1899.

Railways in Western Australia. Notes the difficulties met and the wisdom of the policy adopted, giving information concerning these railways. 1200 w. Engng—Feb. 17, 1899.

See also **New South Wales; Queensland.**

**Austria.**—Notes on the Austrian Railroads. John R. Slack. About half the roads are owned by the state and the tendency is toward the acquisition of the remaining roads. Illustrated description of standard type of locomotive. 1000 w. R R Gaz—April 9, 1897.

**Austria and Italy.**—Notes on Austrian and Italian Railways. The first paper contains detailed reports of single English and French runs, and general observations on fares, equipment and station accommodations in Austria. Passing mention is made of the steepest adhesion railway in Europe—that to the summit of the Uetliberg. 1200 w. Ry Wld—April, 1896.

**Austria-Hungary.**—The Causes and Effects of the Unequal Development of the Railways in Germany and Austria-Hungary (Ursachen und Wirkungen der Ungleichartigen Entwicklung des Eisenbahnwesens in Deutschland und in den Ländern der Oesterr.-Ungar. Monarchie). Carl Büchelen. A general historical review, and discussion of the present situation, with map and tables. 1 plate. 10000 w. Zeitschr d Oest Ing u Arch Ver—June 29, 1900.

**Aviemore, Scotland.**—The Aviemore Railway. Description of the constructional and scenic features of the line, which has been under construction for seven years and is just about to be opened for traffic. 1600 w. Arch, Lond—Sept. 2, 1898.

**Azores.**—See **NARROW-GAUGE RAILWAY.**

**Baluchistan.**—A Remarkable Indian Railway. Interesting account of the Mushkaf-Bolan Railway in Baluchistan. 2700 w. Trans—Oct. 8, 1897.

The Mushkaf-Bolan Railway, Baluchistan, India. James Ramsay. Describes the Bolan Pass and the railway projects of this region. Serial. Ind & East Eng—Aug. 14, 1897.

**Bodmin and Wadebridge, Eng.**—The Old Bodmin and Wadebridge Railway. An article of historic interest, giving views of a number of old cars. 1400 w. Ry Wld—Feb., 1896.

**Bosnia and Herzegovina.**—See **TRANSPORTATION.**

**Boston & Maine.**—The Genesis and Progress of a Great Railroad System—The Boston & Maine. The history of the route from the first stage route in colonial times to the present system. It is of considerable general interest. Serial. Ry Rev—Jan. 11, 1896.

**Brazil.**—Brazil Railways and Shipping. Contains data of lines operated, under construction, and projected, and of the unprofitable operation of existing railways. 500 w. Trans—July 17, 1896.

Railways in Brazil. Information collected from various sources concerning the history, operation, rates, regulations, etc., of the lines. 13800 w. U S Cons Repts, No. 758—June 18, 1900.

The Leasing of the Brazil State Railways. Statement of the wretched management of the government railways, and the decision to invite tenders from capitalists for the privilege of working them. 900 w. Trans—Feb. 12, 1897.

The Railways of Brazil. Information relating to mileage, gauge, equipment, etc. 3300 w. U S Cons Repts—Feb. 14, 1898.

**Brazilian Central.**—Central Railway of Brazil. Lewis Gleason. A lengthy description of the location, organization, operation, equipment, etc., of a very interesting road. 5500 w. Loc Engng—March, 1896.

**Bristol Harbor, Eng.**—New Harbor Railway at Bristol. Nature and extent of the proposed undertaking, with map. 1000 w. Trans—Nov. 27, 1896.

**British.**—British Railway Enterprise. Part first gives an idea of British railway management and construction, with illustrations of equipment. Serial. Can Eng—May, 1897.

British Railroad Matters. W. M. Acworth. Treats briefly of light railroads, railroad clubs, and of a new through service between London and Paris. 1200 w. R R Gaz—March 12, 1897.

Lancashire, Derbyshire and East Coast Railway, and the Sheffield District Railway. Illustrated description. 1300 w. Eng, Lond—Nov. 27, 1896.

Notes on English Railroads. J. W. Thomas, Jr. Permanent way, carriages, wagons, locomotives, signals, etc., are described as they are applied in England. The article is both interesting and detailed. 3000 w. R R Gaz—Dec. 20, 1895.

Opening of New Lines. An account of the opening of the Great Northern's Leen Valley extension, and the Lambourn Valley railway. 2200 w. Transport—April 8, 1898.

Presidential Address to the Institution of Mechanical Engineers. Samuel Waite Johnson. A review of British railway progress, with special reference to the Midland Railway. Serial. Engng—May 13, 1898.

Railroad Matters in England. W. M. Acworth. London letter: the topics are accidents, punctuality, competition and London and Paris traffic. 1400 w. R R Gaz—May 15, 1896.

Some Railroad Matters in England. W. M. Acworth. Communication on light railways, rates on farm products, and other items of interest. 2300 w. R R Gaz—Feb. 7, 1896.

Some Railroad Matters in England. A summary by Mr. W. M. Acworth, of recent railroad matters in England, covering legislation with regard to light railroads, some long and fast runs and improvements in passenger rolling stock, together with other matters. 2500 w. R R Gaz—March 13, 1896.

**Burma.**—The Development of Railways in Burma. An account of the methods of working, which owing to the inferior qualities of labor, are altogether different from the usual practice. The construction and progress are also considered. 2800 w. Engng—June 3, 1898.

The Mandalay-Kunlon Railway. E. Wynan Wagstaff. Deals with a portion of the line from the valley of the Irrawaddy to that of the Salween now in process of construction. Map. 1400 w. Ind Engng—April 8, 1899.

See also **VIADUCT—Gokteik.**

**Canada.**—Canadian Railroad Building, Recent and Prospective. Detailed account of work in Manitoba, British Columbia, and extensions and improvements in general. 1800 w. R R Gaz—March 31, 1899.

The Development of the Railways of Canada. Walter E. Weyl. A critical discussion of the development, operation and present condition of the railways of the Dominion, with reference to the advantages and detriments of government assistance. 3500 w. Eng Mag—June, 1898.

**Canadian Pacific.**—The Canadian Pacific Railway, from Laggan to Revelstoke, British Columbia. William S. Vaux, Jr. Briefly reviews the history of the transcontinental line of the Canadian Pacific Ry., and calls special attention to interesting features in the section named. Map and illustrations. 4200 w. Pro of Engs' Club of Phila—May, 1900.

The Reconstruction of the Canadian Pacific Railway. Brief history of the enterprise and illustrated description of difficult and interesting details of the work. Serial. Engng—Nov. 22, 1895.

The Canadian Pacific Railway as Seen by an Engineer. Thomas C. Clarke. A description of the organization, capitalization, operation, and points of engineering interest of the road. Twenty thousand men are employed and there is always a surplus in the treasury. 2500 w. Eng News—Nov. 28, 1895.

**Canadian Pacific Extension.**—The Crows Nest Pass Extension of the Canadian Pacific Ry. An account of a line being built to open communication between the mineral regions of British Columbia and the Canadian Pacific system. Map. 1300 w. Eng News—March 10, 1898.

**Cape Colony.**—Cape Railways. A review of the year ending Dec. 31, 1898, as given in the annual report. 700 w. Engr, Lond—Aug. 25, 1899.

Cape Railways. A report of the results which, in spite of the difficult conditions, show a surprising degree of prosperity. 1000 w. Engr, Lond—Sept. 17, 1897.

The Railways of Cape Colony. A very favorable report of earnings, with account of improvements to be carried out. 1800 w. Trans—June 4, 1897.

**Cape Colony and Natal.**—The Railways of Cape Colony and Natal. A brief descriptive and financial review for 1895. 1400 w. Trans—May 29, 1896.

**Carbondale and Honesdale.**—Abandonment of the Carbondale and Honesdale Gravity Railroad. Gives briefly the history of this road, one of the oldest in the world. Ill. 1500 w. R R Gaz—Nov. 18, 1898.

**Central America.**—Activity in Railroad Building in Central America. A brief statement of work completed and in progress, and of the improvement in communication which will result. Map. 700 w. Ir Age—Oct. 1, 1896.

**Central Asia.**—See **Astrakhan; Siberia; Transcaspian.**

**Centrifugal.**—See **CENTRIFUGAL RAILWAY.**

**Ceylon.**—Ceylon Railway Extensions. Comments upon the severe engineering difficulties often met in India, and briefly summarizes the climatic and topographic obstacles encountered in certain cases. Ind Engng—Aug. 13, 1898.

Great Northern Railway of Ceylon. Editorial review of what has been done so far and the various schemes for the future. 1400 w. Ind & East Eng—Dec. 5, 1896.

The Railways of Ceylon: The Broad and Narrow-Gauge Problem. An interesting illustrated account of these railways, which are very picturesque, with explanation of the slow progress made in railway building. 3000 w. Engr, Lond—Aug. 19, 1898.

**Chicago.**—Chicago's Railways. The number of roads entering the world's greatest railway center. A correction of the commonly quoted figures and a graphic diagram enumerating the existing lines. 800 w. Ry Age—April 25, 1896.

**Chicago and Eastern Illinois.**—Construction of the Mississippi River Extension of the Chicago & Eastern Illinois R. R. Illustrated description of this work, its viaducts, etc. The distance is 62 miles. 1500 w. Eng News—April 12, 1900.

**Chile.**—The Taltal Railway (Die Taltalbahn). Deodoro Moegle. An account of this Chilean railway, extending from Taltal on the coast, to Cachinal, at an elevation of over 9000 feet in the Andes. The road affords an outlet for saltpetre, as well as gold, silver, and copper to the coast. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 26, 1898.

**Chile, Nitrate.**—Automatic Inclines and Railway, Junin, Chile. Josiah Harding. Communicated to the British Inst. of Civ. Engs. Describes a railway constructed to connect the nitrate beds, which are generally about 1000 meters above the sea-level, with the coast. 2400 w. Col Guard—Aug. 19, 1898.

**China.**—China and Her Railways. Perry F. Nursey. Information relating to past commercial enterprises, and the cause of their failure, with account of the efforts to introduce railways. 2300 w. Ind & Ir—Nov. 5, 1897.

Chinese Railroad Development, Past, Present, and Future. Charles Denby and E. P. Allen. This interesting paper reviews the railway situation in China and gives the grounds for the popular objections to railway building in that country. Routes are described and the problem of conflicting claims by European nations discussed. It concludes with a review of present Chinese politics and describes the vast market for engineering products in the Orient. 4500 w. Eng Mag—Dec., 1898.

Chinese Railways and British Trade. Description of the history, present construction, operation, cost, engineering features, and projected extensions, with some notes of prevailing foreign influences. 1000 w. Ir & Coal Trds Rev—July 3, 1896.

From the Imperial Railway of China. Letter from C. W. Kinder, chief engineer of the Imperial Chinese Railway at Tientsin, China. Also specifications for passenger and freight engines as sent out by the locomotive superintendent for bids. 2000 w. Loc Engng—Nov., 1896.

Imperial Chinese Railways. J. Grant Birch. A report of recent progress, and related matters. 3500 w. Engng—Oct. 20, 1899.

Notes from China. Photographs, with information furnished by Mr. Grant Birch, of the firm of Messrs. John Birch & Co., Limited, London, showing the quite respectable amount of railway work in China, and giving interesting facts relating to the different lines. 2700 w. Engng—May 13, 1898.

Notes from Newchwang. J. Grant Birch. Deals with the Eastern Chinese railway and other engineering works. Ill. 2500 w. Engng—Sept. 15, 1899.

Railroad Enterprise in China. A letter to the editor from Shanghai, supplemented by information gleaned from other sources, concerning the present status of railroad building in China. 1600 w. R R Gaz—March 20, 1896.

Railways in China (Eisenbahnen in China). A general review of the progress of railway construction in China since 1875, with map. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 28, 1898.

Railways in China. Editorial on the recent developments and importance of the railway question in China, calling attention to the present position of the British Government. 1800 w. Engng—Aug. 26, 1898.

The Actual Railway Situation and the Alleged Opportunities for American Engineers in China. Andrei Kmita. A full explanation of the situation. Conditions not promising for Americans. 2400 w. Eng News—Aug. 5, 1897.

The Northern Railways of China (Die Nördlichen Chinesischen Staatsbahnen). With illustrations of bridges, tunnels, and rolling stock of the Tientsin-Peking railway, and the Kaiping coal mines and coke ovens. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 25, 1898.

The Position of Railway Development in China. Review of lines existing and projected, with map. 1200 w. Ir & Coal Trds Rev—May 13, 1898.

The Present Status of Railway Development in China. Abstract of article by M. G. Bouillard in "Revue Génerale des Chemins de Fer." Facts of interest concerning the constructed and projected railways. Map. 1800 w. Eng News—July 5, 1900.

The Railroad from Tientsin to Shan-Hai-Kuan. History of the beginning and progress of railroading in China, and of the road named in particular. 2700 w. U S Cons Repts—Jan., 1896.

The Railways of China, Existing and Prospective. Andrei Kmita. Reviews the work already completed, and gives information concerning prospective railways. Map. 2300 w. Am Eng & R R Jour—Map, 1898.

The Railways of China. Information concerning the lines opened or being built, the style of rail used, and the equipment, with remarks on projected railways. 4000 w. Ir & Coal Trds Rev—July 13, 1900.

The Shanghai-Wusung Railway (Die Shanghai-Wusung Bahn). A brief account of this recently completed railway in China, with details of cost and views of the terminal stations. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 30, 1898.

See also **Siberia; CHINA; RAILWAY PROJECT.**

**Chinese Eastern.**—The Chinese Eastern Railroad. M. Sergey Friede. An interesting account of the rapid growth of towns and cities along this route, the richness of Manchuria, the scope of the Siberian railroad, and the vastness of the enterprise. Ill. 2500 w. R R Gaz—Sept. 30, 1898.

The Eastern Railway of China (Le Chemin de Fer de l'Est de la Chine). Discussing the Chinese railway in connection with the Siberian system and the gold deposits in Manchuria, with topographical map of existing and proposed lines. 3500 w. Génie Civil—Sept. 11, 1897.

See also **Manchuria; Siberia.**

**Civilizing Influence.**—"Railroads—the World's Greatest Benefactors." W. S. Glover. On the civilizing and educating influence of railroads. 3300 w. Ry Mag—Aug., 1897.

See also **National Development.**

**Cleveland, Cin., Chic. & St. Louis.**—Relics of the Big Four Railway. Historical notes on some early construction equipment, and the popular conception of railway undertakings sixty years since. 1700 w. Ry Rev—Aug. 15, 1896.

**Colombia.**—An American Railway in Colombia. Francis R. Hart. Gives a brief outline of the history of Colombia and the physical characteristics of the country and describes the terminal works, railway, and line of steamboats owned and managed by an American corporation. Ill. 4300 w. Tech Quar—June, 1899.

See **LIGHT RAILWAY—Colombia; MANGANESE—Colombia.**

**Colorado.**—Notes on Colorado Railways. Gives interesting profiles, sketch map and illustrations, with particulars of various lines. 3500 w. Eng News—April 6, 1899.

**Combined Electric and Steam.**—See **ELECTRIC RAILWAY—Combined Operation.**

**Congo.**—The Congo Railroad. From "L'Illustration." Particulars concerning this railway, its route, construction and great importance. 2500 w. Sci Am Sup—Sept. 24, 1898.

The Congo Railway. Editorial, describing the geographical character of the country, the difficulties met in surveying the road, some peculiarities of the construction, etc. 2000 w. Engng—Oct. 28, 1898.

The Congo Railway. An interesting illustrated account of the construction and the difficulties encountered. Also describes the equipment, service, and related matters. 2500 w. Engr, Lond—July 29, 1898.

**Corea.**—The First Railway in Korea. Interesting particulars of the railway being built by the Seoul & Chemulpo Ry Co. 600 w. Eng News—Sept. 1, 1898.

**Cripple Creek, Colo.**—The Railways of the Cripple Creek, Colo., Mining District. W. P. Hardesty. Gives brief description of the various railways, both steam and electric, as well as views of various portions, and a topographical map of the region. 2000 w. Eng News—Sept. 8, 1898.

**Croydon-Redhill, Eng.**—The Croydon and Redhill New Line. An account of the new section which will enable the London, Brighton, and South Coast Railway Co. to run entirely over its own lines, instead of using the six miles of the Southeastern Railway. 1200 w. Engr, Lond—Jan. 28, 1898.

**Cuba.**—The Railroads of Cuba. A sketch map with information from various sources. 900 w. R R Gaz—July 8, 1898.

See also **MINERAL REGION.**

**Dalmuir and Clydebank.**—The Dalmuir and Clydebank Railway. Descriptive of construction of a short railroad presenting peculiar difficulties in the crossing of a canal and of other roads. 1800 w. Eng, Lond—June 5, 1896.

**Davos, Switzerland.**—The Highest Adhesive Railroad in Europe. Simon Linden. Describes and illustrates the Davos-Landquart-Thusis Railroad, which runs through a very mountainous part of eastern Switzerland. 600 w. Loc Engng—Oct., 1897.

**Delagoa Bay-Pretoria.**—Delagoa Bay-Pretoria Railway. Map and section, with a few particulars. 500 w. Ind Engng—Oct. 10, 1896.

**Derbyshire Coal Fields.**—The New Railway to the Derbyshire Coal Fields. A few of the principal features of the project and a description of the work. 4800 w. Trans—Nov. 20, 1896.

**Dumbartonshire.**—Railway Extension in Dumbartonshire. Illustrated description of interesting construction work. 2400 w. Engng—Aug. 27, 1897.

**Ealing and South Harrow.**—The Ealing and South Harrow Railway. A brief account of a new line to be constructed in England. 900 w. Engr, Lond—Nov. 18, 1898.

**East Africa.**—See **RAILWAY PROJECT.**

**East Coast, England.**—The Lancashire, Derbyshire & East Coast Railway. Illustrated description of a line in Great Britain, especially interesting on account of the character of the country traversed and difficulties surmounted. Serial. Engng—Dec. 15, 1899.

The Lancashire, Derbyshire & East Coast Railway. Illustrated description of the line and some of the constructive works, with information concerning the road. 2200 w. Eng, Lond—March 12, 1897.

**Economies.**—Recent Railway Economies. E. E. Woodman. Lecture before the Soc. of Engs. Calls attention to the extensive application of Bessemer metal to the improvement of railways, and the economies in consequence, increase of capacity of cars, growth of engines, etc. 6400 w. Engs' Year Book, Univ of Minn—1897.

**Education.**—See **EDUCATION—Railway; MECHANICAL ENGINEERING—Railway; RAILWAY EMPLOYEE; RAILWAY ENGINEERING; RAILWAY SCHOOL.**

**Egypt.**—Railway Development in Egypt. Information from the report of Lord Cromer, relating to railway extension. 1700 w. Trans—Feb. 26, 1897.

See also **Soudan.**

**Electric.**—See **ELECTRIC RAILWAY; ELECTRIC TRAMWAY; PORTABLE RAILWAY.**

**Electric vs. Steam.**—See **ELECTRIC RAILWAY; ELEVATED RAILWAY; LOCOMOTIVE—Motive Power Comparison; RAILWAY MOTIVE POWER.**

**Elevated.**—See **ELEVATED RAILWAY.**

**England.**—See **British.**

**Erie Canal.**—See **CANAL—Erie Railway.**

**Etna.**—The Circum-Etna Railway. Illustrated description of the railway round Mount Etna. 500 w. Eng, Lond—May 28, 1897.

**Europe.**—An American Observer in Europe. E. L. Corthell. Names features of English roads superior to the United States, and compares American and European transportation methods. 1200 w. R R Gaz—Feb. 11, 1898.

**European vs. American.**—See **American vs. European.**

**Feeder Roads.**—A Plea for the Little Roads. C. O. Scranton. Read at the Car Accountants' convention. A review of the disadvantages imposed on small roads in the way of undue operating expenses, and especially of inadequate proportion of revenue and oppressive treatment from through lines. Recommends their encouragement as feeders. 2000 w. Ry Age—July 3, 1896.

The Utility of Secondary Roads (Die Nützlichkeit der Secundärbahnen). A thorough discussion of the commercial value of "feeder," or secondary roads operated in connection with main lines. 10000 w. Mitt d Ver f d Förd d Local u Strassenbahnwesens—Sept., 1897.

**France.**—French Railways and their Work. Charles Rous-Marten. A record of the work done on Le Chemin de Fer du Nord in their express service, with description of the engines and road. Serial. Engr, Lond—July 22, 1898.

See also **FAST TRAIN; LOCOMOTIVE PERFORMANCE.**

**French Northern.**—Northern of France Railway. Information of interest of this most prosperous railway of Europe. 1400 w. Engng—Sept. 10, 1897.

**French Western.**—The New Lines of the Western Railway of France (Les Nouvelles Lignes de la Compagnie des Chemins de Fer de l'Ouest). A description of the new connections made by the obsorption of some local railways by the Western Railway of France together with the new construction work now in hand in and about Paris. 3500 w. Rev Gen des Chemins de Fer—June, 1899.

**German.**—Notes on German Railroads. J. Pearson Pattinson. Some of the salient points of German railroad working, discussing passenger rolling stock, fares, stations and speed. 1800 w. R R Gaz—April 15, 1898.

**Glasgow Central.**—The Glasgow Central Railway. The first part sketches the projected enterprise and its territorial relations, with description of the plans adopted for station building. Sectional plans are given. Serial. Engng—Sept. 11, 1896.

**Government Ownership.**—See **State Ownership.**

**"Gradient."**—See **Halford "Gradient."**

**Great Britain.**—See **British.**

**Great Central, Eng.**—Completing the Great Central Railway. Reviews the work that has been accomplished during the last year in completing the extension opened. 1400 w. Engr, Lond—March 23, 1900.

The Great Central Railway Extension. Abstracts of two papers on this subject, read at meeting of the Brit. Inst. of Civ. Engs. F. W. Bidder's paper referred to the line from Annesley to Rugby. F. Douglas Fox described the line from Rugby to the London terminus. 2200 w. Col Guard—April 6, 1900.

The Great Central Railway from Annesley to Nottingham. An illustrated account of the construction and route, and the buildings, etc. 3300 w. Engr, Lond—Feb. 3, 1899.

The Great Central Railway. A description of this important addition to the English railway system, with map indicating route. Serial. Engng—Feb. 10, 1899.

The Great Central Railway from Leicester to Rugby. Illustrates and describes the Braunstone Gate bridge and other features of the permanent way. 3200 w. Engr, Lond—Sept. 1, 1899.

The New Line in London. W. B. Paley. An account of the first half year's working of the Great Central Ry. which is rather discouraging. 900 w. R R Gaz—March 30, 1900.

**Great Eastern, Eng.**—Notes on the Great Eastern Railway of England. A. M. Bell. Illustrates and describes the equipment, and comments on the excellent feeling between master and men. 1700 w. Loc Engng—Nov., 1899.

**Great Northern, England.**—Great Northern Railway—New Railway at Nottingham. R. F. Bennett. An account of an expensive connecting line of first-class character. Ill. Serial. Engr, Lond—Aug. 17, 1900.

The Great Northern Railway. Illustrates and describes the new branch line and the goods station at Leeds. 1600 w. Engr, Lond—Nov. 24, 1899.

**Great Western, Eng.**—The Progress of the Great Western Railway. An account of the schemes and projects by which a great improvement in the traffic is to be accomplished. 3300 w. Eng, Lond—March 12, 1897.

**Greece.**—Piraeus-Larissa Railway. Gives an account of the work already done, and that remaining. 800 w. U S Cons Repts—April 28, 1898.

See also **STREET RAILWAY.**

**Guatemala.**—The Guatemala Northern Railway. Short historical sketch, with map, profile, brief description of the line and the train service. 500 w. Eng News—July 2, 1896.

**Halford "Gradient."**—The Halford Gradient Railway. Brief illustrated description of a peculiar English railway, the invention of Mr. Halford. 500 w. Eng News—July 5, 1900.

**Heavy Construction and Equipment.**—Wasteful Economy. Editorial discussion as to whether the tendency toward heavier track, more powerful locomotives, and larger cars, has not reached its practical limit. 700 w. Ry Rev—July 31, 1897.

**High Speeds.**—See **FAST TRAIN.**

**History.**—A Half Century of Railway Building.

Gives a comparison by decades, with diagrams. 600 w. Ry Age—Jan. 12, 1900.

Early Railway Construction in the United States. Abstract from "Poor's Manual," reviewing the railway system from its beginning in 1828. 2200 w. Eng News—Nov. 9, 1899.

Railways of the World. A review of the last seventy-two years. 1800 w. Sci Am Sup—May 22, 1897.

Some Railroaders of 1850. Walter S. Phelps. A brief account of early railroading and of the first frog devised for the Milwaukee & Mississippi. 800 w. R R Gaz—March 24, 1899.

The First Railway Engineer. An account of William Jessop and his work—1745-1814. 2200 w. Engr, Lond—April 27, 1900.

The Story of the Railway. The First Tracks. Early Locomotives. First of a series of articles to describe and illustrate the development of the railway. Serial. Ry Mag—April, 1897.

Twenty Years of Railways. Horace R. Hobart. A review of the last two decades, with statistical tables and graphic charts of construction, mileage, financial condition, etc., with editorial. 6200 w. Ry Age—June 13, 1896.

See also **Models; Ohio Pioneer;** and under names of railways; **LOCOMOTIVE; RAIL**—Old Edge; **RAILWAY GRADE—Madison Hill, Indiana.**

**Illinois.**—The Railways of Illinois. Dwight C. Morgan. Diagrams showing in a graphical manner the railroad conditions of Illinois for the past 25 years, with explanatory remarks. 2000 w. Ry Age—June 4, 1897.

**Illinois Central.**—Illinois Central Railroad. Historical and descriptive account of the road and its territorial relations. 5800 w. Mfrs' Rec—July 17, 1896.

**India.**—Administration Report on the Railways in India. A review of the government report, with explanation and critical comment. Serial. Ind Engng—July 4, 1896.

The Doubling of the Northwestern Railway of India, between Karachi and Kotri. Explains reasons for this change by the increase of traffic, and also the construction of a line including a bridge, advocated by reason of the liability of the road to inundation. Serial. Ind & East Engr—May, 1898.

The Railways of India. Information from the Administration Report for the year ending March 31, 1899. 3000 w. Ind & East Engr—July, 1899.

Indian Railway Property. Reviews the conditions of these railways, and the effect of the famine. 1500 w. Engng—June 25, 1897.

Indian Railways. Comments on the influence of disasters that have visited the country, and information on the last report of the Railway Department. 1800 w. Engr, Lond—June 15, 1900.

Indian Railway Extension. On the evidences of recent progress, the new lines opened, their cost, etc. 2000 w. Engr, Lond—May 26, 1899.

Indian Railway Enterprise. Editorial on recent progress and improvement. 1000 w. Engng—Aug. 17, 1900.

Indian Railway Prospects. Notes the new schemes under the several railway systems, with histories of some of the more important. Serial. Ind & East Engr—Jan., 1900.

Railway Travel in India. Allan Forman. An account of travel in this country which indicates very comfortable accommodations; also some reference to interesting sights. 1400 w. Ry Age—March 12, 1897.

Recent Railway Policy in India. Horace Bell. A comprehensive view of the general railway policy, with criticisms and historical account of these railways, with important discussion. 16000 w. Jour Soc of Arts—April 29, 1898.

Some Features of Indian Railways. J. W. Parry. Showing many interesting features of railway operation and construction in India, and the conditions which have led to commercial success. 4000 w. Eng Mag—July, 1898.

The Railways of India. A review of mileage, traffic and earnings, which last are said to be very satisfactory. 1100 w. Trans—July 24, 1896.

The Railways of India. A review of the finances of the India roads; their earnings and expenses; and a summary of recent and current construction. 1800 w. Trans—July 31, 1896.

See also **Assam-Bengal; Baluchistan; Ceylon; Nilgiri; Oriental.**

**Indian East Coast.**—The East Coast Railway of India. Describes chiefly the points of importance reached by the line. The chief object is to secure the pilgrim traffic to the shrine of "Jagannath," with map. 1400 w. Ind Engng—May 16, 1896.

**Invergarry and Fort Augustus.**—The Invergarry and Fort Augustus Railway. Description and sketch map of an important new line in Scotland. 1500 w. Transport—June 8, 1900.

The Invergarry and Fort Augustus Railway. Describes the route and construction of this line. Map. 2000 w. Engr, Lond—Nov. 17, 1899.

**Ireland.**—See also **LOCOMOTIVE.**

**Ireland State Ownership.**—Irish Railways and Their Purchase by the State. An argument for government ownership. 3600 w. Ry Wld—May, 1896.

**Iron and Steel Requirements.**—The World's Railways and Iron and Steel Requirements. Part first discusses the railway prospects of Africa, giving maps. Serial. Ir & Coal Trds Rev—June 30, 1899.

**Italy.**—Notes on the Railways in the Valley of the Tiber (Considerazioni Sulla Ferrovia in Valle Tiberina). A review of the railways of central Italy, and the connections necessary to unite them more effectively with the main lines of Italy and Central Europe. 3000 w. Gior d Lav Pubb e d Str Ferrate—Feb. 22, 1899.

Street and Steam Railways in Italy. F. Benedetti. Considers mainly the lines propelled by steam, and discusses their relation to modern life as shown in Italy. 2000 w. Chau—May, 1897.

See also **Austria and Italy.**

**Japan.**—An Era of Railroad Building. A few facts in relation to the present railway system in Japan, with brief forecast of its possibilities. 1100 w. Nat Assn of Mfrs—Circ. No. 11.

A Journey to the Tenth Annual Railway Congress of Japan. Willard C. Tyler. An interesting account of this journey, describing the equipment, customs, and railway management. Serial. Ry & Engng Rev—Nov. 26, 1898.

A Progressive Japanese Railroad. Willard C. Tyler. Some interesting particulars in regard to the Sanyo Railway. 2000 w. Ry & Engng Rev—Jan. 21, 1899.

Japanese Railways. Analysis and discussion of an official report by the British Sec'y. of Legation at Tokio. An impending boom is predicted, and English manufacturers urged to combat growing American influence. 2500 w. Engng—Sept. 18, 1896.

Japanese Railways. A report upon the condition and extent of railway development containing interesting statistics. On March 31, 1894, there were 1938 miles of operating railways and 994 miles projected. 1800 w. Engng—Feb. 21, 1896.

Japanese Railways. Information on important points, obtained from official sources. Map. 1200 w. Engng—Oct. 29, 1897.

Japanese Railways. C. A. W. Pownall. Submitted to the last annual meeting of the Am. Roadmasters' Assn., at Niagara Falls. An interesting description, with special reference to roadway and track construction. 3700 w. Ry Age—Dec. 11, 1896.

Japanese Railways. C. Kadono. Read before the Japan Society in London. The history, present state and future prospects of the railways, with description of the important lines. 2600 w. Engr, Lond—March 3, 1899.

Railway Enterprise in Japan. Extract from the "Japan Times," showing the progress of railway enterprises in Japan during the year 1897. 900 w. Cons Repts—Feb. 17, 1898.

Railways in Japan. Report on the progress of railways, prepared by Mr. Lowther for the Foreign Office. 1800 w. Arch, Lond—July 23, 1897.

Railways in Japan. An account of the railway development, the supervision by the Government, the individual lines and general results. Map. 2500 w. Engng—April 14, 1899.

Railways in Japan. A résumé of the last annual report of the imperial Japanese railway bureau. 900 w. Cons Repts, No. 593—Dec. 2, 1899.

The Nippon Railroad of Japan. R. Unno, traffic manager, Nippon Railroad, in "N. Y.

Railroad Men." Gives general account of the road and contrasts present and recent conditions in Japan. 800 w. Ry Rev—Aug. 8, 1896.

The Railways of Hokkaido, Japan. S. Tanabe. Brief account of the extent, population, etc., of the island, with a short physical description of the new lines constructed and surveyed. Ill. 800 w. Eng News—Feb. 23, 1899.

The Railways of Japan. An excellent review of the history, present status, and the conditions affecting development, topographical, geographical, meteorological, seismic and political. Comment is made upon the growth of American influence, and English manufacturers urged to increase their representation. 3000 w. Trans—April 24, 1896.

**Java.**—The Railway System of the Island of Java. A. Suethlage. Historical account, with particulars. 700 w. Ry Rev—Dec. 26, 1896.

**Kansas City, Pittsburg and Gulf.**—The Kansas City, Pittsburg and Gulf R. R. Gives the history of the road, location, track, bridges, shops and yards, equipment, terminal, etc. Ill. 5000 w. Eng News—Feb. 17, 1898.

A New North and South Line. The K. C. P. & G. Route from the Grain Fields to the Gulf. Account and map of an important undertaking, predicted to be the inception of a new trunk line. 800 w. Ry Age—May 16, 1896.

**Korea.**—See **Corea.**

**Laboratory.**—See **LABORATORY—Railway.**

**Lagos, Africa.**—Lagos. Interesting information of this British colony of West Africa, and of the railway in process of construction. Ill. 8700 w. Engr, Lond—Feb. 25, 1898.

**Lanarkshire and Ayrshire.**—The Lanarkshire and Ayrshire Railway Extension. Abridged from the "Glasgow Evening Citizen." Describes a new extension to expedite mineral traffic. 1500 w. Transport—Aug. 3, 1900.

**Lanarkshire and Dumbartonshire.**—Lanarkshire and Dumbartonshire Railway. Illustrated description of the new railway connecting the iron and coal district of Mid-Lanarkshire with the numerous shipbuilding and engineering works of the Clyde. Serial. Engng—May 7, 1897.

The Lanarkshire and Dumbartonshire Railway. Map and brief description of the line, bridges, etc. 800 w. Eng, Lond—Oct. 9, 1896.

**Lancashire and Yorkshire.**—One of the Busiest Railroads in the World. E. L. Corthell. An account of the Lancashire & Yorkshire Railway. Ill. 2100 w. R R Gaz—Oct. 20, 1899.

**Lebanon Springs, N. Y.**—A Deserted Railway in New York. Concerning the Lebanon Springs railroad, extending from Chatham, N. Y., to Bennington, Vt., which has not been operated since Aug. 7, 1897. 1100 w. Ry Age—April 22, 1898.

**Light.**—See **LIGHT RAILWAY; NARROW GAUGE RAILWAY.**

**Liverpool and Manchester.**—The Liverpool and Manchester Railway. Historical review, with illustrations of original line and equipment. 1500 w. Ry Wld—Sept., 1896.

**London.**—New Railways for London. Map showing the new railways for London in the several stages of progress, with interesting information concerning them. 1800 w. Engr, Lond—Jan. 22, 1897.

**London and North-Western.**—The London and North-Western's New Route to Buxton and Manchester. Describes a trip over the new line, the country through which the line passes, and some of the features. Ill. 1800 w. Transport—Aug. 4, 1899.

**London and North-Western Jubilee.**—Jubilee of the London & North-Western Railway. W. B. Paley. A sketch of the rise and progress of an important English line. 1100 w. R R Gaz—July 17, 1896.

**London-Dock.**—The Regent's Canal, City, and Dock Railway. Describes past and present status and prospects of a London partial "belt road." 800 w. Eng, Lond—Aug. 21, 1896.

**London-Greenwich History.**—The First London Railroad. W. B. Paley. Historical account of the London Greenwich Railway, the opening of which, as far as Deptford, was made 60 years ago. 1200 w. R R Gaz—Dec. 18, 1896.

**London-South Wales.**—From London to South Wales Direct. An account of the new section of railway which will shorten the Great Western route. It is about 33½ miles in length and will cost a million sterling. The ceremony of cutting the first sod is reported. 1700 w. Transport—Dec. 8, 1897.

**Lumber.**—See **NARROW GAUGE RAILWAY—Galicia; POLE RAILWAY.**

**Mallaig, Scotland.**—Mallaig Railway and Harbor. Description and map of a West Highland Railway feeder of scenic and economic importance. 1500 w. Eng, Lond—May 15, 1896.

The Mallaig Railway. An illustrated account of this railway, being constructed in the Scottish Highlands, which, from a scenic and historical point of view, will be almost unrivalled. 3300 w. Engr, Lond—Sept. 16, 1898.

**Manchuria.**—Russian Railway Construction in Manchuria (Die Russischen Eisenbahnbauten in der Mandschurei). F. Theiss. With map and views of construction work at various points along the line. 2500 w. Oesterr Monatschr f d Oeff Baudienst—Sept., 1900.

The Manchurian Extension of the Trans-Siberian Railway. Map with explanation, showing the advantage to Russia of this new location which carries this railway across Manchuria to Vladivostock. 600 w. Eng News—Nov. 11, 1897.

The Manchurian Railway. Editorial comment on the Russian Imperial order declaring Talienwan a free port. 1200 w. Engng—Sept. 1, 1899.

The Projected Railway through Manchuria (Die projectirte Eisenbahn durch die Mandschurei). An account of the proposed diversion of the eastern section of the Trans-Siberian Railway through Chinese territory, with map. 1500 w. Zeitschr d Oesterr Ing u Arch Vereines—March 19, 1897.

See also **China; Siberia; RAILWAY PROJECT.**

**Mexico.**—American Enterprise in Mexico. Comment on the experience of American capitalists who have invested their resources in Mexican railways. 1000 w. Engng—April 16, 1897.

Railroad Construction in Mexico. L. P. Atwood. An account of work given in charge of the writer. 2000 w. Ill Soc of Engs & Surv—1898.

Railway Construction in Mexico. Reports an interview with John P. Ramsey, general manager of the Rio Grande, Sierra Madre & Pacific Railroad. 1500 w. U S Cons Repts, No. 451—June 14, 1899.

The Mexico, Cuernavaca and Pacific Railroad. H. W. Reed. A letter to the editor describing engineering construction, equipment and operation of the highest order. 800 w. R R Gaz—Oct. 7, 1898.

See also **Tehuantepec.**

**Michigan Copper.**—The Copper Range R. R. in the North Michigan Peninsula. Illustrated account of a new railway opening a section of the Michigan copper regions which has not hitherto been worked, owing to lack of transportation facilities. 2700 w. Eng News—May 31, 1900.

**Military.**—Military Railways in War, Their Construction, Working and Defense. J. A. Ferrier. Lecture delivered at the Royal United Service Inst., Simla. Part first is introductory, with reference made to literature on the subject, comparison of camel power, classification, etc. Serial. Ind Engng—Nov. 28, 1896.

The Working of Railways in Military Operations. W. L. Derr. A discussion of the need for greater knowledge and experience in railroading in military operations, commenting on the manner in which the subject has hitherto been neglected by army officials, and suggesting lines upon which it should be developed. 3500 w. Eng Mag—Oct., 1898.

See also **PORTABLE RAILWAY; ROAD.**

**Models.**—Early Models of Railways and Locomotives. An account of models exhibited as far back as 1808. 3700 w. Engr, Lond—Feb. 23, 1900.

**Mont Dore, France.**—The Railway from Laqueuille to Mont-Dore (Le Chemin-de-Fer de Laqueuille au Mont-Dore). G. Leugny. With topographical maps, profile, sections of tunnels, and general details of the railway recently completed in Puy-de-Dôme, France. 2500 w. Revue Technique—Sept. 10, 1899.

**Mont Dore, France Cable.**—See **CABLE RAILWAY.**

**Mountain.**—See **Nilgiri; MOUNTAIN RAILWAY; RACK RAILWAY.**

**Mushkaf-Bolan.**—See **Baluchistan.**

**Narrow-Gauge.**—See **LIGHT RAILWAY; NARROW-GAUGE RAILWAY.**

**Natal.**—See **Cape Colony and Natal.**

**National Development.**—The Development of Nations by Railways (Länder, Völker, und Eisenbahnen). H. Von Mühlenfels. A study of the influence of railways upon national development, a paper presented before the Railway Society at Berlin. Two articles. 6000 w. Glaser's Annalen—Aug. 15, Sept. 1, 1900.

See also **Civilizing Influence.**

**Newfoundland.**—Newfoundland's Railway Completed. An account of the accomplishment of an undertaking which unites all of England's possessions in this quarter of the globe. 900 w. Sci Am Sup—July 23, 1898.

**New Mexico.**—Where Grades and Curves Prevail. Description and views of an extension recently made to the Alamogordo and Sacramento Railway. 600 w. Ry Age—March 16, 1900.

**New South Wales.**—Line Improvements on the New South Wales Government Railways. Illustrated particulars concerning improvements in permanent way and structures during the period of government ownership. 1800 w. Ry & Engng Rev—Dec. 9, 1899.

Railways in New South Wales. Information taken from the annual Blue Book, compiled by T. A. Coghlan, the government statistician of the colony. The growth and progress of the railways, which are largely under state control, with receipts. 1200 w. Transport—April 22, 1898.

The Railways of New South Wales. Extracts from a recently published review giving information of the progress during the last ten years. Ill. 1000 w. Ry Age—Nov. 24, 1899.

See also **Australia.**

**New South Wales Government.**—New South Wales Government Railways and Tramways. An exhaustive article embracing maintenance of way, construction, rolling stock, traffic department, safety appliances, etc. Illustrations of locomotives and cars are given. Ill. Serial. Eng, Lond—Nov. 8, 1895.

**New York Suburban.**—See **RAILWAY TRANSPORTATION.**

**New York, West Street.**—See **RAILWAY TERMINAL.**

**New Zealand.**—New Zealand Railway. Information from the report of A. J. Cadman, the Present Minister for Railways, showing a most satisfactory year's working. 1200 w. Transport—Sept. 16, 1898.

Railway Construction in New Zealand. The standard specification used for co-operative contracts in government railways. 2000 w. Arch Lond—April 16, 1897.

New Zealand Railways. Editorial criticism on the management of these state railways. 1200 w. Engng—Sept. 16, 1898.

**Nicaragua.**—Silico Lake Railway, and the Greytown Breakwater of the Nicaragua Canal Co. Illustrated descriptions furnishing facts of interest bearing on the construction of the Nicaragua Canal. 450 w. Eng News—May 17, 1900.

The Masaya-Diriamba Railway of Nicaragua. Illustrated description of a recently constructed branch railway from Masaya to Diriamba, which opens one of the most picturesque parts of this country. 1200 w. Eng News—Aug. 10, 1899.

**Nilgiri, India.**—The Nilgiri Mountain Railway. An illustrated account of this Indian railway and its equipment. 1100 w. Engr, Lond—March 31, 1899.

Nilgiri Railway. Part first discusses gradients and curves, stations, tunnels, ballast, brakes, etc. Serial. Ind Engng—Nov. 12, 1898.

The Nilgiri Railway. Benson P. Wall. Interesting particulars of a recently constructed mountain railway of India. 2800 w. Ind & East Eng—April, 1898.

See also **RACK RAILWAY.**

**North Wales and Liverpool.**—The North Wales and Liverpool Railway. An important link in the Welsh Railway system and a notable drawbridge. 2700 w. Trans—April 3, 1896.

**Norway.**—See **Sweden-Norway; Scandinavia.**

**Oberammergau.**—The Murnau-Oberammergau Railroad. Illustrated description of a road made for the use of either steam or electricity. Also an account of the first performance of the passion play this season. 700 w. Sci Am Sup—June 2, 1900.

**Ohio Pioneer.**—Pioneer Railroad of Ohio. Clark Waggoner. Interesting facts connected with the early history of railroading in this state. 1400 w. R R Gaz—Nov. 12, 1897.

**Oriental.**—Oriental Railways. Clement F. Street. The writer visited Tunis, Egypt, and India, securing information for the Commission on World's Transportation of the Field Columbian Museum, and in this well illustrated description gives the results of his observations. Serial. Ry Rev—Feb. 8, 1896.

**Pacific.**—See **American Transcontinental.**

**Panama.**—Concerning the Panama Railroad. George Hebard Paine. Describes the road and its equipment, and gives related information. 1600 w. R R Gaz—Aug. 17, 1900.

**Paris.**—See **ELECTRIC RAILWAY; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; STREET RAILWAY; SUBWAY.**

**Paris Exposition.**—Railways at the Paris Exposition. Willard A. Smith. The first of a series of articles aiming to give an idea of the plans and prospects of the American exhibit of transportation and civil engineering. Serial. Ry Mas Mech—June, 1899.

See also **BRIDGE; TRANSPORTATION.**

**Pennsylvania History.**—The Pennsylvania Railroad Fifty Years Ago. Facts concerning the first scheduled train, and the building of this road. 600 w. R R Gaz—Sept. 15, 1899.

**Peru.**—The Central Railroad of Peru. Engravings and information concerning a road built under exceptional difficulties. 900 w. R R Gaz—Dec. 22, 1899.

The Tallest Railroad. Charles E. Lummis. An illustrated account of the remarkable railroads of Peru. 3600 w. Harper's Weekly—Jan. 23, 1897.

**Philippines.**—Railroading in the Philippines. J. T. M. A description of the railway from Manila before Admiral Dewey arrived. 2000 w. Ry Age—May 27, 1898.

Railroading in the Philippines. A description of the single railroad line in these islands, the equipment, and the country through which it passes. 1800 w. Sci Am—Feb. 25, 1899.

**Pittsburg-Conneaut.**—See **IRON ORE TRANSPORTATION—Pittsburg.**

**Pole.**—See **POLE RAILWAY.**

**Portable.**—See **PORTABLE RAILWAY.**

**Port Talbot, Wales.**—The Port Talbot Railway and Dock. Descriptive account of an extensive project for developing a Welsh coal district, and coal-shipping port. 3300 w. Eng, Lond—Aug. 28, 1896.

**Private Car Lines.**—See **CAR—Private Lines.**

**Prussia, 1848.**—The Prussian Railways in the Year 1848 (Die Preussischen Eisenbahnen im Jahre 1848). A general description of the Prussian railway system fifty years ago, with map, and an account of the methods of operation and administration. 5000 w. Glaser's Annalen—Jan. 1, 1899.

**Public Attitude.**—The Public Attitude Toward Railways. From an address by J. T. Brooks of the Pennsylvania Railroad, at Purdue University. Considers watered stock; what justifies stock issues; uniformity of rates; competition and discrimination; causes of discrimination; and the public attitude towards pools. 5000 w. Ry Age—Jan. 14, 1898.

**Public Relations.**—Railways and the Public. John W. Noble. Address at Purdue University. A discussion of some of the mutual obligations of railroad corporations and the people. Some of the statements made have been challanged by H. P. Robinson of Chicago. 7500 w. Ry Age—Dec. 10, 1897.

**Quarry.**—See **QUARRY RAILWAY.**

**Queensland.**—The Railways and Trade of Queensland. Editorial discussion of the general results of the railway operations of the past year. 2300 w. Engng—March 23, 1900.

**Rack.**—See **Nilgiri; MOUNTAIN RAILWAY; RACK RAILWAY.**

**Rhodesia.**—Railway Development in Rhodesia. A brief report of a conversation with the contractors, giving some facts about progress and opinions as to the political significance of the work. 1500 w. Trans—May 1, 1896.

Rhodesia and Its Railways. Interesting particulars of railway construction, the work of eighteen months covering a distance of 580 miles. 3300 w. Engng—Oct. 22, 1897.

Rhodesia and Its Railways. Extracts from a pamphlet recently published by the British South African Co. On the rapid development of the last ten years, giving interesting facts relating to the railways. Ill. 900 w. Transport—Sept. 8, 1899.

The Railways of Rhodesia. A very brief note of the present conditions. 200 w. Trans—April 8, 1896.

**Russia.**—A Russian Railway Official. Biographical sketch of Prince Michael Hilkoff, imperial minister of ways and communications of Russia, with considerable side light on Russian railway matters. 2500 w. Ry Rev—Oct. 3, 1896.

Railroads in Russia. Gives interesting statistics of the growth of the Russian railroad system, commenting on the interesting features.. 1200 w. R R Gaz—Nov. 11, 1898.

Railway Construction and Management in Russia. Extracts from the report of the British Consul at St. Petersburg, showing the wonderful progress in construction. 1000 w. Transport—Dec. 17, 1897.

Russian Railways. W. J. McCarroll. Illustrated description of the right of way, track, locomotives, cars, etc. 3000 w. Loc Engng—Feb., 1897.

Russian Railways. H. L. Geissel. A review of progress made and projects contemplated. 1500 w. Ry Age—April 13, 1900.

Ten Years' Railroad Progress in Russia. Information from a recent statement made by the Minister of Finance on the economic condition of the country. 1600 w. R R Gaz—March 30, 1900.

The Railways of Russia. John H. Converse. Observations of an American, just returned from an extended European tour. 1000 w. Ry Age—Aug. 13, 1897.

See also **Siberia.**

**Russia and South Africa.**—The Impression of a Motive Power Man in a Trip Abroad. R. H. Soule. Prepared for the Texas Ry. Club. A record of observations that interested a motive power man during a trip to Russia and South Africa. Ill. 1800 w. R R Gaz—May 12, 1899.

**Rutland-Canadian.**—The Construction of the Rutland Canadian Railroad. Map and description of a line under construction in the eastern part of the United States, 47 miles in length. 1000 w. Eng News—Dec. 21, 1899.

**Salt Lake and Mercur, Utah.**—The Salt Lake and Mercur Railroad. W. P. Hardesty. Map, photographs and description of the line and equipment. 1600 w. Eng News—July 2, 1896.

**San Francisco-San Joaquin.**—Completion of the Atchison to San Francisco. An account of the San Francisco and San Joaquin Valley, a proprietary line forming a connecting link for a great transcontinental line to the Pacific metropolis. 1200 w. R R Gaz—May 4, 1900.

**Santo Domingo.**—The Central Dominican Railway. Brief description of the second line of railway to be built in this republic, which was recently opened for traffic. 800 w. Eng News—Oct. 21, 1897.

**Sault Ste. Marie & Hudson's Bay.**—Ontario and Alaska. Information in regard to the prospectus of the Sault Ste. Marie and Hudson's Bay Railway Co., which proposes not only to reach the Klondike, but to open up the lands which lie in the basin of the Mackenzie river. Map. 1200 w. Can Eng—Aug., 1897.

**Scandinavia.**—See **Sweden-Norway.**

**Schools, Russia.**—See **RAILWAY SCHOOL.**

**Scotland.**—Railway Rivalry in Scotland. A statement of the competitive schemes and difficulties affecting the railroads of Scotland. 2000 w. Engng March 19, 1897.

See also **Aviemore; Dalmuir & Clydebank; Dumbartonshire; Glasgow Central; Invergarry and Fort Augustus; Lanarkshire and Dumbartonshire; Mallaig.**

**Secondary.**—See **Feeder Roads; ELECTRIC RAILWAY; LIGHT RAILWAY; NARROW-GAUGE RAILWAY.**

**Senegal-Niger.**—Senegal-Niger Railway (Le Chemin de Fer du Sénégal au Niger). The first of a series of articles describing the railway now being constructed to unite the upper navigable waters of the Senegal and the Niger. 5000 w. Map. La Revue Technique—Jan. 10, 1897.

**Shops.**—See **RAILWAY SHOP.**

**Siam.**—The Railroads of Siam. Information concerning the roads built, and the need of new roads. 1300 w. R R Gaz—Dec. 22, 1899.

**Siberia.**—My Journey on the Siberian Railway (Meine Fahrt auf den Sibirischen Eisenbahnen). Nicholaus Post. An engineer's account of observations on the Trans-Siberian Railway, with maps and views of bridges and road construction. Serial. Zeitschr d Oesterr Ing u Arch Ver—Jan. 5, 1900.

The Siberian Railroad. Some of the more important particulars of this great enterprise. 2000 w. R R Gaz—Oct. 23, 1896.

Notes on the Extension of Railways in Russian Central Asia and Siberia (Mittheilungen über den Ausbau der Eisenbahnen in Russisch-Central-Asien und Sibirien). F. Theiss. With map showing the connection of the Transiberian railway with the general Russian system. 1800 w. Glaser's Annalen—Jan. 15, 1898.

Notes from the Statictics of the Siberian Railway (Einige Mittheilungen aus den Statistischen Veröffentlichungen der Sibirischen Eisenbahn). An abstract of the reports upon the cost of the Trans-Siberian railway from 1893 to 1897, giving data as to progress and cost of the work. 1800 w. Glaser's Annalen—Feb. 1, 1899.

Quinquennial Report of the Committee for Building the Siberian Railroad. Translated from the "Zeitung Des Vereines Deutscher Eisenbahn-Verwaltungen." Reports the work accomplished, the work under way, and to be undertaken. 1500 w. R R Gaz—Sept. 16, 1898.

The Transbaikal Hei-lun-Zagan Railway. Interesting details relating to this section, and some of the problems met. 1800 w. Engng—Aug. 10, 1900.

The Trans-Siberian Railway. Information from a recent "Guide to the Siberian Railway," issued by the Russian Imperial Ministry of Ways of Communication. Shows the importance of the line, the unexpected traffic, and the great wealth of the country. 1600 w. Engr, Lond—April 6, 1900.

The Great Siberian Railway. M. Mikhailoff. An interesting review of this work, the resources of the country, and the effect upon the development. Map. 7000 w. N Am Rev—May, 1900.

The Siberian Railway. Interesting details taken from the survey drawn up for the Paris Exhibition by the Imperial Commission. Map. 1500 w. Engr, Lond—Aug. 3, 1900.

The Trans-Siberian Railroad. Report from Consul General W. R. Holloway, St. Petersburg, containing an extract from the "Novoe Vremia," giving fares and train service. 500 w. U S Cons Repts—Sept. 19, 1900.

The Western Lines of the Siberian Railway (Die Westlinie der Sibirischen Eisenbahn). A review of the progress and operation of the Siberian railway from Tscheljabinsk to Irkutsk, with a good map showing the entire Trans-Siberian system, and data as to cost. Two articles. 1 plate. 6000 w. Glaser's Annalen—Aug. 1, 15, 1899.

The Commercial Import of the Siberian Railway (Die Wirthschaftlishe Bedeutung der Sibirischen Eisenbahn). Dr. Mertens. A very full discussion as to the probable influence of the opening of the Siberian railway upon trade between Europe and the Far East. 6000 w. Glaser's Annalen—Dec. 15, 1898.

The Eastern End of the Great Siberian Railway. A summary of progress on the several divisions, with many photographs along the lines. 850 w. Loc Engng—July, 1896.

The Great Siberian Railway. Attention is called to the importance of the undertaking, and a brief description of the project is given, with map. 1800 w. Eng, Lond—Nov. 6, 1896.

The Influence of the Great Siberian Railway upon Russian Industries. The outlook resulting from the development of the vast resources of Siberia, and their importance to the United States. 1100 w. Ir Age—Feb. 10, 1898.

The Siberian Railroad. Remarks from Russian papers criticising some points in the construction, etc. 1600 w. U S Cons Repts, No. 626—Jan. 12, 1900.

The Siberian Railway. Sketch of the route, engineering features and progress of work on the line. 1700 w. Ind & East Eng—June 20, 1896.

The Trans-Siberian Railroad. Details from the report of the Imperial Commission to the Tsar on the progress made during the five years ending with 1897. 4800 w. Engr, Lond—June 3, 1898.

The Trans-Siberian Railroad. Calls attention to the probable effect of this road on American commerce. 800 w. Bull of Bureau of Am Rep —July, 1898.

The Trans-Siberian Railway. The information from which this article has been prepared has been collected from Russian Government publications, U. S. Consular reports, the technical press and the proceedings of various engineering societies and only in the case of government publications does it bear the stamp of official authority, but as a description of the broad, general features of the work it is believed to be substantially accurate. 4400 w. Eng News—Nov. 19, 1896.

The Trans-Siberian Railway. Its immediate prospects. Extracts from an essay by M. Belinski, in the Russki Vestrick are given, and comments. 800 w. Engr, Lond—Jan. 20, 1899.

The Trans-Siberian Railway and the Coal Resources of Siberia. Considers this new line and its economic results, and the various coal fields that it will open. Map and Ill. 4000 w. Ir & Coal Trds Rev—Jan. 27, 1899.

The Trans-Siberian Railway (La Ferrovia Transsiberiana). E. Pattacini. A general review of the routes of the various sections of the road, with data as to time and cost of construction and statements of the present condition of the work. Serial. Gior d Lav Pubb e d Str Ferrate —Feb. 8, 1899.

The Trans-Siberian Railway. Details concerning the state of the work, taken from the official report. 1600 w. Engr, Lond—April 7, 1899.

The Trans-Siberian Railroad. Henry Michelsen. An illustrated abstract and the full article without illustrations. 4500 w. Sci Am & Sc Am Sup—Aug. 26, 1899.

The Trans-Siberian Railway. William Durban. A general survey of this line and its excellent construction, with remarks on its future possibilities and the effect it is to have on Siberia and the world in general. 5800 w. Contemp Rev—Aug., 1899.

Work on Siberian Railway. Translation of an article from the "Novoe Vremia." On changes that must be made to meet the unexpected traffic, and giving a brief description of the road. 800 w. U S Cons Repts, No. 524—Sept. 9, 1899.

See also **China**; **Chinese Eastern**; **Corea**; **Manchuria**; **GOLD REGION—Siberia**; **RAILWAY CONSTRUCTION**; **RAILWAY PROJECT**.

**Siberia-China.**—Siberian Railway Extension in China. Information regarding the construction and working of the new line, which will have nearly 950 miles in Chinese territory. 2000 w. Eng, Lond—June 4, 1897.

The Railways of Siberia and Eastern China (Les Chemins de Fer de Sibérie de l'Est de la Chine). R. de Bats. An excellent account of the present condition of the work on the Trans-Siberian Railway and its connection with the Eastern Railway of China. with map and numerous views of stations. 3000 w. Génie Civil—Jan. 21, 1899.

Siberian Railroad Extension in China. The details of the arrangement for constructing and working a railway within Chinese territory. Also "Estimates of Siberian Railroad Traffic," and "Siberia as a Grain Exporting Country." 4400 w. Cons Repts—Feb., 1897.

The Trans-Siberian Railway: Its New Terminus in China. Clarence Cary. An intersting account of the work thus far accomplished, making a connected steam route run possible, by the use of the Amoor River; and a presentation of existing conditions and the work remaining. 6000 w. Forum—May, 1898.

See also **Manchuria**.

**Sierra Leone.**—The Sierra Leone Railway. An interesting account of the construction of the road, with many illustrations. 3000 w. Engr, Lond—Sept. 8, 1899.

**Simplon.**—See **TUNNEL**.

**Single Rail.**—See **SINGLE RAIL**.

**Soudan.**—The Military Railway of the Soudan (Le Chemin-de-Fer Militaire du Soudan). A general description of the railway and a special discussion of the Atbara bridge. 2000 w. Revue Technique—Nov. 10, 1899.

The Soudan Railroad. C. H. Grinling. An account of the railroad operations that will assist in following future developments. Historical review. 3500 w. R R Gaz—Aug. 13, 1897.

See also **Africa**; **BRIDGE—Atbara**; **GUNBOAT—Egypt**.

**Soudan, French.**—The Railways of the French Soudan. From "Le Monde Illustre." Gives a list of projected and completed railways, and some particulars and illustrations. 600 w. Sci Am Sup—Feb. 4, 1899.

**South Africa.**—Railroad Building in South Africa. Summary of the existing and proposed railways in the Orange Free State, South African Republic, and Rhodesia, with map and quotation from report of Gen'l Mgr. of Railroads of the Cape of Good Hope referring to the Bechuanaland R. R. 800 w. R R Gaz—Sept. 9, 1898.

Railway Building in South Africa. Interesting interview with Frank Esmonde White, who has recently returned from Bechuanaland, giving a résumé of the work, its present stage and probable development. 1200 w. Ry & Engng Rev —May 14, 1898.

Railroad Building in South Africa. Sketch showing existing railroads, and roads now being built as far north as Kimberly and Bloemfontein, with some particulars regarding the work in progress. 1000 w. R R Gaz—Aug. 19, 1898.

South African Railways. F. W. Wilson. An interesting account of the peculiar features of the South African railway systems, with description and matters related. 4700 w. Eng News—July 15, 1897.

See also **Africa**; **Cape Colony**; **Rhodesia**.

**South America.**—South American Railways. Details with respect to Argentina railways, with brief notice of other lines. 1700 w. Engng—May 27, 1898.

See also **Chile**; **Colombia**; **Peru**; **Uruguay**; **Venezuela**.

**Southern, U. S.**—Evolution of the Southern Railway. An account of the progress during the last six years. 1800 w. R R Gaz—Aug. 17, 1900.

**Spain.**—Railways in Spain. Information concerning the principal corporations, the difficulties in the way of construction, the projected lines, equipment, etc. 1500 w. U S Cons Repts, No. 801 —Aug. 8, 1900.

Railways in Spain. A general account of Spanish railways. 1800 w. Sci Am Sup—Sept. 22, 1900.

Spanish Railway Property. Gives a far from favorable account of the present condition. 1800 w. Engng—July 22, 1898.

**State Control.**—State Control of Railroads vs. the Obligation of State Protection. President Blackstone. From the annual report of the president of the Alton R. R. The facts presented are of interest to all railroad managers. 2500 w. Ry Rev—Feb. 22, 1896.

See also **RAILWAY POOLING**.

**State Ownership.**—Government Ownership and Operation of Railroads. Extract from an open letter by E. P. Ripley discussing this question, and showing that private enterprise has proved more satisfactory. 2400 w. Ry & Engng Rev—Jan. 22, 1898.

J. H. Reagan on Government Ownership. Extract from a letter addressed to Congressman Kleberg of Texas. Unfavorable to government ownership, and also favoring legalizing "pooling." 900 w. Ry Age—Feb. 4, 1898.

Railroad Economics. The last of a course of lectures by Mr. Acworth, delivered in London. It touches upon the municipal railroad systems on the continent. 1400 w. R R Gaz—Jan. 3, 1896.

State Ownership of Railroads. Frank L. McVey. This is shown to involve an investment three times greater than the cost of our late Civil war; the principle embraces equally government ownership of mines, factories, and other large industries; the burden of all losses would fall upon the public; the interest on the investment at 6 per cent. would be at least, $800,000,000; it would add 800,000 to the number of government employés, and is an utterly impracticable scheme. 3600 w. Gunton's Mag—July, 1896.

State versus Private Railroad Ownership. Leonard Darbyshire. Discussion of the arguments advanced in favor of state ownership. 3400 w. Ry Mag—Nov., 1897.

See also Australia; Austria; Brazil; Ireland; New South Wales; Switzerland; RAILWAY EARNINGS—Natal; RAILWAY EMPLOYEE—Australia; STATE OWNERSHIP.

**Street.**—See ELECTRIC TRAMWAY; STREET RAILWAY.

**Submarine.**—See SUBMARINE RAILWAY.

**Surrey, Eng.**—The Early Railways in Surrey. Gives the history of the Surrey Iron Railway, the first one sanctioned by Parliament, and its failure, in the present article. Serial. Engr, Lond—Jan. 5, 1900.

**Suspended.**—See SUSPENDED RAILWAY.

**Sweden-Norway.**—An Arctic Railroad. Information concerning a road to be built across northern Norway and Sweden, to furnish an outlet. for the iron mines. 1300 w. Sci Am—Dec. 31, 1898.

Notes on a Journey in Scandinavia. W. J. McCarroll. Gives information of the railroads of the country. 2400 w. Loc Engng—June, 1897.

The Making of an Arctic Railway. Abstract of an article in a recent number of "Aftonbladet." Interesting details of the railway in course of construction from Gellivara to Victoriahavn in Norway. 1200 w. Ir & Coal Trds Rev—July 21, 1899.

The Swedish-Norwegian Lulea-Ofoten Railway (Die Schwedish-Norwegische Unionsbahn Lulea-Ofoten). Especially devoted to the development of the Swedish iron ore districts, with photographs and colored map. Serial. Part I. Stahl und Eisen—Jan. 15, 1899.

**Switchback.**—See SWITCHBACK.

**Switzerland.**—American Capital in Swiss Railways. Information concerning existing roads, railways projected and in course of construction, concessions, etc. 2200 w. U S Cons Repts, No. 455—June 19, 1899.

The Schaffhausen-Eglisau and Thalweil-Zug Railways (Mittheilungen über den Bau der Linien Schaffhausen- Eglisau und Thalweil-Zug). An interesting descriptive account, with maps, profiles and details of viaducts and tunnels; giving an excellent idea of railway construction in Switzerland. Four articles. 5000 w. Schweizerische Bauzeitung—July 9, 16, 30, Aug. 6, 1898.

The Nationalization of the Railroads in Switzerland. M. Horace Micheli. Gives the history of the railroads in Switzerland and the arguments presented which finally secured the management of the railroads by the state. 4800 w. Ap Pop Sci M—Sept., 1898.

The Referendum and the Swiss Railroads. J. R. Macdonald. Republished from the "New Age," London. An account of the railways of Switzerland and their purchase by the government. 2000 w. Am Rev of Revs—April, 1898.

See also RAILWAY LEGISLATION.

**Syria.**—The Railway Beyreuth-Damascus-Hauran in Syria. Description of the line, with the difficulties of construction, etc. 1300 w. Eng, Lond—Jan. 8, 1897.

**Tehuantepec.**—Mexico: Tehuantepec Railway and Vera Cruz Harbor Works. Historical sketch of the undertaking and announcement of an important new contract for its completion and operation. 2500 w. Ind & East Eng—June 20, 1896.

Railway Contract in Mexico. A copy of the contract relating to the Tehuantepec Railroad and the ports of Coatzacoalcos and Salina Cruz. 1100 w. U S Cons Repts, No. 805—Aug. 11, 1900.

The Tehuantepec Railway Across the Isthmus of Mexico. Reviews the history of the road and the work to be done before it is opened for traffic. 1200 w. Transport—July 14, 1899.

See also Mexico.

**Timber.**—See also NARROW GAUGE RAILWAY—Galicia; POLE RAILWAY.

**Transbaikal.**—See Siberia.

**Transcaspian.**—A Visit to Russian Central Asia. Michael Francis O'Dwyer. An interesting, descriptive paper, containing information concerning the Transcaspian railway. Also discussion. Ill. 25000 w. Jour Soc of Arts—April 16, 1897.

The Building of the Trans-Caspian Railroad. Notes from a paper by General Annenkoff, published in the Nov. "Bull. of the International Railway Congress," concerning the methods pursued in the construction of the line. 1200 w. R R Gaz—Jan. 27, 1899.

The Transcaspian Railway. Alexis Krausse, in "Black and White." Describes and illustrates this railway, constructed by Russian engineers over a country which is mostly a sandy desert. It has engineering features of special interest. 1800 w. Sci Am Sup—March 11, 1899.

**Transsiberian.**—See Siberia.

**Tunis.**—The Construction of the Railway from Sfax to Gafsa (Construction du Chemin de Fer de Sfax à Gafsa). L. Rey. An account of the construction of a railway in Tunis for the exploitation of the phosphate deposits. Steel sleepers are used, the track being laid in sections. 2500 w. Soc Ing Civ de France—Dec., 1898.

The Railway from Sfax to Gafsa, Tunis (Le Chemin de Fer de Sfax à Gafsa). With map of the route, elevation of the track-laying machinery, and views of the terminals. 1500 w. Génie Civil—April 22, 1899.

**Uganda, Africa.**—The Uganda Railway. An account of the line and the progress made, which has been very slow because of the great difficulties. Maps. 2500 w. Engng—Aug. 11, 1899.

The Uganda Railway (Die Uganda Eisenbahn). Col. Fleck. A very full account of the progress of work, tabulated from the start in 1896 to the present time, with map and profile. 4500 w. Glaser's Annalen—Oct. 15, 1899.

The Uganda Railway. An interesting general account of the line. 2500 w. Ind Engng—Feb. 19, 1898.

**Underground.**—See UNDERGROUND RAILWAY.

**Union Pacific.**—Across Wyoming by the Union Pacific. W. P. H. Letter calling attention to the features of interest to an engineer. 4000 w. Eng News—June 30, 1898.

The Union Pacific Railway. J. P. Davis. Historical review with discussion of the financial and political aspects of the past, present and future relations of the railroad to the state. 12500 w. An of Am Acad—Sept., 1896.

**United States.**—Knotty Points of Railroading. Discusses the railway conditions in the United States, and the many problems needing to be faced. Considers that both construction and competition have been overdone. 2200 w. Trans—July 23, 1897.

Railroads and Bridges. Reviews the rapidity and proportions of the growth of the railroad in America, the daring engineering in its development, etc. Illustrates and describes noted railroad bridges crossing rivers, ravines and canyons. 3200 w. Sci Am—July 25, 1896.

The Nation's Railroads. George B. Waldron. On the development of the railroads of the United States, giving information also of the financial side. Ill. 1700 w. McClure's Mag—April, 1898.

**United States.**—The Present and Future of American Railroads. Thomas F. Woodlock. Showing that railroads have reason to expect an increasing volume of business, and may reap a profit therefrom by avoiding waste in train mileage. 4800 w. Eng Mag—Jan., 1897.

The Railways of America. M. E. Ingalls. An address delivered at Purdue University reviewing what the railroads have done for the nation, what they are, and what reforms are needed. 3500 w. Ry Age—Nov. 26, 1897.

See also American; History; State Ownership.

**U. S. Development.**—Railway Development Still Continues. Editorial showing that the demand for railway material in the United States is in no danger of becoming of small importance. The mere replacement requires a large production; the building of side tracks, second tracks, etc., and improvements in roads all make large demands. 1600 w. Ir Age—Aug. 17, 1899.

**United States, Southern.**—Southern Railroad Extensions. D. Allen Willey. An account of the new lines to be built which will aggregate 3000 miles, with a record of the railroad construction in the Southern States for the year 1897. 1500 w. Mfrs Rec—Dec., 1897.

**Uruguay.**—The Railways of Uruguay. Reliable information concerning the railways, their operation and financial condition. 1800 w. U S Cons Repts, No. 456—June 20, 1899.

**Venezuela.**—The Great Venezuela Railway (Die Grosse Venezuela Eisenbahn). The road, 112 miles long, between Caracas and Valencia, was constructed with great difficulty, mainly by German engineers and capital, at a cost of about $15,000,000. A full account of the engineering work is given. 7500 w. Glaser's Annalen—May 15, 1897.

Venezuela Railroad Development. Report of the Puerto Gabello & Valencia Railway, and the Great Venezuela Railway. A descriptive and historical sketch. 5500 w. U S Cons Repts—April, 1897.

**Victoria.**—See **RAILWAY CONSTRUCTION.**

**West Virginia.**—New Railroads in West Virginia. An account of new projects and extensions under contract or construction. 1200 w. R R Gaz—May 11, 1900.

**White Pass & Yukon.**—The Engineer and the Road to the Gold Fields. Harrington Emerson. A graphic account of the opening of the Yukon and White Pass Route to the Klondike, with many illustrations of the difficult engineering work involved in the construction of the railway. 5000 w. Eng Mag—Aug., 1899.

Opening the White Pass & Yukon Railway. W. M. Sheffield. Information concerning this great engineering feat, and the portion of the road already constructed. Ill. 1200 w. Sci Am—April 15, 1899.

The First Railway to the Alaska Gold Fields. Illustrations showing some of the difficulties encountered in building the road from Skagway, Alaska, via the White Pass to Fort Selkirk, N. W. T., a distance of 330 miles. 600 w. Ry Age—Sept. 2, 1898.

The White Pass and Yukon Ry. A description of the completed portion and its equipments, with maps and illustrations. 1200 w. Eng News—Oct. 5, 1899.

## RAILWAY ACCIDENT.

See also **LOCOMOTIVE ACCIDENT; RAILWAY EMPLOYEE.**

Railway Accidents and Their Causes. Editorial discussion of particular cases. 1800 w. Trans—Feb. 14, 1896.

Do Railways Deserve Credit or Blame for the Number of Lives Lost in Their Operation? E. P. Ripley. Extract from a letter to the public dealing with the subject of railway accidents. 4500 w. Ry Age—Jan. 21, 1898.

Notes on Railway Accidents (A Propos des Accidents de Chemins de Fer). Léo Dex. A classification of accidents by their causes, and a critical discussion of the best means of prevention. 1800 w. La Rev Tech—Feb. 10, 1898.

**Atlantic City, N. J.**—The Latest Grade Crossing Collision. The Atlantic City collision, used to emphasize the importance of the human element even in the best mechanical systems. 800 w. Loc Engng—Sept., 1896.

The Atlantic City Collision. Editorial, using the accident as a text for a discussion of safety measures at grade crossings. 1200 w. R R Gaz—Aug. 7, 1896.

The Grade Crossing Collision at Atlantic City. Account of the circumstances in connection with the disaster gleaned from various sources, with editorial comment and suggestions. 3300 w. Eng News—Aug. 6, 1896.

**Austria.**—See **Washout.**

**British.**—Railway Accidents and the Lessons They Teach. Analytical discussion of the Government report with notes of the progress in introducing safety appliances and also of hours of labor and wages. 2500 w. Trans—Oct. 9, 1896.

See also **CAR COUPLER—British Commission.**

**British, 1895.**—Railway Accidents of a Year in England. Editorial comment on the report made by Francis J. S. Hopwood to the British Board of Trade. 900 w. Ry Rev—Oct. 31, 1896.

**British, 1896.**—English Railroad Accidents in 1896. Facts taken from the general report made by Secretary Hopwood. 1500 w. R R Gaz—Oct. 15, 1897.

Railway Accidents in 1896. Review of the Board of Trade returns in England and comments on the new form in which the tables are cast. 1200 w. Engng—July 2, 1897.

**British, 1897.**—Three Lessons from England. Editorial discussion of investigations of accidents given in the last British Board of Trade report, which show the difference between American and English practice. 3600 w. R R Gaz—Oct. 7, 1898.

**British, 1898.**—English Railroad Accidents in 1898. Editorial comment on the Board of Trade report. 1000 w. R R Gaz—June 2, 1899.

Three Months' Railway Accidents. From the British Board of Trade Returns of Accidents and Casualties. Shows a decrease in the numbers of killed and injured as compared with last year. 900 w. Transport—Aug. 19, 1898.

**British, 1899.**—A Year's Railway Accidents. Extracts from Mr. Hopwood's report to the British Board of Trade on railway accidents during 1899. 1700 w. Transport—Sept. 14, 1900.

**Claim Agents.**—See **RAILWAY EMPLOYEE.**

**Cohoes, N. Y.**—See **GRADE CROSSING—Electric and Steam.**

**Derailments.**—Derailments. J. H. Wallace. A paper presented before the Pacific Coast Railway Club, discussing the causes of derailments on curves. 1500 w. Ry & Engng Rev—Sept. 15, 1900.

See also **Preston, Eng.**

**Emergency Service.**—Emergencies in Railroad Work. L. F. Loree. Extracts from a lecture delivered before the students of the College of Mechanics and Engineering, University of Wisconsin. Treats of wrecks, washouts and strikes, and the preparations which can be made for dealing promptly with such events. 3600 w. R R Gaz—June 12, 1896.

Emergencies in Railroad Work. L. F. Loree. A lecture delivered before the students of University of Wisconsin. Treating of wrecks, strikes, and organization. 11500 w. Bull of Univ of Wis—Dec., 1895.

Railroad Accident and Emergency Service. W. L. Derr. Detailing the duties devolving upon, and the qualities requisite in, a railroad wrecking crew, and describing a wrecking equipment and its uses. 4200 w. Eng Mag—Feb., 1896.

See also **Wrecking.**

**Employers' Liability.**—The Liability of Employers. Summary of a case decided against the railway on the ground that under the circumstances the operator was a representative of the company and not a fellow servant of the injured employé. With editorial review. 2000 w. Ry Age—May 16, 1896.

**Europe, 1897.**—Comparative Notes on the Statistics of Accidents (Vergleichende Betrachtungen zur Unfallstatistik). A discussion by Herr Blum of the statistics of railway accidents in Prussia for 1897, plotted in comparative curves with those of other European railways. 4500 w. Glaser's Annalen—June 15, 1899.

**Garrisons, N. Y.**—Concerning the Latest Great Railroad Accident. H. G. Prout. Some remarks on the proper meaning of the word "accident," with a few comments on the accident near Garrisons, on the New York Central. 1200 w. Harper's Wk—Nov. 6, 1897.

Report of the New York State Railroad Commission on the Garrisons Disaster. Abstract from the report giving valuable information regarding the construction of the track and roadbed at the point where the accident occurred. 3500 w. Eng News—Dec. 23, 1897.

The New York Central & Hudson River R. R. Wreck Near Garrisons, N. Y. An account of the disaster which cost the lives of twenty-one persons, with editorial. 2000 w. Eng News—Oct. 28, 1897.

The Garrisons Accident. Report of the investigation by the State Railroad Commission, as given in the "Albany Argus." Illustrations of plan and sections presented. 1300 w. R R Gaz—Dec. 10, 1897.

The Garrisons Wreck. Summary of the report on the accident, by the New York State Board of Railroad Commissioners. 5000 w. Ry Age—Dec. 24, 1897.

See also **AIR BRAKE—Emergency; RAILWAY CONSTRUCTION—Embankment Sliding.**

**Great Northern, Eng.**—Accident on the Great Northern Railway of England. Brief account of the accident, with photographs of the track and the wreck. 200 w. Loc Engng—May, 1896.

**Law of Negligence.**—The Law of Negligence, with Some Statistics. A review of John Brooks Leavitt's work compiling cases, codifying the law and classifying decisions. Some interesting data are abstracted. 3000 w. St Ry Jour—May, 1896.

**Logan.**—The Logan Collision. Editorial reviewing the accident as an argument for the block system. 1600 w. R R Gaz—July 31, 1896.

**New York.**—The 109th Street Collision. The opinion of the Railroad Commissioners is criticised, and an argument made for the policy of written orders for each train all the time. 800 w. R R Gaz—May 15, 1896.

**Niagara River.**—A Train in the River. Illustrated account of an accident which plunged seven cars and a locomotive into the upper Niagara river. 600 w. Ry Age—Sept. 29, 1899.

**Penmaenmawr, Wales.**—The Accident on the London & Northwestern Railway at Penmaenmawr. Brief illustrated description. 300 w. Engng—Jan. 20, 1899.

**Philadelphia.**—The Collision at Park Tunnel, Philadelphia. Facts concerning an accident on the B. & O., at Philadelphia, May 11, followed by an explosion of oil cars that blocked the tunnel for three days. 900 w. R R Gaz—May 25, 1900.

**Preston, Eng.**—Accident to an English Racing Train. Comments on the curions change of attitude of the British press on account of an accident, and questions whether high speed is objectionable on any other ground than that of economy. 900 w. Ry Age—July 31, 1896.

Accident to the West Coast Racer. Descriptive and illustrated account of the Preston derailment. 450 w. Loc Engng—Sept., 1896.

Railway Speeds. Arguments emphasized and illustrated by the Preston accident, relative to the consideration traffic managers should show to the locomotive department. 2000 w. Eng, Lond—Oct. 23, 1896.

The Derailment of the Scottish Express at Preston (Die Entgleisung des Schottischen Expresszuges bei Preston). H. v. Littow. An examination of the railway accident in Scotland on July 13, 1896, which in the author's opinion was due to too sharp a curve. Zeitschr d Oesterr Ing u Arch Ver—Dec. 18, 1896.

The Fatal Derailment at Preston. Statement of conditions and facts relating to the accident, with diagram of curves. 700 w. Engng—Oct. 16, 1896.

The Preston Accident. Editorial comment on Col. Yorke's report, with statement of the accident and the lesson it teaches. 1700 w. Eng, Lond—Oct. 16, 1896.

**Prussia.**—The Prussian Railroad Commission on the Epidemic of Accidents. Data from a memorial submitted by the Minister of Railroads to the Prussian Diet, on the provisions for safety and their effectiveness. 1400 w. R R Gaz—April 15, 1898.

**St. Neots, Eng.**—A Broken Rail Accident on an English Railway. An account of the St. Neots accident, condensed from the "Railway Engineer." Describes the physical features of the accident in detail, with drawings of the broken rail. 1300 w. Ry Age—May 9, 1896.

The Results of a Broken Rail. An editorial discussion of the St. Neots (England) accident, and of heavy weights on engine drivers, with some results of chemical and physical tests of broken rail. 1600 w. R R Gaz—May 8, 1896.

**Snowdon Mountain, Wales.**—The Accident on the Snowdon Railway. An account of the accident, with map of the line and illustrations from photographs of the wreck. 600 w. Eng, Lond—April 10, 1896.

The Snowdon Mountain Railway Accident. Account of the accident at the opening of the line. 1000 w. Trans—April 10, 1896.

The Snowdon Mountain Tramroad. Correspondence reviewing the accident, and discussing causes and preventive measures. 3000 w. Eng, Lond—Sept. 11, 1896.

**Somerset, Mass.**—Report on a Grade Crossing. Collision Between a Railway Train and an Electric Car. Account of accident taken from an advance copy of the report on "Street Railways," issued by the Board of R. R. Commissioners of Massachusetts. The collision was in the town of Somerset. The electric car was demolished and the train derailed. 2400 w. Eng News—March 11, 1897.

**Tramps.**—The Tramps and the Railroads. Editorial, reviewing the danger from the tramp class, and accidents traceable to them. 1000 w. R R Gaz—June 26, 1896.

See also **RAILWAY EMPLOYEE—Police.**

**United Kingdom.**—See British; **CAR COUPLER—British Commission.**

**United States.**—Rolling Stock in the United States. From advance sheets of the report of the Interstate Commerce Commission reviewing the causes of accidents to employees. 1400 w. R R Car Jour—Feb., 1900.

Train Accidents in the United States in 1895. Statistics covering a period of 22 years, classified according to causes; also figures for the year 1895, by months, with causes. 1100 w. R R Gaz—Feb. 4, 1896.

**U. S., 1898 and 1897.**—Fatal Accidents to Trainmen in 1898 and 1897. Editorial showing that the annual report of the Interstate Commerce Commission may show a possible error in the statistics. 1400 w. R R Gaz—April 14, 1899.

**U. S., 1896.**—Train Accidents in 1896. Tabular summary, with comments. 800 w. R R Gaz—Feb. 19, 1897.

**U. S., March, 1896.**—Train Accidents in the United States in March. A summary of the accidents of the month with their causes and results. 2300 w. R R Gaz—April 24, 1896.

**U. S., April, 1896.**—April Accidents. A classified table, with descriptive comment. 2200 w. R R Gaz—May 22, 1896.

**U. S., May, 1896.**—May Accidents. A classified table, with comparison with the same month in the five previous years. 500 w. R R Gaz—June 26, 1896.

**U. S., June, 1896.**—Train Accidents in the United States in June. Classified table with explanatory comment. 2200 w. R R Gaz—July 24, 1896.

**U. S., July, 1896.**—Train Accidents in the United States. Classified review of July accidents, with comment. 2700 w. R R Gaz—Aug. 21, 1896.

**U. S., August, 1896.**—Train Accidents in the United States in August. Classified table with editorial comment. 3000 w. R R Gaz—Sept. 25, 1896.

**U. S., September, 1896.**—Train Accidents in the United States in September. Classified table, with editorial comment. 2800 w. R R Gaz—Oct. 30, 1896.

**U. S., October, 1896.**—Train Accidents in the United States in October. Classified table with summary. 4500 w. R R Gaz—Nov. 20, 1896.

**U. S., November, 1896.**—Train Accidents in the United States in November. Detailed list of the more important accidents, with classified summary. 2700 w. R R Gaz—Dec. 25, 1896.

**U. S., December, 1896.**—Train Accidents in the United States in December. List of accidents for the month and their causes, with classified summary. 2500 w. R R Gaz—Jan. 29, 1897.

**U. S., 1897.**—Train Accidents in 1897. Tabulated report of the accidents for the year in the United States. 500 w. R R Gaz—Feb. 11, 1898.

**U. S., January, 1897.**—Train Accidents in the United States in January. Classified report of the more important accidents, with summary. 3300 w. R R Gaz—Feb. 26, 1897.

**U. S., February, 1897.**—Train Accidents in the United States in February. Report of accidents of the month, with classified summary. 2000 w. R R Gaz—March 26, 1897.

**U. S., March, 1897.**—Train Accidents in the United States in March. Classified statement of accidents of the month with summary. 2500 w. R R Gaz—April 23, 1897.

**U. S., April, 1897.**—Train Accidents in the United States in April. A detailed list of the more important accidents, with classified summary and comments. 2700 w. R R Gaz—May 28, 1897.

**U. S., May, 1897.**—Train Accidents in the United States in May, 1897. A classified statement and summary. 2000 w. R R Gaz—July 16, 1897.

**U. S., June, 1897.**—Train Accidents in the United States in June. Detailed list with classified summary. 3200 w. R R Gaz—Aug. 13, 1897.

**U. S., July, 1897.**—Train Accidents in the United States in July. Detailed list and classified summary. 3400 w. R R Gaz—Sept. 3, 1897.

**U. S., August, 1897.**—Train Accidents in the United States in August. Detailed list with classified summary. 3400 w. R R Gaz—Oct. 1, 1897.

**U. S., September, 1897.**—Train Accidents in the United States in September. Detailed list, with classified summary and editorial. 5000 w. R R Gaz—Oct. 29, 1897.

**U. S., October, 1897.**—Train Accidents in the United

States in October. Detailed list with classified summary. 4500 w. R R Gaz—Dec. 3, 1897.

**U. S., November, 1897.**—Train Accidents in the United States in November. Detailed list with classified summary and comments. 4400 w. R R Gaz—Dec. 31, 1897.

**U. S., December, 1897.**—Train Accidents in the United States in December. Detailed list and classified summary. 4500 w. R R Gaz—Jan. 28, 1898.

**U. S., 1898.**—Train Accidents in 1898. Tabulated summary of the year's accidents, with comments. 1000 w. R R Gaz—March 10, 1899.

**U. S., January, 1898.**—Train Accidents in the United States in January. Detailed list and classified summary. 4500 w. R R Gaz—March 11, 1898.

**U. S., February, 1898.**—Train Accidents in the United States in February. Detailed list and classified summary, with remarks. 3000 w. R R Gaz—March 25, 1898.

**U. S., March, 1898.**—Train Accidents in the United States in June, 1898. Detailed list and classified summary for the month named. 3500 w. R R Gaz—April 29, 1898.

**U. S., April, 1898.**—Train Accidents in the United States in April, 1898. Detailed list and classified summary. 2800 w. R R Gaz—May 27, 1898.

**U. S., May, 1898.**—Train Accidents in the United States in May. Detailed list with classified summary. 3500 w. R R Gaz—June 24, 1898.

**U. S., June, 1898.**—Train Accidents in the United States in June, 1898. Detailed list and classified summary, with comments. 3000 w. R R Gaz—July 22, 1898.

**U. S., July, 1898.**—Train Accidents in the United States in July. A brief description of each, with classified summary. 4000 w. R R Gaz—Sept. 9, 1898.

**U. S., August, 1898.**—Train Accidents in the United States in August. A detailed list and classified summary of accidents during August, 1898, in the United States. 4000 w. R R Gaz—Sept. 30, 1898.

**U. S., September, 1898.**—Train Accidents in the United States in September. Detailed list with classified summary. 4800 w. R R Gaz—Nov. 4, 1898.

**U. S., October, 1898.**—Train Accidents in the United States in October. Detailed list with classified summary and remarks. 3500 w. R R Gaz—Dec. 2, 1898.

**U. S., November, 1898.**—Train Accidents in the United States in November. Detailed list and classified summary. 4800 w. R R Gaz—Jan. 13, 1899.

**U. S., December, 1898.**—Train Accidents in the United States in December. Detailed list, with classified summary and additional information. 4400 w. R R Gaz—Feb. 3, 1899.

**U. S., 1899.**—Train Accidents in 1899. Editorial review with tables of statistics. 1500 w. R R Gaz—Feb. 23, 1900.

**U. S., January, 1899.**—Train Accidents in the United States in January. Detailed list, with classified summary, and an editorial on "Emergency Single-Track Blocking," discussing the butting collision at West Dunellen, N. J. 8400 w. R R Gaz—March 24, 1899.

**U. S., February, 1899.**—Train Accidents in the United States in February. Detailed list and classified summary. 4500 w. R R Gaz—April 14, 1899.

**U. S., March, 1899.**—Train Accidents in the United States in March. Detailed list and classified summary. 3500 w. R R Gaz—May 12, 1899.

**U. S., April, 1899.**—Train Accidents in the United States in April. Detailed list with classified summary. 2500 w. R R Gaz—June 2, 1899.

**U. S., May, 1899.**—Train Accidents in the United States in May. Detailed list with classified summary and remarks. 4400 w. R R Gaz—July 14, 1899.

**U. S., June, 1899.**—Train Accidents in the United States in June. Detailed list and classified summary of 220 accidents, with remarks. 3000 w. R R Gaz—Aug. 11, 1899.

**U. S., July, 1899.**—Train Accidents in the United States in July. Detailed list and classified summary. 4500 w. R R Gaz—Sept. 22, 1899.

**U. S., August, 1899.**—Train Accidents in the United States in August. Detailed list and classified summary. 4000 w. R R Gaz—Oct. 20, 1899.

**U. S., September, 1899.**—Train Accidents in the United States in September. Detailed list and classified summary, with remarks. 4400 w. R R Gaz—Nov. 10, 1899.

**U. S., October, 1899.**—Train Accidents in the United States in October. Detailed list with classified summary and remarks. 5500 w. R R Gaz—Dec. 15, 1899.

**U. S., November, 1899.**—Train Accidents in the United States in November, 1899. Detailed list and classified summary. 4500 w. R R Gaz—Dec. 29, 1899.

**U. S., December, 1899.**—Train Accidents in the United States in December. Detailed list and classified summary. 5000 w. R R Gaz—Feb. 2, 1900.

**U. S., January, 1900.**—Train Accidents in the United States in January. Detailed list and classified summary. 2500 w. R R Gaz—March 9, 1900.

**U. S., February, 1900.**—Train Accidents in the United States in February. Detailed list and classified summary. 3500 w. R R Gaz—April 6, 1900.

**U. S., March, 1900.**—Train Accidents in the United States in March. Detailed list and classified summary, with comments. 3500 w. R R Gaz—April 27, 1900.

**U. S., April, 1900.**—Train Accidents in the United States in April. Detailed list and classified summary. 3300 w. R R Gaz—June 8, 1900.

**U. S., May, 1900.**—Train Accidents in the United States in May. The detailed list and classified summary of train accidents for the month. 4000 w. R R Gaz—July 6, 1900.

**U. S., June, 1900.**—Train Accidents in the United States in June. Detailed list and classified summary. 4500 w. R R Gaz—Aug. 17, 1900.

**U. S., July, 1900.**—Train Accidents in the United States in July. Detailed list and classified summary. 3500 w. R R Gaz—Sept. 14, 1900.

**U. S., August, 1900.**—Train Accidents in the United States in August. Detailed list and classified summary. 4000 w. R R Gaz—Oct. 5, 1900.

**U. S., September, 1900.**—Train Accidents in the United States in September. Detailed list and classified summary for the month. 3500 w. R R Gaz—Oct. 26, 1900.

**Washout, Austria.**—**Railway Washouts** (Ueber Hochwasser-Katastrophen der Eisenbahnen). A. Lernet. With especial reference to disasters occurring in Austria in 1896, with illustrations of temporary bridge, and protection to embankments. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—July 22, 1898.

The High-Water Damage to the Melk Section of the State Railways in 1897 (Die Hochwasserschäden des Jahres, 1897, im Bezirke der k. k. Bahnerhaltungs-Section Melk). R. Ziffer. A description of the nature of a number of washouts on the Austrian Railways and an account of the repair work. Two plates. 4000 w. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1899.

The Railway Disaster at Kolomea (Die Eisenbahn Katastrophe bei Kolomea). A fully illustrated account of the disaster at Kolomea, Austria, in which a washout caused a bridge fall and train wreck; with photographs, and detail drawings. 2500 w. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1897.

**Wellingborough, Eng.**—The Wellingborough Accident. Illustrated account of an accident on an English railway. 900 w. Engng—Sept. 16, 1898.

**West Dunellen, N. J.**—The Lehigh Valley Head Collision at West Dunellen, N. J. Brief illustrated account. 300 w. Eng News—Jan. 19, 1899.

See also **U. S., January, 1899.**

**Wrecking.**—Raising a Locomotive Fallen Into a Canal (Relevage d'une Machine Locomotive Tombée dans un Canal). Interesting illustrated account of the manner in which the locomotive was raised and the canal cleared. 1000 w. Génie Civil—Oct. 6, 1900.

Recovery of Two Locomotives from the River Adour (Relevage de Deux Machines Tombées dans l'Adour, à Tarbes). Interesting short illustrated description of method and tackle employed in the salvage of the locomotives. 400 w. Génie Civil—Oct. 15, 1898.

See also **Emergency Service.**

**RAILWAY ACCOUNTS.**

See **RAILWAY FINANCE—Accounting; RAILWAY OPERATION.**

**RAILWAY ASSOCIATION.**

See also **RAILWAY EMPLOYEES; RAILWAY LEGISLATION; RAILWAY POOLING; RAILWAY TRAFFIC.**

Needed Reforms in the Railway Mechanical Conventions. Editorial comment on the reform needed in the Master Mechanics' Assn. and Master Car Builders' Assn. 1600 w. Eng News—June 24, 1897.

**Blacksmiths.**—The Railroad Blacksmiths' Convention. Brief report of the proceedings and discussions. 3000 w. Ry Age—Sept. 4, 1896.

**Conventions, 1898.**—The Work of the Railway Mechanical Conventions of 1898. Editorial discussion of the action to bring about a consolidation of the organizations, and the forces which are tending to unite the associations, with other features of the conventions. 2800 w. Eng News—June 30, 1898.

**Maintenance of Way.**—Eastern Maintenance of Way Association Meeting. Abstracts of papers and reports of committees at the meeting at Saratoga. 1300 w. R R Gaz—Sept. 28, 1900.

**Master Car Builders.**—The Master Car Builders' Association. Report of the meeting at Fort Monroe, with abstracts of addresses, discussions, etc. 2000 w. R R Gaz—June 18, 1897.

See also **CAR—M. C. B. Convention.**

**Master Mechanics.**—Annual Convention of the American Railway Master Mechanics' Association. An account of the meeting at Old Point Comfort, Va., with abstracts of most of the committee reports. 10000 w. R R Gaz—June 18, 1897.

Annual Convention of the Railway Master Mechanics' Association. A condensed report of the meeting at Saratoga, with short abstracts giving the conclusions of committee reports on exhaust pipes, balanced valves, reciprocating parts, cylinder bushings, hub liners, steam pipe joints, and the safety of radial stay boilers. 2700 w. Eng News—June 25, 1896.

Master Mechanics' Reports. Gives reports presented at the Saratoga meeting of the association. 13500 w. R R Gaz—June 24, 1898.

The Reports of the Master Mechanics' Association. Extracts from most of the reports, and from the president's address, and discussions. Also editorial. 31700 w. R R Gaz—June 29, 1900.

The Reports of the Master Mechanics' Association. A summary of reports on exhaust pipes and steam passages, thickness of engine truck wheel flanges, cylinder bushing, and driving box wedges, with editorial. 10000 w. Ry Rev—June 27, 1896.

Reports to the Master Mechanics' Association. Abstracts of reports presented by the various committees of the American Railway Master Mechanics' Association, at the convention in Old Point Comfort, Va. 12500 w. R R Gaz—June 23, 1899.

Meeting of the American Railway Master Mechanics' Association. A general report of the meeting, topical discussions, etc. 11700 w. R R Gaz—June 30, 1899.

Standards of, and Practices Approved by, the Master Mechanics' Association. Information extracted from the report presented at the Saratoga convention. 2000 w. Ry Mas Mech—Aug., 1900.

**Roadmasters.**—Address of E. E. Russell Tratman, before the Roadmasters' Association. Extracts from the address, touching on wheels, rails, track, etc. 4000 w. Ry Age—Sept. 24, 1897.

Convention of the Roadmasters' Association of America. Report of convention, with special reports and discussions on facing point switches, ditching, rail joints, ballast, etc. 6500 w. Eng News—Sept. 17, 1896.

The New England Roadmasters' Convention. Committee reports on spring rail frogs, rail-joints, automatic switch-stands, elevation of curves and minor points. 2200 w. Ry Age—Aug. 28, 1896.

**Superintendents.**—Convention of the American Society of Railroad Superintendents. Brief report of annual meeting, with abstract of committee reports on electric locomotives, and tonnage rating of freight trains. 2000 w. Eng News—Sept. 17, 1896.

**Traveling Engineers.**—The Traveling Engineers' Convention. Brief report with abstract of reports and discussions. 7000 w. Loc Engng—Oct., 1896.

The Traveling Engineers' Association. A notice of the Cleveland meeting, with abstracts of the reports of various technical committees. 4000 w. R R Gaz—Sept. 21, 1900.

**RAILWAY BRIDGE.**

See also **BRIDGE—Railway**; and under geographical locations; **CULVERT; RAILWAY BUILDINGS; VIADUCT.**

**Damaged But Strong.**—A Strong Though Damaged Bridge. Illustrated description of a 115 ft. heavy riveted lattice bridge, which permitted the passage of a heavy freight train after it had been severely injured. 600 w. Eng Rec—Jan. 21, 1899.

**Design.**—See **BRIDGE DESIGN—Railway.**

**High Speed.**—The Mechanical Action and Resultant Effects of Motive Power at High Speeds on Bridges. Report of committee to Convention of Ry. Supts. of Bridges and Buildings, with brief discussion. 1000 w. Pro Assn of Ry Supts—Oct., 1896.

The Mechanical Action and Resultant Effects of Motive Power and High Speeds on Bridges. Report presented to the Assn. of Ry. Supts. of Bridges and Buildings. 900 w. Can Eng—Dec., 1896.

**Inspection, Timber Structures.**—Notes on Inspection of Timber Structures. Justin Burns. Suggestions to bridge inspectors in the maintenance department of railroads. 2500 w. Trans Assn of Civ Engs of Cornell Univ—1898.

**Numbering.**—Different Methods of Numbering Bridges. Should All Waterways Be Numbered? Report of committee to the Convention of Ry. Supts., with discussion. 7500 w. Pro Assn of Ry Supts—Oct., 1896.

**Salt Water Drippings.**—See **METAL CORROSION; RAILWAY EQUIPMENT.**

**Short Span.**—Construction of Short Span Railway Bridges. Henry Goldmark. Review of the fundamental principles governing the construction of culverts, arches, and truss bridges less than 175 ft. long. 3300 w. Eng Rec—Dec. 31, 1898.

Railway Bridges of Short Span. F. W. Wilson. Calls attention to the fact that short span bridges are much more numerous than long span and equally disastrous in collapse; describes and illustrates rail floor, longitudinal trough and special design bridges up to 16-ft. clear span. 1600 w. Eng News—May 7, 1896.

Short Span Railroad Bridges. Illustrated description of some structures designed for unusually high loads and very low unit stresses; includes a description of special templates for reaming. 1200 w. Eng Rec—Dec. 30, 1899.

See also **GIRDER—Indian Railways.**

**Weak.**—Is it Safer to Run Fast or Slow Over a Weak Bridge? A communication from an engineer advocating running fast and giving reasons. 1400 w. Eng News—Dec. 8, 1898.

**RAILWAY BUILDING.**

See also **GRAIN ELEVATOR; RAILWAY BRIDGE; RAILWAY SHOP; RAILWAY STATION; RAILWAY TERMINAL.**

A Railway Bridge and Building Department. Onward Bates. Shows the importance of the work of this department, the changing conditions that must be met by engineers, with information and advice for young engineers. 10000 w. Purdue Soc of Civ Engs—1896.

A Railway Bridge and Building Department. Onward Bates. A well written article examining into the factors which are conducive to the highest efficiency. 2700 w. Ry Rev—Feb. 15, 1896.

The Superintendent of Bridges and Buildings. Onward Bates. Lecture delivered before the students of the College of Mechanics and Engineering, Univ. of Wisconsin, 1898. Discussing the personality, duties, responsibilities, education and experience he should possess. 10500 w. Bull of Univ of Wis—No. 26.

Railroad Bridges and Buildings. Walter G. Berg. General remarks with a brief survey of the leading characteristics of the various structures and classes of work. 2500 w. Ry Mag—March, 1897.

**Chittagong, India.**—Assam-Bengal Railway Head Office Buildings, Chittagong. Illustrated description. Serial. Ind Engng—March 6, 1897.

**Round House.**—See **ROUND HOUSE.**

**Siberian.**—Structures on the Trans-Siberian Railway.

Illustrated description of structures showing the substantial character of the work performed by the Russian government. 1100 w. Eng News—Aug. 12, 1897.

**RAILWAY CAR.**

See **CAR; RAILWAY EQUIPMENT; ROLLING STOCK; TRAIN.**

**RAILWAY COALING STATION.**

See **COALING STATION.**

**RAILWAY COMMISSION.**

See also **RAILWAY LEGISLATION; RAILWAY POOLING; RAILWAY RATES; RAILWAY STATISTICS; RAILWAY TRAFFIC.**

**Convention.**—National Convention of Railroad Commissioners. A condensed report of the Washington meeting. The papers and discussion are devoted to various phases of the relation of railroads to the public and to the government. 4800 w. R R Gaz—May 29, 1896.

See also **RAILWAY LEGISLATION—Interstate Commerce.**

**Interstate Commerce.**—Annual Report of the Interstate Commerce Commission. Gives the principal part of the abstract prepared by the Secretary of the Commission. Deals with rates, powers of the commission, long and short haul, pooling, etc. 3500 w. R R Gaz—Dec. 24, 1897.

Annual Report of the Interstate Commerce Commission. Comment on the report, with brief extracts. 1600 w. R R Gaz—Dec. 25, 1896.

Demanding a Dangerous Privilege. Thomas P. Grasty. Claims that the ambition of the interstate commerce commission menaces the South and the country at large. 2000 w. Mfrs Rec—Jan. 14, 1898.

Interstate Commerce Commission Hearing at Chicago. Abstract of cases and evidence presented. 1400 w. Ry Age—Sept. 25, 1896.

Report of the Interstate Commerce Commission. Interesting information taken from this report with editorial comment. 800 w. Sci Am—Nov. 13, 1897.

Statistics of Railways in the United States. Eighth annual report of the statistics of railways in the United States for the year ending June 30, 1895. Prepared by the statistician to the commission. 17500 w.

Tenth Annual Report of the Interstate Commerce Commission. A brief reference to some of the subjects treated, with nine amendments to the law which are recommended. 1800 w. Ry Rev—Dec. 19, 1896.

The Railroads of the United States in 1895. Editorial abstract of the Interstate Commerce Commission statistics, with running comment. 1800 w. R R Gaz—Oct. 9, 1896.

The Sphere of the Interstate Commerce Commission. Discussing whether the Commission fulfills the ends for which it was created, and if not, what is needed to make it do so. 3500 w. Ry Age—June 3, 1898.

The Interstate Commerce Commission's Demands for More Power. M. H. Smith. A discussion of the additional powers desired by the commission, as shown in the Cullom bill, claiming that not one will tend to correct the rate demoralization. 2500 w. R R Gaz—Nov. 18, 1898.

The Interstate Commerce Commission. Abstract of report, taken from advance sheets, touching pooling, free storage, railroad earnings, safety appliances, and accidents. 2000 w. Ir Age—Jan. 19, 1899.

The Dangerous Demands of the Interstate Commerce Commission. Milton H. Smith. Considers that the Commission's radical demands will not correct the evil which requires correction, and that all other evils are sufficiently guarded against by the Act as it stands. 6300 w. Forum—April, 1898.

The Powers of the Interstate Commerce Commission. Milton H. Smith. A reply to the article of Charles A. Prouty, in the Nov. number of this publication. 5500 w. N Am Rev—Jan., 1899.

The Powers of the Interstate Commerce Commission. Basil W. Duke. A discussion of the views advanced by Charles A. Prouty, in the November number of the "N. Am. Review." Serial. R R Gaz—Dec. 16, 1898.

The Powers of the Interstate Commerce Commission. Charles A. Prouty. Discusses proposed legislation and the attitude of the prominent railroad men, stating what the commission has asked in respect to rates. 6800 w. N Am Rev—Nov., 1898.

See also **RAILWAY LEGISLATION; RAILWAY RATES; RAILWAY TRAFFIC.**

**Maine Refuse an Electric Application.**—Maine Railroad Commissioners Refuse an Electric Railroad Application. The application was opposed by a steam road, and the application was denied on the ground that public convenience did not require the new line. Abstract of the report is given, and editorial. 2800 w. R R Gaz—Sept. 11, 1896.

**Massachusetts.**—Massachusetts Railroad Commissioners' Report. Extracts from report with remarks. 1200 w. R R Gaz—Feb. 5, 1897.

Railroads in Massachusetts. The Annual Report of the Board of Railroad Commissioners. It is of considerable interest. 1500 w. R R Gaz—Jan. 24, 1896.

Report of the Massachusetts State Board of Railroad Commissioners. Extracts from report for 1896. Treats of bicycle transportation, car ventilation and grade crossings. 4000 w. Eng News—Jan. 28, 1897.

**New York.**—Abstract of Report: Board of Railroad Commissioners State of New York. Interesting abstracted matter relating to the condition of the roads, earnings, expenditures, improvements, equipment, etc. 3500 w. Ry & Engng Rev—Jan. 22, 1898.

New York Railroad Commissioner's Report. Review of this report which gives statistics for the year to June 30, 1897. 2000 w. R R Gaz—Jan. 21, 1898.

New York Railroad Commissioners' Report. Review of the fourteenth annual report. 1700 w. R R Gaz—Jan. 15, 1897.

The Railroad Situation in the State of New York. Editorial review of the sixteenth annual report of the board of railroad commissioners of the State of New York. 1400 w. Ry & Engng Rev—Jan. 7, 1899.

**Rates.**—See also **RAILWAY RATES.**

**Texas.**—The Texas Railway Commission and Railway Rate Discriminations. Editorial discussion of the revelations brought out by the railway commission of Texas in regard to free transportation, rebates, etc. 1700 w. Eng News—July 6, 1899.

The Work of the Texas State Railway Commission. Editorial review of the work as set forth in the last report of the Texas Commission, approving the position as economically, and politically correct, and stating that the work that has been done could be profitably studied by other States. They have attempted to base railway rates upon the cost of service. 1500 w. Eng News—April 23, 1896.

**RAILWAY CONDUCTING TRANSPORTATION.**

See **CAR INTERCHANGE; FAST TRAIN; RAILWAY ACCIDENT; RAILWAY EMPLOYEE; RAILWAY MANAGEMENT; RAILWAY OPERATION; RAILWAY ORGANIZATION.**

**RAILWAY CONSOLIDATION.**

See also **RAILWAY FINANCE.**

**B. & A. and N. Y. C.**—The Boston & Albany and the Central. Editorial comment on the agreement by which the B. & A. passes into the ownership and control of the N. Y. Central. 1200 w. R R Gaz—July 7, 1899.

**Grand Trunk-Central Vermont.**—The Grand Trunk System and the Central Vermont. An account of the terms on which the Grand Trunk Railway Company have received absolute control of the Central Vermont system, with brief history of the latter road. Map. 900 w. Ry Age—Oct. 22, 1897.

**Seaboard Air Line.**—The Greater Seaboard Air Line System. An account of the project to consolidate several railroads in to a system known by this name. Map. 1000 w. R R Gaz—April 6, 1900.

**Vanderbilt System.**—Consolidation of the "Vanderbilts." Editorial on the proposed consolidation of the New York Central and Lake Shore & Michigan Southern, and other contemplated changes. 700 w. Ry Age—Feb. 4, 1898.

**RAILWAY CONSTRUCTION.**

See also **RAILWAY; RAILWAY CURVE; RAILWAY GRADE; RAILWAY PERMANENT WAY; RAILWAY PROJECT; RAILWAY STATISTICS; RAILWAY TERMINAL; SUBWAY; TRACK; TRACK ELEVATION; TRACKLAYING; TUNNEL.**

Mistakes and Improvements in Railroad Construction. Geo. H. Paine. Showing the causes of the inferiority of American railway track and the considerations that must govern in improving it. 4300 w. Eng Mag—March, 1897.

Mistakes and Improvements in Railroad Construction. George H. Paine. Showing that the tendency in maintenance of way work is towards more subsoil tile drains, abundance of good stone ballast and immovability of track. Ill. 4500 w. Second paper. Engng Mag—April, 1897.

**Alaska.**—See **RAILWAY.**

**Algeria.**—Improvement Works upon the Arzen-Ain-Sefra Railway, Algeria (Travaux sur le Chemin de Fer d'Arzew à Ain-Sefra, Algérie). Showing the application of embankment methods, similar to those employed in Switzerland, for the protection of a railway from damage by river overflow. 1200 w. Génie Civil—March 18, 1899.

**Ann Arbor, Mich.**—Improvements on the Ann Arbor Railroad. An account of heavy construction work in the improvement of grades. 700 w. Ry Age—April 27, 1900.

**Battersea, London.**—The Southwestern Railway Widening at Battersea. Brief account of the widening and bridge building between Vauxhall and Clapham Junction on this English road. 1200 w. Engr, Lond—May 13, 1898.

**Boston Suburbs.**—Readville, Dedham, and West Roxbury Improvements. An illustrated account of the abolition of grade crossings, with changes in highways and station facilities, near Boston. 2500 w. R R Gaz—Aug. 12, 1898.

**British.**—Current Railway Construction. Notes of work now under way in England. 900 w. Engng—Sept. 4, 1896.

Current Railway Construction. Reviews the most important works now pending in connection with British railways. 2000 w. Engng—Aug. 20, 1897.

The Most Expeditious Method of Relaying the Railways of This Country, Involving the Least Interruption of Traffic, Having Regard to Safety and Economy. Harry Footner. Read before the Engng. Conference of the Inst. of Civ Engs., England. Classifies and discusses methods. 1400 w. Engr, Lond—June 23, 1899.

**Bukowina, Austria.**—See **RIVER REGULATION—Austria.**

**Chicago.**—See **Illinois Central; RAILWAY STATION; RAILWAY TERMINAL; TRACK ELEVATION.**

**Chic., Burlington & Quincy.**—Improvements in Alignment and Grades, C., B. & Q. Ry. Illustrates and describes heavy and extensive work. 2400 w. Ry & Engng Rev—Sept. 23, 1899.

**Cincinnati Southern.**—Improvements on the Cincinnati Southern Ry. Illustrates and describes the work of building a new line around tunnel No. 27, and other improvements. 1000 w. Ry & Engng Rev—Aug. 18, 1900.

**Electric.**—See **ELECTRIC TRAMWAY—Construction.**

**Embankments, Boone County Ry., Iowa.**—Building Large Embankments on the Boone County Ry. (C. & N. W. Ry. System). Information concerning the work, with illustration. 700 w. Eng News—Feb. 8, 1900.

**Embankment, Sliding.**—The Sliding Embankments of the Hudson River Shore Lines. Archibald A. Schenck. Shows the limited extent and number of difficult places on the Hudson River lines, and explains the care taken in the construction. Ill. 1300 w. Sci Am—Nov. 13, 1897.

**Flood Prevention.**—See **Algeria; FLOOD; FLOOD PREVENTION; RIVER REGULATION—Austria.**

**Illinois Central.**—Double-Track Construction. H. R. Safford. Describes a difficult piece of road to operate on the Illinois Central R. R., and the construction of a second track to improve the conditions. 2500 w. Pro of Purdue Soc of Civ Engs—1897.

**Illinois Central, Chicago.**—Illinois Central Lake Front Improvements. An account of an important piece of improvement, with plan of the tracks before and after the alterations. 1100 w. Ry Rev—June 27, 1896.

**Illinois Central, Tenn.**—Grade Reductions on the Illinois Central in Tennessee. Information relating to work between Fulton, Ky., and Memphis, Tenn. Map and ills. 800 w. Ry & Engng Rev—Nov. 18, 1899.

**Inundated Districts.**—Railway Construction in Districts Subject to Inundation. A discussion of the subject appearing to prove the economic value of the low-level system in spite of short interruptions to traffic. 2000 w. Eng News—Sept. 29, 1898.

**Kentish Town, London.**—Widening of the Midland Railway at Kentish Town. Illustrations with description of important work on an English railway. 2500 w. Engr, Lond—July 22, 1898.

The Midland Railway in London. Illustrated description of the Khentish Town widening and Somers Town coal depot, reconstruction of stations, etc. 2800 w. Transport—Nov. 18, 1898.

**London.**—See also **RAILWAY STATION; RAILWAY TERMINAL.**

**Monon.**—Monon Improvements. An illustrated account of the work of eliminating curves and grades near Cedar Lake, Indiana. 1000 w. Ry Age—Oct. 22, 1897.

**New.**—See **RAILWAY STATISTICS.**

**N. Y. Central, Hoffman's.**—New York Central Improvements at Hoffman's, N. Y. Describes a connection made between the N. Y. C. and the West Shore railroads, to facilitate the use of the West Shore tracks. 900 w. Ry Age—Dec. 22, 1899.

**N. Y., Ont. & West.**—The Pecksport Connecting Line of the N. Y., O. & W. A typical example of modern grade elimination, with calculation of resultant saving. 400 w. R R Gaz—May 22, 1896.

**Northern Pacific.**—See also **RAILWAY LOCATION.**

**Paris.**—Extension of the Orléans Railway Line in Paris (Prolongement de la Ligne d'Orléans de la Place Valhubert au Quai d'Orsay). A. Boudon. An illustrated description of the present condition of the work. Serial. Génie Civil—Jan. 7, 1899.

General Description of the Railway Line from Courcelles to the Champ-de-Mars which Crosses the Seine by Viaduct (Ligne de Courcelles au Champ-de-Mars, à Paris). A. Dumas. A general description of this new connecting line, partly in tunnel and partly on viaduct, very well illustrated. 5000 w. 1 plate. Génie Civil—June 2, 1900.

Line from Courcelles to the Champ-de-Mras, Paris. Crossing of the Auteuil Line,—Construction of the Passy Tunnel (Ligne de Courcelles au Champ-de-Mars, à Paris. Traversée de la Ligne d'Auteuil.—Construction du Tunnel de Passy). A. Dumas. Complete description of the work and methods employed. Elaborately illustrated. 4500 w. 1 large plate. Génie Civil—Oct. 29, 1898.

Prolongation of the Orleans Line to the Quai D'Orsay. From "La Nature." Illustrated detailed description. 1200 w. Sci Am Sup—Sept. 30, 1899.

Recent Railway Work in and About Paris (Neuere Eisenbahnbauten in und um Paris). H. Frahm. A general account of railway terminal and street railway work, well illustrated, in a paper read before the "Verein für Eisenbahnkunde," Berlin. 7500 w. Glaser's Annalen—May 1, 1900.

The Extension Works of the Station of the Eastern Railway of France (Les Travaux d'Agrandissement de la Gare de l'Est). G. Leugny. With plans and views of the extension works now in progress in view of the increased travel anticipated during the Paris Exposition. 2000 w. La Rev Tech—July 10, 1899.

The Line of the Left Bank of the Seine (La Ligne de la Seine. Rive Gauche). Describes the tunnel along the left bank of the Seine at Paris, through which the Orleans Railway is to be brought to the new terminal station on the Quai d'Orsay; giving numerous sections of the tunnel at various points along the line. 2500 w. 1 plate. La Rev Tech—Nov. 25, 1897.

The New Lines of the Western Railway of France (Les Nouvelles Lignes de la Compagnie l'Ouest). An account of the new connections of the Western Railway within the city limits and in the environs of Paris, with numerous illustrations and plans. 3500 w. 1 plate. Génie Civil—May 7, 1898.

The New Lines of the Western Railway in Paris and its Vicinity (Die Neuen Bauten der Französischen Westbahn in Paris und Umgebung). E. A. Ziffer. Paper before the Verein f. d. Förderung d. Local u Strassenbahnwesens describing the various improvements by which the railroad now reaches the Esplanade des Invalides, with maps and illustrations. 1 plate. 5000 w. Mitt d Ver f d Förderung d Local r Strassenbahnwesens—June, 1900.

The Passy Underground Railroad. From "La Nature." Interesting particulars of the construction work. Ill. 1800 w. Sci Am Sup—March 25, 1899.

The Prolongation of the Orleans Railway (Prolongement de la Ligne d'Orléans). Describing especially the use of the shield in connection with the tunnelling under the Quai de la Tournalle. 3500 w. 1 plate. Génie Civil—Feb. 11, 1899.

The Prolongation of the Orleans Railway in Paris (Le Prolongement de la Ligne d'Orleans dans Paris). E. Dieudonné. With numerous views of the present state of the work from the Place Valimbert to the Quai d'Orsay, and a plan of the new terminal station. 4000 w. 1 plate. Revue Technique—June 25, 1899.

The Prolongation of the Orleans Railway (Prolongement de la Ligne d'Orléans). Alfred Boudon. A fully illustrated account of the present state of the works, showing the construction of the subway along the Seine, and the terminal on the Quai d'Orsay. 3000 w. Génie Civil—Oct. 28, 1899.

The Railway from Courcelles to Passy (Le Chemin de Fer de Courcelles à Passy). A description of the extension of this local railway to the Champ de Mars, with details of work on tunnel and bridges. 2500 w. Revue Technique—March 10, 1899.

The Works of the Western Railway of France in Paris (Les Travaux Parisiéns de la Compagnie de l'Ouest). Giving an account of the local and terminal extensions in Paris for the handling of the traffic of the Exposition of 1900. Map and profile. Serial. Génie Moderne—Oct. 1, 1897.

The Works of the Western, the Orleans and the Metropolitan Railways in Paris (Die Bauten der Französischen Westbahn, der Orleansbahn und der Stadtbahn in Paris). H. Koestler. A description of the improved terminal facilities recently constructed in Paris, and of the new underground road, with map. 3500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Aug. 31, 1900.

Work on the Courcelles-Passy Section of the Line from Courcelles to the Champs de Mars (Ligne de Courcelles au Champ-de-Mars, à Paris. Travaux de la Partie Comprise entre Courcelles et Passy). A. Dumas. A very fully illustrated description of improvements made by the Western Railway on this section of its Paris terminal lines. 2 plates. 5000 w. Génie Civil—July 7, 1900.

See also **BRIDGE; ELECTRIC RAILWAY; RAILWAY STATION; RAILWAY TERMINAL; SUBWAY; TRANSPORTATION—Paris Exposition; UNDERGROUND RAILWAY.**

**Pennsylvania R. R.**—Alignment Improvements on the Pennsylvania Railroad. A section of double track tunnel is given. 600 w. Ry Rev—Jan. 11, 1896.

**Pioneer.**—Pioneer Railway Construction in New Countries. Editorial discussion of this subject, with special reference to China. Advises a cheap construction which will greatly reduce the cost of transit, executed through a large extent of country in the shortest possible time. 3000 w. Eng News—Sept. 29, 1898.

**South Eastern, Eng.**—South Eastern Railways Improvements. On changes being made in the widenings, stations, etc., of this English railway. 1500 w. Engr, Lond—Feb. 10, 1899.

**Statistics.**—See **RAILWAY COMMISSION; RAILWAY STATISTICS.**

**Track Elevation.**—See **TRACK ELEVATION.**

**Tracklaying.**—See **TRACKLAYING.**

**Victoria.**—Economic Railway Construction in Victoria. Maurice Edwin Kernot. Description of the work with analysis of cost per mile. 2300 w. Ind & East Eng—Jan., 1898.

**Wis. Chic. & N. W. Ry.**—Second Track Construction and Improvement of Line and Grade from Madison to Baraboo, Wis.; Chi. & N. W. Ry. H. W. Battin. Illustrated detailed description of the work. 3500 w. Eng News—June 3, 1897.

### RAILWAY CROSSING.

See **GRADE CROSSING.**

### RAILWAY CROSS TIES.

See **CROSS TIES; RAILWAY; PERMANENT WAY; TRACK.**

### RAILWAY CURVE.

See also **RAILWAY ENGINEERING; RAILWAY LOCATION.**

Degree of Curve. William D. Pence. The single chord, short chord and arc definitions are discussed, differences between respective radii for all degrees tabulated, and formulae for sub chord correction and determination of radius, and excess of arc over chord are deduced and graphically illustrated. 1400 w. Tech—May, 1896.

**Adjustment.**—Adjustment Curves. William G. Raymond. From a forthcoming text-book. "The Elements of Railroad Engineering." The theory and practice of curves in railroading. Treats of the two general methods of providing for gradual entry to a curve. 1. The three-centre compound curve. 2. The transition curve, or spiral. 4500 w. Polytechnic—March 27, 1897.

**Boston Elevated.**—Transition Curves Used by the Boston Elevated Railway. Gives tables arranged to suit the requirements of this road, with explanatory remarks. 2300 w. St Ry Rev—July 15, 1900.

**Compound.**—Theory of Compound Curves in Railroad Engineering. Arnold Emch. The problem is treated from a general geometrical standpoint. 1400 w. Kansas Univ Qr—Oct., 1896.

**Electric Tramways.**—See **Parabola; Spiral; ELECTRIC TRAMWAY—Curves.**

**Gauge Widening.**—On the Measurement of Super-Elevation and of the Widening of Gauge. A. Bewley. Considers devices used in this work and the simplest means of measuring for the adjustment of tracks. 1000 w. Ind Engng—Dec. 10, 1898.

Should the Gauge of Railway Track be Widened on Curves? Abstract of replies received to questions bearing on this subject, sent out by the committee of the American Railway Assn. 4000 w. Eng News—Oct. 14, 1897.

The Determination of Elevation and Spread of Rails on Curves (Zur Bestimmung der Ueberhöhungen und Erweiterungen in Eisenbahncurven). Emil Masik. A very full discussion of the questions of the elevation of the outer rail and the proper spread for various curves and speeds. Two papers. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—March 31, April 7, 1899.

Widening the Gauge of Railway Track on Curves. William H. Searles. A study of the action of trucks and locomotives upon a curved track, showing that the widening is a simple mathematical problem. Also editorial. 3800 w. Eng News—Dec. 2, 1897.

**Lubrication.**—Lubricating Rails on Curves. A short account of some recent experience in Germany with the use of lubricants on the gauge side of rails on very sharp curves. A considerable reduction in wear of material and in power expended in hauling is obtained at trifling expense. 600 w. R R Gaz—April 3, 1896.

**Outside Rail Forces.**—Forces Acting on the Outside Rail. F. T. Hatch. A study of this subject with results. Ill. 1200 w. R R Gaz—Dec. 31, 1897.

**Parabola.**—Laying Down Transition Curves by Offsets. Shows a transition curve based upon the cubic parabola, and describes the method of laying it out. 700 w. Eng News—June 22 1899.

The Cubic Parabola as a Transition Curve for Street Railways. Jenks B. Jenkins. An example of its use as a solution of a difficult problem in Pittsburg, given to illustrate the practice, with formulae for determining minimum clearance in any curve and smallest radius to which the curve is applicable. 500 w. Eng News—July 23, 1896.

**Parallel Tracks.**—The Union of Parallel Tracks into a Single Given Curve (Einführung von Parallelgeleisen in eine bestehende Kurve). A graphical solution of a special problem in railroad curves. 1000 w. Schweizerische Bauzeitung—March 27, 1897.

**Rail Elevation.**—The Elevation of the Outer Rail of Railway Curves. Wm. G. Raymond. Abstract of a paper in the last issue of "The Polytechnic" discussing the proper amount of cant to give railway track on curves. 700 w. Eng News—March 25, 1897.

See also **Gauge Widening.**

**Spiral.**—The Railroad Spiral. Editorial review of the condition of the transition curve problem, suggested by a paper by E. S. M. Lovelace. 1800 w. R R Gaz—Feb. 9, 1900.

The Railway Transition Spiral on Old Railway

Curves. Arthur N. Talbot. Methods of computation and field work for inserting a spiral between two curves, or between a tangent and a curve. 1200 w. Tech—May, 1896.

Uniform Chord Length Method for the Railway Transition Spiral. Arthur N. Talbot. Describes method and presents a general table. 1600 w. Tech, No. 14—1899-1900.

See also **Adjustment; Transition.**

**Spiral, Street Railway.**—Street Railway Easement Curves. Charles A. Alden. Illustrates the racking effect of curves on long cars with short wheel-base, and argues the importance of applying the spiral to street railway curves. 600 w. Eng News—Oct. 15, 1896.

Spiral Curves for Street Railways. Charles A. Alden. Tables designed to meet most cases arising in usual practice, with explanations and remarks. 2400 w. Eng News—Oct. 29, 1896.

**Train Motion.**—See **TRAIN RESISTANCE—Curves and Tangents.**

**Transition.**—Railway Transition Curves. F. K. Vial. An analysis of the fundamental principles, simple demonstrations, and tables of deflections and co-ordinates. 6500 w. Eng News—Sept. 20, 1900.

Railway Transition Curve Tables for Field Use. F. K. Vial. Describes short methods for developing curve tables for field use for the several transition curves and explains their application to special field problems. 3800 w. Tech, No. 14—1899-1900.

The Construction of Transition Curves for Railways (Zur Construction der Uebergangsbögen bei Eisenbahngeleisen). A mathematical discussion by Herr Alfred Birk, of the advantages of the lemniscate of Bernoulli as a figure for railway curves. Tables are given, simplifying the application of the curve to practice. 10000 w. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1897.

Transition Curves. Letters from various correspondence bearing on this subject. 2500 w. Eng News—April 15, 1897.

See also **Adjustment; Compound; Parabola; Spiral.**

**Wheel Bases.**—On the Relation Between the Radii of Railway Curves and the Wheel-Bases of Vehicles and Locomotives. A. Hallbauer. Translated from the "Organ für die Fortschritte des Eisenbahnwesens." Mathematical. 900 w. Ind Engng—May 28, 1898.

### RAILWAY DEMURRAGE.

See **RAILWAY TRAFFIC—Demurrage.**

### RAILWAY EARNINGS.

See also **RAILWAY FINANCE; RAILWAY STATISTICS.**

**British.**—Improved British Railway Returns. The returns from the various roads show a general increase in revenue. 500 w. Bradstreet's—March 21, 1896.

**Natal.**—The Remarkable Railway Year in Natal. An account of the marvelous earnings of the government railways as given in their report and from interview with Mr. David Hunter, the general manager. 1500 w. Trans—April 30, 1897.

**Pennsylvania Ry., 1897.**—Pennsylvania's Year of Improvement. Synopsis of report for 1897, with editorial. 4000 w. Bradstreet's—March 5. 1898.

**Prussia.**—Prussia's Railroad Earnings. Consular report of the enormous sums earned by the railways under government ownership. 500 w. Cons Repts—Oct., 1897.

**United States, 1894-95.**—Increased Railway Earnings in 1895. These statistics are given for each road and classes of roads for 1894 and 1895. It is a very detailed statement showing the increase in 1895 to be 5.2 per cent. 1400 w. Bradstreet's—Jan. 11, 1896.

**United States, 1895.**—Gross and Net Railroad Earnings in 1895. Tabulated statement of the gross earnings and the net earnings of each road separately for each of the past three years. 1000 w. Bradstreet's—Feb. 22, 1896.

**United States, 1896.**—Railroad Earnings in 1896. Comment on the reports as given in the "Financial Chronicle," "Dun's" and "Bradstreets." 1400 w. R R Gaz—Jan. 22, 1897.

Net Railway Earnings in 1896. A comparison with the previous year, with reasons for the less favorable showing, and tabulated statements. 1500 w. Bradstreet's—Feb. 20, 1897.

**United States, 1897.**—Continued Improved Railway Earnings. Report of prosperous business on all roads except soft-coal carriers, with comparative tables showing increases and decreases of 118 railroads. 2500 w. Bradstreet's—Aug. 14, 1897.

Less Pronounced Railway Earnings' Increases. Report with tables of comparison, showing gross earnings for June, and for the past six months. 1800 w. Bradstreet's—June 10, 1897.

Net Railway Earnings. Report for second quarter of the present year showing slow, but gradual improvement. Also tables of comparison. 2500 w. Bradstreet's—Aug. 21, 1897.

Results of the Railroad Year. A comparatively favorable report of the roads of the United States, for the year 1897. 1000 w. Bradstreet's—Feb. 19, 1898.

**United Sttaes, 1898.**—Net Railroad Earnings in 1898. Discusses some of the causes that have affected the earnings of railroads of the United States in recent years, giving tabulated statement of gross and net earnings for twelve months ending in Dec. 1000 w. Bradstreet's—Feb. 18, 1899.

### RAILWAY ECONOMICS.

See **RAILWAY; RAILWAY ENGINEERING; RAILWAY FINANCE; RAILWAY MANAGEMENT; RAILWAY OPERATION; RAILWAY TRAFFIC.**

### RAILWAY EMPLOYEE.

See also **LABOR—Railway; RAILWAY ACCIDENT; RAILWAY ASSOCIATION; RAILWAY OPERATION; RAILWAY ORGANIZATION.**

Employer and Employé. Brief account of a meeting of railway officers and Brotherhood Men at Grand Rapids. 2500 w. Ry Age—April 9, 1897.

Employer and Employee. E. T. Jeffery. Address before the Y. M. C. A. of the Denver & Rio Grande. Extract. 1700 w. Ry Age—May 14, 1897.

Railroads and Employees. F. H. Stark. Considers the relation of employees on railroads to the employer. 1200 w. R R Car Jour—June, 1897.

Railway Companies and Their Employés. H. P. Robinson. Extract from an article in "Locomotive Firemen's Journal." The importance of co-operation, and an explanation of many matters not understood by employés. 2500 w. Ry Age—April 8, 1898.

Relations Between Railways and Their Employees. Report of a special committee of the Am. Soc. of Ry. Supts. Includes the selection of employees, discipline, systems of relief, etc. 1500 w. Ry Rev—March 20, 1897.

**Apprentices, Union Pacific.**—Apprentice System—Union Pacific Railway. Regulations, form of application and illustrations of examinations. 2500 w. Ry Mas Mech—Oct., 1896.

**Australia.**—Employés on Government Railways.—The Rules and Regulations in Force on the Government Railways of Australia. Alfred C. Fraser. A brief introductory note commends the article to attention on account of its interest in connection with the agitation for government ownership of railways in this country. 3300 w. Ry Age—April 11, 1896.

**British.**—Good Discipline as a Factor of Safety in Train Operation in England. Editorial on information given in the English Board of Trade report, showing that most accidents are the result of carelessness, and that the system of investigation and of discipline exert a powerful influence toward the prevention of accidents. 2800 w. Eng News—Aug. 12, 1897.

Railways and Railwaymen. Editorial discussion of the demands made by the Amalgamated Society of Railway Servants. 1300 w. Engr, Lond—Oct. 29, 1897.

**Character.**—Conduct and Character. M. N. Forney. A lecture to railroad and supply men on this subject. 14800 w. N Y R R Club—Nov. 17, 1898.

**Claim Agents.**—The Claim Agent and His Relation to the Safety of Employees. L. L. Gilbert. Abstract of a paper read before the St. Louis Ry. Club. On the attitude of their agents, the best way to settle claims, safety devices, inspection, etc. 1300 w. R R Gaz—May 19, 1899.

**Discipline.**—Railroad Ethics. H. D. Judson. Abstract of a paper read before the Western Railway Club. The writer considers present systems of discipline antiquated and defective, and pleads for broader and more advanced ideas. With editorial. 4000 w. Ry Rev—May 23, 1896.

**Discipline, Brown System.**—Discipline Without Suspensions. Results of the use of the Brown system of discipline on the K. C. F. S. & M. Ry. The results described are highly favorable to the system, even under adverse circumstances. 900 w. Ry Age—July 17, 1896.

Discipline Without Suspension. George R. Brown. An excellent system of rewards for good work by employees and the effects of the system. Should be read by every superintendent. 4800 w. Loc Engng—Jan., 1896.

One Year's Experience with the Brown System of Discipline. H. S. Rearden. The Chicago, Peoria & St. Louis Railroad Co., adopted this system on Feb. 1, 1896. The success of the past year is recorded and the advantages explained. 4800 w. Ry Mag—Feb., 1897.

The Discipline and Education of Railway Employees. George R. Brown. Concerning the success of the Brown System of Discipline, which has been adopted by fifty-three American railways. 2200 w. Am Eng & R R Jour—Feb., 1899.

**Discipline "Fall Brook" System.**—Report on Discipline of Committee at Annual Meeting of American Society of Railroad Superintendents. A discussion of the relations of employer and employed, with commendation of what is known as the "Fall Brook" system. 1300 w. Ry Rev—Sept. 25, 1897.

**Discipline, Louisville and Nashville.**—Discipline on the Louisville and Nashville. An editorial giving considerable account of certain important modifications of the usual methods of discipline for railroad employees, as put in practice on this road. 1500 w. R R Gaz—March 6, 1896.

**Discipline Southern Pacific.**—Suspensions Abolished on the Southern Pacific. Description and illustration by example of a new system of discipline. 1600 w. R R Gaz—Aug. 7, 1896.

**Dispatcher.**—The Duties and Discretionary Powers of a Train Dispatcher. H. A. Dalby. Extracts from a paper read before the annual meeting of the Train Dispatchers' Assn. The things necessary to make the best dispatcher. 1400 w. R R Gaz—June 25, 1897.

**Education.**—Education of Railroad Men as Subordinates for the Maintenance of Way Service. Walter G. Berg. Abstract of paper before the Eastern Maintenance of Way Association, advocating the establishment of railroad trade schools at important centers. 1400 w. Eng News—Sept. 20, 1900.

Education of Railroad Men for Maintenance of Way. Walter G. Berg. Extracts from a paper before the Eastern Maintenance of Way Association, advocating the establishment of railroad trade schools and presenting an outline programme for such a school. 2500 w. R R Gaz—Sept. 21, 1900.

See also **EDUCATION—Railway; MECHANICAL ENGINEERING—Railway; RAILWAY ENGINEERING; RAILWAY SCHOOL.**

**Electric Train Staff.**—The Electric Train Staff. Abstract of Mr. Charles Hansel's paper before the Am. Soc. of Ry. Supts., at Niagara Falls. Ill. 3000 w. Ry Rev—Sept. 26, 1896.

**Engineers.**—Traveling Engineers—Their Duties and What They May Accomplish. C. E. Slayton. Read before the Northwest Railway Club. Discusses the work of the traveling engineer in great detail, and strongly recommends the extension of his authority with the operating department. 2500 w. Ry Rev—July 25, 1896.

Traveling Engineers—Their Duties and What They May Accomplish. C. E. Slayton. Abstract of a paper read before the Northwest Ry. Club. Gives the organization of their duties C & N. W. Ry. and strongly urges the value of their reports to the master mechanic. 2200 w. Ry Mas Mech—Aug., 1896.

**Engineers and Firemen.**—Rules Governing Engineers—The System in Force on the Soo Line by Which Engineers Engage Their Own Firemen. The rules are given fully in a copy of the letter addressed by the mechanical superintendent to each engineer in the company's service. 1800 w. Ry Age—May 30, 1896.

**Engineers or Road Foreman?**—Traveling Engineers or Road Foreman? An argument for giving traveling engineers authority in the operating department. 800 w. Ry Age—July 17, 1896.

**Firemen.**—Instructing Firemen. Editorial calling attention to some things firemen should be taught, and referring to the discussion to be held at the convention of the Traveling Engs. Assn. on "How can the traveling engineer best instruct and assist firemen in the economical firing of locomotives?" 1000 w. Loc Engng—Sept., 1898.

On Standard Form of Examination of Firemen for Promotion and New Men for Employment. Report of committee with discussion. 10000 w. Trav Engs' Assn Repts—Sept., 1896.

**Labor Organization.**—Labor Organization a Detriment to the Railroad Employé. William Gibson. Abstract of address before the Central Assn. of R. R. Officers. Enumerates some of the features of railroad labor organization which appear to be a disadvantage to the employé. 2500 w. Ry Mas Mech—Aug., 1896.

**Louisville and Nashville.**—See **Discipline.**

**N. Y., N. H. & Hartford.**—See **RAILWAY OPERATION.**

**Passenger Man.**—The Successful Passenger Man. George H. Daniels. States the five requisites to be knowledge of the line, industry, courtesy, promptness and honesty, and discusses each separately. 2000 w. Ry Age—May 9, 1896.

**Physical Examination.**—The Physical Examination of Employés. Henry F. Hoyt. Read before the tenth annual convention of the International Association of Railway Surgeons. An argument for a physical examination of all employés, with editorial. 3000 w. Ry Age—July 9, 1897.

**Physical Fitness.**—Physical Fitness of Employees. R. C. Richards. Read at meeting of the N. Y. State Assn. of Ry. Surgeons. Gives information obtained from special examinations, with views of the writer. 3800 w. Ry Age—Nov. 24, 1899.

**Police.**—A Railroad Police and Some of its Work. L. F. Loree. An address at meeting of the Railway Claim Agents. Gives an account of the trouble caused by people stealing rides, walking on track, and otherwise causing trouble to railroads, and of the police system maintained and its cost. 1800 w. R R Gaz—Oct. 14, 1898.

Railroad Police Organization and the Tramp Problem. Josiah Flynt. Read before the Cent. Assn. of R. R. Officers. An account of the great number of tramps continually on the railroads, and the history of the police service in vogue on one important railroad. 3500 w. St Louis Ry Club—Aug. 10. 1900.

See also **RAILWAY ACCIDENT—Tramps.**

**Prospects.**—The Young Man and His Chances of Success. M. M. Kirkman. An outline of the conditions attending railway operation in relation to the success of young men seeking employment therein. From the "Chicago World." 2200 w. Ry Rev—Jan. 30, 1897.

**Provident Institutions, India.**—Indian Railway Provident Institutions. Discussion of the system which insures a railway employee a competence upon being retired from service. 1500 w. Ind Engng—Dec. 28, 1895.

**Relation to Public.**—Relations of Railway Employés to the Public. Extract from an Ill. Cen. R. R. circular with comment by Mr. Harahan on the rule enjoining employés to report at once anything they may notice detrimental to the company's business, and to strive to accommodate the public. 800 w. Ry Age—May 9, 1896.

**Relief Associations.**—Railroad Relief and Beneficiary Associations. W. H. Baldwin, Jr. Address before the Am. Econ. Assn., Ithaca, N. Y. Considers the development of these features of railroad organization, and their bearing upon the relations between corporations and their employees. 4000 w. Ry Age—Jan. 12, 1900.

See also **Provident Institution.**

**Relief Department.**—Railway Departments for the Relief and Insurance of Employés. E. R. Johnson. A study of the railway relief department, the motives which prompted the establishment, the different organizations and history, the pension and superannuation feature, the savings feature, results accomplished and objections raised, special advantages, etc. Concludes that it is an institution of undoubted benefit to the employés, the railway companies, and the public. 1400 w. An of Am Acad—Nov., 1895.

Railway Relief Departments. Reviews information on this subject as presented by Mr. Emory R. Johnson, and published as "Bulletin No. 8 of the Dept. of Labor," at Washington, with comments. 4000 w. Eng News—June 8, 1897.

Railway Relief Department. Emory R. Johnson. Reviews their history, plan of organization, various features and results. 6300 w. Bull of Dept of Labor—Jan., 1897.

**Relief Department, B. & O.**—A Railroad Relief Department. L. W. Reilly. Believed to be the most complete account of the Baltimore & Ohio Relief Department and its results that has yet appeared. Serial. R R Gaz—March 20, 1896.

**Relief Department, Penn. R. R.**—The Pennsylvania Railroad Voluntary Relief Department. Gives in brief form the chief principles upon which the plan is formulated. 1100 w. R R Gaz—June 12, 1896.

**Roadmasters.**—Civil Engineers for Maintenance of Way. Jerry Sullivan. The writer does not consider that the education as a civil engineer equips a man for the position of roadmaster. The duties he may be called upon to perform are stated, and the training needed. 2700 w. Ry & Engng Rev—Jan. 28, 1899.

**Selection.**—The Systematic Selection of Employees. R. C. Richards. Considers the importance of having good employees, and suggests a plan. 1400 w. Ry Age—Feb. 23, 1900.

**Siberia.**—Wages and Living on the Siberian Railway. L. Lodian. An account of the poor pay of Russian railway employees and how they live. Ill. 1400 w. Loc Engng—Dec., 1899.

**Southern Pacific.**—See **Discipline; RAILWAY OPERATION.**

**Standard Code.**—See **RAILWAY OPERATION.**

**Sunday Traffic.**—Sunday Railway Traffic. L. S. Coffin. Pointing out the necessity for a rest day for railway men. 1000 w. Ry Rev—Jan. 2, 1897.

**Superintendent.**—The Division Superintendent and His Work. Defining the duties and responsibilities of a railroad superintendent, and commenting on an address before the Amer. Railway Assn., by Col. H. S. Haines, who says that if a man is held responsible, he should certainly have control of the work. 1800 w. Eng News—Jan. 9, 1896.

**Track Forces.**—Peorganization of the Track Forces on the Ohio River Railway. Gives particulars of a new system of dividing the labor in track maintenance, arranged to provide a more thorough inspection of track and economy in track repairs. Also editorial. 2500 w. Ry & Engng Rev—Sept. 9, 1899.

**Traveling Engineer.**—See **Engineer.**

**Vision.**—Examination for Defects of Vision. Dr. Charles H. Williams. Condensed paper read before the Am. Med. Assn., at Columbus, O. Tests in connection with the semaphore signal are discussed, also color perception tests, and methods used. 3200 w. R R Gas—Nov. 17, 1899.

Standards of Form and Color-Vision Required in Railroad Service. Charles H. Williams. A paper read at meeting of the American Opthalmological Society, in Washington. Some information of the standards of vision required on different roads, with discussion of what should be required, and suggestions. 5500 w. R R Gaz—Oct. 8, 1897.

### RAILWAY ENGINEERING.

See also **MECHANICAL ENGINEERING—Railway; RAILWAY CURVE; RAILWAY LOCATION; RAILWAY MAP; RAILWAY ORGANIZATION.**

A Railway Engineer. Reviews a criticism of American practice in "Indian Engineering," and defends the system of entrusting work to practical mechanics under expert engineering supervision. 1400 w. Ry Rev—Aug. 15, 1896.

Railway Engineering. Cecil B. Smith. The first of a series of papers to appear later in book form. The papers will deal chiefly with location, construction and maintenance. Serial. Can Eng—May, 1897.

**Department.**—See **RAILWAY ORGANIZATION.**

**Education.**—The Profession of the Railway and a Suggested Course of Training Therefor. George B. Leighton. Read before the N. Y. R. R. Club. The author's ideas are presented and the paper followed by a lengthy discussion. 3300 w. N Y R R Club—Jan. 21, 1897.

See also **EDUCATION; MECHANICAL EDUCATION—Railway; RAILWAY SCHOOL; RAILWAY EMPLOYEE.**

**English Practice.**—Observations of English Railway Practice, with Some Account of the Fifth Session of the International Railway Congress. George B. Leighton. Read before the club, Jan. 8, 1896. 7000 w. Jour Assn of Engng Soc—Jan., 1896.

**Location.**—See **RAILWAY LOCATION.**

**Map.**—See **RAILWAY MAP.**

**New South Wales.**—Railway Practice in N. S. W. H. B. Howe. Presidential address to the Engng. Assn., of N. S. W. Part first gives information relating to the engines used. Serial. Aust Min Stand—March 29, 1900.

**Slide Rule.**—See **SLIDE RULE—Railway Surveying.**

**Traffic and Economic.**—Railway Engineering, and Its Relation to Traffic and Economic Conditions. E. E. Russell Tratman. A discussion of this branch, showing the important relations which it bears to railway operation and the railway system in general. 5400 w. Wisconsin Engr—Jan., 1899.

### RAILWAY EQUIPMENT.

See also **AIR BRAKE; CAR; CAR COUPLER; LOCOMOTIVE; RAILWAY MATERIAL; ROLLING STOCK; TRAIN.**

The Increased Cost of Railway Equipment. Tabulated information of prices in 1898 and 1900 for material entering into the construction and repair of locomotive and car equipment. 1000 w. Ry Age—March 9, 1900.

**Economies.**—Fads, Customs and Their Cost. R. P. C. Sanderson. A paper and discussion on the points where savings can be made in the maintenance of equipment, without impairing the efficiency. 20500 w. N Y R R Club—Dec. 16, 1897.

See also **RAILWAY.**

**Repairs.**—See **RAILWAY SHOP.**

**Rolling Stock.**—See **CAR; LOCOMOTIVE; ROLLING STOCK; TRAIN.**

**Safety Appliance.**—Progress in Adopting Safety Appliances in Railway Equipment. Edward E. Moseley. A statistical article showing the percentage of total equipment already fitted, and reviewing existing and pending legislation. 1300 w. R R Car Jour—June, 1896.

See also **AIR BRAKE; BRAKE; BLOCK SIGNAL; CAR COUPLER; GRADE CROSSING; INTERLOCKING; RAILWAY SIGNAL; RAILWAY SWITCH.**

**Safety Appliance Law.**—Extension of Safety Appliance Law. On the order for extending for two years the time within which the U. S. railroads must comply with this law, with digest of arguments. 1500 w. R R Car Jour—Jan., 1898.

**Salt Water Drippings.**—Injury Caused by Salt Water Drippings. Rather startling report of injury to cars, tracks, bridges, etc, from the salt drippings from refrigerator cars. 3000 w. Pro Cent Ry Club—March, 1896.

### RAILWAY EXHIBITION.

See also **LOCOMOTIVE EXHIBITION; PARIS EXPOSITION; RAILWAY MUSEUM.**

**Budapest, 1896.**—The Railway Exhibits at the Millennial Exposition at Budapest, 1896 (Das Eisenbahnwesen auf der Millenniums-Landesausstellung in Budapest, 1896). Description of roadway and locomotives, with details of compound locomotives and plate for four-cylinder tandem compound engine. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 9, 1897.

**France at Paris.**—The State Railways of France at the Paris Exhibition. Illustrates and describes the exhibits of the Administration of State Railways in France. Serial. Engng—July 6, 1900.

### RAILWAY FAST TRAIN.

See **FAST TRAIN; LOCOMOTIVE PERFORMANCE; RAILWAY OPERATION.**

### RAILWAY FINANCE.

See also **RAILWAY CONSOLIDATION; RAILWAY EARNINGS; RAILWAY MANAGEMENT; RAILWAY POOLING; RAILWAY RATES; RAILWAY STATISTICS; RAILWAY TRAFFIC.**

Problems of Railway Management. Henry Clews. The causes for diminution in value of railway investments, the evils from interference of legislation, etc. 2400 w. Gunton's Mag—Nov., 1896.

**Accounting, Graphic Methods.**—Graphic Methods as

Applied to Railway Records. Tracy Lyon. Read before the Northwest Ry. Club. Describes the method and demonstrates its value. 1800 w. Ry & Engng Rev—March 26, 1898.

The Use of Graphical Methods in Keeping the Accounts of Railway Mechanical Departments. An advocacy of the system, with illustration taken from a large western road. 900 w. Am Eng & R R Jour—June, 1896.

**Accounting, Physical Aspect.**—The Physical Aspect in Railroad Accounting. Thomas F. Woodlock. Maintaining that railroad reports should show character and composition of business, and circumstances surrounding its handling. 3300 w. Eng Mag—June, 1897.

**America.**—See **United States.**

**Atchison, Topeka & Santa Fé.**—The Atchison, Topeka & Santa Fé Railway Company. Report for the fiscal year ending June 30, 1897, with editorial comment. 4500 w. Ry Age—Sept. 24, 1897.

**Auditing.**—Duties of the Traveling Auditor. J. Shirley Eaton. Extracted from the "Railway Agent and Station Agent." States briefly the personal qualities and preparation desirable, and considers the duties and manner of fulfilling them. 2400 w. Ry & Engng Rev—Oct. 29, 1898.

**Australasia.**—The Cost of the Australasian Railways. Editorial remarks on the information furnished by Mr. Price Howell to the Royal Statistical Soc. 1400 w. Engng—Feb. 24, 1899.

**Australia.**—Colonial Railway Management. Commendatory of the Austrian railways, giving results as taken from the annual report of 1896-97. 1500 w. Trans—Oct. 8, 1897.

**Baltimore & Ohio.**—Little's Baltimore & Ohio Report. Mr. Stephen Little, the noted expert in railroad accounting, was employed to make an investigation of the company's financial affairs. The article comments on this report. 1100 w. Bradstreet's—Dec. 12, 1896.

**Bankruptcies.**—See **Receiverships.**

**Belgium.**—Railways of Belgium. Historical review, table of mileage and balance sheet of receipts and disbursements. 1800 w. U S Cons Repts—Oct., 1896.

**British.**—Are British Railroads Good Investments? Thomas F. Woodlock. Showing the ratio of capital to revenue and of operating expenses to earnings in the administration of British railroads, and maintaining that the decreasing percentage of dividend and the steady increase in operating expenses point to a decline of confidence in the security of British railroad shares. 4700 w. Eng Mag—May, 1896.

British Railway Stocks as Desirable Investments. William J. Stevens. Answering Mr. Thomas F. Woodlock's arguments against investment in English railroads. 4700 w. Eng Mag—Aug., 1896.

Railways of the United Kingdom. Analytical comparison of British railway returns, of construction, traffic and revenue, with charts. 1000 w. Ry Wld—Oct., 1896.

The Recent Prosperity of British Railways. William J. Stevens. Showing the extent and causes of the greater returns from British railway investments since June 1, 1895. 4400 w. Eng Mag—May, 1897.

British Railway Profits. An editorial review of the traffic returns and working expenditure. 1800 w. Engng—Sept. 22, 1899.

British Railway Finance. The benefit to English railway interests due to distrust of foreign securities is discussed, and the results of investing the capital in British railways are declared satisfactory. 700 w. Engng—Oct. 16, 1896.

British Railway Returns. Editorial on the Board of Trade return for the year ending Dec., 1897. The traffic is unprecedented both in volume and revenue. 1500 w. Engng—Oct. 21, 1898.

English Railroad Prosperity. A review of the substantial basis for present prosperity of the English railroads. 1100 w. Bradstreet's—Aug. 29, 1896.

Home Railways as Investments. A discussion of the indications that English railways as investments are coming again into favor. 3700 w. Trans—Oct. 1, 1897.

The Home Railway Half-Year. Report of results of the half-year's working of the principal English railways, showing general prosperity. 3000 w. Trans—Aug. 13, 1897.

**British, 1895.**—British Railroad Statistics in 1895. Abstract of Board of Trade returns. 700 w. R R Gaz—Oct. 9, 1896.

A Thousand Millions in British Railways. A review and analysis of the Board of Trade report, especially as to capital additions and the traffic receipts for 1895. 2200 w. Trans—Oct. 9, 1896.

**British, 1896.**—British Railroads for 1896. Editorial on the railway returns recently published, which indicate great prosperity. 1000 w. R R Gaz—Sept. 10, 1897.

British Railways in 1896. William J. Stevens. A survey of the year's railway working and results, confined mainly to the principal English and Welsh companies. 4200 w. Bankers' Mag, Lond—March, 1897.

**Central Pacific.**—The Central Pacific Settlement and Readjustment. On the plan for the readjustment of the corporation's finances as agreed upon. 900 w. Bradstreet's—Feb. 25, 1899.

**Decline in Rates and Profits.**—Decline in Railway Rates and Profits. John Moody. Claims that while the actual return on capital has materially decreased, the actual return on money has not fallen off in the same ratio. Discusses the wealth-cheapening tendency and its cause. 1800 w. Gunton's Mag—Jan., 1899.

**Denver & Rio Grande.**—Eleventh Annual Report of the Denver & Rio Grande R. R. Summary of operations presented to the stockholders by E. T. Jeffrey, with editorial. 1500 w. Ry Rev—Oct. 23, 1897.

**Dividends.**—New Railroad Dividends. Editorial discussion of recent declarations, and the roads announcing an increase. 1200 w. R R Gaz—March 2, 1900.

**Earnings.**—See **RAILWAY EARNINGS.**

**Foreclosures.**—See **Receiverships.**

**France.**—The Administration of Six Great French Railway Systems (Quelques Chiffres sur l'Exploitation des six Grand Reséaux Français). A comparative study of financial management with diagrams and tabulated statements. 2500 w. 1 plate. La Rev Tech—Sept. 10, 1897.

**France, 1897.**—The Railways of France (Chemins de Fer Français). A review of the financial workings of the French railways during 1897, with comments on the rates and character of the business. 2000 w. Moniteur Industriel—May 21, 1898.

**France, 1899.**—Earnings and Operating Expenses of the French Railways for 1899 (Chemins de Fer Français Recettes et Dépenses d'Exploitation en 1899). Abstracts of company reports, with table of gross earnings and operating expenses. 1000 w. Moniteur Industriel—June 2, 1900.

**Fraudulent Management.**—See **RAILWAY MANAGEMENT.**

**Germany.**—German Railway Working, 1895-96. Statistics taken from report issued by the Imperial Railway Department. 1200 w. Eng, Lond—May 28, 1897.

**Illinois Central.**—Illinois Central Railroad Company. Extracts from the forty-seventh annual report of the directors to the stockholders, with editorial comment. 7000 w. Ry Age—Sept. 10, 1897.

**India.**—Some More Facts About Indian Railways. Information from the Administration Report on the Railways of India for the year 1896-97 prepared by the director-general of railways. Also table showing the position of all the principal railways as regards net earnings, and the percentage of net earnings to capital expenditure in the past two years. 1400 w. Trans—July 16, 1897.

The East Indian Railway Report for Latter Half of 1897. Comment and statistics based on the latest report of the Board of Directors of the East Indian Railway, which show a prosperous year in spite of the plague and famine. 800 w. Ind Engng—Oct. 1, 1898.

The Government Purchase of the Great Indian Peninsula Railway. Information concerning the causes of delay in the acquisition, and related matter. 1500 w. Transport—Aug. 31, 1900.

The East Coast State Railway. S. R. E. Observations on the present situation, analyzing the financial results so far obtained. 1000 w. Ind Engng—Jan. 28, 1899.

The Railroads of India. Editorial review of condition as based upon the administration report. 1200 w. R R Gaz—Jan. 8, 1897.

The Railways and Trade in India. Discusses the decrease caused by the famine and plague. The report of passenger traffic is generally favorable. 1600 w. Engng—Aug. 20, 1897.

See also **RAILWAY; RAILWAY MANAGEMENT.**

**India, 1897.**—Indian Railway Property. Review of the experiences of the year, which were greatly affected by the pestilence, famine and war in some districts. 1800 w. Engng—Dec. 24, 1897.

**Ireland.**—Irish Railway Property. Information upon the finances of the three trunk companies which represent largely the railway network of the country. 1400 w. Engng—Feb. 25, 1898.

**Lake Shore and Michigan Central.**—The Reports of the Lake Shore and the Michigan Central. A statistical review of mileage, passenger and ton-mile, expenses and earnings. 800 w. R R Gaz—May 15, 1896.

**Lake Shore & Michigan Southern.**—Statistics—Lake Shore & Michigan Southern Railway Company—Twenty-sixth Annual Report. The statistics are of freight and passenger traffic, earnings and expenses annually for twenty-five years, and are used to point an editorial in favor of absolute maintenance or material advance of rates. 1200 w. Ry Rev—May 9, 1896.

**Lake Shore, Refunding.**—A Pivotal Movement in Finance. A discussion of the Lake Shore Railway refunding plan and its effect. 1000 w. Bradstreet's—March 13, 1897.

**Lehigh Valley, 1896.**—Annual Report of the Lehigh Valley R. R. The results of a year which was unprofitable to nearly all the anthracite coal carrying roads, with brief review of new lines, etc. 1600 w. R R Gaz—Jan. 22, 1897.

**New South Wales.**—The Railways of New South Wales. A review of the year's results, revenues, expenditures and rates, with some general comments. 1400 w. Trans—Sept. 18, 1896.

See also **RAILWAY.**

**N. Y. Central Refunding.**—New York Central Refunding. A statement of the plan in brief. 500 w. Bradstreet's—April 17, 1897.

**New Zealand.**—Railway Results in New Zealand. Facts from report of Mr. Cadman, Minister of Railways, showing the results of the past year to be very satisfactory. 1200 w. Transport—Dec. 10, 1897.

The Railway Year in New Zealand. Tabulation and review of earnings, mileage, traffic, etc. 1500 w. Trans—Sept. 11, 1896.

**Operating Expenses.**—A Method of Examining Operating Expenses. J. Shirley Easton. Suggestions for making expense returns, with explanations. Serial. R R Gaz—March 17, 1899.

See also **RAILWAY OPERATION.**

**Pennsylvania, 1897-98.**—Railways and Prosperity. Extract from the report on the railways of Pennsylvania for the year ending June 30, 1898, prepared by Isaac B. Brown, superintendent of the Bureau of Railways. 3600 w. Ry Age—Dec. 16, 1898.

**Phil. & Reading Reorganization.**—The Reading Plan at Last. A radical departure in railroad organization, which is expected to place the Philadelphia & Reading railroad on a solvent basis. 1400 w. Bradstreet's—Dec. 21, 1895.

**Prussia.**—The Budget of the Royal Prussian State Railway Administration for 1898-99 (Der Etat der Königlich Preussischen Eisenbahn-Verwaltung für das Jahr, 1898-99). Giving tabular estimates for the coming year in comparison with those of the past, with details of proposed expenditures and operations. 8000 w. Stahl und Eisen—Feb. 1, 1898.

The Prussian State Railroads. Editorial on report recently issued recording the results from the new organization in force since April 1, 1895. 1350 w. R R Gaz—April 9, 1897.

**Queensland.**—The Railways of Queensland. Report of the past year showing increase in earnings and improvements under discussion. 1800 w. Trans—Nov. 19, 1897.

See also **RAILWAY.**

**Receivership.**—Railway Receiverships and Reorganizations. Abstract of President Moorfield Story's address before the American Bar Assn. Methods at present in vogue. A statute designed to correct some of the evils in this connection was recently enacted in Kentucky and formed the text of the speaker's remarks. 1400 w. Ry Rev—Aug. 22, 1896.

**Receiverships, 1896.**—Railroad Bankruptcies in 1896. Records of the year's foreclosures and receiverships are presented with comment. 900 w. Bradstreet's—Jan. 9, 1897.

Receivership and Foreclosures in 1896. The record for the year shows an increase in the number and mileage of roads placed in the hands of receivers, although the capitalization involved is less. 800 w. Ry Age—Jan. 1, 1897.

**Receiverships, 1897.**—Receiverships and Foreclosure Sales in 1897. A remarkable decrease. No year since 1887 has shown so few roads or so small mileage confessing insolvency. 900 w. Ry Age—Dec. 31, 1897.

**Receiverships, 1898.**—The Movement in Receiverships during 1898. Editorial presenting facts showing that the railroads have practically recovered from the panic of 1893, and that it is probable that the railroad mileage in the hands of receivers will soon be as low as it ever has been in the history of the United States. 1500 w. R R Gaz—Jan. 6, 1899.

**United States.**—An English View of Our Railways. W. M. Acworth, in the London "Times." Considering the financial aspects of American roads. 3200 w. Ry Age—April 20, 1898.

Mr. Acworth on American Railroads. Extracts from the fourth of a series of articles in the London "Times." Considers the financial position of American railways and concludes that at least in the northeastern section they have reached a comparatively stable and prosperous position. 2000 w. R R Gaz—April 29, 1898.

Conditions Affecting the Future of Our Railroads. George B. Leighton. Notwithstanding the merited or unmerited adversity brought upon railroads by the recent commercial depression, an examination into the present status of railroads in the United States, leads the author to conclude that very many of the lines at present constructed will prove safe investments as to their bonds, and many of them will regularly pay fair returns on their stock. 2200 w. R R Gaz—April 10, 1896.

The Increased Confidence in American Railroad Securities. Thomas F. Woodlock. Showing that railroads should not, by the issue of long-term bonds, sacrifice advantages arising from future improvement in credit. 3200 w. Eng Mag—May, 1897.

The Present Railway Situation. H. T. Newcomb. Gives a summary of the situation and enumerates some of the changes which the writer believes necessary to a satisfactory solution of the problem in America. 3300 w. N Am Rev—Nov., 1897.

The Profits of United States Railways. Editorial. Some interesting comments upon American railway securities. Compares the rates, traffic, etc., on American with that on English roads. The editor offers an explanation as to why the stocks are dealt in principally from a speculative point of view, in the London market. 2500 w. Engng—Feb. 14, 1896.

The Railroads of the United States. Reasons why American railroad shares do not readily find a market in England, with review of results for the last three years as given in "Poor's Manual." 1500 w. Trans—Sept. 24, 1897.

See also **Receiverships.**

**United States, 1896-97.**—The Country's Railroads. Some remarks on the statistics for the year ending June 30, 1897, which show how the railroads suffered from the effects of the disturbance of credit and shrinkage of business during that trying year. 800 w. Bradstreet's—Aug. 27, 1898.

## RAILWAY GRADE.

See also **RAILWAY CONSTRUCTION; RAILWAY LOCATION; RAILWAY OPERATION; RAILWAY PERMANENT WAY; SWITCHBACK.**

**Elimination.**—See **RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY.**

**Madison Hill, Indiana.**—The Madison Hill Incline; P., C., C. & St. L. Ry. Edward Grafstrom. Historical sketch on the origin and development of engineering on the Madison Hill at Madison, Ind. Ill. 3600 w. Eng News—June 10, 1897.

**Velocity.**—The Uses of Momentum Grades. William G. Raymond. A letter discussing some of the features involved in the theory and practice of using the momentum of the train in surmounting grades. 1100 w. R R Gaz—April 17, 1896.

The Theory of Velocity Grades. Charles C. Wentworth. Mathematical demonstrations of the advantages in handling tonnage in connection with velocity grades. 1100 w. R R Gaz—Dec. 8, 1899.

Momentum Grades. C. Frank Allen. Explains the principle involved in the use of these grades, and discusses the objections to their indiscriminate use. 2400 w. R R Gaz—Jan. 12, 1900.

Theory of Velocity Grades. Two letters to the editor criticising Mr. Wentworth's explanation, and his tractive force formula. 2000 w. R R Gaz—Jan. 26, 1900.

The Theory of Velocity Grades. Letters from Charles C. Wentworth, and C. Frank Allen, in further discussion of this subject. 2200 w. R R Gaz—Feb. 16, 1900.

**RAILWAY HISTORY.**

See **RAILWAY—History.**

**RAILWAY IMPROVEMENT.**

See **RAILWAY BUILDINGS; RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY; RAILWAY STATION; RAILWAY TERMINAL.**

**RAILWAY LANDS.**

**California Mineral.**—Railroad Absorption of Mineral Lands in California. A. H. Ricketts. Explains the situation by which the Southern Pacific Railroad Co. have gained possession of mineral lands in California. 1000 w. Eng & Min Jour—Sept. 26, 1896.

**RAILWAY LEGISLATION.**

See also **ELECTRIC RAILWAY—Legislation; RAILWAY COMMISSION; RAILWAY POOLING; RAILWAY RATES; RAILWAY TRAFFIC.**

The People and the Railroads. J. B. Flemming. Argument before the Georgia railroad commission which clearly sets forth the relations of the railroads, the people, and the state. 1500 w. Mfrs Rec—Oct. 1, 1897.

The Railway Problem. I. The Legislative Solution. Lloyd Bryce. II. A Mercantile View. James J. Wait. A review of the past and present condition of railroads is given by Mr. Bryce, with presentation of the difficulties, and the remedies suggested. Mr. Wait recommends educating the people to be honest with railroads, discusses existing conditions and suggests solution of the problem. 7500 w. N Am Rev—March, 1897.

**Anti-Scalper.**—New York Anti-Scalper Law Dead. The opinion rendered by the New York Court of Appeals, with editorial. 4500 w. R R Gaz—Dec. 2, 1898.

The Anti-Scalping Bill. Editorial report of the statements of George W. Boyd, of the Pennsylvania Road, and Messrs. Daniels, King and Dill. 1400 w. R R Gaz—Jan. 14, 1898.

**Anti-Scalping.**—See also **Rate-Cutting; RAILWAY TRAFFIC—Scalping.**

**Anti-Trust.**—Railroad Agreements Under the Anti-Trust Law. Discusses the decision in the action brought by the United States Government against the Trans-Missouri Freight Assn. Also some of the effects of the decision. 2200 w. Bradstreet's—March 27, 1897.

The Scope and Effect of the Anti-Trust Act. From the "Yale Review." A brief review of railroad history in this connection and a discussion of the legislation on this subject in the United States, as compared with England. 1200 w. R R Gaz—Dec. 9, 1898.

See also **Trans-Missouri Decision; RAILWAY COMMISSION; RAILWAY POOLING; RAILWAY TRAFFIC.**

**Arbitration.**—The Federal Arbitration Law. Abstract of the arbitration bill of Senator Kyle which has passed through congress, with brief editorial comment. 1500 w. R R Gaz—May 27, 1898.

**British.**—State Regulation of Railroads in Great Britain. Editorial on the Fishguard scheme and the action of the British Parliament. 1200 w. R R Gaz—Sept. 23, 1898.

The Preparation of Parliamentary Plans for Railways. Harnett John Fuller. The aim of the author is to explain those methods which he has found to minimize errors. Serial. Engr, Lond—Nov. 5, 1897.

**British Coal.**—The Law Respecting Freight for the Carriage of Coal. British law concerning the principles relating to contracts of affreightment, illustrated by cases. 4000 w. Col Guard—March 4, 1898.

**Brown Case.**—The Supreme Court Decision in the Brown Case. A short editorial discussion of the recent decision in this celebrated case. This is the case which has been fought for some years between the Interstate Commerce Commission and the railroads, involving the right, under the constitution, of a witness to refrain from giving incriminating testimony. The Supreme Court of the United States now upholds the Interstate Commerce Commission in the contention that officers of the railroads must give testimony and rely upon the provisions of the law of Feb. 11, 1893, for protection. 1100 w. R R Gaz—April 3, 1896.

**Canadian Pacific.**—See **RAILWAY RATES.**

**Charter Rights.**—An Atlanta View of the Railroad Situation. Review of the political bearings of the railroad situation, especially as regards charter rights. 1200 w. Mfrs Rec—Aug. 21, 1896.

**Chicago Decision.**—See **RAILWAY RATES.**

**Commission.**—See **Interstate Commerce; RAILWAY COMMISSION.**

**Competition.**—The Failure of Legislation to Enforce Railway Competition. H. T. Newcomb. After reviewing the experience of the U. S. under the Interstate Commerce Law, it is shown that other countries do not consider railway competition the correct method of establishing rates. The true competition is that of actual trade, not transportation. 3000 w. Eng Mag—Dec., 1897.

**Connecticut.**—Railroad Legislation in Connecticut. Reviews the 16 acts passed during the present year. 800 w. R R Gaz—July 16, 1897.

Railroad Interests in the Connecticut Legislature. Clarence Deming. A statement of legislation affecting the steam and trolley interests in the state. 2500 w. R R Gaz—July 28, 1899.

See also **ELECTRIC RAILWAY.**

**Demurrage.**—See **RAILWAY TRAFFIC.**

**Eau Claire Lumber Rate.**—See **RAILWAY RATES—Lumber.**

**Florida.**—Florida's Railway Bill. A law to discourage railway investment in the state of Florida, also editorial. 3000 w. Ry Age—May 14, 1897.

**Free Cartage.**—A Free Cartage Decision. Review of an Interstate Commerce Commission order prohibiting free cartage by the D., G. H. & M. railroad at Grand Rapids, and of a circuit court decision affirming the order, with an editorial discussion strongly urging the demoralizing influence of the practice. 1400 w. R R Gaz—April 24, 1896.

**Illinois.**—Necessary Railroad Legislation. Recommendation of the Illinois Railroad and Warehouse Commission that legislative enactment should be passed, restraining unnecessary and destructive new roads. Text and editorial comment. 1600 w. Ry Rev—May 2, 1896.

**Import Rate Case.**—Mr. Justice Harlan's Dissenting Opinion in the Import Rate Case. An abstract. The Justice holds that the import rate is a discrimination against the native, putting him at the mercy of foreign combinations. 800 w. Ry Rev—May 9, 1896.

**Interstate Commerce.**—A Decade in Federal Railway Regulation. H. T. Newcomb. Abstract of paper read at meeting of Am. Economic Assn. Discusses the effect of the Interstate Commerce law. 1000 w. Ry Rev—Feb. 27, 1897.

A Decade of Railway Regulation. Henry C. Adams. A review of the ten years' experience with the Federal Act to regulate commerce. 6400 w. Atlantic M—April, 1898.

Interstate Commerce Law. Violations of the Act to Regulate Commerce. Judge Grosscup's Charge to the Jury in the Hanley Case. The charge is given in full on account of the complete statement of the law and the facts in the case. With editorial comment. 4900 w. Ry Rev—Jan. 16, 1897.

Judge Knapp on the Present Status of the Law. Gives views of Hon. Martin A. Knapp as given in a lecture and informal talk at the Univ. of Pennsylvania. 1000 w. R R Gaz—Dec. 30, 1898.

Proposed Changes in the Act to Regulate Commerce. Editorial discussion of the bill introduced in the Senate of the United States by Mr. Cullom. 1500 w. Ry & Engng Rev—Jan. 29, 1898.

The Effect of the Interstate Act. W. P. Clough. Read before the National Convention of Railroad Commissioners. The communication attributes rate cutting to the influence of important shippers, and deprecates the effect of the Interstate Commerce Act in maintaining rates. 3500 w. Ry Age—May 23, 1896.

The Latest Interstate Commerce Decisions. Editorial comment on the decision dealing with the question of the power of the commission to fix rates, and other decisions of the Supreme Court. 1300 w. Bradstreet's—May 29, 1897.

The Necessity of Limiting Railway Competition. H. T. Newcomb. While credit is given to the Interstate Commerce Law for much good during the nine years it has been n force, it is thought that the effect of preventing railroads from mitigating by agreement the force of competition for traffic, was unanticipated and is undesirable. An argument for legislation to remove this disability, follows. 1800 w. N Am Rev—July, 1896.

The Proposed Changes in the Law to Regulate Commerce. Milton H. Smith. The objections of the writer to the proposed changes relating to the long and short haul. Also editorial. 3000 w. Ry & Engng Rev—Feb. 19, 1898.

The Railroads and the Interstate Commerce Law. Address of M. E. Ingalls at the convention of the Railroad Commissioners at Washington. Discusses the difficulties and the changes in legislation needed. 3800 w. Ir Age—July 7, 1898.

Address of M. E. Ingalls before the Convention of Railroad Commissioners. Discusses the maintenance of tariffs, and the changes that should be made in the present legislation. 3500 w. Ry Age—May 13, 1898.

Is the Interstate Commerce Act a Failure? From the Chicago "Herald." Views of various officials. 1400 w. Ry Rev—Feb. 13, 1897.

Amendments to the Interstate Commerce Law. Editorial comment on the general good and harm of the act, with examination of the amendments. 1800 w. R R Gaz—Jan. 1, 1897.

The Shipper and the Law. From the circular of the Kansas City transportation bureau calling attention to the liability of shippers under evasions of the interstate commerce law. 500 w. Ry Age—April 25, 1896.

See also **RAILWAY COMMISSION; RAILWAY RATES.**

**Joint Traffic Association.**—Joint Traffic Association Declared Illegal. The decision of the U. S. Supreme Court against the railroads, with editorial comment. 3300 w. R R Gaz—Oct. 28, 1898.

The Railroads and the Joint Traffic Decision. Discusses the power of Congress over railroad traffic and the effect of the recent decision of the U. S. Supreme Court. 1800 w. Bradstreet's—Oct. 29, 1898.

The Government's Argument in the Joint Traffic Association Injunction Suit. An abstract of the government's position, as presented by Dist. Atty. Wallace Macfarlane, with editorial. 2800 w. R R Gaz—May 15, 1896.

The Joint Traffic Association's Defense. A synopsis of Mr. James C. Carter's brief for the defense, in the suit brought by the Government to dissolve the association. With editorial review. 4000 w. R R Gaz—May 22, 1896.

The Joint Traffic Association Sustained. Substance of Judge Wheeler's decision, denying the Government's motion for an injunction. With editorial. 2500 w. R R Gaz—June 5, 1896.

See also **Trans-Missouri; RAILWAY TRAFFIC—Association.**

**Kansas.**—New Railroad Law in Kansas. Gives the principal provisions of the new bill. 1800 w. Ry Age—Jan. 13, 1899.

See also **RAILWAY RATES.**

**Kentucky.**—See **RAILWAY FINANCE—Receivership.**

**Long and Short Haul.**—The Long and Short Haul Clause Again. Comments on the decision rendered by the Supreme Court of the United States in the case of the Interstate Commerce Commission against the Alabama Midland and the Georgia Central Railroad Companies and others, arising out of complaints made by the citizens of Troy, Alabama. 1200 w. Bradstreet's—Nov. 13, 1897.

"The Long and Short Haul Clause Invalidated." A Criticism. Milton H. Smith. A letter called forth by an editorial on the Alabama Midland decision. 3500 w. Ry & Engng Rev—Dec. 4, 1897.

**Lynchburg Case.**—Discrimination Under the Short Haul Clause. Summary of the Lynchburg case, with Interstate Commerce Commission ruling, denying the right to maintain higher rates for a shorter haul, even when the disproportion is caused by competitive reductions at the farthest point. 900 w. Bradstreet's—Sept. 5, 1896.

**Massachusetts.**—Railroad Legislation in Massachusetts. Editorial on the railroad policy of this state, as shown in the recently passed law to help the Boston & Maine road to retain control of its leased lines, and the discussion during its passage. 1400 w. R R Gaz—April 8, 1898.

Railroad Legislation in Massachusetts. A review of the large amount of railroad legislation presented at the last session. 3000 w. R R Gaz—June 25, 1897.

**Michigan Mileage Case.**—The Michigan Mileage Case. Extracts from the opinion of the United States Supreme Court, with editorial comment. 4700 w. Ry Age—April 28, 1899.

**Milk Rate Decision.**—See **RAILWAY RATES—Milk.**

**Nebraska.**—Has the Supreme Court Pronounced the Nebraska Law Unconstitutional? Editorial discussion of Justice Harlan's decision. 1800 w. R R Gaz—March 18, 1898.

State Regulation of Railways. Harry Perry Robinson. Discusses the effect of the decision of the United States Supreme Court in what is known as the Nebraska Maximum Rate case. 3300 w. N Am Rev—April, 1898.

The Supreme Court on the Nebraska Freight Rate Law. Editorial on the decision which nullified the Newberry freight-rate law, and the efforts being made to have it modified. 1600 w. R R Gaz—April 15, 1898.

**New York.**—Railroad Legislation in New York State. Summary of bills affecting railroad interests passed by the N. Y. legislature in 1896. 1000 w. R R Gaz—June 5, 1896.

Railroad Legislation in New York. Reviews the 15 bills affecting railroads, which have been passed during the past year. 1500 w. R R Gaz—June 25, 1897.

**Pooling.**—See also **RAILWAY POOLING.**

**Pooling Bill.**—The Pooling Bill. Communication to the Committee on Interstate and Foreign Commerce, with editorial comment. 3400 w. Ry Rev—Feb. 6, 1897.

**Rate.**—Another Supreme Court Decision. Editorial comment on the decision that the Interstate Commerce Commission has no power to prescribe rates. 1400 w. R R Gaz—May 28, 1897.

See also **RAILWAY RATES.**

**Rate Cutting.**—Can Rate Cutting Be Prevented by Injunction? Opinion of Judge Somonton. The opinion is adverse to the court's power of interference in the case as presented, but implies that the limitations are from the special circumstances and not from general principles of law. 1900 w. Ry Age—Sept. 4, 1896.

Injunction Against Rate Cutting. Summary of the petition in the new proceedings and of the order of Judge Speer granting the injunction. 1000 w. Ry Age—Sept. 18, 1896.

See also **Anti-Scalping; RAILWAY RATES—Cutting.**

**Reparation.**—Reparation Under the Act to Regulate Commerce—Opinion and Order of the Commission. The opinion is given in full; also editorial. 5700 w. Ry Rev—Dec. 7, 1895.

**Safety Appliances.**—See **RAILWAY EQUIPMENT.**

**Separate Car.**—Supreme Court on the Separate Car Law. A review of Justice Harlan's dissenting opinion. The review severely criticises the law. 1100 w. R R Gaz—June 19, 1896.

**South Dakota.**—South Dakota Railroad Law. Summary of the provisions of the act passed by the last legislature, to regulate common carriers, etc. 1800 w. R R Gaz—April 30, 1897.

**Switzerland.**—The Regulation and Nationalisation of the Swiss Railways. Hans Dietler. Part first reviews the development of the railways, and the legislation affecting them up to 1872. Serial. An Am Acad—March, 1899.

The Nationalization of Swiss Railroads. W. M. Acworth. Extracts from a paper written for the "Economic Journal." Gives an outline of the organization for the government of railroads, and discusses the prospects. 1300 w. R R Gaz—July 8, 1898.

See also **RAILWAY.**

**Taxation.**—Taxation of Railroads. Editorial discussion of the report of the special New Jersey Tax Commission. 2000 w. R R Gaz—Feb. 12, 1897.

Taxation: Methods of Taxing Railroads in the Various States. From the annual report of S. R. Billings, Railroad Commissioner of Michigan. Gives the information in condensed form. 1800 w. R R Gaz—Jan. 15, 1897.

**Texas.**—Judicial Construction of the Texas Anti-Rebate Law. Gives the construction of Judge Howard Templeton of the District Court at Sulphur Springs. 1600 w. Ry Age—Sept. 8, 1899.

See also **RAILWAY COMMISSION.**

**Texas Cotton Tariff.**—The Decision in the Texas Commission Cases. Decision rendered by Judge A. P. McCormick. A complete victory for the railroads. 2800 w. Ry Age—Dec. 9, 1898.

**Trans-Missouri Decision.**—Full Text of the Trans-Missouri Freight Association Decision. 19500 w. Ry Age—March 26, 1897.

The Trans-Missouri Decision. George R. Blanchard. Presents the public necessity for legalized railway compacts; argues that they do not and will not unreasonably restrain trade or commerce; and that their intent is an important feature of their creation, in practice if not in law. 3500 w. Forum—June, 1897.

See **Anti-Trust; Joint Traffic; RAILWAY COMMISSION; RAILWAY POOLING; RAILWAY TRAFFIC.**

**United States.**—A Decade in Federal Railway Regulation. H. T. Newcomb. Discusses the causes that led to the passage of the Interstate Commerce Law, and the measure of success that has resulted in the ten years since its enactment. 3500 w. Ap Pop Sci M—Oct., 1897.

Prospects for Railway Legislation at Washington. Editorial discussion of bills likely to be brought before Congress, relating to pooling, ticket scalping, freight equipment, etc. 2500 w. R R Gaz—Dec. 16, 1897.

**Venezuela.**—Railroad Laws in Venezuela. A translation of the new law on railroad construction, which grants subsidies and other favorable concessions. 2800 w. U S Cons Repts—Nov., 1897.

**RAILWAY LOCATION.**

See also **RAILWAY CURVE; RAILWAY ENGINEERING; RAILWAY MAP.**

From Trade to Profession—Advances in American Railway Location. William G. Raymond. Part first is introductory to a series of papers whose purpose is to point out the advance in American railroad location to the dignity of a profession, and the fitness of American engineers for the work in China. 1200 w. R R Gaz—Nov. 25, 1898.

Preliminary Work in Railway Construction (Ueber Eisenbahn-Vorarbeiten). A paper before the German Railway Society by Dr. Jordan, of Hanover, particularly discussing the surveying and topographical work preliminary to the actual construction of road bed. 6000 w. Glaser's Annalen—July 15, 1897.

**Burma.**—An Interesting Piece of Railway Location. Gives a countour map showing interesting work in the Gokteik gorge, on an extension of the Burma Ry. 900 w. Ry & Engng Rev—May 20, 1899.

See also **RAILWAY; VIADUCT—Gokteik.**

**Curve.**—See also **RAILWAY CURVE.**

**India.**—Railway Location and Surveys in Rajputana, India. C. H. Croudace. A beautifully illustrated paper upon the work on the location of the Delhi-Karachi direct line through the sand-ridge district in Northern India. 4000 w. Eng Mag—March, 1899.

**Local Railways.**—The Technics of Railway Location (Technische Tracirung). Franz Hafferl. Devoted especially to the location of tramways, and local railways, with detailed descriptions of the Tichy-Starke Tachymeter. 4000 w. Mitt d Ver f d Förd d Local Strassenbahnwesens—Sept., 1898.

**Northern Pacific.**—Rules for Railway Location and Construction; Northern Pacific Ry. Extracts from the rules and instructions for the engineering and construction departments, with editorial comment. 11400 w. Eng News—April 20, 1899.

**Philadelphia & Reading.**—A Re-Survey of the Williamsport Division of the Philadelphia & Reading Railroad. George D. Snyder. Abstract of a paper accepted by the Committee on Publication for filing in the library of the Society. The method used is explained and its advantages stated. 1600 w. Am Soc of Civ Engs—Sept., 1896.

**Re-Survey.**—Specifications for a Railroad Re-Survey. G. W. Chance. Treats of general measurements, transit work, photographic survey, leveling, platting, etc. 2000 w. Ry & Engng Rev—Dec. 25, 1897.

**Stadia.**—See **SURVEYING.**

**RAILWAY MAIL CATCHER.**

Railway Mail Catcher and Delivery Devices. An illustrated description of the Fleming mail catcher, one of three devices tested and approved by the Post-Office Department at Washington, D. C. 1000 w. Sci Am—Aug. 14, 1897.

**RAILWAY MANAGEMENT.**

See also **RAILWAY FINANCE; RAILWAY OPERATION; RAILWAY ORGANIZATION; RAILWAY TRAFFIC.**

**Ethics.**—Ethics of Railroad Management. William Taussig. An address before the Commercial Club of St. Louis, with editorial comment. Considers some of the points that might become subjects or railroad ethics. 5800 w. R R Gaz—April 15, 1898.

**Experimental Farms.**—See **FARM—Experimental.**

**Fraudulent.**—The Fruits of Fraudulent Railroad Management. J. Selwin Tait. Showing the source of distrust in United States corporations, and the legislation necessary to remove the same. 4300 w. Eng Mag—June, 1896.

**India.**—Indian Railway Policy. Criticism of the vacillating policy, alternating between government operation and company working under government guarantee, and recommendation of management under a few large companies. 2800 w. Ind & East Eng—Aug. 15, 1896.

**N. Y., N. H. & Hartford.**—The Retirement of President Clark. Clarence Deming. Reviews the twelve years during which President C. P. Clark controlled the New York, New Haven & Hartford (Consolidated) Railroad Company, paying tribute also to his fine personality. 1400 w. R R Gaz—Nov. 24, 1899.

**Prussia.**—The Administration of Prussian Railroads. B. H. Meyer. A discussion of the Prussian system, with special reference to the adjustment of railway rates. 12000 w. An Am Acad—Nov., 1897.

**RAILWAY MAP.**

See also **RAILWAY ENGINEERING.**

Right of Way Maps. Concerning a fine set just completed by the engineering department of the Chicago & West Michigan and the Detroit, Grand Rapids & Western Rys. 5000 w. Ry Age—March 16, 1900.

**Records.**—Railway Map and Profile Records. V. K. Hendricks. Describes the practice on the Terre Haute & Logansport Ry., with additional suggestions. 2400 w. Pro of Ill Soc of Engs & Surv—1899.

**RAILWAY MASTER MECHANICS.**

See **RAILWAY ASSOCIATION.**

**RAILWAY MATERIAL.**

**Purchase and Inspection.**—The Purchase and Inspection of Railroad Supplies. H. B. Hodges. Extracts from a paper presented at the meeting of the N. Y. R. R. Club. Advises the purchasing of only the best quality of material. 1800 w. R R Gaz—Oct. 28, 1898.

The Purchase and Inspection of Railway Supplies. Editorial discussion of paper by H. B. Hodges, read at the Oct. meeting of the N. Y. R. R. Club. 800 w. Ry Mas Mech—Dec., 1898.

**Scrap.**—See **RAILWAY SHOP.**

**Street Railway.**—See **STREET RAILWAY—Material.**

**Testing.**—Mechanical Testing of Materials. W. Gadsby Peet. From a paper read before the Inst. of Mech. Engs. (Eng.) at the Oct. meeting. Describes the system adopted by the Midland Railway at Derby. Ill. 2000 w. Col Guard—Nov. 4, 1898.

Testing Material for Rolling Stock. George T. Glover. An account of the present requirements for railway rolling-stock material in England, and the manner in which the tests are carried out. Serial. Engr, Lond—July 1, 1898.

The Chicago and Northwestern Testing Plant. E. M. Herr. Abstract of paper presented at the W. Ry. Club. Description of tests. 2800 w. R R Gaz—Feb. 19, 1897.

See also **LABARATORY—Railway Testing; TESTING; TRACK—Experiments.**

**Tests and Specifications.**—Tests of Materials and Their Purchase under Specifications. Alfred Lovell. Extracts from a paper read at meeting of the Northwest Ry. Club. Stating the advantages to buyer and seller, the economy, and desirability of buying under specification. 2500 w. Ry & Engng Rev—Dec. 31, 1898.

**Uniformity.**—Uniformity in Storehouse Stock. Extracts from a paper by S. F. Forbes before the Northwest Railway Club, recommending adoption of uniform material on railways, with editorial. 2000 w. Ry Rev—May 9, 1896.

**RAILWAY MEN.**

See **RAILWAY ASSOCIATION; RAILWAY EMPLOYEE.**

**RAILWAY MOTIVE POWER.**

See also **ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY; LOCOMOTIVE.**

**Business Problems.**—Business Problems of the Motive Power Department. Robert Quayle. Extracts from a lecture delivered at Purdue Univ. Presents an idea of the expenses, and discusses the problems within the department named. 3700 w. R R Gaz—Feb. 18, 1898.

**Comparison.**—Motive Powers; Past, Present and Future. Discussion by the N. Y. R. R. Club, considering steam motors and cable motors. 8000 w. N Y R R Club—April 21, 1898.

See also **ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY; LOCOMOTIVE—Motive Power Comparison.**

Some Studies in Speed and Accelerations of Various Motors. George L. Fowler. Investigations of the mechanical possibilities of the several methods of passenger transportation that are at present in use in the neighborhood of New York City. Serial. R R Gaz—March 19, 1897.

**RAILWAY MOTIVE POWER AND EQUIPMENT.**

See **RAILWAY EQUIPMENT; RAILWAY MOTIVE POWER.**

**RAILWAY MUSEUM.**

See also **RAILWAY EXHIBITION.**

**Field Columbian.**—The Field Columbian Museum and Railroad History. Herbert T. Walker. Information of this collection of relics, models, photographs and drawings, in Chicago, illustrating the development of transportation and motive power from the year 1680 to the present time. 1100 w. R R Gaz—Oct. 22, 1897.

**RAILWAY OPERATION.**

See also **CAR INTERCHANGE; LOCOMOTIVE OPERATION; LOCOMOTIVE PERFORMANCE; LOCOMOTIVE RATING; RAILWAY ACCIDENT; RAILWAY EMPLOYEE; RAILWAY MANAGEMENT; RAILWAY ORGANIZATION; RAILWAY TRAFFIC; RAILWAY TRANSPORTATION; TRAIN; TRAIN SERVICE.**

A Railway Division and Its Work. An article that should be read by every railroad manager. The character of the road is fully described; the organization of the departments, their equipment, and operation are given in detail. This is an actual case in the N. Y., L. E. & W. R. R. on its Delaware division. 8000 w. Eng News—Jan. 9, 1896.

Transportation Department of Railroads. Russell Harding. Describes the tonnage system in train service, and notes its benefits. 1700 w. Ry Age—Feb. 23, 1900.

Transportation From an Operating Standpoint. D. S. Sutherland. Read at the meeting of the Toledo Assn. of R. R. Officers. Calling attention to the failure to effect, in yards and terminals any such improvement as has been made in every other department of R. R. service. 800 w. Ry Rev—April 18, 1896.

**Accounting.**—Motive Power Accounting. W. G. Taylor. Reviews the most important features, and the importance of accuracy in details, etc. 3000 w. Ry Mag—March, 1897.

**Arlberg.**—See **RAILWAY.**

**Blockade.**—A Blockade on the New York, New Haven & Hartford. An account of the damage to the double-track bridge over the Housatonic River, five miles east of Bridgeport, and the management of trains during the blockade, which lasted 41 hours. 1400 w. R R Gaz—July 8, 1898.

**Boarding Moving Trains.**—The Taking Up of Passengers and Baggage by Moving Trains (Die Uebernahme von Personen und Gepäck durch Fahrende Bahnzüge). An illustrated account of a system recently patented at Berlin, by which a motor car is to accompany moving trains for a short stretch at stations and transfer passengers and freight. 700 w. Oesterr Monatschr f d Oeffent Baudienst—April, 1900.

**Break-in-Two.**—See **CAR COUPLER.**

**British Punctuality.**—The "Crawl to the South." Contains some statistics of punctuality of trains on the principal English railroads having a London terminus, interesting in comparison with U. S. practice. 900 w. Trans—April 10, 1896.

**British Unpunctuality.**—Railway Unpunctuality. Editorial discussion of some of the important points in connection with the habitual lack of punctuality on the British railways. 4000 w. Engng—May 20, 1898.

**Car Carding.**—See **RAILWAY TRAFFIC.**

**Car Famines and Terminals.**—Car Famines and Railway Terminals. On the delay caused by lack of facilities for unloading. 1400 w. Eng News—Dec. 21, 1899.

**Car Interchange.**—See **CAR INTERCHANGE.**

**Code.**—See **Train Rules.**

**Detentions.**—Passenger Train Detentions. Editorial. An examination into the causes. 1300 w. Am Eng & R R Jour—Jan., 1896.

The Cause of Train Detentions. Discussion. The causes are itemized and their relative frequency indicated in per cents. 7000 w. N Y R R Club—Dec. 19, 1896.

**Economics.**—Railway Economics. Editorial comments on a series of lectures by Mr. Acworth on "Railway Economics," before the Society of Arts. The article disagrees with the opinions of the lecturer and says that technical education is not a necessity in railroad management and operation. 2200 w. Eng, Lond—Nov. 8, 1895.

Studies in Economic Practice:—St. Paul—Minneapolis. C. B. Fairchild. The first paper is devoted to operating expenses, receipts, maintenance, discipline and shop practice. Serial. St Ry Jour—May, 1896.

**Economics, American vs. English.**—The Cost of Railway Working. American figures for maintenance of way and equipment, annually for six years, are given as object lessons in economy, and the English situation compared. 1100 w. Ir & Coal Trds Rev—April 10, 1896.

**Economics, English.**—Railway Economics. Showing why the operating expenses are higher and the receipts per mile of road are lower than in other countries. 1500 w. Eng, Lond—March 13, 1896.

**Electric Haulage, Yards.**—See **ELECTRIC LOCOMOTIVE; RAILWAY YARDS.**

**Empty-Car Mileage.**—Should Mileage Be Paid on Empty-Car Movements? W. E. Beecham. From "Ry. Equipment Register." Discusses the return movements of empty cars, and gives what the writer considers the common sense way of disposing of the car. 1800 w. Ry Rev—Feb. 13, 1897.

**Expenditures, Improvements and Equipment.**—Railroad Expenditures for Improvements and Equipment. A collation of recent and contemplated expenditures for the information of contractors and manufacturers. 5000 w. R R Gaz—May 22, 1896.

**Expenses.**—A Study in Operating Expenses—Periodic Traffic. R. L. D. Experience of the Southern Pacific Co. 1500 w. R R Gaz—Jan. 3, 1896.

Locomotive Expenses vs. Cost of Transportation. Abstract, with comment on a paper before the Western Railway Club, stating that the important question is how much does haulage cost per ton mile, not how much does it cost to run the locomotive. 1000 w. Ry Mas Mech—Jan., 1896.

See also **RAILWAY FINANCE—Operating Expenses.**

**Expenses, Maintenance of Way.**—Railway Maintenance of Way Expenses. Gives a table showing the relation of the maintenance of way expenses to the mileage, train mileage and operating expenses on a number of railways, with comments. 700 w. Eng News—March 8, 1900.

**Fast Train.**—See **FAST TRAIN.**

**Freight Speeds, Northern Pacific.**—Freight Train Speeds on the Northern Pacific. Discussion by E. H. McHenry, chief engineer of the road named. Also editorial. 2000 w. R R Gaz—March 2, 1900.

**Freight Switching System.**—New Freight Switching System of the Illinois Central. Description of the method of designating divisions; the switching rules are given in full. 1300 w. Ry Age—Dec. 6, 1895.

**Freight Trains.**—Faster and Heavier Freight Trains and Economical Freight Movement. Editorial on the remarkable record of the Chesapeake and Ohio R. R. in the movement of freight at low cost. 1500 w. Eng News—Sept. 9, 1897.

**Freight Trains on Grades.**—Handling Long Freight Trains on Mountain Grades. From a committee report presented at the Jacksonville meeting of the Assn. of Ry. Air Brake Men. 1800 w. Ry Mas Mech—May, 1900.

**Grade Crossing Signals.**—See **GRADE CROSSING—Train Signals.**

**Gradients.**—The Influence of Gradients on Speeds and Loads. Instructive statement of results in the running of two test trains on the Midland, on the Eastern, and on the Orange Free State Northern, with the object of ascertaining the actual and relative cost of haulage, as well as the cost of return empties. Tabulated statements are given. 1500 w. Engng—Aug. 13, 1897.

**Haulage.**—Economical Haulage. Editorial discussion of American practice as compared with English. 2000 w. Engr, Lond—Nov. 17, 1899.

**Large Locomotives.**—The Revolution in Railway Transportation. Editorial discussion of the relation of large locomotives to the problem of cheap transportation of bulk freights, especially considering the new and powerful locomotive of the Illinois Central R. R. 2700 w. Eng News—Oct. 26, 1899.

**Locomotive Distribution.**—See **LOCOMOTIVE OPERATION.**

**Locomotive Double-Heading.**—See **LOCOMOTIVE OPERATION.**

**"Midland-Scottish."**—With the "Midland-Scottish." Charles Rous-Marten. An analysis of the working of this line. 2500 w. Eng, Lond—Jan. 29, 1897.

**Pooling Cars.**—Pooling of Freight Cars. Mr. Cavanagh's plans explained in answer to inquiries. 900 w. Ry Age—Sept. 25, 1896.

See also **CAR POOLING.**

**Royal Train, Eng.**—The Way They Take Care of Queen Victoria When She Takes a Railroad Ride. James Thompson. Interesting account of the extreme caution exercised. 1200 w. Loc Engng—Nov., 1896.

**Safety and Economy.**—Safety and Economy in Railway Operations (Betriebssicherheit und Oekonomie im Eisenbahnwesen). A paper before the German Railway Society by Herr Haarmann discussing German, English and American statistics, from 1881 to 1895, showing the close relation between safety and economy, in the operation of railways. 10000 w. Glaser's Annalen—Dec. 1, 1897.

**South Africa.**—Railroading in South Africa. Philip E. Stillwagen. A practical letter from a practical man. The details of operating, wages, etc. for the Netherlands Railway Co. are given. 2500 w. Loc Engng—Dec., 1895.

**Space Interval.**—The Space Interval on a Single Track Railroad. Describes the method of working on the Cincinnati division of the Chesapeake & Ohio R. R., with graphical transcript of train sheet. 500 w. R R Gaz—Nov. 26, 1897.

**Speed.**—See **Freight Speeds; Tunnels; FAST TRAIN; LOCOMOTIVE—High Speed; LOCOMOTIVE PERFORMANCE—High Speed.**

**Standard Code.**—See **Train Rules.**

**Standards.**—Value of Standards for the Maintenance of Way and Structures. W. G. Curtis. Arguing for the use of standard methods, and giving illustrations of some of the recent standards of the Southern Pacific Co. 1200 w. Ry Mag—July, 1897.

**Station Service.**—How Can Our Station Service Be Improved? F. E. Hoff. Paper read before the N. Y. R. R. Club. The recommendation is chiefly the institution of a station service department, with separate superintendent, inspectors, etc. This suggestion is amplified and explained, and followed by an extended discussion. 15500 w. N Y R R Club—April 16, 1896.

**Sunday Traffic.**—See **RAILWAY EMPLOYEE—Sunday Traffic.**

**Telephone.**—The Railway and the Telephone. Henry W. Pope. Read before the Ry. Telegraph Supts.' Assn., at Detroit, Mich. The possibilities of the telephone, and its adaptability to railroad service. 3500 w. St. Louis Ry Club—July 13, 1900.

The Telephone Dispatching System of the Akron, Bedford & Cleveland Railroad. F. J. J. Sloat. Describes the system that has been very advantageous under the conditions existing on this road. Ill. 1100 w. St Ry Jour—July, 1897.

The Telephone in Railroad Service. George W. Blodgett. Considers requirements for sending important railroad messages by telephone. 1500 w. R R Gaz—July 28, 1899.

The Telephoning of Railways. J. Pigg. Suggestions for the most efficient arrangement of telephone circuits in their adaptation to the special requirements of the railway service. Ill. 2400 w. Elec Eng, Lond—Feb. 14, 1896.

The Use of the Telephone in the Working of Railway Traffic. Thomas Ireland. Prepared for the International Ry. Cong. Discusses its usefulness and limits, and considers it an important auxiliary. 2000 w. Transport—July 13, 1900.

Train Dispatching by Telephone. Editorial treating the operator's strike on the C. P. R. R. as the possible originating cause of an extended movement toward train dispatching by telephone. 1000 w. Ry Age—Oct. 16, 1896.

See also **TELEPHONE—Electric Tramway; Elevated Railway.**

**Ton-Mile.**—Abolish the Ton-Mile. Editorial argument opposing the ton-mile, except as a basis of comparison, and granting it but limited value even then. 900 w. Ry Rev—Oct. 10, 1896.

**Trainloads.**—What Do We Mean by a Trainload? Editorial discussion of the misleading use of this term. 1500 w. R R Gaz—Nov. 3, 1899.

**Trainloads Northern Pacific.**—Trainloads on the Northern Pacific. Important statements and figures bearing on this subject from the last annual report. 900 w. R R Gaz—Oct. 7, 1898.

**Train Order.**—Annulling Part of a Train Order. J. F. Mackie. A paper read before the National Assn. of Train Dispatchers, urging propriety and convenience of the proposed amendment of Am. Ry. Assn. rules permitting a particular movement to be superceded. 2000 w. Ry Age—June 20, 1896.

19 vs. 31 Train Orders. Harry B. Ware. Read before the annual convention of the Train Dispatchers' Association of America. Arguing for the use of the 19 order in place of the 31, on account of the frequent and sometimes annoying delays occasioned by the requirements of the latter. 1000 w. Ry Age—June 27, 1896.

**Train Resistance.**—See **TRAIN RESISTANCE.**

**Train Rules, American.**—The Standard Code of Train Rules of the American Railway Association for Single Track. A copy of the rules adopted at Detroit, April 12, 1899. 5200 w. R R Gaz—April 21, 1899.

**Train Rules, C. & O. Ry.**—The New Standard Code. Editorial on the revised code of the Chesapeake & Ohio. 1800 w. R R Gaz—Jan. 20, 1899.

**Train Rules, Cin., New Orl., Texas Pac.**—C., N. O. & T. P. Train Rules. Information in reference to the revised edition of the book of rules for employees in the transportation department of this road. 2000 w. R R Gaz—May 28, 1897.

**Train Rules, Canadian Pacific.**—Superior Extras vs. Scheduled Trains—Proposed Rules. J. F. Mackie. Discusses proposed rules for the Can. Pacific Ry., and offers some suggestions. 1700 w. Ry Age—July 20, 1900.

**Train Rules, English.**—Revised English Train Rules. Considers some of the rules which are of special interest to this country. 2100 w. R R Gaz—April 14, 1899.

**Train Rules, N. Y., N. H. & Hartford R. R.**—The Standard Code of the New York, New Haven & Hartford. Comments on the new rules just put in use on all of the 20 divisions of this road. 2000 w. R R Gaz—July 14, 1899.

**Train Rules, Southern Pacific.**—Standard Code on the Southern Pacific. Calling attention to some of the rules in the revised edition recently issued for the operating department. 1000 w. R R Gaz—March 18, 1898.

**Train Service.**—See **TRAIN SERVICE.**

**Tunnels.**—The Limits of Speed and Frequency of Trains in Tunnels. The consideration of a problem presented at meeting of N. Y. R. R. Club, and left unanswered, as to the safety of running trains at 30 miles an hour, on one minute headway, through a tunnel with grades as stated. 1200 w. R R Gaz—March 26, 1897.

**Velocity Grades.**—See **RAILWAY GRADE—Velocity.**

**Yards.**—See also **RAILWAY YARD.**

**RAILWAY ORGANIZATION.**

See also **RAILWAY EMPLOYEE; RAILWAY MANAGEMENT; RAILWAY OPERATION.**

The Organization of a Railway. J. H. Goodyear. Discussing the operating department of American railways, and how it may be improved, 2000 w. Ry Age—June 17, 1898.

**Bridges and Buildings.**—See **RAILWAY BUILDINGS.**

**Chief Engineers' Department.**—The Organization of the Chief Engineers' Department of an Extensive Railway. Walter Katte. Deals with the functions of the engineer and the apportionment of members and duties in the various departments of construction and maintenance work. 1900 w. Ry Rev—June 6, 1896.

**Electric Train Staff.**—See **RAILWAY EMPLOYEE.**

**Engineering Department.**—Organization of a Railway Engineering Department. Willard Beahan. The writer's views on a better organization of the engineering department of railroads with a view to saving money for the owners of the stock and bonds of the roads. 5300 w. Trans of Assn of Civ Engs of Cornell Univ—1898.

**Industrial Department.**—The Industrial Department of the Seaboard Air Line. The explanation of John T. Patrick, as to the object and present status of this work. 2000 w. R R Gaz—Nov. 11, 1898.

**Maintenance of Way.**—A Change in Maintenance of Way Organization. Editorial on the change taking place in the management of the Lehigh Valley Railroad. Does not think the step the correct solution of the problem. 1600 w. Ry & Engng Rev—Aug. 20, 1898.

The Organization of Railway Engineering and Maintenance of Way Departments. E. E. Russell Tratman. Abstract of paper read at meeting of the Eastern Maintenance of Way Assn., at Portland, Me., somewhat modified. Gives examples now in force on some leading railways. 4200 w. Eng News—Oct. 19, 1899.

The Organization of the Maintenance of Way Department. E. E. Russell Tratman. Extracts from an address before the first annual convention of the Eastern Maintenance of Way Assn., at Portland, Me. 4500 w. Ry & Engng Rev—Sept. 30, 1899.

**Pennsylvania R. R.**—Organization of the Pennsylvania Railroad. Diagram, showing in graphic form the official relations of all the general officers and heads of departments. 400 w. R R Gaz—April 27, 1900.

**Police.**—See **RAILWAY EMPLOYEE.**

**Signal Department.**—See **RAILWAY SIGNAL—Engineer.**

**RAILWAY PERMANENT WAY.**

See also **CROSS TIE; RAIL; RAILWAY CONSTRUCTION; RAILWAY CURVES; RAILWAY GRADES; RAILWAY MATERIAL; RAILWAY SIGNAL; RAILWAY STATION; RAILWAY SWITCHES; RAILWAY TERMINAL; RAILWAY YARD; ROUND HOUSE; TRACK; TRACK ELEVATION; TRACKLAYING.**

Permanent Way for Steam Railways. Letters criticising features of designs suggested in recent paper of J. W. Schaub, and presenting other plans for improvement. Ill. 4000 w. Eng News—March 23, 1899.

Some Recent Features of Permanent Way. Review and comment upon increased rail length trials and other recent experiments and innovations in practice, designed to increase the life of rails. 3200 w. Ir & Coal Trds Rev—April 10, 1896.

The Conditions Existing Under Railway Sleepers (Ueber die Vorgänge unter der Schwelle eines Eisenbahngeleises). A study of the action of the pressure on the sleepers upon the ballast beneath; with many illustrations. 4500 w. Glaser's Annalen—May 1, 1899.

**American vs. British.**—American and British Permanent Way. Editorial, arguing the superiority of English practice. 1500 w. Eng, Lond—July 10, 1896.

Permanent Way. Editorial review of the distinctive characteristics of American and English practice, favorable in tone to the latter. 2000 w. Eng, Lond—June 5, 1896.

Permanent Way of American Railways. E. E. Russell Tratman. An authoritative exposition and defence of American permanent way against British strictures. 2000 w. Eng, Lond—Aug. 14, 1896.

**Ballast.**—Ballast. A. Feldpauche. Abstract of a report to the International Railroad Congress on the properties of good ballast, choice to be made between ballast of different qualities, etc. 2200 w. R R Gaz—July 13, 1900.

Permanent Way. W. Lawford. Urges the extreme importance of good ballast and good ballasting. 2000 w. Eng, Lond—July 24, 1896.

Recent Investigations in Railway Superstructure Construction (Neuere Versuche mit Oberbau-Constructionen). An account by Prof. Birk, of experiments with various kinds of ballast, including the influence of frost, travel, material and other conditions. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 15, 1896.

Tests of Gravel and Broken Stone for Use as Railway Ballast (Untersuchungen von Kies und Steinschlag zur Beurtheilung ihres Werthes als Stopfmaterial für den Eisenbahnoberbau). M. Rudeloff. Important researches made at the government testing bureau, with especial reference to various German gravels, but also of value for other localities. Many tables and diagrams. 18000 w. Mitt aus d Kgl Tech Versuchsanstalt—Part 6, 1897.

**Ballasting.**—Ballasting and Filling with the Rodgers Ballast Car. Illustrated description of car and manner of working. 1500 w. Eng News—Feb. 17, 1898.

Ballasting. Committee report presented to annual convention of American Ry. Engng. and Maintenance of Way Assn. 10000 w. Ry Age—March 16, 1900.

Handling Ballast on the Michigan Central. Illustrates and describes the method of loading and distributing gravel. 1600 w. R R Gaz—Oct. 13, 1899.

**British.**—Permanent Way. A series of communications devoted principally to discussion of English practice. Contains interesting comment upon the limit of advantageous rigidity. 3000 w. Eng Lond—May 8, 1896.

**Cementing Gravel.**—On the Structure of Cementing Gravel. Geo. R. Wieland. Discusses the manner in which material such as cementing gravel, used as ballast, forms rocks. 900 w. Ry & Engng Rev—Sept. 15, 1900.

**Chicago and Northwestern.**—Double Tracking on the Chicago and Northwestern Ry. Construction of another track, between Baraboo and Madison, with improvement in grades and straightening of alignment. Illustrated by diagrams. 1600 w. Ry Rev—Oct. 31, 1896.

**Compressed Air Surfacing.**—Surfacing Railroad Track by Means of Compressed Air. Brief description, with illustrations of the method. 400 w. Compressed Air—Dec., 1897.

**Dirt Handling.**—A Record in Dirt Handling. Illustrates and describes methods used in widening banks and ballasting on the Kansas City Southern Railway, and of the appliances used. 4500 w. Ry Age—Oct. 12, 1900.

**Germany.**—The Necessary Strengthening of the Permanent Way of our Railways (Die Nothwendige Verstärkung des Oberbaues unserer Eisenbahnen). Dr. Vietor. A paper showing the increasing traffic upon the German roads and a comparison with the railways of other countries in respect of increase of strength. 4500 w. Stahl und Eisen—Aug. 1, 1898.

See also **TRACK.**

**Improvements.**—See also **RAILWAY CONSTRUCTION.**

**Inspection.**—See **TRACK INSPECTION.**

**Japan.**—See **RAILWAY.**

**Maintenance.**—Maintenance of Way. Abstract of reports of F. Tettelin and L. A. Denys, to the International R. R. Congress, on systems for maintenance and renewal of permanent way on lines of heavy traffic so as to avoid slackening speed of trains. 1800 w. R R Gaz—July 13, 1900.

Maintenance and Way Problems. J. F. Wallace. Presidential address before the American Assn. A review of progress. 1800 w. Ry Age—March 16, 1900.

Methods and Standards of Maintenance of Way. W. M. Duane. Extracts from a paper read before the St. Louis Railway Club, May 14, 1897. Discusses sub-grade, curves, ballast, rail sections, joints, etc. 1700 w. Ry Rev—July 3, 1897.

Recent Improvements in Maintenance of Way. Benjamin Reece. Considers ballast, ties, rail and fastenings from the point of view of necessity of excellence imposed by competitive struggle for business. 5000 w. Jour Assn of Engng Socs—May, 1896.

See also **RAILWAY ASSOCIATION—Maintenance of Way; RAILWAY CONSTRUCTION; RAILWAY OPERATION—Expenses, Maintenance of Way; RAILWAY ORGANIZATION.**

**Oil Sprinkling.**—Dustless Roadbeds. Theory and practice in the use of oil coated ballast as a dust preventive on the Pennsylvania road. Apparatus used is illustrated. 1800 w. Ry Age—Aug. 6, 1897.

See also **CAR.**

**Rail Deflection.**—See **RAIL DEFLECTION; TRACK DEFORMATION.**

**Rogers Ballast Car.**—See **Ballasting.**

**Safety Appliances.**—See **BLOCK SIGNAL; GRADE CROSSING; INTERLOCKING; RAILWAY SIGNAL; RAILWAY SWITCH.**

**St. Gothard.**—The St. Gothard Railway (Le Chemin de Fer du St. Gothard). Jules Michel. Describing especially the permanent way, and the results of the reconstruction of portions with steel sleepers. 4000 w. Rev Gen de Chemins de Fer —May, 1899.

**Salt Water Dripping.**—See **RAILWAY EQUIPMENT.**

**Signal.**—See **BLOCK SIGNAL; GRADE CROSSING; INTERLOCKING; RAILWAY SIGNAL.**

**Signs.**—Standard Roadside and Station Signs—Cincinnati, New Orleans and Texas Pacific Railway. Drawings with particulars concerning the design and construction. 1000 w. R R Gaz—Sept. 10, 1897.

**Supervision.**—Best Method of Directing and Supervising the Work of Section Foremen. H. W. Church. Read before the Roadmasters' Convention. Discusses the details of the work, and what reports are necessary for the special information of the roadmaster. 2300 w. Ry Rev—Sept. 18, 1897.

**Track Deformation.**—See **RAIL DEFLECTION; TRACK DEFORMATION.**

**Track Elevation.**—See **TRACK ELEVATION.**

**Tracklaying.**—See **TRACKLAYING.**

**Traffic Relations.**—See **TRACK.**

**Tunnels.**—Permanent Way Construction in Tunnels (Le Mode de Pose de la Voie des Chemins de Fer dans les Souterrains). J. Michel. An argument against the use of ballast, for underground roads or in tunnels, and a recommendation of stringers laid in concrete. 3500 w. Rev Gen des Chemins de Fer—April, 1899.

### RAILWAY POOLING.

See also **RAILWAY COMMISSION; RAILWAY LEGISLATION; RAILWAY RATES; RAILWAY TRAFFIC.**

Different Views of Pooling. Editorial discussion of the differences in the positions of railroad traffic officers, commenting especially on the views of Milton H. Smith. 2000 w. R R Gaz—Nov. 25, 1898.

Mr. Ripley on Pools and State Regulation of Railroads. A reply to the assertions of George F. Stone. Extract from paper submitted to the Congressional Committee. 1300 w. R R Gaz—Dec. 1, 1899.

Pooling—Fancies versus Facts. Editorial discussion of the address of George F. Stone, secretary of the Chicago Board of Trade. 1500 w. Ry & Engng Rev—March 26, 1898.

Railroad Pools. W. W. Knight. Part first gives a brief review of railroad history, the disastrous results of rate "wars," and the effect of pools in keeping the rates steady. Serial. Yale Sci M—March, 1898.

The Opposition to Railway Pooling. H. T. Newcomb. Discusses the question of competition among railways, and the facts and arguments which have favored the re-establishment of the pooling system, with the causes that have prevented effective legislation. 5500 w. N Am Rev —March, 1899.

Railroad Pooling and Sound Public Policy. Frank J. Firth. Extracts from a paper read before the Merchants' Assn. of New York. Calls attention to a large number directly or indirectly dependent upon the successful operation of the railroads, explains pooling and the advantages made possible by its agreements. 1700 w. R R Gaz—April 22, 1898.

Railroad Pooling. Martin A. Knapp. An address delivered before the Political Economy Club of the University of Chicago. The first part treats of the general relations of railways, the principles involved in pooling, and the abuses which would be checked by its influence. Serial. Ry Rev—July 25, 1896.

Railway Pooling. George R. Blanchard. Considers the subject under eleven headings covering most of the phases. 3700 w. Ry Mag—Oct., 1897.

Some Observations on Railroad Pooling, and the Conditions upon which Pooling Contracts Should Be Authorized by Law. M. A. Knapp. The author sets forth reasons for the belief that interests of the publis would be promoted by allowing rival railroads to substitute,—under certain restrictions—coöperative for competitive methods. 6500 w. An Am Acad—July, 1896.

The Objection to "Pooling." E. W. J. A defence on the maxim "combination in rates, competition in facilities." 1000 w. Bradstreet's —Aug. 29, 1896.

The Pooling of Railway Earnings. Aldace F. Walker. The differences which exist between railways and other business enterprises in the matter of determining the charges to be made are shown, the object of the railway pool explained and the method suggested for meeting the requirements of the present situation in the United States. 4000 w. Ry Mag—Feb., 1897.

**Adverse Decision.**—The Decision Against Railway Pooling. Roswell Miller. Thinks the only remedy for the existing state of things, is to permit agreements among roads as to rates, and to permit pooling. 1000 w. N Am Rev—Dec., 1898.

See also **RAILWAY LEGISLATION.**

**Bill.**—The Railroads and a Pooling Bill. Discusses the present situation and the grounds of the railroad opposition to the bill. 800 w. Bradstreet's—Dec. 18, 1897.

**British.**—Railroad Matters in England. W. M. Acworth. Favorable opinion of the Glasgow Chamber of Commerce on pooling in England, and some notes on English baggage handling. 1100 w. R R Gaz—July 17, 1896.

**Freight Equipment.**—See **CAR POOLING; RAILWAY OPERATION—Pooling Cars.**

**Joint Traffic Association.**—See **RAILWAY LEGISLATION; RAILWAY TRAFFIC.**

**Legalization.**—The Legalization of Pooling. Editorial giving views of prominent railroad men, with comments. 900 w. R R Gaz—Dec. 10, 1897.

**Locomotive.**—See **LOCOMOTIVE—Pooling.**

**Rate Reduction.**—Railroad Pooling and the Reduction of Freight Rates. H. T. Newcomb. Showing the nature of pooling contracts and how they operate to lower railway charges. 3400 w. Eng Mag—Sept., 1896.

**Regulated.**—Regulated Pooling. H. T. Newcomb. An examination of the conditions which it is proposed to exact as consideration for permission to pool traffic. 2200 w. R R Gaz—Nov. 4, 1898.

**State Control.**—Pooling Railroad Earnings. J. A. Latcha. Claiming that the safety of the people of the United States requires the pooling of the wealth and power of the railroads under state supervision. 1500 w. N Am Rev—Aug., 1897.

### RAILWAY PROJECT.

See also **RAILWAY; RAILWAY CONSTRUCTION.**

The World-Wide Field for American Railroad Men. Condensed address of Col. H. S. Haines, President of the American Railway Association, at Cincinnati, April 15, drawing attention to wide field for railroad work in Asia and Africa. 1800 w. R R Gaz—April 17, 1896.

**Africa.**—From Djibouti to Harrar. From "Le Monde Illustré." Illustrations with particulars concerning this section of the road. 1700 w. Sci Am Sup—March 4, 1899.

The Commercial Importance of the Railway in German South-Western Africa (Ueber die Rentabilität der Deutsch-Südwest-Afrikanischen Eisenbahn.). A paper by Councillor Schwabe before the German Railway Society discussing the possible profitableness of the road, based upon the nature and products of the country, and showing the necessity of the greatest economy in construction if the interest on the cost is to be met. 7500 w. Glaser's Annalen—March 15, 1898.

See also **Cape-to-Cairo; East Africa; Sahara; RAILWAY—Africa; Iron and Steel Requirements.**

**Alaska.**—Railways to the Klondike. An account of the various projects for furnishing improved transportations to the Alaskan gold fields. Map. 1200 w. Ry Age—Oct. 29, 1897.

See also Yukon; **RAILWAY—Alaska; White Pass-Yukon.**

**America.**—Railroads Building or Projected in the United States, Canada and Mexico. List of such enterprises as show signs of genuineness, either by work in progress or by signs that it will soon be begun. 4000 w. R R Gaz—Feb. 11, 1898.

See also **Pan-American.**

**Asia.**—An All-British Railway to China. C. A. Moreing. Notes some of the changes the Siberian Railway will effect, and considers the advisability of Great Britain carrying a continuous line from the Mediterranean to the Yang-tze. 3800 w. Nineteenth Cent—Sept., 1899.

From London to the Far East by Railway. Reviews the various schemes proposed for building railways connecting the distant parts of the world, and makes remarks on the probable effect of the Trans-Siberian railway. 1800 w. Engng—May 14, 1897.

The Railway to India. C. E. D. Black. Discusses the importance, the political aspect, and physical obstruction; touching also the commercial advantages. Discussion follows. 6000 w. Jour Soc of Arts—May 7, 1897.

New Projects of Railway Communication with India. J. M. Maclean. Discusses the great changes brought about by the construction of new roads in Russia, Siberia, and other countries, and the inaction of England. Also general discussion. 10000 w. Jour Soc of Arts—Feb. 16, 1900.

See also **Asia Minor; Bagdad; Bengal; Burma-China; China; Egypt-Assyria; Euphrates Valley; India; Indo-China; Russo-Chinese; Siberia-China.**

**Asia Minor.**—Railroad Construction in Asia Minor. Map and brief account of important extension uniting the Persian Gulf with Europe. 350 w. U S Cons Repts, No. 665—Feb. 28, 1900.

The Railway Struggle in Asia Minor. Editorial discussion of new railway projects under the control of Germany and of Russia. 1300 w. Engr, Lond—March 16, 1900.

See also **Asia; Bagdad; Egypt-Assyria; Euphrates Valley.**

**Austria.**—Plans for Building Several Austrian Railroads at the Cost of the Government, Particularly a Second Railway Connection with Triest (Die Projectierte Herstellung mehrerer Oesterreichischer Eisenbahnen auf Staatskosten, insbesondere eine Zweite Eisenbahnverbindung mit Triest). The full official report on the project, with maps. Serial. 2 plates. Oest Monatschr f d Oeff Baudienst—May, 1900.

The Solution of the Tauernbahn Route (Zur Lösung der Tauernbahnfrage). A. Waldvogel. A discussion of the railway proposed to connect the Tyrol with Trieste, with maps and profiles of the various routes. Two articles. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 17, 1900.

**Bagdad.**—Germany's Survey for the Bagdad Railway. Brief account of the route being investigated. 700 w. Engr, Lond—Oct. 27, 1899.

The German Bagdad Railway. Considers the routes, the difficulties, and the greatness of the enterprise. Map. 1500 w. Engr, Lond—May 11, 1900.

See also **Asia; Asia Minor; Euphrates Valley.**

**Bengal.**—Railway Extension in Bengal. Extract from a letter addressed by the Secretary of the Bengal Chamber of Commerce to the Government of Bengal. Information regarding proposed roads. 2400 w. Ind and East Eng—Sept. 19, 1896.

**British Parliament.**—Railway Schemes in Parliament. Editorial comment on projects in England for the improvement and extension of the railways. Serial. Engng—Nov. 26, 1897.

Railway Schemes in Parliament. A general editorial review of the possible work in prospect. Serial. Engng—Nov. 27, 1896.

Railway Schemes in Parliament. Editorial discussion of schemes to be brought before the next session of the British Parliament. 5400 w. Engng—Nov. 24, 1899.

**Burma-China.**—Railways in Burma and Their Proposed Extension Across Yunnan. John Nisbet. Discusses the proposal to extend the railway now being constructed to the eastward, concluding that the present prospect of trade does not warrant the expense. Also general discussion. Map. 13000 w. Jour Soc of Arts—Jan. 27, 1899.

Railway Connection Between Burma and China. Editorial on the paper of Dr. John Nisbet, recently read before the Society of Arts. 2800 w. Engng—April 7, 1899.

**Canada Transcontinental.**—The Canadian Northern Railway and the Great Northern of Canada. Describes a proposed route across Canada. 1100 w. R R Gaz—Dec. 22, 1899.

**Cape-to-Cairo.**—The Cape-to-Cairo Project. J. Hartley Knight. A fully illustrated article treating of the growth of Mr. Rhodes' imperial conception, together with an account of the progress of the work. 4000 w. Eng Mag—April, 1900.

The Cape-to-Cairo Railroad. H. G. Prout. Extracts from an article in "Munsey's Magazine" for April, giving information concerning this project, its cost, and other means of attaining the same ends at less expense. 1200 w. R R Gaz—April 14, 1899.

**Central America.**—Central American Railway Enterprises. Brief account of the proposed transcontinental lines in Guatemala, Honduras, San Salvador, Nicaragua, and Costa Rica. 1800 w. Ry Age—Nov. 19, 1897.

See also **Honduras; Pan-American.**

**Chicago-New York.**—A New Trunk Line to New York. Discusses a proposed line from Chicago to New York. Map. 700 w. Ry Age—Feb. 25, 1898.

**China.**—American Contract for a Railroad in China. Brief account of road to be built from Han-Kow to Canton. Map. 500 w. R R Gaz—Sept. 23, 1898.

A Modern Railroad System for China. S. P. Butler. Interesting account of Sheng Ta-Jen and his influence in railway matters. 3300 w. Harper's Wk—Nov. 27, 1897.

China, and Chinese Railway Concessions. Clarence Cary. Discussing the railway possibilities in China, and the general subject of railway extension; also other business enterprises. 6000 w. Forum—Jan., 1898.

Foreign Possessions in China, and their Prospective Railways (Die Fremden Besitzungen in China und deren Künftige Eisenbahnen). H. Post. A discussion by the Austrian consular attaché at Shanghai, of the probable development of Chinese railways consequent upon political changes. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 18, 1898.

Imperial Chinese Railways. A detailed history of the railway projects in China. 2300 w. Engng—June 1, 1900.

Opportunities for American Engineers and Railway Builders in China. R. Van Bergen. Showing that the conditions are favorable for business in this field. 800 w. Eng News—April 29, 1897.

Railroading in China. R. Van Bergen. Interesting information of railroading prospects of this country, with the difficulties and obstacles to be met, and stating that there is no probability of Americans obtaining concessions for building railroads. 1500 w. R R Gaz—May 14, 1897.

Prospects of Railway Construction and for Manufacturing in China. A reprint of a report by Minister Charles Denby, predicting great expansion of railroad and industrial enterprises in China. 1000 w. Eng News—July 9, 1896.

Railway Prospects in China. J. T. M. A

summary of the arguments for and against the likelihood of rapid building. 1600 w. Ry Age—Dec. 17, 1897.

Railway Building in China. J. T. M. A summary of the lines which may possibly be built in the empire in the near future. 2000 w. Ry Age—Dec. 31, 1897.

Railway Development in the Celestial Empire. Information of proposed undertakings, their routes, and the effect looked for on the country. 2000 w. Trans—April 16, 1897.

Railway Enterprises in China. Translations from Chinese journals in reference to railroad construction. 1300 w. Cons Repts, No. 148—June 23, 1898.

Railway Enterprises in China. Translations of articles from Chinese papers in regard to the construction of railroads. 1500 w. Cons Repts—Aug., 1898.

New Chinese Railway from Canton to Hankow. A general outline of the work, furnished by William Barclay Parsons, who had charge of the surveys. 1000 w. Eng News—June 15, 1899.

The Hankow-Canton Railroad. Interesting information concerning the line recently surveyed by William Barclay Parsons, known as the "Brice Concession." 1200 w. R R Gaz—June 16, 1899.

Railway Opportunities in the Orient. Wm. Barclay Parsons. Considers India and Japan as prophetic of the future of China, and shows by the profitable returns from railways worked in those countries what large opportunities are opening in China. Ill. 2700 w. Eng Mag—May, 1900.

Railway Projects on the South-Western Frontier of China. Reports concerning concessions secured by Sir Claude Macdonald, the situation in relation to the French, and the projects completed, in course of construction, and proposed. Map. 3000 w. Engr, Lond—May 20, 1898.

Railway Prospects in China. Editorial review of the progress being made. 3400 w. Engng—March 18, 1898.

Railway Prospects in China. Considers the interests and influence of Russia in this field, also the other forces at work. 2200 w. Engng—March 26, 1897.

The Chinese Railway Contracts. J. T. M. Information concerning terms of the famous Belgian contract which is said to have been rejected, and of Sheng Senn Wy, the Director-General of Railways. 3000 w. Ry Age—Nov. 26, 1897.

The Building of the German Railway in Shan Tung (Der Bau der Deutschen Eisenbahn in Shantung). A general description from the "Zeitung der Verein. Deutschen Eisenbahnwaltungen" of the line of the railway which has been started inland from Kiauchou, China. 1000 w. Zeitschr f Klein u Strassenbahnen—Aug. 1, 1900.

The Pekin-Hankau Railway Contract. The text of the contract recently made between the director-general of the Chinese railways and the Belgian syndicate, for the construction of a road from Lou kon-chiao to Hankau. 2000 w. U S Cons Repts—Nov., 1898.

The Proposed Railways of Shansi, China. These railways will connect Pekin and the coast line with extensive deposits of coal and iron. The contour of the country and the difficulties to be met in the construction are discussed. 1200 w. Eng News—March 31, 1898.

See also **Asia; Corea; Indo-China; Russo-Chinese; Siberia-China; MINING CONCESSION; RAILWAY.**

**Colombia.**—Railway Contract in Colombia. Copy of a contract for the construction of a railroad from the port of Girardot to the Savannah of Bogotá. 800 w. Cons Repts—April 19, 1898.

**Corea.**—Railroads in Korea. J. Henry Dye. Information concerning the prospects for railroad building, and the various lines under consideration. 3500 w. R R Gaz—March 12, 1897.

See also **Siberia-China.**

**Cosmopolitan.**—The Cosmopolitan Railway. Harry C. Martin. Brief discussion of the scheme proposed by ex-Gov. Gilpin of Colorado, for uniting five continents by one system of railroad. 1200 w. Yale Sci M—June, 1900.

**East Africa.**—Railway Construction in German East Africa. From a lecture delivered by Mr. Bernhard before the Bergischer Bezirksverein, translated and published in the "Bulletin of the Internation Railway Congress." The territory is four-fifths as large as Germany, and contains four million inhabitants. An account is given of the work thus far projected or constructed toward providing better means of transportation, with some account of the difficulties. 1700 w. Ry & Engng Rev—Sept. 3, 1898.

Railway Building in German East-Africa (Eisenbahnbau in Deutsch Ostafrika). With map. profiles and an account of existing and proposed work; the roads will ultimately connect the Zanzibar coast with lakes Tanganyika and Victoria Nyanza. 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 12, 1898.

The Construction of the German East-African Central Railway (Der Bau der Deutsch-Ostafrikanischen Centralbahn). A discussion before the German Railway Association giving an account of the proposed routes, with estimates of cost. 2000 w. Glaser's Annalen—Dec. 1, 1899.

The German East-African Central Railway (Die Deutsch-Ostafrikanische Centralbahn). H. von Schwabe. With profiles, data of cost, and general details of the programme. 2500 w. Glaser's Annalen—Oct., 1898.

See also **RAILWAY—Uganda.**

**Ecuador.**—Railway in Ecuador. Report relative to the Guayaquil and Quito Railway. 2000 w. U S Cons Repts, No. 314—Jan. 3, 1899.

The Proposed Guayaquil & Quito Railway in Ecuador. Illustrates and describes some of the principal features of this road. 1100 w. Eng News—Aug. 17, 1899.

**Egypt-Assyria.**—An Egypto-Assyrian Railway as the New Overland Route to India. A. T. Fraser. A representation of the enormous importance to England of connecting Ismailia by rail with the head of the Persian gulf. 2000 w. Jour Soc of Arts—Sept. 4, 1896.

See also **Asia; Asia Minor; Euphrates Valley.**

**1896.**—Prospects for Railway Construction in 1896. A summary of recent conditions, and of lines on which construction has begun or is promised. 700 w. Ry Age—April 25, 1896.

**Engadine.**—The Engadine-Orient Railway (Die Engadin-Orientbahn). Lieut. Col. Buchholz. A paper before the German Railway Society upon the proposed railway to connect the eastern cantons of Switzerland with the Tyrol. 3000 w. Glaser's Annalen—Oct. 15, 1899.

**Euphrates Valley.**—Railway Scheme in the Euphrates Valley. The practicability of a shorter route to India, and the attempts made to obtain it. 900 w. Cons Repts—Sept., 1897.

The Euphrates Valley Railway. Editorial review of the various projects during the last sixty years for constructing a line of railway in this valley, and showing the importance from a trade point of view, and as a connection between England and India. 1500 w. Engr, Lond—Aug. 18, 1899.

See also **Asia; Asia Minor; Bagdad; Egypt-Assyria.**

**Formosa.**—Railway Improvements in Formosa. Describes the very poor transportation facilities, and gives an account of a proposed line that will be a benefit to North Formosa. 1200 w. U S Cons Repts, No. 789—July 25, 1900.

**Hawaii.**—A New Railway for Hawaii. Information concerning a road to be known as the Kohala & Hilo Ry., having a trackage of 130 miles. 900 w. Ry Age—Oct. 6, 1899.

**Honduras.**—Proposed Railroad in British Honduras. A proposal of British capitalists for the construction and working of a railway from Belize to Guatemala. 1000 w. U S Cons Repts, No. 529—Sept. 15, 1899.

**India.**—The Kalka-Simla Railway. Details and plans of this project for bridging the mountain barrier between Kalka and the hill capital. 2800 w. Ind & East Engr—Sept., 1899.

**Indo-China.**—Railway Construction in French Indo-China. A review of various French projects in Indo-China and Southern China. 1100 w. Engng—Sept. 14, 1900.

The Railways of Indo-China (Les Chemins de Fer de L'Indo-China). Henry Haguet. Description, with a map, of the proposed system of railways now under discussion in the French Chamber of Deputies. 1100 w. Jour des Transports—Dec. 3, 1898.

**Kashmir Electric.**—Kashmir Electric Railway

Scheme. Concerning a project brought forward by M. Nethersole, State Engineer, for working the line by electricity, and adopting a route differing considerably from previous plans. Maps. 1300 w. Elec Rev, Lond—Sept. 8, 1899.

**Kootenai, B. C.**—The Kootenai Mining Country. An important railway enterprise looking to the development of this region. 1800 w. Ry Age—Dec. 18, 1896.

**Leeds, Eng.**—Railway Extension in the Leeds District. The improvements contemplated on the London and North-Western Railway, England. 600 w. Transport—Nov. 26, 1897.

**Long Island.**—Long Island Railroad Improvements. An illustrated account of improvements made and proposed, which will cost about a million dollars. Includes a tunnel under the East River. 1000 w. R R Gaz—May 5, 1899.

The Brooklyn Terminal Improvements and East River Tunnel of the Long Island R. R. Considers the plan of this road to furnish an all-rail route from the suburban towns on Long Island to the business centers of Brooklyn and Manhattan. Also editorial. Ill. 3800 w. Eng News—May 18, 1899.

**Madagascar.**—Railway Contract in Madagascar. A copy of a concession for a railway from Tananarivo to Tamatave. 2800 w. U S Cons Repts—Dec., 1898.

The Madagascar Railway (Le Chemin-de-Fer de Madagascar). Editorial discussion of the need of railway communication in the new colony, with estimates of cost and statements of the valuable developments which would follow. 1200 w. Moniteur Industriel—Feb. 19, 1898.

**Newfoundland.**—Newfoundland Railway Contract. Synopsis of a contract between the government of Newfoundland and Robert G. Reid, of Montreal. 3000 w. Cons Repts—April 27, 1898.

See also **RAILWAY.**

**Pan-American.**—The Inter-Continental Railroad. Editorial on the work of the Commission and their recently issued report. 1500 w. R R Gaz—March 3, 1899.

The Railway Systems of Central and South America. An abstract of the report of the Inter-continental Ry. Commission, showing the principal technical features and giving an account of the surveys. Ill. 6000 w. Eng News—March 23, 1899.

**Peru.**—Proposed Railway in Peru. Translation of a government decree under which bids are invited for the construction of a line from Oroya to Cerro de Pasco. 1400 w. U S Cons Repts, No. 452—June 15, 1899.

**Russo-Chinese.**—A New Russo-Chinese Railroad Scheme—Samarkand to Hankow. From the Moscow "Russian Gazette." Concerning a road into the interior of China for the benefit of Russian foreign trade with the East. 700 w. R R Gaz—Aug. 10, 1900.

**Sahara.**—The Trans-Sahara Railroad (Le Transsaharien). G. Leugny. A general sketch, with maps of this proposed railroad from Algiers to Lake Tchad and other points in French Africa. 3000 w. Revue Technique—March 10, 1900.

The Trans-Saharan Railway (Le Chemin de Fer Transsaharien). Account of a proposed railway across the Sahara desert which will be of great strategic value to the French colonies in Africa. It is proposed to prolong the Sfax-Gafsa line across the desert to Lake Tchad, about 2000 kilometers. 1200 w. Moniteur Industriel—Oct. 15, 1898.

**Siberia.**—See **RAILWAY.**

**Siberia-China.**—Notes on the Proposed Siberian-Chinese Railway to China and Korea (Mittheilungen über der Geplanten Ausbau der Sibirisch Ost-Chinesischen Eisenbahn nach Korea und China). With map showing the projected lines, the portion now under construction, and the connections with various steamship lines. 1000 w. Glaser's Annalen—May 15, 1898.

See also **RAILWAY.**

**Switzerland.**—New Railway Projects in Switzerland (Neue Schweizerische Eisenbahn Projekte). R. Moser. A discussion of the plans for the extension of the Swiss Railways consequent upon the acquisition of the entire system by the government; with especial reference to the Weissenstein railway. 3000 w. Schweiz Bauzeitung—April 8, 1899.

Recent Railway Projects in Switzerland (Neue Schweizerische Eisenbahnprojekte). R. Moser. A review of a number of proposed railway schemes, including, among others, the railway and tunnel over the Splügen Pass. Three articles. 7500 w. Schweiz Bauzeitung—Feb. 24, March 3, 10. 1900.

See also **Engadine; RAILWAY; RAILWAY LEGISLATION.**

**Venezuela.**—Railway Contract in Venezuela. Translation of a recent concession for the construction of a road between Puerto Cabello and Yaritagua. 1200 w. U S Cons Repts, No. 453—June 16, 1899.

Railway Contracts in Venezuela. Translations of contracts made with the Government for the construction of the Perico-Crucero and the Los Teques-Cua railroads. 1800 w. U S Cons Repts—March 30, 1898.

**Wales.**—The South Wales Railway Struggle. A statement of the projects for extending the railways. 900 w. Engr, Lond—Dec. 3, 1897.

**White Sea, Russia.**—The White Sea Railway. A brief account of this project and the advantages it will bring to Russia and Finland. 900 w. Engr, Lond—April 7, 1899.

**Yukon.**—A Railroad to the Yukon. Extract from the "Ottawa Citizen," concerning a new line of railway of this region. 700 w. U S Cons Repts—Feb. 4, 1898.

See also **Alaska; RAILWAY—Alaska; White Pass-Yukon.**

### RAILWAY RATES.

See also **RAILWAY COMMISSION; RAILWAY LEGISLATION; RAILWAY POOLING; RAILWAY TRAFFIC.**

Causes Affecting Railway Rates and Fares. W. E. Weyl. A comparison showing the decline in passenger fares to have been much slower than in freight rates, with a study of the causes, and the peculiar conditions that have caused the discrepancy in the United States. 9000 w. An Am Acad—May, 1898.

Relative Freight Rates on Large and on Small Shipments. Editorial discussion of the principles that should govern in the making of rates. 2700 w. Eng News—March 1, 1900.

**American.**—Are American Railway Rates Too High? H. T. Newcomb. An analytical comparison of the rates of travel and transportation prevailing at different periods of this country's history, and a consideration of the causes operating to raise or lower these rates. 3700 w. Eng Mag—Jan., 1896.

**American vs. British.**—American Lessons in Cheap Railroad Transport. Editorial considering the benefits to American industries arising from American railroads and the cheap transport as compared with Great Britain. 900 w. Ir & Coal Trds Rev—Nov. 13, 1896.

Lessons from American Railroads as to Cheap Transportation. W. R. Stirling. A paper aiming to show to what extent and how American railways have lowered their rates for transportation, and thereby cheapened the cost of raw material and manufactured commodities. Read at the annual conference of the British Trade Assn. 5300 w. Ir & Coal Trds Rev—May 28, 1897.

**Austria.**—Austrian Experience with Passenger Fares. From an account by P. F. Kupka, published in the "Journal of the German Railroad Union." Changes made and their effects are discussed. 2700 w. R R Gaz—Oct. 21, 1898.

**British.**—See also **American vs. British.**

**British Agricultural.**—The Railroads and the Farmers. W. M. Acworth. From the "Trans. of the Surv's Inst.," London. On the English rates for the conveyance of agricultural products. 1600 w. R R Gaz—Dec. 1, 1899.

**British and Foreign.**—Home and Foreign Railway Rates for Goods Traffic. B. H. Thwaite. Summary of an address delivered before the London Chamber of Commerce. Advocating the low freight policy. 1500 w. Prac Engr—April 28, 1899.

**British Coal.**—An English Freight Rate Adjustment. Editorial discussion of the decision reached in a case brought before the Commission relating to an increase of 2½ per cent. on coal traffic carried to London. 1200 w. R R Gaz—March 12, 1897.

Railway Companies and the Carriage of Coal. A copy of the circular issued by the Midland, Great Northern and London and Northwestern railway companies on the subject of charges for the conveyance of coal, with action taken by the Coalowners' Assn. 600 w. Col Guard—July 2, 1896.

See also **COAL TRANSPORTATION; RAILWAY TRANSPORTATION.**

**British Coal and Coke.**—Railway Rates for Coal and Coke. George Johnson. Information concerning British rates of transportation. 1200 w. Col Guard—May 4, 1900.

**British Electrical Machinery.**—Railway Rates and Charges for Electrical Machinery and Apparatus. Discusses the high rates for the transportation of this class of merchandise charged in England. 1500 w. Elec Rev, Lond—July 13, 1900.

**British vs. American.**—British Railway Fares. William J. Stevens. Gives a careful comparison between English and American passenger fares. The very low excursion rates in England are compared with the higher American rates, and the tendency of competition to provide extended facilities is noted. 4000 w. Eng Mag—March, 1898.

**Canadian Pacific.**—Canadian Pacific Passenger Rate Differentials. Synopsis of the decision of the Interstate Commerce Commission, with editorial. 2800 w. Ry & Engng Rev—Sept. 10, 1898.

The Canadian Pacific Decision. Editorial upholding the soundness of the recent decision of the Interstate Commerce Commission. 800 w. Bradstreet's—Sept. 10, 1898.

**Carload vs. Pounds.**—Carload versus Pounds as a Rate Basis. Editorial on the demands of the cattle shippers, giving a brief history of the controversy. 800 w. Ry Age—Aug. 27, 1897.

**Chicago Decision.**—Power to Change Rates of Fare. Correction of mis-reported Chicago decision. It is stated that the right to fix rates of fare must be exercised at the time of granting franchise. 600 w. Ry Age—May 9, 1896.

**Cutting.**—The B. & O. Receivers on Rate Cutting. Copy of a letter sent to the Interstate Commerce Commission last week, with editorial comment. 1300 w. Ry & Engng Rev—Dec. 31, 1898.

The Public, the Railroads, and Rate-Cutting. Editorial discussion of the address of Martin A. Knapp at the meeting of railroad commissioners in Denver, Colo. 1800 w. R R Gaz—Aug. 18, 1899.

See also **RAILWAY LEGISLATION—Rate-Cutting.**

**Decrease.**—Have Transportation Rates Decreased? Statistical figures reviewed to show the enormous reduction, in refutation of the political utterances of the free silver candidate. 1000 w. Ry Age—Aug. 28, 1896.

The Reduction in Railway Transportation Rates in the United States. Editorial comment on a special report recently published by the Division of Statistics of the Dept. of Agriculture giving the decrease in railway passenger and freight rates, and the means by which this reduction has been brought about. 1800 w. Eng News—Sept. 1, 1898.

See also **RAILWAY FINANCE—Decline in Rates and Profits.**

**Differential.**—Differential Rates and the Seaboard Air Line. T. J. Anderson. A letter to the editor explaining the grounds on which this company claims that it is entitled to differential passenger rates, with editorial. 2000 w. Ry Age—Nov. 12, 1897.

The Outports in the Differential Rate Case. Report of the Philadelphia meeting of the commission, which was mainly devoted to the exposition of views of shippers and grain dealers of that city and Baltimore. 1100 w. Bradstreet's—May 15, 1895.

See also **Grain.**

**Differential and Excess.**—Differential Rates and Excess Fares. Facts given to throw light on the question of regulating competition, with editorial discussion of the general principles involved. 3500 w. Ry Age—Sept. 3, 1897.

Differential Rates and Excess Fares. Some further considerations of the problem, with map of standard lines and connections between Chicago and New York. 1700 w. Ry Age—Sept. 10, 1897.

**Grain.**—Hearing on New York Grain Rates. A summary of the New York argument made by John D. Kernan, with testimony of several witnesses and editorial. 3500 w. R R Gaz—March 26, 1897.

Unlawful Rates in Grain Transportation. The finding of the Interstate Commerce Commission in the alleged unlawful rates made by the Chicago Great Western Ry., with editorial comment. 3000 w. Ry Rev—Feb. 13, 1897.

See also **Differentials; Russian Grain; GRAIN TRAFFIC—Gulf Ports; RAILWAY TRANSPORTATION.**

**Grain Differentials.**—The Grain Rate Differentials. A discussion of the case before the Interstate Commerce Commission. The complaint that the trunk railroads make rates from the West to the seaboard cities that unjustly discriminate against New York to the benefit of other cities. A statistical table relating to flour, wheat and corn receipts and exports is given. 1600 w. Bradstreet's—March 20, 1897.

**Grain, New York.**—The Grain Exporters' Complaint. Rates on grain to New York, are made the basis of a discussion of the merits of this particular case, and of some general comment on rate making and differentials. 2800 w. R R Gaz—Aug. 28, 1896.

**Grain Rate Decision.**—The Latest Grain Rate Decision. Editorial discussion of Commissioner Prouty's opinion on export and domestic rates. 1500 w. R R Gaz—Sept. 8, 1899.

**Interstate Commerce.**—See also **RAILWAY COMMISSION; RAILWAY LEGISLATION.**

**Iron and Coal.**—Railway Charges in the Iron and Coal Industries. An excellent discussion showing the difference between English, continental and American railway rates. It is stated that English railways will have to earn nine times the amount earned by American railways in order to pay the same dividends. 1500 w. Ir & Coal Trds Rev—Jan. 31, 1896.

**Kansas.**—Railroad Rates in Kansas. Abstracts of some portions of an open letter by E. P. Ripley, of the Atchison, Topeka & Santa Fé Ry., bearing upon railway rates and methods used by anti-railroad agitators. 5500 w. Ry & Engng Rev—Jan. 15, 1898.

Rate Reductions in Kansas. E. P. Ripley. A protest from the president of the Santa Fé against the proposed reductions in grain rates, with editorial. 3300 w. Ry Age—July 2, 1897.

Rate Reductions in Kansas. W. H. Truesdale. The protest of the Rock Island road against the commission's proposed cuts. 2700 w. Ry Age—July 16, 1897.

Regulation of Commerce. Abstract of the report of the Kansas Railroad Commission, concerning "reasonable rates." 2500 w. Ry Rev—Aug. 22, 1896.

See also **RAILWAY LEGISLATION.**

**Legislation.**—Should Congress Legislate on the Subject of Railway Rates? Aldace F. Walker. Extracts from a synopsis of a paper. Also editorial. Considers the constitutional right, the practical common sense, the demand for additional power in this direction, etc. 7000 w. R R Gaz—Jan. 7, 1898.

See also **RAILWAY LEGISLATION.**

**London, Chatham & Dover.**—Maximum Legal Passenger Tariffs. London, Chatham & Dover Railway. A tabular arrangement, with graphic representation of the main line and branches. Trans—July, 1896.

**Lumber.**—The Eau Claire Lumber Rate Case. Editorial examination of the controversy relating to the transportation of lumber. 1200 w. R R Gaz—March 12, 1897.

**Maximum.**—Maximum Railway Rates. Review of a work issued by Messrs. Butterworth & Co., London, on the law respecting the maximum charges for the carriage of goods by railway. 2700 w. Trans—April 23, 1897.

**Milk.**—The Milk Rate Decision. An abstract of the report recently issued by the Interstate Commerce Commission on rates for the transportation of milk to New York City, with editorial. 2800 w. R R Gaz—May 7, 1897.

**Minimum.**—The Fixing of Minimum Rates. Editorial discussion of the need of legislation regulating both the maxima and minima of tariff rates. 1000 w. Ry Engng Rev—Oct. 1, 1898.

**Passenger.**—See **RAILWAY TRAFFIC.**

**Russian Grain.**—The New Russian Grain Rates. Explains the new schedule of rates and comments on its importance to farmers and carriers of the United States. 1500 w. R R Gaz—Jan. 21, 1898.

**Russia-Siberia.**—See **RAILWAY TRANSPORTATION—Russia-Siberia.**

**Sleeping-Car.**—Sleeping-Car Rates in America and Europe. Benjamin H. Ridgely. An interesting article giving a comparison of arrangements and rates in the United States and Europe, with related information. Ill. 6000 w. Ry Age—Oct. 28, 1898.

**Stable.**—Stable Rates. Editorial discussion of freight rates and the agreements of the presidents of the trunk lines. 1600 w. R R Gaz—Jan. 27, 1899.

**State Control.**—Railway Corporations. Railway rates. Limitations to the state's control of rates. Paper prepared for the convention of Railway Commissioners by A. B. Stickney. 6000 w. Ry Rev—May 23, 1896.

See also **RAILWAY.**

**Texas-New York.**—The Lone Star Case. Gives a history of the trouble which caused a demoralization of rates between New York and Texas, with a statement of the case and opinion of the court. 1800 w. R R Gaz—June 17, 1898.

**Tickets.**—See **RAILWAY TRAFFIC.**

**United States.**—See also **American.**

**United States Outlook.**—The Outlook for Railroad Rates. Brief discussion of points affected by the agreement made between the president of the principal lines and the Interstate Commerce Commission. 700 w. Bradstreet's—Jan. 28, 1899.

**United States, Western.**—The K. C., P. & G. Freight-Rate Injunction. Gives facts presented by the Atchison, Topeka & Santa Fé during the recent contest, showing difficulties to be met by new roads in thinly settled country. 1800 w. R R Gaz—Oct. 20, 1899.

The Kansas City, Pittsburg & Gulf Division. The decision of Judge Thayer, of the Federal Court at St. Louis, ordering the receivers to restore rates to the basis which prevailed before the trouble. 1200 w. Ry Age—Oct. 6, 1899.

**Wars.**—Railroad Rate Wars; Their Cause and Cure. John W. Midgely. A statement of the conditions out of which present evils have grown, with suggestions of the remedy. 5000 w. Forum—Jan., 1896.

Rate Wars and Rate Control. Editorial argument for divorce of rate-making power from traffic management. 800 w. Ry Rev—Oct. 17, 1896.

See also **RAILWAY TRAFFIC—Association.**

**Zone System.**—See **RAILWAY TRAFFIC.**

## RAILWAY REPORT.

See **RAILWAY; RAILWAY COMMISSION; RAILWAY EARNINGS; RAILWAY FINANCE; RAILWAY STATISTICS; RAILWAY TRAFFIC.**

## RAILWAY SAFETY APPLIANCES.

See **AIR BRAKE; BRAKE; BLOCK SIGNAL; CAR COUPLER; GRADE CROSSING; INTERLOCKING; RAILWAY EQUIPMENT; RAILWAY SIGNAL.**

## RAILWAY SCHOOL.

**Russia.**—Railway Schools. Facts from note by Mr. Messayedoff, in the "Bulletin of the International Ry. Congress," describing the Russian schools. 1600 w. Ry Rev—Dec. 12, 1896.

## RAILWAY SHOP.

See also **CAR SHOP; ELECTRIC RAILWAY SHOP; LOCOMOTIVE SHOP.**

Railway Workshops and Their Equipment. An argument for the importance of having the best tools, and some suggestions for practical mechanical devices and handy appliances for shop use. The ideas are largely drawn from American practice. 2500 w. Ir & Coal Trds Rev—April 10, 1896.

The Arrangement and Construction of Railway Shop Plants. Considers generally the location, arrangement, architecture, and equipment of buildings. 2500 w. Eng News—July 23, 1896.

**Altoona, Pa.**—The Altoona Shops of the Pennsylvania Railroad. The first article is devoted chiefly to a general description of the shop arrangement, buildings, and some special tools and methods. With editorial on car wheel matters. Serial. Am Eng & R R Jour—June, 1896.

**Americus, Ga.**—New Railroad Shops. Brief illustrated description of the plant of the Georgia and Alabama Railway at Americus, Ga. 800 w. Ry Age—Nov. 5, 1897.

**Arrangement.**—Some Elements of Modern Shop Arrangements. Suggestions relating to systems of arrangement found convenient and necessary for modern work. 1500 w. R R Gaz—June 15, 1900.

**Boston & Maine.**—See **Concord, N. H.**

**Buffalo, N. Y.**—Passenger Car Repair Shops. Illustrated description of the shops of the Lake Shore & Michigan Southern Ry., at Buffalo, N. Y. 2000 w. R R Car Jour—June, 1900.

**Burnside, Ill.**—Burnside Shops, Illinois Central R. R. The first number treats of the general plan of the shops and connected yards, sewerage, drainage, lighting, water supply and minor yard features, and also of the buildings, with dimension and construction details. Serial. Eng News—June 18, 1896.

See also **Stores.**

**Canadian Pacific.**—See **CAR SHOPS.**

**Chicago-Northwestern.**—Chicago and Northwestern Shops at Chicago. An illustrated description of extensive improvements being carried out. Serial. Am Engr & R R Jour—March, 1899.

**Chicago, Rock Island.**—In the Shops. Notes some recent improvements in equipment at the Rock Island shops in Chicago. Ill. 1500 w. Ry Age—Aug. 27, 1897.

**Cincinnati Street Railway.**—Shops of the Cincinnati Street Railway Company. Illustrated detailed description. 1800 w. St Ry Rev—March 15, 1897.

**Cleburne, Santa Fé R. R.**—Cleburne Shops of the Santa Fé. Description of large shops recently erected for locomotive and car repairs. 1200 w. Loc Engng—April, 1900.

**Compressed Air.**—See **COMPRESSED AIR—Railway Shops.**

**Concord, N. H.**—Concord Shops—Boston & Maine Railroad. Description and plans of new, well-equipped shops. 2000 w. Am Eng & R R Jour—Feb., 1898.

Concord Shops—Boston & Maine Railroad. Some of the features of the locomotive shops and planing mill. Plans of the buildings, and also views of interiors including the powerful electric traveling cranes, are also given. Ill. 3800 w. Am Eng & R R Jour—March, 1898.

Concord Shops—Boston & Maine Railroad. Illustrated descriptions of the boiler plant, power house, generators, motors, and steam heating system. 4500 w. Am Engr & R R Jour—April, 1898.

New Shops at Concord, N. H.,—B. & M. R. R. Description of structures and arrangement, with sketch plan. 800 w. Ry Rev—Sept. 26, 1896.

**Denver, Colo.**—New Shops and Yards of the Colorado & Southern Ry. Plans, sections and description of large shops being built in Denver, Colo. 2000 w. R R Gaz—June 15, 1900.

**Depew, N. Y.**—The Depew Shops of the New York Central. Illustrated description of some special devices in use and features of locomotive practice. 2000 w. R R Gaz—Feb. 16, 1900.

The Depew Shops—N. Y. C. & H. R. R. R. Gives a brief description of plan and equipment, with plat and exterior and interior views. 1000 w. Ry Rev—June 13, 1896.

**Electric Railway.**—See **Cincinnati; ELECTRIC RAILWAY SHOP; STREET RAILWAY SHOP.**

**Fitchburg.**—Some Fitchburg Kinks. Description of some useful devices used at the Fitchburg R. R. car shops. 400 w. Loc Engng—May, 1896.

The Remodeled Shops of the Fitchburg Railroad at Keene, N. H. A plan of the new arrangement is given, with description. 700 w. Ry Age—Dec. 20, 1895.

See also **TOOL—Railway Shop.**

**French Northern.**—Extension of the New Workshops of the Northern Railway of France (Agrandissements des Nouveaux Ateliers de la Compagnie des Chemin de Fer du Nord). A very full account of the locomotive works at Hellemes-Lille, with plans showing construction of buildings and arrangement of tools. 4 plates. Serial. Rev Gen de Chemins de Fer—Feb., 1900.

**Gateshead, Eng.**—The Northeastern Railway Works. Full illustrated detailed description of the Gateshead Works, with drawings of Mr. Worsdell's latest engine. 9300 w. Eng, Lond—Dec. 18, 1896.

**Gleiwitz, Silesia.**—See **Shifting Arrangements.**

**Hackensack Meadows.**—Some Devices at the Meadows Shops of the Pennsylvania Railroad. Illustrates and describes some useful labor-saving devices in daily use at these shops. 900 w. R R Gaz—Aug. 25, 1899.

**Hannibal & St. Joseph R. R.**—New Shops of the Hannibal & St. Joseph Railroad. Plans and description. 600 w. R R Gaz—Oct. 5, 1900.

**Horwich, Eng.**—The Horwich Shops of the Lancashire & Yorkshire Railway. F. J. M. Illustrated detailed description of English shops of unusual interest. Serial. Am Mach—Aug. 25, 1898.

**Hungary.**—The Operation of the Hungarian Railway Workshops in 1897 (Ergebnisse des Werkstättendienstes der Königlich Ungarischen Staatsbahnen im Betriebsjahre, 1897). Rudolf Nagel. With tabulated statements of results, expenditures, and general details of operation. 4000 w. Glaser's Annalen—Feb. 1, 1900.

**Jackson, Michigan Central.**—The Michigan Central Shops at Jackson. A brief description of the plant, with drawings of a number of special tools. 2000 w. R R Gaz—April 23, 1897.

**Japan.**—The Omiya Shops of the Nippon Railway of Japan. W. C. Tyler. Diagram and description of carefully planned shops, the finest in the Far East. 1200 w. Ry & Engng Rev—Oct. 1, 1898.

The Workshops of the Japanese Imperial Railways at Kobe. Notes relating to these shops, with general remarks. 1200 w. Engr, Lond—Nov. 25, 1898.

**Keene, N. H.**—See **Fitchburg.**

**Knoxville, Tenn.**—Southern Railway Shops at Knoxville. An illustrated description. 2700 w. Loc Engng—March, 1896.

**La Fayette, Ind.**—Chicago, Indianapolis & Louisville Ships at La Fayette, Ind. Brief description, with engravings of some locomotive details used by this road which differ from general practice. 1200 w. R R Gaz—Aug. 6, 1897.

**Lehigh Valley.**—See **Sayre, Pa.**

**Lima, O.**—New Shops of the C. H. & D. Railway. An illustrated description of the new car shops at Lima, Ohio. 800 w. Ry Mas Mech—Nov., 1898.

**Machine** Tools.—See **Management**; **MACHINE TOOL.**

**Management.**—The Cost of Locomotive Repairs and the Efficiency of Machine Tools in Railroad Shops. William Forsyth. Showing how to economize, taking into consideration the fact that the largest expense is for labor; and also pointing out how tools can be made to do more work. 3600 w. Pro West Ry Club—April, 1897.

The Cost of Locomotive Repairs and the Efficiency of Machine Tools in Railroad Shops. William Forsyth. Read before the Western Railway Club. Considers the saving that can be made by the increased capacity of old tools, and by the use of more efficient new tools. 3000 w. R R Gaz—May 14, 1897.

**Meadows.**—See **Hackensack Meadows.**

**Mexican Central.**—Shops of the Mexican Central at Aguas Calientes. Plan and description of the plant, with remarks. 1500 w. R R Gaz—April 6, 1900.

**Michigan Central.**—See **Jackson.**

**Mt. Clare, W. Va.**—Erecting Shop, Mt. Clare—Baltimore & Ohio Railroad. Illustrated description. 2000 w. Am Eng & R R Jour—Nov., 1897.

**Oelwein, Iowa.**—The Oelwein Shops. An illustrated description of the new plant of the Chicago Great Western Ry., with editorial comment on interesting features. 5500 w. Ry Age—March 2, 1900.

**Omaha.**—In the Shops. A statement of results of tests made by the Union Pacific railroad during Aug., to determine the relative value of coal, and a description of jacking up locomotives by compressed air in the Omaha shops of the same company. 900 w. Ry Age—Sept. 3, 1897.

**Oneonta, N. Y.**—Delaware & Hudson Shops at Oneonta. Illustrates and describes the appliances used in these shops, giving also a brief description of the buildings. 2500 w. R R Gaz—Feb. 3, 1899.

**Pennsylvania R. R.**—See **Altoona**; **Hackensack Meadows.**

**Phil. & Reading.**—Philadelphia & Reading Shops. A. S. The history of this well known shop is related, and the present equipment is described. 2800 w. Loc Engng—April, 1896.

**Piece Work.**—See **WAGES—Piece Work.**

**Pumps vs. Compressors.**—See **COMPRESSED AIR—Railway Shops.**

**Roanoke, Va.**—Roanoke Machine Shops. A. S. The description includes some ideas which are of value to railroad men as being very good practice. Ill. 1200 w. Loc Engng—March, 1896.

**Running Shed.**—A Running Shed; Its Work and Experiences. A. E. Lockyer. Illustrated from numerous photographs showing the method of cleaning engines, washing out boilers, inspection and repair of engines and wrecking trains, with description. 3000 w. Ry Wld—Nov., 1895.

**Sayre, Pa.**—Recent Improvements in the Sayre Shops, L. V. Ry. Illustrated description of enlargement of shops and connections made, new paint shop, etc. 900 w. Ry & Engng Rev—April 28, 1900.

**Scrap.**—Railroad Scrap. J. A. Carney. Discusses a method of handling machine-shop scrap from the time it is made until loaded for shipment. 1300 w. St Louis Ry Club—Oct. 12, 1900.

**Shifting Arrangements.**—See also **TRANSFER TABLE.**

**Shifting Arrangements, Gleiwitz, Silesia.**—The Shifting Arrangements at the Gleiwitz Railroad Shops (Das Verschubgeschäft in der Hauptwerkstatt Gleiwitz). H. Lach. An illustrated description of arrangements for shifting cars about the repair shops, in which electricity is employed to a great extent. 2500 w. 1 plate. Glaser's Annalen—May 15, 1900.

**Siberia.**—Through Siberian Railroad Shops. L. Lodian. An illustrated description of the shops, machinery, and stations of the Trans-Siberian Ry. 3000 w. Loc Engng—May, 1900.

**Stores.**—A New Method of Keeping Track of Railroad Stores. Explains the method used by the Illinois Central Railroad at the Burnside shops, Chicago. 1000 w. Ry & Engng Rev—July 8, 1899.

See also **RAILWAY MATERIAL.**

**Supplies.**—Making Supplies in Railroad Shops. The editor contends that there can be no general decision as to whether railways should make their own supplies and repairs, as it depends upon other contributory circumstances than that of time or economy. 1500 w. R R Car Jour—Dec., 1895.

**Swindon, Eng.**—Swindon Works. Illustrated description of the shops of the Great Western Ry., Eng. 700 w. Loc Engng—Sept., 1896.

**Testing.**—See **LABORATORY—Railway Testing; RAILWAY MATERIAL—Tests; TESTING.**

**Tools.**—Blacksmith Tools in a Small Railroad Shop. Illustrates and describes some of the labor-saving tools used in the Boston & Maine shops at Springfield, Mass. 800 w. Loc Engng—April, 1900.

Some Shop Tools. Illustrated description of a few special contrivances that are useful in railroad repair shops; tools, device for using compressed air, turntables, etc. 2000 w. R R Car Jour—Dec., 1896.

See also **MACHINE TOOL; TOOL.**

**Topeka, Kan.**—Shop Notes, Atchison, Topeka & Santa Fé Ry., Topeka, Kan. Describing some interesting points of practice and economy in a practical and progressive shop. 2800 w. Ry Rev—April 18, 1896.

Transfer Tables.—See **Shifting Arrangements; TRANSFER TABLE.**

**Urbana, Ill.**—The New Shops of the Peoria & Eastern at Urbana. Description of the new shops and yards being built, with general plan, sections, etc. 2000 w. R R Gaz—Sept. 24, 1897.

**Urbana, O.**—The Urbana, O., Shops. Description, with plan, of Cleveland, Cincinnati, Chicago & St. Louis railway repair shops. 1000 w. Loc Engng—Oct., 1899.

**Valley Falls.**—Shop Kinks at Valley Falls. O. H. R. Interesting hints of useful shop practice and tools from the N. Y., N. H. & H. R. R. 900 w. Loc Engng—May, 1896.

**West Shore.**—West Shore Kinks. Illustrated description of shop devices and methods. 2000 w. Loc Engng—Sept., 1896.

### RAILWAY SIGNAL.

See also **BLOCK SIGNAL; GRADE CROSSING; INTERLOCKING; RAILWAY SWITCH.**

Agreements, Contracts, Specifications, Installation and Repairs. W. H. Elliott. The author shows exactly what should be included under the given headings in the installation, and operation of a signal system. Crossings, signal-towers and interlocking are given special attention. 5000 w. Loc Engng—Feb., 1896.

Are Present Methods of Train Protection Adequate? C. E. Davis. Brief paper of general character followed by discussion. Ill. 12500 w. Jour W Soc of Engs—April, 1900.

First Principles in Railroad Signaling. George H. Paine. Describing in detail the various methods of interlocking and block-signaling. Ill. 5200 w. Eng Mag—Aug., 1896.

Progress in Signal Engineering. Charles Hansel. Briefly reviews the early history of railways and the requirements to protect traffic, and the growth of the system, showing improvements to the present, and the effect upon the volume of traffic. Ill. 11800 w. Trans Assn of Civ Engs of Cornell Univ—June, 1897.

Progress in Signaling. H. M. Sperry. Prepared for the Boston meeting of the Railway Signaling Club. Review of improvements and advances. 1100 w. R R Gaz—Nov. 3, 1899.

Railway Signaling. Charles Hansel. Considers the most approved methods of guarding against collisions, signaling one single track, protection of grade crossings and junctions, etc., with discussion. Ill. 15000 w. N Y R R Club—Jan. 19, 1899.

Railway Signaling. W. McC. Grafton. From the "Bulletin of the University of Wisconsin, No. 6." The article is prepared by the signal engineer of the Pennsylvania lines west of Pittsburg. Serial. Sci Am Sup—Dec. 14, 1895.

Recent Practice in Railroad Signaling. George W. Blodgett. The progress that has been made in the last ten or twelve years and the standard practice of to-day so far as it is well established. Ill. 6000 w. Jour Assn of Engng Socs—Dec., 1896.

Remarkable Progress in Signaling. Editorial review showing the varied character of the enterprise and expansion during recent years. 2500 w. R R Gaz—July 27, 1900.

Signaling as It Is and as It Might Be. A. H. Rudd. Part first gives a review of the progress of signaling. Serial. R R Gaz—Jan. 26, 1900.

Some Elementary Notions about Signals. A statement and exposition of four desirable ideals, not incompatible with the restrictions which frequently surround a small or impoverished road. 2000 w. R R Gaz—Sept. 9, 1898.

Some Signal Problems. H. M. Sperry. Read before the Railway Signaling Club, Chicago. Considers some of the problems that have not yet been satisfactorily solved, such as colors for night signals, a method of checking the operation of distant signals, etc. 2300 w. R R Gaz—March 19, 1897.

The Evolution of Safety in Railway Travel. Charles Hansel. This interesting paper traces the development of safety appliances for railways from the beginning. It treats of methods of switching and signaling, interlocking devices, the protection of road grade crossings and the crossings of steam and electric railways. The mechanism of signal cabins is fully described and illustrated, other illustrations also showing signals protecting stations and drawbridges. 4100 w. Eng Mag—Jan., 1899.

**Agabey's Repeating System.**—Agabey's System of Repeating Signals between Stations and Trains in Motion. This is an adaptation of electromagnetic signaling by which the position of the home signal is shown by an indicator on the locomotive of an approaching train. It is hardly applicable to American practice. 900 w. Ind Engng—May 9, 1896.

**America.**—Railway Signaling in America. Reviews recent papers by H. M. Sperry, A. J. Wilson, and Frank Rhea. 2200 w. Engr, Lond—Dec. 29, 1899.

**Audible.**—See **Boult's; Fog.**

**Automatic Indicator, France.**—An Automatic Indicator on the Western Railroad of France. M. E. Brille. An article translated, rewritten and condensed from a contribution to the "Revue Generale des Chemins de Fer," for Sept., 1896. Illustrated detailed description of apparatus. 2200 w. Am Eng & R R Jour—Jan., 1897.

**Automatic Switch Indicators.**—Automatic Switch Indicators. W. W. Salmon. Paper read before the Railway Signaling Club. Description of various installations. 1800 w. Eng News—Dec. 19, 1895.

**Back Lights.**—Back Lights. W. H. Lane. Read before the Ry. Sig. Club. Discusses the dangers due to present practice in the use of signal lights, and the means of overcoming them. 1200 w. Ry & Engng Rev—Sept. 8, 1900.

**Bavaria.**—See **INTERLOCKING—Westinghouse.**

**Belgium.**—Signals on the State Railways of Belgium (Les Signaux des Chemins de Fer de l'Etat Belge). M. Lavigne. Remarks on an accident, with an account of the signal system on Belgian railways and some French ones. 2000 w. Moniteur Industriel—May 19, 1900.

**Block.**—See **BLOCK SIGNAL.**

**"Bootjack."**—The "Bootjack" Signals of the Lake Shore & Michigan Southern Ry. Illustrates and describes a peculiar signal in use on the L. S. & M. S. Ry. 900 w. Eng News—Aug. 4, 1898.

**Boston & Albany, Automatic.**—Automatic Signals on the Boston & Albany. George W. Blodgett. Describing the initiation and gradual development of a comprehensive system, with general considerations on the choice of a system and the incalculable value of signaling. 2000 w. R R Gaz—July 24, 1896.

**Boult's.**—Boult's Audible Signal. Describes the construction and operation of an electric signaling device invented by W. S. Boult. 2700 w. R R Gaz—May 21, 1897.

Boult's System of Railway Signaling. Describes this invention of Wilfrid S. Boult, the underlying principle of which is the employment of a long electromagnet on the road, and a special device for closing a battery circuit, carried by the engine. 5000 w. Prac Eng—Dec. 4, 1896.

A System of Signaling for Railways. W. S. Boult. Abstract of a paper read before the Brit. Assn. for the Adv. of Science. Illustrates and describes an apparatus for fog signaling. 5500 w. Eng News—June 14, 1900.

Signaling Without Contact. W. S. Boult. Read at Dover meeting of the British Assn. Describes a system specially suitable for fog signaling. Serial. Elec Rev, Lond—Sept. 22, 1899.

**Bouré Locking.** The Bouré Locking System (Les Surrures d'Enclenchement du Système Bouré). M. A. Moutier. A very complete account of the Bouré system of locks and keys for the prevention of tampering with railway signals, as employed on the Northern Railway of France. 20000 w. Rev Gen des Chemins de Fer—June, 1899.

**British.**—Criticism of English Railroad Signaling. Charles Hansel. Cites cases of collisions and discusses the causes. 2200 w. R R Gaz—Dec. 30, 1898.

**Caboose Revolving.**—Revolving Signal for Cabooses. Illustrates and describes an apparatus which has been in experimental use on the Chicago. Rock Island & Pacific, and on other roads. 600 w. Ry & Engng Rev—May 13, 1899.

**Calling On.**—Calling On Signals at Savanna, Ill. Illustrates and describes how this signal, on C., M. & St. P. Ry., is used. 350 w. R R Gaz—April 13, 1900.

**Caution.**—The Caution Signal in the Proposed West Arlington Signaling. C. C. Anthony. Letter to the editor criticising the use of the caution signal in the scheme proposed for the West Arlington drawbridge, and showing why it is objectionable. 2400 w. R R Gaz—Oct. 8, 1897.

**Colors.**—Colors for Night Fixed Signals. Editorial on this subject from the point of view of the men who use the signals. 1800 w. R R Gaz—Nov. 26, 1897.

Colors for Night Signals. Abstract of report of committee of the Railway Signaling Club. They recommend that the present system of red for danger, green for caution, and white for clear, be retained, but that the danger of colored glasses breaking be reduced, and that the colors should be so decided as to be unmistakable. 1800 w. Eng News—March 12, 1896.

Colors for Night Signals. An abstract of a committee report and discussion on this subject, before the Railway Signaling Club, Chicago, also an editorial on the same subject. 2400 w. R R Gaz—April 3, 1896.

See also **Yellow.**

**Color Tests.**—Visibility and Confusion Tests of Signal Glasses. Brief account of interesting experiments made by Prof. Louis Derr with colored glasses for fixed signals. 700 w. R R Gaz—April 6, 1900.

**"Crocodile," France.**—The Lartigue and Forest "Crocodile" (Le "Crocodile" Lartigue et Forest). M. Crossmann. Describing the electric warning signal used on the Northern Railway of France. An electric contact of a brush on the locomotive with a shoe on the track operates a pneumatic whistle when a block signal is closed. 3500 w. Rev Gen de Chemins de Fer—Feb., 1900.

**Distant.**—The Distant Signal. E. D. Wileman. Abstract of a paper presented at the Philadelphia meeting of the Railway Signaling Club. Outlines a satisfactory installation at a very difficult location, and discusses various types of distant signal. 2200 w. Eng News—Feb. 23, 1899.

**Electric.**—Electric Automatic Signals—The Right to Use the Overlap. Gives a synopsis of the decision in the suit of the Union Switch Signal Co., against the Philadelphia & Reading R. R. 2200 w. R R Gaz—June 17, 1898.

Electric Signal Systems for Railways (Ueber Elektrische Signalisirung der Geleiswege). A paper by Director Othegraven before the German Railway Society, discussing especially signaling in terminal stations and yards. 2500 w. Glaser's Annalen—April 1, 1899.

Rail Circuit Signals on the Boston & Albany. George W. Blodgett. A discussion of the operation of signals under the control of a rail circuit, the construction work, batteries, etc., with report of the changes to the rail circuit on the B. & A. Ry. 2400 w. R R Gaz—Jan. 6, 1899.

Single Acting Rail Contact (Einseitig Wirkender Schienencontact). An illustrated account of an improved electric contact attached to the rail and operated by wheel pressure, for the operation of bells, signals, etc. 1500 w. Zeitschr. d Oesterr Ing u Arch Ver—July 23, 1897.

The Applications of Electricity to Railway Signaling. J. Warren. Treats of some of the applications for this purpose, giving illustrations. 1200 w. Elec, Lond—Dec. 3, 1897.

The Arrangement of Electric Railway Signals (Dispositif Electrique Applicable aux Signaux de Chemins de Fer). A description of an improved system of electrical control adapted to be used with the signal systems at present in use on the French railways. 2500 w. La Rev Tech—Feb. 25, 1899.

See also **BLOCK SIGNAL; INTERLOCKING.**

**Electric Tramway.**—See **ELECTRIC TRAMWAY—Signals.**

**Electro-Pneumatic.**—Electro-Pneumatic Contact System (Pneumatisch-Elektrischer Kontakt-Apparat). Illustrated description of the Boldt & Vogel automatic signal. An electric contact, made by the elastic depression of the rail, operates the valve of a pneumatic system of signals and switches. 2000 w. Glaser's Annalen—March 1, 1897.

See also **INTERLOCKING.**

**Elevated Ry., Chicago.**—See also **INTERLOCKING.**

**Engineer.**—The Signal Engineer. W. H. Elliott. Read before the Railway Signaling Club. Discussion of this department of railway operation; the proper one to receive reports, and give orders, repairs, maintenance of interlocking plant, etc., are considered. 1800 w. Ry & Engng Rev—Jan. 15, 1898.

**Fixed.**—Uniformity and Consistency in the Use of Fixed Signals. Editorial on the recent address of F. A. Delano at Purdue University upon the use of railway signals. 1300 w. R R Gaz—July 29, 1898.

**Fog.**—Mechanical Fog Signaling Apparatus. Describes a system invented by V. L. Raven and Charles Baister. Ill. 3300 w. Engr, Lond—Nov. 10, 1899.

Supplements to Railway Signaling (Brierley's Apparatus). An illustrated description of an arrangement for giving indications on the engine itself, to avoid danger in fogs. 2000 w. Elec Rev, Lond—Dec. 29, 1899.

See also **Boult's.**

**Foundations.**—Foundations for Signal Work. Charles Hansel. Description with illustrations of approved design. 1100 w. R R Gaz—Jan. 7, 1898.

**Gas-Electric.**—See **GAS ENGINE—Electrical Control.**

**Glass Tests.**—Tests of Railroad Signal Glass. Louis Derr. Extracts from a paper read before the New England R. R. Club. Gives the results of a series of rather severe tests. 1800 w. Ry & Engng Rev—June 30, 1900.

**Grade Crossings.**—See **GRADE CROSSING—Train Signals.**

**Interlocking.**—See **INTERLOCKING.**

**Lamps.**—Maintenance and Inspection of Signal Lamps, A., T. & S. Fé Ry. Information supplied by J. S. Hobson, signal engineer, concerning inspection of lamps in service, repairs, tests, etc. 2200 w. Ry & Engng Rev—Sept. 30, 1899.

**Lamp Testing.**—A Simple Method of Testing Railroad Signal Lamps. T. A. Lawes. Reviews progress in perfecting lenses, position of flame and protection against wind, shocks and overheating, with simple tests for photometric and other qualities. 1200 w. Loc Engng—July, 1896.

**Lanterns.**—Railway Signal Lanterns (Lanternes de Signaux pour Chemins de Fer). Experiments on the visibility of signal lights with various arrangements of reflectors. 3000 w. Génie Civil—May 8, 1897.

**Lever Compensator.**—An Improved Lever Compensator for Wires to Distant Signals. F. G. Lynde. Discusses the causes of uncertainty in successfully working distant signals and describes a mechanism intended to counteract the defects. Ill. 1500 w. Ind Engng—April 2, 1898.

**Locomotive Cabs.**—A Train-Order Annunciator for Locomotive Cabs. A recording device, invented by Harry De Wallace, which warns by sight and sound when approaching a meeting point, crossing, etc., and would stop the train, if the engineer neglects his duty. Ill. 1500 w. Eng News—Oct. 27, 1898.

**Night Colors.**—See **Colors; Yellow.**

**Pennsylvania Standards.**—Signal Department Standards—Pennsylvania Lines West of Pittsburg. A review of the pamphlet recently issued by the company. The general principles of signaling are fully given, signal standards illustrated by diagram and note made of recent changes of specifications of construction, and special points in the practice of these lines. 1400 w. Ry Rev—May 2, 1896.

Signal Standards on the Pennsylvania Lines West of Pittsburg. A description with diagrams, of the arrangements adopted as standard for the disposition of signals, together with a statement of the principles governing the arrangement. An important illustration of the subject. 1000 w. R R Gaz—March 27, 1896.

**Pflasterer.**—Pflasterer's Combined Switch and Distant Signal Movement. Illustrated description of a recent patent. The parts are operated by a single lever, which is thrown one way to set the signal and open the switch, and in the opposite direction to close the switch and clear the signal. 1200 w. R R Gaz—Oct. 15, 1897.

**Pipe-Connected.**—Pipe-Connected Signals for Mechanical Interlocking. G. S. Pflasterer. Read before the Ry. Sig. Club. Favoring the pipe-connected signal, and reporting the satisfactory use on the Chicako & Eastern Illinois R. R. 1200 w. Ry & Engng Rev—March 10, 1900.

**Pipe Tests.**—Tests of Signal Pipe Connection. These tests were made on galvanized and ungalvanized iron pipe, one inch diameter, for the purpose of determining whether galvanizing affects the strength, and also to find what the strength limits will be. Specimens were two inches and twelve inches long. 400 w. Ry Rev—Nov. 16, 1895.

**Pneumatic.**—Pneumatic Signaling Plant at the Paris Exhibition. An illustrated description of the system and the exhibit of the International Pneumatic Railway Signaling Co., of Rochester, N. Y. 1500 w. Engng—Sept. 14, 1900.

See also **Electro-Pneumatic; Thomas Pneumatic.**

**Poles.**—Iron Signal Poles on the C. M. & St. P. Ry. Illustrated description. 1000 w. Am Eng & R R Jour—Sept., 1898.

**Positive Code.**—A Code of Positive Signals. Editorial discussion of the difficulties, and of the changes recently made by the officials of the N. Y., N. H. & H. R. R. 1800 w. Loc Engng—April, 1899.

**Prussia.**—New Signal and Safety Switches on the Prussian Railroads (Neuerungen an den Signal-Weichensicherungsanlagen auf den Preussischen Eisenbahnen). H. Scholkmann. An address delivered before the Verein für Eisenbahnkunde, Berlin, giving an account of recent improvements in safety appliances on the Prussian railways. Well illustrated. 4500 w. Glaser's Ann f Gew u Bauw—March 15, 1900.

**Relative Importance.**—The Relative Importance of Train Signaling Indications. J. Pigg. An explanation of the meanings of different indications, and their relative importance. 1400 w. Elec Eng, Lond—May 5, 1899.

**Sargent's Semaphore.**—Sargent's Automatic Semaphore. Illustrated description of a signal worked by a motor placed in a box at the top of the post. 700 w. R R Gaz—Oct. 13, 1899.

**Semaphore.**—Uniformity in Semaphore Signals. Editorial on a new rule adopted by the Pennsylvania Co., commending the practice. 400 w. Ry Rev —April 11, 1896.

**Stalled Train.**—System for Protection of Railway Trains. Emile Dieudonné. Translated from "La Vie Scientifique." Brief account of a protecting system devised by MM. Chauvin and Baulan, which enables a stalled train to communicate with neighboring stations, signal towers, etc., or to announce its presence to approaching trains. 1200 w. Elec, N. Y.—May 11, 1898.

**Street Railway.**—See **ELECTRIC TRAMWAY—Signal; STREET RAILWAY SIGNAL.**

**Thomas Pneumatic.**—The Thomas Pneumatic Switch and Signal System. Illustrated description. 1400 w. Loc Engng—Jan., 1897.

The Thomas Pneumatic System of Handling Railway Switches and Signals. Illustrated detailed description. The fundamental feature is the manipulation of the valves admitting air to and exhausting it from the working cylinders, by means of pistons of the equalizing type. Ill. 4000 w. Compressed Air—Oct., 1897.

The Thomas Pneumatic System of Handling Railway Switches and Signals. Part first is an illustrated description of the switch arrangements of this system. Serial. Ry Rev—July 17, 1897.

**Thomas Stand.**—The Thomas Stand, for Switch and Distant Signal. Illustrated description of a stand which has a spring connection with the points at all times and a stiff connection while the points are being thrown. 800 w. Ry & Engng Rev—Oct. 8, 1898.

**Timmis-Lavezzari.**—The Timmis-Lavezzari Automatic Electric Signal System (Signaux Electriques Automatiques Système Timmis-Lavezzari). A. Lavezzari. An illustrated description of the system as applied on the electric railroad at the Paris Exposition of 1900. 1600 w. Mem d l Soc d Ing Civils de France—No. 8, 1900.

Automatic Electric Signals at the Paris Exhibition. Illustrates and describes the system worked out by I. A. Timmis. 1200 w. Engng—May 18, 1900.

**Track Circuit.**—Observations on the Track Circuit from an English Standpoint. Arthur H. Johnson. A short description of the principles upon which such a circuit is operated. 1500 w. R R Gaz—March 5, 1897.

The Track Circuit. C. C. Anthony. An explanation of the requirements and advantages of this system. 1800 w. Elec Wld & Elec Engr—April 29, 1899.

**Train Intercommunication.**—See **TRAIN INTERCOMMUNICATION.**

**Yard Limits.**—See **RAILWAY YARD—Limits.**

**Yellow.**—Yellow as a Color for Distant Signals. N. Y., N. H. & H. R. R. Discusses the need of a third color and the study that has been given the problem, with the decision of the road named. 1600 w. Am Engr & R R Jour—April, 1899.

**Yellow Lights.**—Yellow Signal Lights. Editorial, stating the considerations pro and con as taken by the N. Y., N. H. & H. R. R., and discussing the objections and advantages. 1400 w. R R Gaz—Dec. 8, 1899.

**RAILWAY SPEED.**

See **FAST TRAIN; LOCOMOTIVE—High Speed; LOCOMOTIVE PERFORMANCE—High Speed; RAILWAY OPERATION.**

**RAILWAY STATION.**

See also **RAILWAY BUILDING; RAILWAY TERMINAL; RAILWAY YARD.**

**Albany, N. Y.**—New Passenger Station at Albany, N. Y. Brief description with illustrations of the plans decided upon for a station to accommodate the N. Y. C. & H. R. R., the B. & A., and the D. & H. railroads. 400 w. R R Gaz—Dec. 16, 1898.

New Union Passenger Station at Albany, N. Y. An illustrated general description of the new union passenger station, now being built. 9000 w. Ry & Engng Rev—May 6, 1899.

**Albany, N. Y.**—See also **RAILWAY TERMINAL.**

**Austria.**—The Recent Improvements of the Stations of the Kaiser Ferdinand Northern Railway (Ueber Neuere Erweiterungsbauten auf Stationen der Kaiser Ferdinands-Nordbahn). Ernst Reitler. With numerous illustrations of new stations, together with plans and interior views of the locomotive works at Ostrau in Moravia. 4000 w. 3 plates. Zeitschr d Oesterr Ing u Arch Ver—Feb. 16, 1900.

**Baltimore.**—The New Baltimore & Ohio Station in Baltimore. A description of the building with perspective and plan and plot of the depot grounds. 1400 w. R R Gaz—May 15, 1896.

**Beaver, Pa.**—Pittsburg & Lake Erie R. R. Passenger Station at Beaver, Pa. Karl J. C. Zinck. Illustration, floor plan, and general plan of grounds, with description of an attractive station. 400 w. Eng News—Jan. 12, 1899.

**Boston.**—Back Bay Station of the New York, New Haven & Hartford. Describes a new way-station, Italian Renaissance in architectural style. 750 w. R R Gaz—Sept. 8, 1899.

The Back Bay Station of the New York, New Haven & Hartford at Boston. Illustrated description of interesting features, with general information. 1500 w. R R Gaz—March 18, 1898.

See also **RAILWAY TERMINAL.**

**Boston & Albany Ry.**—See Grounds.

**Chantilly Race Course, France.**—See **RAILWAY TERMINAL.**

**Chicago.**—Van Buren Street Suburban Station—Illinois Central R. R., Chicago. Illustrated description. 700 w. Ry Rev—March 6, 1897.

See also **RAILWAY CONSTRUCTION; RAILWAY TERMINAL.**

**Chicago-Englewood.**—Rock Island and Lake Shore Work at Englewood. Illustrates and describes a joint station for three roads to be erected at Englewood (Chicago), in connection with the elevation of the tracks. 800 w. Ry Age—May 20, 1898.

**Coal.**—See also **COALING STATION.**

**Coal, Ash and Sand.**—Coal, Ash and Sand-Handling Station—Illinois Central Railway, 27th Street Shops, Chicago. Illustrates and describes a station that has been in successful operation since January 1, serving about 100 locomotives a day. 1000 w. Ry & Engng Rev—July 29, 1899.

**Columbus, O.**—Columbus Union Passenger Station. Brief illustrated description. 400 w. R R Gaz—Nov. 12, 1897.

New Union Station at Columbus, O. Floor plans of building now in process of erection, with description. 1100 w. R R Gaz—April 30, 1897.

New Freight Station at Columbus, O., for the Pittsburg, Cincinnati, Chicago & St. Louis Ry. Illustrated detailed description. 1000 w. Eng News—Feb. 4, 1897.

New Union Station at Columbus, O. Description, with illustration, plan and sections of a very elaborate railway building recently completed. 1800 w. Ry Rev—Oct. 16, 1897.

**Creston, Iowa.**—New C. B. & Q. Passenger Station at Creston, Iowa. Engraving and plans of the building which is to cost about $50,000. 700 w. Ry & Engng Rev—Aug. 20, 1898.

**Dayton, O.**—New Union Station at Dayton, O. Description, with illustrations, of a new union passenger station. 1100 w. R R Gaz—Feb. 23, 1900.

**Design.**—The Design of Railway Stations. This first article of a series deals largely with the arrangements of stations, with some comment on architectural design. Serial. Eng News—Jan. 12, 1899.

**Dresden.**—The Railway Stations in Dresden (Die Bahnhofsanlagen in Dresden). H. Von Köpcke. A description of the new passenger station at Dresden; also the new goods station, yards, bridge, and general terminal details. 6000 w. 2 plates. Zeitschr d Ver Deutscher Ing—Oct. 8, 1898.

New Railway Stations in Dresden (Les Nouvelles Installations des Gares de Dresde). Henry Martin. Elaborately illustrated and complete description of several new stations. 3500 w. Génie Civil—Nov. 12, 1898.

The New Dresden Main Station. Illustrated description of a new building, said to be one of the finest of its kind in Europe. 1500 w. R R Gaz—Sept. 9, 1898.

The New Railroad Station at Dresden. From the "Illustrirte Zeitung." Brief illustrated description. 800 w. Sci Am Sup—July 2, 1898.

The Wettin Street Railway Station in Dresden (Die Haltestelle Wettinerstrasse in Dresden). Illustrated account of this fine new "through" railway station. The train shed has single braced arch roof 152 ft. span by 350 ft. long. Two articles. 3500 w. Deutsche Bauzeitung—Dec. 18, 22, 1897.

See also **RAILWAY YARD.**

**Duluth.**—New Terminal Station at Duluth, Minn.; C., St. P., M. & O. Ry. Illustrated description. 500 w. Eng News—Feb. 10, 1898.

**Edinburgh.**—The Enlargement of the Waverley Station, Edinburgh. From the "Scotsman." Extract from an interesting account describing the remodelling of the North British Co.'s Waverley Station at Edinburgh. 1200 w. Transport—May 26, 1899.

The Waverley Station, Edinburgh. An illustrated detailed description of the enlargement, nearly completed, of the North British Railway Company's Waverley station. Serial. Engng—Oct. 6, 1899.

**England.**—Great Railway Stations of England. Thomas Cargill. A very fully illustrated account of the principal railway terminals with plans of track arrangements, and details of design and construction of buildings. The first of a series of papers. 4500 w. Eng Mag—Oct., 1898.

The Great Railway Stations of England. Thomas Cargill. The second paper contains many views and plans of important stations, with comments on the construction and arrangement. 4000 w. Eng Mag—Nov., 1898.

**English Freight.**—English Goods Stations and Railway Yards. Arch. R. Whitehead. An account of the growth of English goods stations both at terminals and elsewhere, with many illustrations of stations and yards of the principal railways. 4000 w. Eng Mag—Nov., 1897.

See also **RAILWAY—Great Northern, Eng.; RAILWAY TERMINAL.**

**Forth Worth, Tex.**—New Texas & Pacific Passenger Station at Ft. Worth, Tex. Illustrated description of this recently completed station. 600 w. Ry & Engng Rev—Feb. 3, 1900.

The New Texas and Pacific Station at Fort Worth. Brief illustrated description. 300 w. Ry Age—March 16, 1900.

**Galveston.**—A Handsome Structure for Galveston. Illustrated description of a new depot and general office building for the Gulf, Colorado & Santa Fé. 1000 w. Ry Age—March 5, 1897.

**Germany.**—Recent Passenger Stations (Ueber Neuere Personenbahnhöfe). H. Hoogen. With plans of the new stations at Altona, Kiel, Danzig, Coblenz, and other German cities, and a general discussion of station arrangements and facilities. 5000 w. Glaser's Annalen—Feb. 15, 1900.

**Grand Central, N. Y.**—See **New York.**

**Grand Rapids, Mich.**—New Union Station at Grand Rapids, Mich. Illustration with description. 1000 w. Ry & Engng Rev—May 5, 1900.

**Grand Trunk.**—Grand Trunk Railway Improvements. Drawings and description of some of the passenger stations and other important buildings erected during the past season. 1700 w. Can Eng—Feb., 1897.

**Grounds.**—The Embellishment of Railroad Station Grounds. A. Reinisch. On the treatment such grounds should receive. 1500 w. R R Gaz—Nov. 3, 1899.

**Grounds, Boston & Albany.**—Landscape Gardening on the Boston & Albany. Ellen F. Blodgett. An account of the artistic work which has so greatly added to the beauty of the route. 800 w. R R Gaz—April 7, 1899.

**Grounds, Mechanicsville, N. Y.**—Improvement of Station Grounds at Mechanicsville, N. Y., D. & H. Ry. Illustrated description of recent improvements effected. 1000 w. Ry & Engng Rev—Sept. 9, 1899.

**Jersey City, N. J.**—New Pennsylvania Passenger Station at Jersey City. Plan of the new building made necessary by the fire of last winter. 850 w. R R Gaz—Nov. 18, 1898.

The Jersey City Trainshed. Illustrated description of the extension of the Jersey City trainshed for the Pennsylvania R. R., and the methods of carrying out the work, with notes on the erection of other large arch roofs. 3500 w. Eng Rec—Aug. 5, 1899.

The New Pennsylvania Railroad Passenger Terminal at Jersey City. Edward R. Gumaer. Illustrates and describes the recent improvements. 2800 w. Eng News—Sept. 28, 1899.

See also **RAILWAY TERMINAL—Jersey City; New York; ROOF TRUSS—Railway Station.**

**Leeds, Eng.; Freight.**—See **RAILWAY—Great Northern, Eng.**

**Local.**—Local Stations for Small Towns and Villages, Giving Plans of Buildings and Platforms. Report of committee to convention of Ry. Supts., with numerous plans and discussion. 4500 w. Pro of Assn of Ry Supts—Oct., 1896.

The Designing and Planning of Small Railroad Stations. Alfred Hoyt Granger. Discusses the requirements of town or country stations, giving many illustrations of recent work. 700 w. Br Build—July, 1900.

**London.**—The Enlargement of Liverpool Street Station, Great Eastern Railway. The article is chiefly devoted to description of design and construction of a railway bridge. It is interesting as illustrating the solution of difficult problems attendant on enlarging railroad facilities in the heart of a city. 3300 w. Engr, Lond—April 24, 1896.

Liverpool Street Station Widening. Illustrated description of the extension of Primrose Street bridge. 2200 w. Engr, Lond—Aug. 21, 1896.

See also **RAILWAY CONSTRUCTION; RAILWAY TERMINAL.**

**Manchester, Eng.**—New Goods Station, Great Northern Railway, Manchester. Illustrated account of the new station, now under construction, with plans of the complete structure and photographs of the present condition of the works. 2000 w. Engr, Lond—Sept. 2, 1898.

See also **RAILWAY TERMINAL.**

**Mechanicsville, N. Y.**—See **Grounds.**

**Montgomery, Ala.**—New Passenger and Freight Station at Montgomery, Ala.; L. & N. R. R. Illustrated description of arrangement and design. 1400 w. Eng News—Aug. 19, 1897.

New Union Station at Montgomery, Ala. Brief illustrated description of the improved facilities for passengers and freight provided by the Louisville & Nashville Railroad. 500 w. Ry Age—June 4, 1897.

**Montreal.**—New Terminal Station of the Canadian Pacific Ry., at Montreal. Plan showing the general arrangement of tracks, etc., at the new Dalhousie Square terminal station, with brief description. 500 w. Eng News—Dec. 31, 1896.

New East End Canadian Pacific Railway Station at Montreal. Brief illustrated description. 450 w. Ry & Engng Rev—Jan. 29, 1898.

**Nashville.**—A New Station at Nashville. Brief illustrated description of an imposing structure to be erected. 400 w. Ry Age—Aug. 19, 1898.

**New York.**—Improvement of the Grand Central Station, New York. Describes and illustrates plans for the construction of a large waiting room for the use of all divisions, changes in the trainshed, and other improvements, all of which must be carried out without interrupting the immense traffic. 2300 w. R R Gaz—June 23, 1899.

Refacing the Grand Central Station Walls. Brief description, with illustrations, of the veneer of artificial stone being built over the reconstructed station, which is to give the effect of solid coursed ashlar fronts of gray stone. 800 w. Eng Rec—Jan. 15, 1898.

Remodeling the Grand Central Station, New York. Illustrated description of the improvements to be made, with details of the iron construction. 2000 w. Eng Rec—June 17, 1899.

The Enlargement of the Grand Central Station, New York, N. Y. Illustrated description of improvements being made, estimated to cost about $1,000,000. 2000 w. Eng News—Jan. 6, 1898.

The New Grand Central. An illustrated article criticising the inconvenience and poor architecture of the station before alteration, and explaining the improvements made. 1500 w. Harper's Wk—Feb. 5, 1898.

The Reconstruction of the Grand Central Station, New York. Illustrated description of the methods adopted to put in the foundation of heavy walls across tracks in almost constant use. 1400 w. Eng Rec—April 28, 1900.

The Revised Grand Central Station, New York City. Illustrated description of the extensive changes proposed, which will greatly increase the facilities for handling the immense business carried on. 1800 w. R R Gaz—Feb. 19, 1897.

See also **RAILWAY TERMINAL.**

**Oakland, Cal.**—See **RAILWAY TERMINAL.**

**Omaha, Neb.**—The New Burlington Station at Omaha, Neb. Illustrated description of a substantial building of brick and stone, well adapted to its intended use. 500 w. Ry Age—Sept. 30, 1898.

The New Railway Stations at Omaha, Neb. Introductory account of the various projects for station improvement in this city, and illustrated description of the Burlington station. 2800 w. Eng News—May 4, 1899.

**Paris.**—The Lyons Depot Shelter, Paris. Illustrated description of a very large shed built over the site of a railway station head-house which was constructed within its shelter. 500 w. Eng Rec—April 21, 1900.

The New Paris Station of the Paris, Lyons, & Mediterranean Railway. Plans and sections of the work, with description. 2200 w. Engng—July 1, 1898.

The Temporary Shed over the New Lyons Railway Station (La Charpente-Abri da la Nouvelle Gare de Lyon). An illustrated account of the temporary structure erected to protect the works of a new railway station in Paris, and describing the traveling cranes and erecting plant. 2000 w. Génie Civil—March 4, 1899.

See also **ELECTRIC RAILWAY; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; TRANSPORTATION—Paris Exposition.**

**Pittsburg, Pa.**—New Station of the Pennsylvania R. R. at Pittsburg, Pa. General plan and description of improvements about to be made at a cost of probably over $1,500,000. 900 w. Eng News—Nov. 17, 1898.

New Union Station for the Pennsylvania R. R., at Pittsburg, Pa. Brief description, with illustration. 300 w. Eng News—May 10, 1900.

The New Terminal Station of the Pittsburg & Lake Erie Terminal R. R., at Pittsburg, Pa. Burcham Harding. Detailed description of the engineering equipment of a very complete station. 2000 w. Eng News—Dec. 7, 1899.

**Platforms.**—Advantage of Station Platforms. Arguing for station platforms on a level with car platforms, on the grounds of time saving and increased comfort of passengers. 450 w. Loc Engng—May, 1896.

**Providence, R. I.**—Providence Passenger Station. An illustrated description of the trainshed, now nearly completed, which has been the point of dispute between the railroad company and the officers of the city. 600 w. R R Gaz—Aug. 5, 1898.

The New Passenger Station at Providence—N. Y., N. H. & H. R. R. Illustrated description, with view of completed structure and diagram of station and tracks. 2300 w. Ry Rev—Aug. 29, 1896.

The Providence, R. I., Station of the New York, New Haven & Hartford. Calling attention to special points in these new railroad station buildings. Ill. 900 w. R R Gaz—Oct. 1, 1897.

See also **RAILWAY TERMINAL.**

**Puebla, Mexico.**—Puebla Station, Interoceanic Railway of Mexico. Plan of the Puebla Yard and view of the recently completed station with brief remarks. 400 w. Ry & Engng Rev—March 26, 1898.

**Quincy, Ill.**—New Passenger Station at Quincy, Ill.; C., B. & Q. R. R. Plan and elevation are given, with description. 500 w. Eng News—Feb. 16, 1899.

See also **RAILWAY TERMINAL.**

**Richmond, Va.**—A New Union Station at Richmond, Va. Illustration and plans are given, with brief description of the proposed building. 600 w. Ry Age—Nov. 3, 1899.

New Passenger Station at Richmond, Virginia. Illustrates and describes a union station in process of construction. 700 w. R R Gaz—July 13, 1900.

See also **RAILWAY TERMINAL.**

**St. Gall, Switzerland.**—See **RAILWAY TERMINAL.**

**Seattle, Wash.**—Proposed Northern Pacific Station at Seattle, Wash. Illustration and ground floor plan, with brief description. 600 w. Ry & Engng Rev—Dec. 9, 1899.

Great Northern Terminal Improvements at Seattle, Wash. Plans and description of a proposed union passenger station, yard tracks, etc. If not approved as a union station, with slight changes the plans will be carried out as a station for the road named. 1200 w. Ry & Engng Rev—Jan. 27, 1900.

**Service.**—See **RAILWAY OPERATION—Station Service.**

**Small.**—See **Local.**

**Springfield, Ill.**—New Union Passenger Station at Springfield, Ill.; Illinois Central R. R. Description with two-page plate. 1700 w. Eng News—March 1, 1900.

Union Passenger Station at Springfield, Illinois. Illustrated description of a commodious and beautiful station to be built within the present year. 1000 w. Ry Rev—Aug. 14, 1897.

**Syracuse, N. Y.**—Syracuse Station—N. Y. C. & H. R. R. Bradford L. Gilbert. Description, sectional drawing and plan of section, trainshed and tracks. 1800 w. Ry Rev—April 25, 1896.

**Tours, France.**—The New Railway Station at Tours (La Nouvelle Gare de Tours). A fully illustrated account of this handsome new French railway station, with plan of the approaches, and details of the construction. 2500 w. 1 plate. Génie Civil—June 24, 1899.

The Reconstruction of the Railway Stations at Tours (La Transformation des Gares de Tours). MM. Couvrat & Sabouret. A very full account of the improvements recently completed at this important railway center of France. 7500 w. 4 plates. Rev Gen de Chemins de Fer—Sept., 1899.

**Vienna.**—The Reconstruction of the Main Station of the Vienna Municipal Railway (Umbau und Neubau des Hauptzollamts-Bahnhofes der Wiener Stadtbahn). A. Oelwein. With details of bridge and elevated railway construction and plans of station and approaches. 5000 w. 2 plates. Zeitschr d Oesterr Ing u Arch Ver—June 9, 1899.

**Water.**—See **RAILWAY WATER STATION.**

**Zürich.**—The New Railway Station at Zürich (La Nouvelle Gare de Zurich). MM. Berquet & Margot. A general description of this new terminal, providing accommodations for eight railways. 2000 w. 1 plate. Rev Gen des Chem de Fer—Jan., 1899.

**RAILWAY STATISTICS.**

See also **RAILWAY; RAILWAY COMMISSION; RAILWAY EARNINGS; RAILWAY FINANCE.**

Statistics of the Railroads of the World. Table giving mileage of railroads of all countries, in proportion to area and population; and capital per mile for all important countries. 300 w. R R Gaz—July 10, 1896.

The World's Railroads. Editorial consideration of some of the details given in the "Archiv für Eisenbahnwesen," published by the Prussian Ministry of Public Works. 1100 w. R R Gaz—Aug. 6, 1897.

The World's Railways. Diagram showing the distribution of the railways of the world, with explanation. 500 w. Engng—March 18, 1898.

Great Railway Systems of the World. A condensed statement giving much information. 900 w. Ry Age—Dec. 1, 1899.

The Railroads of the World. Condensed table from the "Archiv für Eisenbahnwesen." 400 w. R R Gaz—June 1, 1900.

The Railways of the World (Die Eisenbahnen der Erde). Tabulated statistics of the development of the railways of the world from the close of 1894 to the end of 1898, in relation to population. 2000 w. Stahl und Eisen—Sept. 1, 1900.

**Algiers and Tunis.**—Statistics of the Railways of Algeria and Tunis (Statistique des Chemins de Fer Algériens et Tunisiens). The official report of the operations of the French railways in Northern Africa. 2000 w. Rev Gen de Chem de Fer—July, 1899.

**America.**—See **North America; United States.**

**Austria Local.**—Statistical Tables of the Austrian Local Railways for 1898 (Uebersichts-Tabellen zusammengestellt aus der Statistik des Verbandes der Oesterreichischen Localbahnen für das

Jahr 1898). General engineering and financial statistics of 32 roads. 2000 w. Mitt d Ver f d Förderung d Local u Strassenbahnwesens—June, 1900.

**British, 1895.**—British Railway Statistics for 1895. Statement relating to the capital, traffic, working expenditure and profits for the year. 1000 w. Eng News—Dec. 17, 1896.

**Denmark.**—Danish State Railroads. Comments on the published statistics of the past year. 700 w. R R Gaz—March 12, 1897.

General Operating Statistics of the Denmark State Railroads for 1897 and 1898 (Danemark, Résultats Généraux de l'Exploitation des Chemins de Fer de l'Etatpendant les Exercises Terminés aux 31 Mars, 1898 et 1897). Five short tables giving general movement and expense statistics, taken from the Danish official reports. 100 w. Ann d Ponts et Chaussées—Jan., 1900.

**Europe.**—The Railways of Germany, England, and France in 1895-1897 (Die Eisenbahnen Deutschlands, Englands, und Frankreichs in den Jahren 1895-1897). A tabulated comparison of equipment and operation of the three countries, showing the increase in Germany over England and France. 1500 w. Glückauf—Feb. 24, 1900.

**European Mileage, 1894.**—Mileage of Railway in European Countries. Interesting information from the report of bureau of railways of the French government. The mileage of each European country at the end of 1894 is given with the increase over the previous year. Russia heads the list with an increase of 1212 miles during 1894. 850 w. Ry Age—Nov. 15, 1895.

**North America, 1898.**—New Railroad Building in 1898. Revised figures of the total mileage of new roads built in United States, Canada and Mexico. 3500 w. R R Gaz—May 26, 1899.

**Prussia, 1900.**—The Condition of the Royal Prussian Railway System for the Year 1900 (Der Etat der Königlich Preussischen Eisenbahnverwaltung für das Etatsjahr 1900). A statement of the official administration of the system, with details of expenditures for operation, maintenance, etc. 5000 w. Stahl und Eisen—Feb. 1, 1900.

**Queensland.**—General Operating Statistics of the Queensland, Australia, Railroads for 1897-98 and 1896-7 (Australie, Province de Queensland. Résultats Généraux de l'Exploitation des Chemins de Fer pendants les Exercises 1897-8 et 1896-7). Five short tables giving general movement and expense statistics, taken from the report of the Queensland Railway Commissioner. 100 w. Ann d Ponts et Chausées—Jan., 1900.

**Roumania.**—General Operating Statistics of the Roumanian State Railroads for 1896 and 1897 (Roumanie. Résultats Généraux de l'Exploitation des Chemins de Fer de l'Etat pendant les Années 1897 et 1896). Five short tables giving general movement and expense statistics, taken from Volume 48 of the "Statistique de l'Union des Administrations des Chemins de Fer Allemands." 100 w. Ann d Ponts et Chaussées—Jan., 1900.

**Russia, 1898.**—Railroad Business in Russia in 1898. Reports the increase in mileage, total length of lines, projected lines, and other matters relating to the railroad interests. 1100 w. U S Cons Repts, No. 434—May 24, 1899.

**Switzerland.**—Statistics of the Swiss Railways (Aus der Schweizerischen Eisenbahn-statistik). Tabulated data brought down to the close of 1898, with discussion. 2000 w. Schweizerische Bauzeitung—Aug. 11, 1900.

**United States, 1895.**—Railway Construction in 1895. Statistics, by years and by States, of mileage built. 400 w. Ry Age—Dec. 27, 1895.

**United States, 1895-6.**—Statistics of Railways in the United States for the year ending June 30, 1896. Figures from the advance abstract of the ninth annual statistical report of the Commission. 1400 w. Eng News—Oct. 21, 1897.

**United States, 1896.**—Railroad Building in 1896. Tabular statement of lines building, new road, and the points between which the new track has been built, with editorial comment. 2700 w. R R Gaz—Jan. 1, 1897.

Railroad Statistics of the United States. Abstract of statistics from advance sheets of Poor's Manual for 1896. 600 w. R R Gaz—Aug. 28, 1896.

The Railways of the United States in 1896. Statistics of railway construction and operation, taken from advance sheets of Poor's Manual for 1897. 1200 w. Eng News—Sept. 2, 1897.

**United States, 1896-7.**—The Official Statistics of the Railways of the United States in 1896. Abstracted matter from advance copy of the ninth annual report of the Interstate Commerce Commission's Statistican. 2000 w. Eng News—Dec. 30, 1897.

American Railways. Abstract of ninth statistical report of the interstate commerce commission, giving the estimated value of American railways as over $10,000,000,000. 1600 w. Bos Jour of Com—Oct. 30, 1897.

**United States, 1897.**—Railway Building in the United States in 1897. Detailed statement by States showing the number of miles of track laid. 2500 w. Ry Age—Feb. 11, 1898.

**United States, 1897-8.**—Railway Construction in 1897 and 1898. A general review of the work for 1897, with enumeration of the more important lines added, those still under construction, and for which contracts have been let. 1700 w. Ry Age—Dec. 24, 1897.

Statistics of Railways in the United States for the year ending June 30, 1898. Advance abstract of the forthcoming Interstate Commerce Commission report. 900 w. Eng News—July 20, 1899.

Statistics of Railways in the United States for the year ending June 30, 1898. Extracts from the advance abstract of the tenth annual report furnished by Henry C. Adams. 1500 w. Eng News—Sept. 1, 1898.

**United States, 1898.**—Nearly 1,300 Miles of New Road in the First Half of 1898. Revised report giving figures in detail by states. 1400 w. R R Gaz—Sept. 2, 1898.

Poor's Railroad Statistics. Editorial comment on information furnished in the introduction to "Poor's Manual" for 1899. 900 w. R R Gaz—Sept. 8, 1899.

Statistics of Railways in the United States for the Year 1898. Extracts from tables given in advanced sheets of "Poor's Manual." 500 w. Eng News—Oct. 15, 1899.

The New Railway Construction of 1898. A general survey of the new work of the year, in the United States, showing it to be the largest since 1892. 2800 w. Eng News—Nov. 17, 1898.

**United States, 1898-9.**—Statistics of Railways in the United States for the year ending June 30, 1899. Information from the twelfth report of the Interstate Commerce Commission. 2400 w. Ry & Engng Rev—July 14, 1900.

**United States, 1899.**—Statistics of the Railways of the United States in 1899. Reviews the last issues of Poor's Manual, and the Statistical Bureau of the Interstate Commerce Commission. 3000 w. Eng News—Oct. 11, 1900.

The Year's Railroad Building. A brief review of the new construction in the United States during the year ending Dec. 31, 1899. 600 w. R R Gaz—Dec. 22, 1899.

**United States, 1900.**—Six Months of Railroad Building in 1900. Particulars in detail, by states and territories, of railroads building and sections completed. 2000 w. R R Gaz—Aug. 31, 1900.

### RAILWAY STRUCTURE.

See **RAILWAY BRIDGE; RAILWAY BUILDINGS; RAILWAY PERMANENT WAY; RAILWAY STATION; RAILWAY TERMINAL.**

### RAILWAY SURVEYING.

See **RAILWAY CURVE; RAILWAY ENGINEERING; RAILWAY LOCATION; RAILWAY MAP; SURVEYING.**

### RAILWAY SWITCH.

See also **INTERLOCKING; RAILWAY SIGNAL; TRACK.**

Switches with Unbroken Main Line Track for Siding Connections (Weiche mit Ununterbrochenem Hauptgeleise für Abzweigung von Industriebahnen). Describing several forms of switches by means of which railway siding connections may be made without interrupting the continuity of the main line rails. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 5, 1897.

**Derail.**—The Derailed Switch as a Moral and Physical Safety Device. Charles Hansel. Abstract of a paper read at the meeting of the Railway Signaling Club, New York. Also the "Proposed Signals at Passaic River Drawbridge, West Arlington, N. J.," as planned by Mr. Hansel are described. 2500 w. R R Gaz—Sept. 17, 1897.

**Derail Electrical Lock.**—Electric Locks for Derails at Crossings. Diagram showing arrangement of instruments and circuits, with description furnished by Mr. Hansel, general manager of the National Switch and Signal Co. 1300 w. R R Gaz—Sept. 10, 1897.

**Electric.**—Electrically Operated Switches (Weiche mit Elektrischem Betrieb). Dr. Russner. A description of the Jüdel system, by which only a single circuit is necessary for operating the switch in either direction. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 22, 1899.

**Electro-Pneumatic.**—Electro-Pneumatic Push-Button Machine in the Pennsylvania Yards at Altoona, Pa. Illustrated description of plant in the distribution yard of the Pennsylvania Railroad at Altoona. The device is intended for work where interlocking is not required, but where a large number of movements must be performed in rapid succession. 1000 w. Ry Rev—Aug. 28, 1897.

**Flickinger Stand.**—The Flickinger Switch Stand, L. S. & M. S. Ry. Illustrates and describes a switch stand in which the safety device is operated by the action of the switch stand itself. 900 w. Ry & Engng Rev—May 6, 1899.

**Frog.**—Spring Rail Frog; Union Pacific Ry. Illustrated description of design by George H. Pegram. 500 w. Eng News—Feb. 4, 1897.

See also **RAILWAY—History.**

**Frog, Coughlin.**—The Coughlin Swing-Rail Frog. Gives description with letter from C. O. Vandevanter, of the Western Maryland R. R., and illustrations. 1200 w. Eng News—Nov. 18, 1897.

**Frog Location.**—Formulas for Locating Frogs. Malverd A. Howe. Gives a method for locating a given frog requiring only a few simple formulas for all the cases that ordinarily occur. 400 w. R R Gaz—March 10, 1899.

**Hinged.**—Hinged Switch and Cast Steel Frog; Netherlands State Railways. Illustrates and describes two interesting features of track construction. 500 w. Eng News—Sept. 7, 1899.

**Interlocking.**—See **INTERLOCKING.**

**Leads.**—Simple and Accurate Rules for the Computation of Shortened Switch Leads. Wellington B. Lee. Gives a set of arithmetical formulas which give surprisingly accurate results. 800 w. Eng News—April 21, 1898.

**Lock.**—Is the Switch and Lock Movement Safe? W. H. Elliott. A paper read before the Railway Signalling Club. The position taken is that the movement is reasonably safe when used in connection with the bolt lock. 1500 w. Ry Rev—Sept. 26, 1896.

See also **INTERLOCKING.**

**Manganese Steel Points.**—See **TRACK.**

**McPherson Safety.**—McPherson's Safety Switch and Frog. Illustrated detailed description. 400 w. R R Gaz—April 10, 1896.

**Pflasterer.**—See **RAILWAY SIGNAL.**

**Pneumatic.**—Pneumatic System of Handling Switches and Signals. The air at 80-lbs. pressure, operated by pipes and valves, acts as the moving power. The valves and switch are illustrated by cuts and switch indication fully explained. Serial. Ry Age—Jan. 3, 1896.

**Sand Track.**—See **TRACK—Sand.**

**Street Safety.**—Safety Switches. John A. Beeler. Communication describing and illustrating a device used in Denver with great satisfaction and economy. 600 w. St Ry Jour—May, 1896.

**Thomas Pneumatic.**—See **RAILWAY SIGNAL.**

**Three-Rail.**—Standard Track and Three-Rail Switch Work; Denver and Rio Grande R. R. Description, with diagrams. 400 w. Eng News—Oct. 15, 1896.

**RAILWAY TARIFF.**

See **RAILWAY RATES; RAILWAY TRAFFIC.**

**RAILWAY TERMINAL.**

See also **RAILWAY BUILDINGS; RAILWAY CONSTRUCTION; RAILWAY STATION; RAILWAY YARD; SUBWAY; TRACK ELEVATION.**

Railroad Terminal Stations. Discusses the requirements of freight and passenger terminal stations. 2200 w. Lord's Mag—Feb., 1897.

Railway Yards and Terminals. W. L. Derr. A thorough and able discussion of governing principles of design and practice, track arrangement and usage, switching, electric communication, lighting, signalling, and location of yard accessories, with plan and diagrams. 4800 w. Eng News—June 18, 1896.

Railway Yards and Terminals. T. Appleton. A review of Mr. Derr's article on the subject commending his principles but questioning the practicability of his plan. 2000 w. Eng News—July 9, 1896.

Terminal Yards. H. G. Hetzler. Shows the importance of giving attention to the arrangement so that business can be handled with the least expense and delay possible. Discusses details, and is followed by discussion. 4800 w. Jour W Soc of Engs—Oct., 1896.

**Albany, N. Y.**—New York Central Improvements at Albany. Illustrated account of improvements embracing the reconstruction of bridge across the Hudson River, the erection of a new station, and elevation of tracks. 1000 w. Ry Age—Oct. 27, 1899.

See also **RAILWAY STATION.**

**Berlin.**—Recent Railway Improvements in Northern Berlin (Neuere Eisenbahnanlagen im Norden Berlins). A very full paper by Herr Bathmann describing important underground and overhead work, with numerous illustrations and 4 plates. An important and valuable railroad paper. 15000 w. Glaser's Annalen—June 15, 1897.

**Boston, Mass.**—Boston's New Union Station. This station and train-shed will be the largest in the world. It will have twenty-three tracks, and cover an area of 495,000 sq. ft. Interesting figures concerning other stations are given. 900 w. Bos Jour of Com—March 21, 1896.

New Southern Union Station at Boston. Illustrated description of a new station, the largest ever constructed, to be used by the Boston & Albany, the New England, and the New York, New Haven & Hartford systems. 1500 w. Ry & Engng Rev—April 2, 1898.

Opening of the Boston Terminal. An account of the opening of the new South Union Station, with description of the building, its equipment and general arrangement. 3300 w. R R Gaz—Jan. 6, 1899.

Proposed Southern Union Station in Boston. A general description of a plan for a new union railroad station in Boston, on a very extensive scale, showing location in general, and arrangement of tracks and head house. 1500 w. R R Gaz—March 27, 1896.

The "Boston and Providence Extension." An illustrated description of some of the problems in engineering in the extension from Huntington Ave., Boston, to the new South Terminal. Serial. R R Gaz—Dec. 8, 1899.

The Boston Southern Station. J. P. Coleman. Continuation of an article published May 12. The present article describes the electro-pneumatic interlocking, giving diagram of switches and signals, and general views. 2700 w. R R Gaz—July 21, 1899.

The Boston Southern Station. J. P. Coleman. Illustrates and describes the track facilities and interlocking which give this station the greatest traffic possibilities in the world. 3000 w. R R Gaz—May 12, 1899.

The New Boston Terminal Station. Elevation and illustrations with description of the new south station of the Boston Terminal Company. 2800 w. Ry Age—Jan. 6, 1899.

The New Southern Terminal Station, Boston. Illustrated description of the new depot of the Boston & Albany, and New York, New Haven & Hartford Systems, which has accommodations for 2000 trains in 18 hours. Part I describes the station as a whole and the details of the foundations. Serial. Eng Rec—Dec. 31, 1898.

The New South Station of the Boston Terminal Company. H. W. Weller. History and illustrated description of this fine station, also illustrations of abandoned stations of the roads now brought into this one train-shed. 2400 w. Am Arch—Sept. 16, 1899. Serial. 1st part.

The New South Terminal Station in Boston and its Effect on Traffic Conditions in Eastern Massachusetts. An interesting article giving a brief description of this new station with its peculiarities, and discussing its influences on transportation conditions. Ill. 2800 w. St Ry Jour—March, 1899.

The New Southern Terminal Station at Boston. Considers in detail the proposed arrangement. When this is completed, all the railway traffic will be concentrated at two union stations. 3000 w. Eng News—Jan. 14, 1897.

The New Union Terminal Station at Boston.

Description with plans of a station which will be the largest in the world, and possess features which are radically new. Serial. R R Gaz—Jan. 1, 1897.

The South Terminal Station, Boston, Mass. George B. Francis. An illustrated detailed description of the engineering features. 17500 w. Pro Am Soc of Civ Engs—Dec., 1899.

The South Terminal Station, Boston, Mass. Discussion of paper by George B. Francis. 2500 w. Pro Am Soc of Civ Engs—Feb., 1900.

I.. The Planning and Building of the Southern Station, Boston. George B. Francis. II. The Mechanical Equipment of the Southern Station. Henry J. Conant. An illustrated account of this large project and its many details is given in the first paper, while the second gives an illustrated description of the mechanical equipment, exclusive of track and structural work, which cost nearly three-quarters of a million dollars. 8400 w. Tech Quar—March, 1899.

Engineering Equipment of the Boston Southern Terminal Station. An account of an unusually comprehensive and complete engineering equipment intrusted to one firm of contractors—Westinghouse, Church, Kerr & Co. 1000 w. Eng News—July 8, 1897.

See also **MECHANICAL PLANT; RAILWAY STATION; WATERPROOFING.**

**Brooklyn Bridge.**—The Terminals of the Brooklyn Bridge Railway. A review of past discussions regarding the facilities and an explanation of the changes made by the switching of electricity and their effect upon the solution of the difficulties. 2200 w. Eng News—Jan. 7, 1897.

**Car Famines.**—See **RAILWAY OPERATION.**

**Chantilly Race Course, France.**—New Railway Station for the Chantilly Race Course (La Nouvelle Gare des Courses a Chantilly). A description of a station adapted for prompt handling of large numbers of people; with plate showing arrangement of tracks and system of signals. 3000 w. La Revue Technique—Aug. 10, 1897.

**Chicago.**—The Illinois Central and the Lake Front. An illustrated description of the Chicago terminal improvements, which will give one of the finest terminal arrangements in the country when completed. The total cost to be about $1,000,000. 3000 w. Ry Rev—Nov. 28, 1895.

Illinois Central Improvements at Chicago. Description and full illustration with map, of an important piece of track depression. 3500 w. Ry Age—May 23, 1896.

The Illinois Central Railroad Improvements at Chicago. Detailing the agreement between the railroads and the general plan of the proposed work. 1700 w. R R Gaz—July 10, 1896.

The Lake Front Improvements of the Illinois Central Railroad in Chicago. John Findley Wallace. Gives the history of the litigation between the railroad company and the city of Chicago, with illustrated description of the improvements. 5500 w. Pro Am Soc Civ Engs—Aug., 1897.

The Illinois Central Improvements at Chicago. Illustrated description of the work of track depression and rearrangement of terminal yards, bulkhead work, viaducts, etc. Serial. R R Gaz—Jan. 28, 1898.

See also **RAILWAY CONSTRUCTION; RAILWAY STATION; TRACK ELEVATION.**

**Chicago Elevated.**—See **ELEVATED RAILWAY—Chicago Terminal.**

**Dresden, Saxony.**—See **RAILWAY STATION; RAILWAY YARD.**

**East St. Louis.**—New Freight Terminals at East St. Louis—Cleveland, Cincinnati, Chicago & St. Louis Railway. Description, with general view and plans, of the new freight houses built to replace those destroyed by the cyclone of 1896. 1300 w. R R Gaz—May 7, 1897.

**Electric Haulage.**—See **New Orleans; ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY.**

**England.**—See **RAILWAY STATION.**

**Galveston.**—The Great Texas Hurricane. The effect of the storm upon the railways and shipping. The great dock enterprise of the Southern Pacific R. R. Co., which was wrecked. Ill. 1600 w. Ry Age—Sept. 14, 1900.

See also **RAILWAY STATION.**

**Grain Elevator.**—See **GRAIN ELEVATOR.**

**Hamburg.**—The Rearrangement of the Railway Terminal at Hamburg (Die Umgestaltung der Eisenbahn-Anlagen in Hamburg). With a plan showing the improved arrangement of tracks, stations and warehouses to be used in connection with the harbor traffic. Two articles. 1 plate. 6000 w. Deutsche Bauzeitung—May 13, 20, 1899.

**Ivry, France.**—The Terminal Wharves at Ivry (La Gare d'Eau d'Ivry). Georges Leugny. Illustrated description of the terminus of the Orleans Railway at Ivry (France) with notes upon the franchise under which it is to be constructed. 2000 w. La Rev Tech—Oct. 25, 1898.

**Jersey City.**—The National Docks & New Jersey Junction Connecting Railway. Map showing route and connections of an extension, which, it is expected, will have the effect of considerably increasing the business and make possible a reduction in time and expense. 900 w. R R Gaz—April 9, 1897.

The Proposed Improvement of the Erie Railroad Company's Terminal in Jersey City. A statement of the difficulties to be overcome, with illustrated description of a proposed method. 1600 w. R R Gaz—April 23, 1897.

See also **RAILWAY STATION; TRACK ELEVATION.**

**London.**—Great Northern and Strand Railway. Describes the extension of this system into the center of London. Map. 1400 w. Transport—Nov. 5, 1898.

The London Works of the Great Central Railway. Illustrated description of the London structures of this road now in process of construction. 2000 w. Ry Wld—June, 1897.

See also **RAILWAY CONSTRUCTION; RAILWAY STATION.**

**Louisville, Ky.**—Louisville (Ky.) Terminal of the C. C. C. & St. L. and the C. & O. Railways. Description, illustrated by track plan, view and cross section. 1500 w. Ry Rev—March 21, 1896.

**Manchester.**—The Great Northern Railway in Manchester. Illustrated description of the new Deansgate station and warehouse. 1700 w. Transport—Jan. 19, 1900.

**Montgomery, Ala.**—Western Railway of Alabama Terminal Improvements at Montgomery, Ala. Plans and illustration, with brief description. 900 w. Ry & Engng Rev—Nov. 11, 1899.

**Montreal.**—See **RAILWAY STATION.**

**Nashville, Tenn.**—The New Station and Yards at Nashville. Plan showing the proposed arrangement as revised, and the portion of the work that will be done immediately, with brief description. 700 w. R R Gaz—Oct. 28, 1898.

**New Orleans.**—A Revolution in Shipping Facilities. Albert Phenis. Port Chalmette, at New Orleans, its docks, wharves, warehouses, compressor and elevator. The great work of the New Orleans and Western Railroad and its destined influence upon the commerce. 5500 w. Mfrs' Rec—July 17, 1896.

Development of the Railroad Facilities of New Orleans, and the Proposed Double Track Railroad Bridge over the Mississippi River. E. L. Corthell. Reviews the expansion of commerce in New Orleans consequent upon Ead's work, and the necessity for railroad facilities in proportion, and sketches the bridge project. 5500 w. Mfrs' Rec—July 17, 1896.

Improvements on the Illinois Central near New Orleans. Describes the arrangement of a new yard, and briefly notes other features. 800 w. R R Gaz—Sept. 29, 1899.

The Electrical Haulage System of the New Orleans & Western Railroad Company at Port Chalmette, New Orleans, La. W. Nelson Smith. Interesting installation, recently completed, showing the adaptability of electricity to the conditions of a railroad yard. Ill. 2500 w. Elec Wld—April 3, 1897.

**New York.**—Certain "Connecting" Railroads in New York City. An account of the projects for connecting the New York Central & Hudson Riv. with the Long Is. Railroad, and the tunnel road to connect the roads terminating in New Jersey, with the Long Is. R. R. Ill. 700 w. R R Gaz—May 11, 1900.

Improvement of the Terminal Facilities at the Port of New York. Criticisms on the plans proposed for facilitating the interchange of goods between ships and systems of land transportation, with lengthy editorial. 4400 w. Eng News—March 10, 1898.

The Railroad on West Street, New York. Discussing the scheme presented to the Dock Commissioners. A criticism of C. W. Buchholz. Extracts from an article published in the N. Y. "Journal of Commerce." 1800 w. R R Gaz—March 4, 1898.

The Railroad Terminals of New York. James F. Hobart. Part first gives interesting illustrated accounts of the stations of the Pennsylvania and the Grand Central, with brief reference to the changes that have been made and those in process. Serial. Ry Mag—Nov., 1897.

See also **RAILWAY STATION; RAILWAY YARD.**

**Oakland, Cal.**—Southern Pacific Terminal at Oakland. Illustrates and describes the recently re-arranged and improved station. 600 w. R R Gaz—July 21, 1899.

**Paris.**—The New Terminal Station of the Orleans Railway at Paris (La Nouvelle Gare Terminus de la Compagnie d'Orleans, à Paris). Plans and elevations of the competitive designs submitted for the proposed new railway station on the Quai d'Orsay, in Paris. 3000 w. Génie Civil—Dec. 11, 1897.

The New Terminal Station of the Orleans Railway (Nouvelle Gare Terminus de la Cie d'Orleans). An illustrated account of the extension of the road to the Quai d'Orsay, and the preparatory demolition works for the new station in Paris. 3500 w. 1 plate. Génie Civil—April 16, 1898.

The New Terminal Station of the Orleans Railway (La Nouvelle Gare Terminus de la Cie d'Orleans). An illustrated account of the progress of the work upon this new terminal in Paris, showing the present condition of the work on the Quai d'Orsay. 3500 w. Génie Civil—June 10, 1899.

The New Terminal Station of the Orleans Rwy. Co. (La Nouvelle Gare Terminus de la Compagnie d'Orleans). Alfred Bondon. An illustrated description of the condition of the work at the Quai d'Orsay (Paris) with numerous plans of buildings, etc. 3500 w. Génie Civil—Nov. 19, 1898.

The New Terminal of the Orleans Railway at the Quai d'Orsay. Jacques Boyer. A handsomely illustrated account of the important terminal works now in construction, which will bring the Orleans railway into the heart of Paris. 5000 w. Eng Mag—April, 1899.

The Orleans Station in Paris. An account of the location and plans for two new stations in Paris, for the Orleans Railroad of France. Ill. 1300 w. R R Gaz—April 1, 1898.

See also **ELECTRIC RAILWAY; RAILWAY CONSTRUCTION; RAILWAY STATION; TRANSPORTATION—Paris Exposition.**

**Passenger.**—Railroad Terminal Stations. E. K. Turner. Read before the New England R. R. Superintendents. The paper is confined to the consideration of stations for passenger traffic. 4000 w. Ry Age—Oct. 23, 1896.

**Pensacola, Fla.**—Louisville & Nashville Terminal Improvements, Pensacola, Fla. Illustrates and describes a grain elevator and conveyor, and warehouse. 900 w. Ry & Engng Rev—April 28, 1900.

**Pittsburg, Pa.**—Baltimore & Ohio Improvements. Rearrangements of tracks and yards at Pittsburg. Description with plans. 1000 w. Ry Age—Dec. 18, 1896.

See also **RAILWAY STATION.**

**Providence, R. I.**—The New Railway Terminals at Providence, R. I. Account of the local conditions and the problems to be solved in this work, with illustrated description. 3000 w. Eng News—Jan. 28, 1897.

See also **RAILWAY STATION.**

**Quincy, Ill.**—Terminal Improvements at Quincy, Ill.; Chicago, Burlington & Quincy R. R. Plan, showing the situation, with explanatory notes. 1300 w. Eng News—March 17, 1898.

See also **RAILWAY STATION.**

**Richmond, Va.**—Chesapeake and Ohio Improvements. A. E. Coulter. An illustrated description of the new connections, yards and terminals at Richmond, Va. 5000 w. Ry Age—Dec. 4, 1896.

The Chesapeake & Ohio's Work at Richmond. Brief illustrated account of the new viaduct, new station, and new freight yard. 1800 w. Ry Age—April 27, 1900.

The Proposed Chesapeake and Ohio Improvements at Richmond. Photographs, map and partial details, with description of an important piece of track elevation and increase of traffic facilities. 4000 w. R R Gaz—Oct. 9, 1896.

See also **RAILWAY STATION.**

**St. Gall, Switzerland.**—Plans for a Union Station for the Swiss Railways at St. Gall (Das Umbau Projekt der Vereinigten Schweizerbahnen für den Bahnhof St. Gallen). With plans showing the approaches and track connections, as well as the relation to the city, together with a profile of grades. 2500 w. Schweizerische Bauzeitung—Dec. 25, 1897.

**Seattle, Wash.**—See **RAILWAY STATION.**

**Two Harbors, Minn.**—Two Harbors Terminal of the Duluth & Iron Range Railroad. Illustrated description of the dock yards and terminals; the design of the yard and approaches to the ore-docks are a fine example of railroad construction. 800 w. Ry Rev—Oct. 9, 1897.

**Weehawken, N. J.**—The New York Central's Improvements at Weehawken. Plans of the proposed reorganization of a great terminal freight yard, with several additional piers, and eventually a new grain elevator. 1000 w. Ry Age—Aug. 10, 1900.

**Zürich, Switzerland.**—See **RAILWAY STATION.**

**RAILWAY TICKET.**

See **RAILWAY TRAFFIC—Ticket.**

**RAILWAY TRACK.**

See **RAIL; RAILWAY PERMANENT WAY; TRACK.**

**RAILWAY TRAFFIC.**

See also **RAILWAY COMMISSION; RAILWAY LEGISLATION; RAILWAY MANAGEMENT; RAILWAY POOLING; RAILWAY RATES; RAILWAY TRANSPORTATION.**

A Railroad Confession of Faith. Statement submitted by Mr. Paul Morton, of the A. T. & S. F. Ry. to the Industrial commission in session at Chicago. 2500 w. Ry & Engng Rev—Nov. 25, 1899.

The Relation of Railroads and Localities. A. J. Vanlandingham. From an address before the Commercial Club of Kansas City. A discussion of rates and related questions. 1200 w. Ry Rev—April 10, 1897.

The Shipping and Transportation of Goods. George Eastlake. The proper method of billing goods for shipment; the classification so as to take advantage of the most favorable tariffs; and the routing of shipments to distant points. 1800 w. Ry Mag—Jan., 1898.

**Association.**—Joint Traffic Association Agreement. An agreement in full, entered into by the Presidents of the Trunk Line and Central Traffic Association, on Nov. 19, to establish traffic standards. 2700 w. R R Gaz—Nov. 22, 1895.

Railway Associations. Aldace F. Walker. Explains what these associations are, and the work undertaken by them, showing the absurdity of attempting to subject them to the Anti-Trust statutes. 8000 w. Ry Mag—Nov., 1897.

The Gentleman's Agreement—A Bit of History. An account of the beginning of the Joint Traffic Association, and its history. 1200 w. Ry Age—Nov. 11, 1898.

The Reorganization of the Traffic Associations. Editorial on the new agreements in process of adoption by the various associations, for the purpose of continuing all of their functions which are not contrary to law as expressed in the recent Supreme Court decision. 1100 w. R R Gaz—May 7, 1897.

The Turning Point in Railway Reforms. M. E. Ingalls. Showing that rate-agreements and the abolition of rate cutting mark a new era in railroading. 2700 w. Eng Mag—July, 1896.

Traffic Associations and the Law. A summary of the opinions of various courts on the legality of association agreements. 1800 w. Ry Age—May 7, 1897.

See also **RAILWAY LEGISLATION—Joint Traffic Association; RAILWAY RATES—Wars.**

**Bonding, Canada.**—The Canadian Bonding Privilege. Condensed from an article in the "Toronto Globe." Discusses the traffic through Canadian territory, and the comparative Canadian traffic, through the United States, and the effect if the Canadian Pacific and the Grank Trunk should be placed under the Interstate Commerce Act. 1700 w. R R Gaz—Nov. 25, 1898.

**British.**—See **RAILWAY RATES; RAILWAY TRANSPORTATION.**

**Bureau.**—The Traffic Bureau. A. J. Vanlandingham. Substance of an address before the Business Men's League of St. Louis. Explains the work and value of such organizations. 1400 w. Ry & Engng Rev—Jan. 29, 1898.

**Car Carding.**—The Canadian Pacific Car Carding System. A description of a system that has proved efficient. 1600 w. Ry Age—Jan. 20, 1899.

**Car Interchange.**—See **CAR INTERCHANGE.**

**Classification.**—A National Classification of Freight Presented before the National Assn. of Agricultural Implement and Vehicle Manufacturers. Reasons pro and con relating to improvements in freight classification. 1500 w. Ry Rev—Nov. 9, 1895.

Efforts to Unify the Freight Classifications. J. W. Midgley. On the course that should be adopted to carry the movement to successful completion. 2500 w. Ry Age—Sept. 15, 1899.

**Clearing House, England.**—The English Railway Clearing House. Extracts from a valuable descriptive paper, read by Dr. William Tausig, before the Commercial Club of St. Louis. 1500 w. R R Gaz—May 22, 1896.

**Demurrage.**—Demurrage on Freight Cars in England and America. A review of an English decision sustaining individual as opposed to average computation in levying demurrage on cars. 900 w. R R Gaz—July 10, 1896.

**Demurrage Legislation, Ohio.**—Demurrage Legislation. Full bill of a text introduced in the Ohio legislature designed to enforce demurrage charges against railroads as well as shippers and consignees. 1000 w. Ry Rev—April 18, 1896.

**Differential Rates.**—See **RAILWAY RATES.**

**Economics.**—The Commercial Meaning of Transport Charges (Ueber die Wirthschaftliche Bedeutung der Gütertarife). Bergrath Gothein. An address delivered before the Silesian ironmasters, discussing especially the relations of railway charges to the coal mining industry. 4500 w. Stahl und Eisen—Jan. 1, 1899.

**Estimation.**—A Method of Estimating the Probable Volume of Traffic on New Railways. W. H. Schuermann. A discussion and illustration of Richard and Mackensen's method as applied to American railways, accompanied by tables, formulae and graphic diagrams. 5000 w. Eng Assn of the South—April, 1896.

**Excursions.**—The Christian Endeavor Excursions. An account of the handling of heavy traffic on the roads west of the Mississippi, which has broken all previous records of the excursion business moving by sleeping cars. 1800 w. R R Gaz—July 9, 1897.

The Movement of the Excursion over the Southern Pacific. Details of how the Christian Endeavor excursion was handled. 600 w. R R Gaz—July 16, 1897.

**Experimental Farms.**—See **FARM—Experimental.**

**Express Charges.**—An Attack upon Railways Through the Express Companies. Editorial discussion of the schedule of charges prepared by the Merchants' Association of New York, and the statements made. 1400 w. Ry & Engng Rev—Dec. 24, 1898.

**France and Germany.**—See **Small Shipments.**

**Freight Checking.**—The "Vericheck" System of Checking and Loading Freight. Describes the system devised by Charles T. Banks, which has proved successful in active practice, giving a copy of the instructions. 2500 w. Ry & Engng Rev—Nov. 12, 1898.

**Freight Station.**—How to Manage a Freight Station. J. F. Youse. Read before the Assn. of Officers & Junction Agents of the Columbus, Hocking Valley & Toledo R. R. Suggestions. 1100 w. R R Gaz—June 4, 1897.

**Germany and Hungary.**—Traffic Statistics from Germany and Hungary. Report of railroad passenger and freight traffic, with comparison with American rates. 1000 w. R R Gaz—May 21, 1897.

**German Union.**—A Review of the Work of the Union of German Railway Administrations. Alex Bewley. An account of the remarkable work accomplished by this association. 3500 w. Ind Engng—Jan. 21, 1899.

**Grain.**—See also **GRAIN TRAFFIC; RAILWAY RATES.**

**India.**—See **RAILWAY FINANCE.**

**Industrial Department.**—See **RAILWAY ORGANIZATION.**

**Lancashire & Yorkshire.**—See **RAILWAY.**

**Long and Short Haul.**—See also **RAILWAY LEGISLATION.**

**Long and Short Haul, England.**—"Long and Short Haul" in England. W. M. Acworth. States the facts to correct a misunderstanding of English practice, as given in the report of the Interstate Commerce Commission. 1000 w. R R Gaz—Jan. 21, 1898.

**Mail Carrying.**—Cost of Carrying Mail on the Southern Pacific. Testimony brought out at the hearing in San Francisco, before the committee appointed to investigate the postal service. 1400 w. R R Gaz—Nov. 18, 1898.

Compensation for Carrying Mails. J. Kruttschmitt. A letter criticising deductions drawn from testimony of Henry C. Adams, and discussing rates of railway mail. 2000 w. R R Gaz—April 20, 1900.

The Cost of Carrying the United States Mails. Interesting statistics on the cost of transporting mails by railroad, aiming to show that the present compensation should not be reduced. 1800 w. R R Gaz—May 6, 1898.

**Passenger.**—Abuses of the Passenger Department. D. B. Martin. Address delivered at meeting of the General Passenger and Ticket Agents in St. Louis. 1300 w. Ry Age—Nov. 19, 1897.

Passenger Traffic and Passenger Profits on American Railways. Editorial discussion of the difficulties in conducting passenger traffic on a paying basis. 3000 w. Eng News—Aug. 16, 1900.

Railroad Fares and Passenger Travel. H. G. Prout. A discussion of this important problem by an expert, showing the intricacy of the subject and the many independent factors of which it is composed. 3000 w. Eng Mag—May, 1898.

The Growth of Passenger Traffic. Editorial review of statistics of the Interstate Commerce Commission, comparing the growth of the traffic in the United States with foreign countries. 1600 w. R R Gaz—May 11, 1900.

See also **RAILWAY TRANSPORTATION—Great Britain.**

**Passengers and Company's Rules.**—Duties of Passengers to Obey Company's Rules. Digest of decision sustaining the company's right to enforce reasonable rules, and reversing a verdict awarding damage to a passenger ejected for violating such a rule. 1200 w. St Ry Rev—June 15, 1896.

**Passenger Classification.**—Passenger Classification. William G. Raymond. A comparison of statistics, as furnished by the Interstate Commerce Commission, as an argument for reducing rates. 2000 w. R R Gaz—Feb. 10, 1899.

**Passenger Rates.**—On Two Cents Per Mile Passenger Rates. Extracts from an address of James Charlton before the Senate Committee and House Committee on Railroads, Illinois legislature, opposing the proposed reduced rates. 2700 w. R R Gaz—April 30, 1897.

**Passes.**—Pass-Selling in Illinois. Editorial on a bill passed by the Illinois Legislature to prevent buying, selling or fraudulently using passes. 600 w. Ry Age—Sept. 10, 1897.

**Pooling.**—See **RAILWAY POOLING.**

**Pooling Cars.**—See **CAR POOLING; RAILWAY OPERATION.**

**Pooling Locomotives.**—See **LOCOMOTIVE—Pooling.**

**Rates.**—See also **Passenger; Passenger Rates; Ticket; Zone; RAILWAY RATES.**

**Rate Wars.**—See **RAILWAY RATES.**

**Reforms.**—Reforms in Freight Methods. J. W. Midgley. Notes some reforms which have been made and others which should be brought about. 2000 w. Ry Age—Aug. 11, 1899.

**Routing.**—The Right to Route Your Freight. Editorial on an interesting decision of the Supreme Court of Tennessee. 2500 w. R R Gaz—June 30, 1899.

**St. Gothard.**—The Operation of the St. Gothard Railway in 1897 (Résultats de l'Exploitation de Chemin de Fer du Saint Gothard pendant l'Année 1897). Jules Michel. A general examination of the traffic between Italy and Switzerland, with diagrams showing the growth of various branches of the service since 1883. 3500 w. Rev Gen des Chemins de Fer—Feb., 1899.

**Scalping.**—The Ethics of Ticket Scalping. A discussion of scalping from the economic and the moral points of view. 3700 w. Gunton's Mag—March, 1899.

See also **RAILWAY LEGISLATION—Anti-Scalping.**

**Small Shipments.**—French and German Practice in Grouping Small Shipments of Freight. Abstract of a paper to be presented at the International Ry. Congress at Paris, by Mr. Mange. 1200 w. R R Gaz—March 16, 1900.

The Handling and Conveyance of Small Consignments. Discusses the report of Mr. Jasper, general goods manager of the North-Eastern Railway of Great Britain, and the advisability of carrying small consignments by passenger train. 2000 w. Transport—Feb. 16, 1900.

**South Eastern, London.**—The South-Eastern Railway and its London Traffic. A vivid description of a traffic which has outgrown its facilities. Illustrated by diagram showing "stringing" of the card between 8 a. m. and noon. 1100 w. Engng—May 29, 1896.

**Switching Charges.**—Handling of Switching Charges. Proposed method of disposing of these troublesome accounts. 1200 w. Ry Age—Sept. 25, 1896.

**Terminal Charges.**—Terminal Charges. Editorial comment on paper of R. Price Williams, read before the Royal Statistical Society. 2200 w. Engng—Feb. 19, 1897.

**Ticket.**—See also Zone.

**Ticket, France.**—Kilometric Tickets and Ticket Money (Carnets Kilometriques et Tickets-monnaie). Discussing the question of mileage tickets and also the sale of reduced rate coupons in quantity for subsequent use in purchase of railway tickets. 1000 w. Génie Civil—Sept. 4, 1897.

**Tickets, Interchangeable Mileage.**—Interchangeable Mileage Tickets. Describes the new tickets for use of commercial travelers, with editorial comment. 2000 w. Ry Age—July 30, 1897.

Interchangeable Mileage Tickets. Reprint of arguments as presented in this paper of June 4, 1892, which fairly state the case. Permission has been granted for such roads as desire to unite in the issue of such a ticket. 1400 w. Ry Rev—Dec. 5, 1896.

**Tickets, Inter-Line.**—Inter-Line Railway Tickets. Action of the General Passenger Agents' Association to secure protection against fraud and misuse. 2800 w. Ry Age—Oct. 9, 1896.

**Ticket, Thousand Mile.**—Thousand Mile Railway Tickets in England. Criticises strongly the value or advantage of the system as recently introduced on the North-Eastern Railway. 700 w. Ry Rev—Aug. 8, 1896.

**Ton-Mile Rate.**—The Ton-Mile Rate and a Great Consolidation. Editorial discussion of the principles affecting rate averages, considering the ton-mile average from the point of view of the railroad stockholder. 2000 w. R R Gaz—July 21, 1899.

**Tonnage Statistics.**—Some Results of the Use of Tonnage Statistics. Gives a practical example of the use of ton-mile statistics as a means of economy. Documents sent to the editor by Mr. Kruittschmitt of the Southern Pacific. 3800 w. R R Gaz—Sept. 1, 1899.

**Track.**—See **TRACK—Traffic.**

**United States.**—Current Transportation Topics. Emory R. Johnson. A discussion of various topics bearing upon transportation, such as the power of the Interstate Commerce Commission to fix rates, reorganization of traffic associations, railway receiverships, etc. 4800 w. An Am Acad —Jan., 1897.

**United States, 1896.**—The Traffic Field in 1896. Annual review of the work, looking at some facts and incidents not touched upon by the Commission of Interstate Commerce. 1700 w. R R Gaz—Jan. 8, 1897.

**United States, 1897.**—Traffic Review of 1897. Editorial review of events affecting rates of traffic in various parts of the United States. 1700 w. R R Gaz—Jan. 14, 1898.

**United States, 1898.**—Events of the Year in the Traffic Field. Editorial review of the events and experiences during 1898. 2000 w. R R Gaz —Dec. 30, 1898.

**U. S. Southern.**—Some Changes in the Railroad Map. J. C. Ransom. Showing how consolidation and traffic arrangements affect transportation and build up southern ports. 4500 w. Tradesman—Jan. 1, 1897.

**U. S. Southwestern.**—The Southwestern Passenger Agreement. An account of the organization of this bureau, with the essential parts of the agreement. 3000 w. Ry Age—June 3, 1898.

The Southwestern Bureau. The essential articles of the agreement entered by eleven roads, and a statement of its purpose. 1400 w. Ry Age—May 20, 1898.

**Zone, Germany The Hungary.**—Railway Passenger Fares and the Cost of Transportation (Selbstkosten und Tarifsysteme der Eisenbahnen). H. Klett. A comparison of the zone system with the distance system as operated in Hungary and Germany. 3000 w. Zeitschr d Ver Deutscher Ing —July 23, 1898.

**Zone, Hungary.**—The Zone Tariff in Hungary. An editorial review of the proposed reform, giving the distance, fares, and a summary of the contemplated change which is expected to result in considerably increased revenue. 500 w. R R Gaz—April 24, 1896.

The Zone System. An interesting report showing the tendency in the distribution of passenger traffic in Hungary, with editorial comments. 1800 w. Ind & East Eng—Feb. 29, 1896.

**Zone, Russia.**—The Railway Zone Tariff System in Russia. Gives details of the system, and tabulation of former and existing (reduced) fares. A large increase of travel reported since the reduction, and favorable predictions made for the future of Russian railways. 1000 w. Eng, Lond —April 24, 1896.

**RAILWAY TRAIN.**

See **RAILWAY OPERATION; TRAIN; TRAIN SERVICE.**

**RAILWAY TRANSPORTATION.**

See also **COAL TRANSPORTATION; IRON ORE TRANSPORTATION; RAILWAY OPERATION; RAILWAY RATES; RAILWAY TRAFFIC; TRAIN SERVICE; TRANSPORTATION.**

**Bicycles.**—Bicycle Traffic on the Long Island Railroad. Illustrated detailed description of methods used by this road, which carried over 176,000 wheels in six months. 1300 w. R R Gaz—April 7, 1899.

**British Coal.**—British Traders and British Railways, with Reference to the Control and Cost of Mineral Transport. John J. Jenkins. Read before the British Iron Trade Assn. Discusses the importance of the country acquiring the control of the railroads, and proposals for the purchase. Also general discussion. 7500 w. Ir & Coal Trds Rev—June 15, 1900.

See also **COAL TRANSPORTATION; RAILWAY RATES.**

**British Minerals.**—Mineral Traffic on British Railways. Gives an idea of the extent and distribution of mineral products, their value, etc. Facts taken from report and mining statistics of the United Kingdom. 1200 w. Trans—Oct. 16, 1896.

Railway Traffic During 1898. Statistics of traffic on roads of Great Britain, with special reference to the transportation of minerals. 2000 w. Col Guard—Aug. 11, 1899.

**Coal.**—See also **COAL TRANSPORTATION; RAILWAY TRAFFIC—Economics.**

**Continental vs. English.**—Continental Railway Facilities. Editorial asserting that nowhere is it possible for the ordinary traveler to be carried so rapidly and so cheaply as in England. The criterion adopted is the average speed over the system. Makes comparison with Continental railways. 2000 w. Engng—Jan. 8, 1897.

**Electric Competition.**—Suburban Competition. Charles J. Bates. Considers the requirements of a system that will enable lines to compete successfully with electric lines in handling traffic. 1600 w. R R Gaz—March 12, 1897.

See also **ELECTRIC TRAMWAY; ELECTRIC RAILWAY.**

**Europe vs. America.**—Railway Travel in Europe and America. Benjamin H. Bidgely. Gives the conditions of travel on the continent of Europe, comparing with American accommodations, with illustrations of some of the car arrangements. 5800 w. Ry Age—Nov. 4, 1898.

**France.**—A View of the Recent Improvements in Railway Service in France (Coup d'Oeil sur les Récentes Améliorations Réalisées par les Grandes Compagnies Francaises de Chemins de Fer). A. Mange. A discussion of the improvements in the interest of travelers which have been made in France during the past ten years, both as regards tariffs and improved accommodations. 6000 w. Rev Gen des Chemins de Fer—Jan., 1900.

**Freight Transferring.**—Freight Transferring. C. W. Nash. Notes the steps recently taken to improve the handling of freight, describing the method as conducted at the railroad department of the D. & H. C. C., at Mechanicsville, N. Y. Serial. Ry & Engng Rev—Feb. 25, 1899.

**Germany, 1896.**—The Movement of Freight on the German Railways in 1896 (Die Güterbewegung auf Deutschen Eisenbahnen im Jahre, 1896). Giving comparative tables with 1895, 1894 and 1893, especially as regards metals and ores. 1200 w. Glückauf—Nov. 27, 1897.

**Great Britain.**—Passenger Service and Rates in Great Britain. W. M. Acworth. Report of new cars and various improvements recently introduced on the different roads, with reduction in rates and changes in third-class travel. 1100 w. R R Gaz—July 16, 1897.

**India.**—Indian Railway Questions. Discusses mail service, connection with docks, conditions of recent working, the Bombay Baroda line, and the loss caused by the famine. 1800 w. Trans—June 25, 1897.

**Live Stock.**—The Transit of Live Stock on Railways. Discusses the poor accommodations for the transportation of animals in Great Britain and Ireland, with the recommendations of the Departmental Committee of the Board of Agriculture. 1500 w. Transport—July 22, 1898.

**Live Stock, Uruguay.**—Rail Transportation of Live Stock in Uruguay. Humphrey Chamberlain. From a paper presented to the Inst. of Civ. Engs., England. Descriptive. 1800 w. Ry Rev—Dec. 26, 1896.

**Loading.**—See also **Structural Material; Timber.**

**Loading, Richmond.**—Freight Loading System at Richmond, Va. Edwin H. Lea. Describes in detail a system that has been working satisfactorily for ten years. 2300 w. R R Gaz—March 24, 1899.

**Mails.**—See **RAILWAY TRAFFIC.**

**Military, Long Island.**—Military Traffic on the Long Island Railroad. An account of the manner of meeting the sudden increase of passenger and freight service required by the establishment of a camp at Montauk. 2000 w. R R Gaz—Oct. 14, 1898.

The War Work of the Long Island Railroad. An account of what was done to handle the troops at Camp Wyckoff and Camp Black. 2200 w. Ry Age—Oct. 21, 1898.

**New York Suburban.**—The Railroad Facilities of Suburban New York. Illustrated article by Foster Crowell. Discussing the probable development of means of transit for the accommodation of districts surrounding New York within a 'thirty-mile radius. 4200 w. Eng Mag—March, 1896.

**Parcels.**—See **RAILWAY TRAFFIC—Small Shipments.**

**Private Car Lines.**—See **CAR—Private Lines.**

**Review.**—Retrospective and Prospective. W. G. Creamer. Discusses the material advances made in transportation methods, and calls attention to "little things" which would add greatly to the comfort and safety of passengers. 1300 w. R R Car Jour—Sept., 1897.

**Ruhr District, Germany.**—See **CANAL—Rhine-Elbe.**

**Russia.**—Railway Traveling in Russia. From "Railroad Men." An interesting account of conveniences furnished for night travel, and of manners and customs of the country. 2200 w. R R Car Jour—March, 1899.

**Russian Freight.**—Freight Traffic on Russian Railroads. Some information concerning the amount of freight. 400 w. U S Cons Repts—Nov., 1898.

**Russian Grain.**—Russian Grain Transportation. Editorial comment on lately published statistics of the production and movement of grain. 1500 w. R R Gaz—April 23, 1897.

See also **RAILWAY RATES.**

**Russian-Siberia.**—Russian Fares and Trains and the Siberian Railroad. Information of interest concerning the transportation system, and probable cost, at present rates, of a journey from London to China. 2000 w. R R Gaz—Dec. 23, 1898.

**Spain.**—Railroad Traveling in Spain. S. W. D. An entertaining letter to the editor, giving many details of operation of the roads through this interesting country. 2500 w. R R Gaz—Jan. 3, 1896.

**Structural Material.**—Rules for Loading Long Structural Material on Railway Cars. Report of committee of Master Car Builders' Assn., submitted to letter-ballot for adoption. The methods are illustrated by diagrams. 3500 w. Eng News—July 23, 1896.

The Loading of Long Structural Material. The latest revised form of the rules and regulations of the Master Car Builders' Assn., for the loading and carrying of structural material. Ill. 4000 w. Bridges—May, 1899.

**Timber.**—Rules Governing the Loading of Lumber and Timber on Open Cars. Abstracted from pamphlet issued by the M. C. B. Assn. 2000 w. Ry Rev—Aug. 29, 1896.

Standard Loading of Lumber and Timber. Pulaski Leeds. Rules for loading on freight cars lumber up to 100 ft. long. The directions are full and explicit. 500 w. Ry Mas Mech—March, 1896.

See also **TIMBER—Railway Transportation.**

**Train Service.**—See **TRAIN SERVICE.**

**Transshipment Car.**—See **NARROW GAUGE RAILWAY.**

**United States.**—Cheap Transportation in the United States. J. A. Latcha. Favoring transportation by railroad, and considering briefly canal transportation, which the writer thinks has in general passed the era of its usefulness. The requisites for improvement are discussed. 6000 w. N Am Rev—May, 1897.

**RAILWAY WASHOUT.**

See **RAILWAY ACCIDENT—Washout.**

**RAILWAY WATER SCOOP.**

See **WATER SCOOP.**

**RAILWAY WATER STATIONS.**

See also **TANK—Railway; TRACK TANK; WATER SUPPLY—Railway.**

Central Water Supply Stations for Railways. Charles A. Hague. Illustrated description of supply well and stand-pipe supply of the Long Island (N. Y.) R. R. 1400 w. Eng News—Feb. 20, 1896.

Water Supply for Locomotives. Thomas Appleton. From a paper read before the Western Railway Club. Discusses the quality, location of tanks, methods of supplying tanks, etc. 1200 w. R R Gaz—July 16, 1897.

**Chicago & Northwestern Railway.**—A Notable Water Tank Installation. Tank at Elmhurst, on the Chicago & Northwestern Railway. The controlling ideas in design were quick delivery of water, durability and cost. Drawings of the valves and pipe connections are given with a view of the tank. 550 w. Ry Mas Mech—April, 1896.

**Gas Pumping Engine.**—Water Supply Stations for Locomotives. C. F. Street. From a discussion before the Western Ry. Club. Discusses the use of the gas engine for pumping. 1300 w. Ry Rev—Feb. 20, 1897.

**Reservoir.**—See **RESERVOIR—Railway Water Station.**

**Russia.**—Russian Water Stations. Illustrated description of the various sources of supply and the construction of water stations. Translated from the "Apercu des Chemins de Fer Russes." 1800 w. Ry Age—Aug. 18, 1899.

**Submerged.**—Submerged Water Station N. P. Ry. Illustrates and describes a system of water supply, invented by E. H. McHenry, in which a submerged tank is used for storage, and steam from the locomotive used to force the water into the tender tank. 800 w. Ry & Engng Rev—Dec. 17, 1898.

**Wheeling & Lake Erie Ry.**—Water Station Improvements on the Wheeling & Lake Erie Railway. Illustrated description of tanks supported on cast iron columns, and with other improvements in details. 800 w. Ry & Engng Rev—April 9, 1896.

**RAILWAY WEED BURNER.**

The Atchison Weed Burner. Plan and vertical section of the railroad weed burner in use on the Atchison, Topeka & Santa Fé, with description of operation. 800 w. R R Gaz—Sept. 10, 1897.

**RAILWAY WRECKING.**

See **RAILWAY ACCIDENT—Emergency Service; Wrecking.**

**RAILWAY YARD.**

See also **RAILWAY STATION; RAILWAY TERMINAL.**

**Construction and Operation.**—The Construction and Operation of Railway Yards. Sums up certain general principles and calls attention to the inadequate consideration too often given the matter in the country. 1700 w. Eng News—June 18, 1896.

**Denver, Colo.**—See **RAILWAY SHOP.**

**Dresden, Germany.**—Freight Yard at Dresden, Germany. A noteworthy instance of time economy secured by proper laying-out and gravity switching, with some notes on sand track. 800 w. R R Gaz—July 31, 1896.

The Great Train Yard at Dresden-Friedrichstadt (Der Grosse Rangirbahnhof in Dresden-Friedrichstadt). An account of the new train yard at Dresden, with detailed description of the system of making up trains, etc. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 25, 1896.

See also **RAILWAY STATION.**

**Electric Haulage.**—See also **ELECTRIC LOCOMOTIVE; ELECTRIC RAILWAY; RAILWAY TERMINAL—New Orleans.**

**England.**—See **RAILWAY STATION—English Freight.**

**Limits.**—Yard Limits. Editorial discussion of the necessity of adequate marks, rules and signals to remove the danger of occupying main tracks with yard work. 1400 w. R R Gaz—July 10, 1896.

**New York.**—A Novel City Freight Yard. Illustrates the freight yard of the Harlem Transfer Co., 135th St., New York City. It was designed by Walter G. Berg, and presents many interesting features. 1000 w. R R Gaz—July 29, 1898.

Harlem Transfer Co.'s Freight Yard, New York City. Plan and data relating to this novel freight yard, designed by Walter C. Berg. 900 w. Ry & Engng Rev—Sept. 24, 1898.

See also **RAILWAY TERMINAL.**

**RAIL WORKS.**

See **RAIL—Australian Works.**

**RAINFALL.**

See also **DRAINAGE; METEOROLOGY; RIVER DISCHARGE; RIVER REGULATION; SEWER—Overflow; Storm Water; SEWERAGE; WATER SUPPLY.**

**Chicago.**—Tables of Excessive Precipitations of Rain at Chicago, Ill., from 1889 to 1897 Inclusive. Edwin Duryea, Jr. Facts considered important as data for sewerage engineers in proportioning the sizes of sewers for the removal of rainfall. 4000 w. Tables. Jour W Soc of Engs—Feb., 1899.

Tables of Excessive Precipitations of rain at Chicago, Ill., from 1889 to 1897, Inclusive. Discussion on paper of Edwin Duryea, Jr. 20000 w. Jour W Soc of Engs—April, 1899.

**City Drainage.**—Rainfall in Cities Considered with Reference to the Design of Sewers (Ueber die den Stadt-Entwässerunganlagen zu Grunde zu Legenden Regenmengen, mit Besonderer Berücksichtigung der Verzögerung im Abflusse derselben). Ed. Bodenseher. A very complete treatment of the subject, paying special attention to the retardation of the flowing off of rain water from the surfaces on which it falls. Tables and diagrams. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—April 20, 1900.

**Cloudburst, Dalmatia.**—Cloudburst in Southern Dalmatia, Nov. 8 and 9, 1896 (Der Wolkenbruch am 8 und 9, November, 1896, in Süd. Dalmatien). Report of the hydrographic bureau upon the meteorological conditions accompanying the hurricane and extraordinary rainfall of above date, 234.4 mm. equal 9,2 ins. of rain, fell in 24 hours. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1897.

**Pennsylvania.**—Observations on Rainfall and Stream-Flow in Eastern Pennsylvania. John E. Codman. Discusses the quantity of water available from a given watershed, either as a source of water supply or water power. 4200 w. Pro Engs' Club of Phila—July-Sept., 1897.

**Run-Off.**—Rainfall and Run-Off in Relation to Sewerage Problems. Walter C. Parmley. A comprehensive study of this subject, presenting the difficulties and the remedies. 7200 w. Jour Assn of Engng Socs—March, 1898.

The Volume and Velocity of Run-Off Water (Abfluss-Geschwindigkeit und Quantität). Rudolf Müller. An exposition of a new method of computing the run-off of rain water, with diagrams showing a graphical solution of given cases. 6000 w. Oesterr Monatschr f d Baudienst—Sept., 1899.

See also **SEWER; SEWERAGE.**

**Stream Flow.**—Data Pertaining to Rainfall and Stream Flow. Thomas T. Johnson. An account of methods and a general discussion accompanies the extensive tables of results of systematic observations presented in this valuable contribution to engineering data. 4800 w. Jour W Soc of Engs—June, 1896.

**United States, 1896.**—Excessive Precipitation in the United States. Alfred J. Henry. Extract from the "Monthly Weather Review," Jan., 1897. Valuable table of facts concerning excessive rain during 1896 with other information. 1500 w. Eng News—June 24, 1897.

**RAMMER.**

**Pneumatic.**—A Portable Pneumatic Rammer. George C. Mattock. Read before the Foundrymen's Assn. Illustrated description of a portable pneumatic rammer designed by Joseph C. Cramp. 2000 w. Ir Trd Rev—April 14, 1898.

**RANGE FINDER.**

See also **ARTILLERY; BALLISTICS; POSITION FINDER; TELEMETER.**

Concerning the Reliability of Range Finding Shots. Rohne. An investigation showing the uncertainty of correct fork construction, and how the range can be made more reliable. 10000 w. Jour U S Artillery—March-April, 1898.

Range Finders and Range Finding. Gives an illustrated description of various range finders, explaining their use, especially on board ships. 4400 w. Ir Age—Oct. 5, 1899.

**Coast Artillery.**—A Horisontal-Base Range and Position Finder for Coast Artillery. George O. Squier and Albert C. Crehore. Description and brief account of the development of the instrument. Ill. 3200 w. Jour U S Artillery—Nov.-Dec., 1898.

**Weldon.**—The Weldon Range Finder, Its Use and Its Theory. Alston Hamilton and H. L. Hawthorne. On the value of this range finder, and the uses to which it may be applied. 4000 w. Jour U S Artillery—Nov.-Dec., 1897.

**RAPID-FIRE GUNS.**

See **ARTILLERY; GUN.**

**RARE EARTHS.**

See also **ELECTRIC CONDUCTIVITY—Oxides; INCANDESCENT GAS LIGHTING; INCANDESCENT LAMP; NERNST LAMP; THORIUM.**

**Luminosity.**—On the Luminosity of the Rare Earths When Heated "in vacuo" by means of Cathode Rays. A. A. Campbell Swinton. Describes investigations of the writer of the comparative luminosity of different mixtures of the rare earths. 2000 w. Elec Rev, Lond—June 2, 1899.

**RARE METALS.**

See also **METAL—Rare; MOLYBDENUM; PLATINUM; TELLURIUM; THORIUM; TITANIUM; TUNGSTEN; URANIUM; VANADIUM.**

Rare Metals and Minerals. J. Ohly. Considers metals found in nature in limited amounts, or whose production is combined with extraordinary difficulties. Among these, platinum, uranium, vanadium, tungsten and molybdenum. 3000 w. Ores & Metals—Oct., 1900.

**RATCHET DRILL.**

See also **DRILL; MACHINE TOOL; TOOL.**

**Manufacture.**—The Making of a Ball-Bearing Ratchet Bit Brace. Illustrates and describes the methods connected with the manufacture of this brace as carried out at Plantsville, Conn. 2400 w. Ir Age—Jan. 5, 1899.

**RAY.**

See also **ELECTRO-PHYSICS; PHOTOGRAPHY; PHYSICS; RADIOGRAPHY.**

**Cathode.**—See **CATHODE RAY.**

**Roentgen.**—See **ROENTGEN RAY.**

**Ultra Violet.**—Ultra Violet Rays and Lamps Adapted to Produce Them. Herbert Cottrell. Conclusions of the writer as to construction, with directions. 700 w. Elec Eng—March 11, 1896.

**X.**—See **ROENTGEN RAY.**

**REAMER.**

See also **TOOL.**

Reamers Without Clearance. T. B. Almond. Practical hints upon the production of reamers very accurately sized, the keeping of these tools in order and upon their use. 700 w. Am Mach—Feb. 20, 1896.

**"Chattering."**—Chattering Reamer. Frank Richards. A talk about reamers and the ways of curing "chattering." 1200 w. Am Mach—Jan. 28, 1897.

**RECTIFIER.**

See **ELECTRIC CURRENT RECTIFIER.**

**REFLECTOR.**

See also **SEARCH LIGHT.**

**Electrolytic Process.**—An Electrolytic Process for the Manufacture of Parabolic Reflectors. Sherard Cowper-Coles. Read before the British Institution of Elec. Engs. Describes the process, one of the chief features being that the surface produced requires no after polishing. Ill. 2500 w. Elec Eng, Lond—Feb. 18, 1898.

**REFRACTORY MATERIAL.**

See **CUPOLA—Lining; FIRE BRICK; FIRE CLAY; FURNACE LINING.**

**REFRIGERATING MACHINE.**

See also **REFRIGERATING PLANT; REFRIGERATION.**

Refrigerating Machinery (Les Machines Frigorifiques). G. Richard. Describing the various machines introduced since 1889, with accounts of their application, records of tests, and determination of data for subsequent use in designing refrigerating apparatus and investigating the theory of these machines. Four articles, with many illustrations. 20000 w. Rev de Mécanique—Jan., March, May, Sept., 1897.

Refrigerating Machinery. Howard Lee Davis. Describes the process of refrigeration, and plant, mentioning some of the peculiarities of ammonia. 2000 w. Yale Sci M—April, 1898.

The Production of Cold (Kälteerzeugung). Two articles by Dr. H. Lorens upon refrigerating machinery, treating of the theory as well as mechanical details. 10000 w. Zeitschr d Ver Deutscher Ing—Jan. 9, 1897.

**Ammonia.**—Ammonia Refrigerating Machine. Illustrated description of the invention of B. Lebrun, of Nimy, Belgium, its special feature being the use of two compression cylinders, each opening into a framing filled with oil, so arranged that, if there is leakage, it will be oil and not ammonia. 900 w. Engng—Oct. 22, 1897.

**Carbonic Acid.**—Carbonic Acid Refrigerating Machines (Les Machines Frigorifiques à Acid Carbonique). P. de Mériel. An illustrated description of the Escher, Wyss & Co., refrigerating machines, operating with carbonic acid gas, and extensively used in the French breweries. 2000 w. La Rev Tech—July 25, 1898.

**Carbonic Anhydride.**—Carbonic Anhydride Refrigerating Machines. E. Hesketh. Paper read before the British Assn. at Ipswich. Illustrated detailed description of a new English compression machine for liquefying carbonic anhydride for refrigerating purposes. 3800 w. Engng—Nov. 1, 1895.

**Compressor.**—An Unusual Compressor. Walter K. Edgar. A criticism of Mr. Wakeman's article on "Operating Ice Machines." 1800 w. Ice & Refrig—July, 1899.

**Efficiency.**—To Prove Efficiency of Ice Machines Without a Trial Test. J. C. Bertsch. Explains the way to find the work of the machine on the card drawn by the indicator; and tests of ammonia compression machines do not prove efficiency. 3900 w. Ice & Refrig—April, 1900.

**Improvements.**—Recent Improvements in Refrigerating Machinery (Neuerungen und Fortschritte auf dem Gebiete der Kälteerzeugung). Prof. H. Lorens. With especial reference to improvements in compressors and valves, with many detailed illustrations. 4500 w. Zeitschr d Ver Deutscher Ing—July 30, 1898.

**Operating.**—Operating Ice Machines. W. H. Wakeman. Practical suggestions to engineers in charge of ice or refrigerating machinery. Explains how a machine is rated and how to calculate capacity. 2700 w. Ice & Refrig—June, 1899.

**Vacuum.**—Vacuum Ice Machines. Alfred Siebert. Calculation of the theoretical economy. 1800 w. Ice & Refrig—Aug., 1900.

**Water.**—The Importance of Water for Refrigerating Machines. Alfred Siebert. Considers different types of refrigerating machines, showing how indispensable is water, the best method of expelling air, etc. 2500 w. Ice & Refrig—Oct., 1898.

**REFRIGERATING PLANT.**

See also **REFRIGERATING MACHINE; REFRIGERATION.**

Building for a Large Ice-Making Plant. Illustrated description of a 5-story structure about 200 ft. square, consisting of a machine house, freezing house and boiler house, and containing many unusual details in the steel work. The coal and ash pockets are described very fully. 2800 w. Eng Rec—Sept. 8, 1900.

**Brooklyn.**—A Brooklyn Refrigerating Plant. Illustrated description of the mechanical plant and insulating details of the building of a large cold-storage company. The plant provides for ventilation as well as refrigeration. 3500 w. Eng Rec—Sept. 1, 1900.

**Cincinnati.**—The Cincinnati Oyster and Fish Co. Illustrates and describes the modern, up-to-date plant of the Triumph Ice Machine Co. 2500 w. Ice & Refrig—Jan., 1899.

**Cologne Slaughter-House.**—Performance of Refrigerating Plant of the Slaughter-House in Cologne (Die Leistung der Kühlanlage des Städtischen Schlachthofes zu Köln). R. Schlottler. Description of the plant with methods used. 3500 w. Zeitschr d Ver Deutscher Ing—Oct. 10, 1896.

**Electrical Equipment.**—Electrical Equipment of a Modern Refrigerating Plant. An illustrated description of the refrigerating plant of the Manhattan Refrigerating Co., in New York City. 3000 w. Am Elect'n—Jan., 1899.

See also **REFRIGERATION.**

**"Glacier."**—See **STEAMSHIP—Cold Storage.**

**Independent.**—Medium and Small Independent Refrigerating Plants. Illustrated description of the methods of refrigerating adopted by the Atlantic Refrigerating Co., of Springfield, Mass. 1200 w. Sci Am—Feb. 12, 1898.

**Pictet.**—A Refrigerating Plant on the Pictet System (Kälteerzeugungsanlage nach System Pictet). W. Brautigam. An illustrated description of a large refrigerating plant on the Pictet system, with data and results of tests. 3500 w. Zeitschr d Ver Deutscher Ing—Feb. 4, 1899.

**St. Louis.**—St. Louis Refrigerating and Cold Storage Co. Description of a new up-to-date plant, with exterior and interior views. 3800 w. Ice & Refrig—Sept., 1900.

**Tests.**—Practical Tests. Alfred Siebert. Discussing the making of approximate tests by the engineer with appliances at hand, to determine the results of the coal used, and the work of pumps, engines and refrigerating machines. Serial. Ice & Refrig—Jan., 1899.

A Series of Tests of the Refrigerating Plant in the Steam Engineering Laboratory of the University of Wisconsin. Walter Alexander, William H. Kratsch, Wallace F. Macgregor. Briefly reviews the history of ice-making from the earliest times, and the refrigerating systems and machines, giving the results of a series of tests conducted to determine the comparative efficiencies, with pressures varying from 140 to 220 pounds. 3500 w. Wisconsin Engr—Jan., 1899.

**Test, De La Vergne.**—Test of a Refrigerating Plant. E. L. Spencer and A. W. Wyckoff. The machine tested is of the De La Vergne make and had been in operation less than one year. The plant is described, and test reported. 1200 w. Sib Jour of Engng—May, 1896.

**Vienna.**—The Refrigerating Plant in the City Markets of Vienna (Die Kühlanlage in der Städtischen Grossmarkthalle in Wien). Joh. Hermanek. A full account of the manner in which a uniformly low temperature is maintained in the vaults of the market at Vienna, by the forced circulation of cooled air. Zeitschr d Oesterr Ing u Arch Ver—Jan. 6, 1899.

**Work and Cost.**—Method of Determining the Work Done Daily by a Refrigerating Plant and Its Cost. Francis H. Boyer. Describes a method of obtaining the amount of work accomplished daily, used in the abbattoir of John P. Squire & Co., East Cambridge, Mass. 1100 w. Am Soc of Mech Engs—Dec., 1896.

**REFRIGERATION.**

See also **REFRIGERATING MACHINE; REFRIGERATING PLANT.**

Artificial Refrigeration. George Richmond. A popular lecture delivered at Cooper Inst., March 1, 1896, under the auspices of the N. A. S. E. 4500 w. Power—April, 1896.

Cold Storage. Comments on Prof. Rane's experiments, giving extracts from his paper read before the Philadelphia Society for the Promotion of Agriculture. 1000 w. Ice & Refrig—Aug., 1898.

Mechanical Refrigeration. Otto Luhr. Gives a brief description of the essentials of the system, and the principles of operation. 3200 w. Power—Jan., 1900.

Mechanical Refrigeration. Peter Neff, Jr. A simple explanation of the principles of mechanical refrigeration. Serial. Engr, Cleveland, O.—Sept. 15, 1898.

Refrigeration. Alfred Siebert. As applied to dwellings, hotels, hospitals, business houses and public institutions. 3000 w. Jour Assn of Engng Socs—Dec., 1896.

Refrigeration for Engineers. Otto Luhr. A plain dissertation upon the philosophy of refrigeration. 1200 w. Power—Sept., 1896.

The Mechanical Production of Cold. J. A. Ewing. Howard lecture before the Society of Arts. General consideration of the thermodynamical basis of the processes, and of the action of refrigerating machines. Ill. 8000 w. Jour Soc of Arts—Aug. 13, 1897.

The Theory and Practice of Mechanical Refrigeration. T. R. Murray. Read Dec. 21, 1897, before the Inst. of Engs. and Shipbuilders in Scotland. A brief description and analysis, from an engineering point of view, of the theory of the subject, and of the application of that theory to practice. Serial. Engr, Lond—Feb. 18, 1898.

**Ammonia Absorption.**—Ammonia Absorption System of Refrigeration. H. F. Stanley. Considers the construction of the generator, and separator, the importance of the economizer, etc. Serial. Ice & Refrig—Dec., 1898.

**Brewery.**—Brewery Refrigeration. E. Brueckner. Illustrated description of the refrigerating plant in R. Leicht's brewery at Vaihingen, Germany. 1200 w. Ice & Refrig—Feb., 1900.

Refrigeration in the Brewery. A. F. McClatchey. Describes the process of beer making and the coolers and cooling arrangements. 2500 w. Ice & Refrig—July, 1899.

**Building.**—Construction of a Cold Storage Building. From "Carpentry and Builder." Illustrated description of a building erected at Fort Sheridan, Ill. 700 w. Met Work—April 22, 1899.

**Car.**—See **CAR—Refrigerator.**

**Chloride of Calcium.**—Chloride of Calcium in Refrigeration. Madison Cooper. On its value as an absorbent and purifier for cold storage rooms. Ill. 3400 w. Ice & Refrig—Feb., 1900.

**Compressed Air.**—Cold Storage and Cold Rooms from Compressed Air. G. D. Hiscox. An explanation of the conditions of air expansion applied to the practical effects of refrigeration, with diagram showing much that is interesting in regard to the general conditions. 1800 w. Compressed Air—Dec., 1897.

Compressed Air Refrigeration. Frank Richards. Describes, with comment, a plant employing compressed air for refrigeration. 1200 w. Am Mach—Jan. 21, 1897.

Mechanical Refrigeration by Use of Compressed Air. Leicester Allen. A clear explanation of the mode of cooling by compressed air, and the causes of failure from wrong applications. Covers the entire cycle of operations and changes in the process. 3000 w. Am Mach—April 21, 1898.

Regulating Temperature of Buildings by Compressed Air. Presents a plan showing in detail the system employed by the Davis & Roesch Co., of New York. Ill. 500 w. Compressed Air—Dec., 1897.

**Dwellings.**—Residence Cooling in St. Louis. Alfred Siebert. Describes method used by the writer. 600 w. Ice & Refrig—March, 1900.

The Application of Refrigerating Machinery for Cooling the Air of Dwellings (Die Verwendung von Kältemaschinen zur Lüftung von Wohnräumen). Dr. Brückner. A discussion of the practicability of cooling the atmosphere of dwellings in heated climates by the use of artificial refrigeration, within a reasonable limit of cost, and without producing excessive humidity. 6000 w. Gesundheits Ingenieur—Sept. 30, 1898.

The Refrigeration of Dwellings. E. Brueckner. Shows the importance of pure cold air, and discusses the development of mechanical refrigeration and the scientific principles. Serial. Ice & Refrig—Dec., 1899.

The Refrigeration of Dwellings. E. Brueckner. Considers the cost and value, the systems, and scientific principles on which to calculate the amount required. 3500 w. Ice & Refrig—March, 1900.

See also **Compressed Air; HEATING—Cooling Combination.**

**Electric Power.**—Electrical Refrigeration. Thomas J. Fay. Describes a system where electricity is used as a motive power, and as a compressor, driven by an electric motor, compresses a refrigerating medium. Ill. 1500 w. Elec Eng, N. Y.—Oct. 6, 1898.

See also **REFRIGERATING PLANT.**

**European.**—European Refrigerating Practice. A. J. Wallis-Tayler. Part first describes the Yaryan system of distilling apparatus. Ill. Serial. Mod Mach—Jan., 1900.

**Exhaust-Steam.**—Cooling with Exhaust Steam. Alton D. Adams. Discusses its utilization in the manufacture of ice or in the cooling of apartments near the steam plants. 2000 w. Am Arch—Sept. 1, 1900.

**Heating Combination.**—See **HEATING—Cooling Combination.**

**Holden.**—Ice Manufacture on a New System. Illustrates and describes the Holden system of ice manufacture, which can produce ice at a cost of 50 cts. a ton. 2200 w. Sci Am—Sept. 2, 1899.

**Hotel.**—Hotel and Restaurant Refrigeration. E. T. Skinkle. Notes the special requirements and gives plan and elevation for modern cold storage room, and sectional views of "short order" box. 2200 w. Ice & Refrig—Dec., 1899.

**Human Corpses.**—The Refrigerating Plant of Val-de-Grâce (Les Installations Frigorifiques du Val-de-Grâce). An illustrated account of the refrigerating apparatus used for preservation of bodies awaiting identification, as used in several Paris hospitals, as well as at the morgue. 1200 w. Génie Civil—Jan. 21, 1899.

**Meat.**—Refrigerated Meat Industry of Victoria. The refrigerating methods employed, extent of the business and other particulars. 2400 w. U S Cons Repts—Oct., 1896.

Preservation of Meat by Freezing Processes (Conservation des Viandes par les Procédés Frigorifiques). Report of M. Deiss upon an inspection of British methods of shipping meat for long distances, with details of cost. 2500 w. Génie Civil—Sept. 11, 1897.

See also **CAR—Refrigerator; STEAMSHIP—Cold Storage.**

**Philadelphia Railway Station.**—The Rooms in the Reading Terminal. Illustrated detailed description. The rooms are refrigerated by ammonia compressors, distribution being by brine circulation. 1800 w. Eng Rec—Jan. 4, 1896.

**Rooms.**—Cold Storage Rooms. W. H. Wakeman. Describes proper construction and insulation, with some reference to piping. Ill. 2000 w. Ice & Refrig—Dec., 1898.

The Cooling of Closed Rooms. Hermann Eisert. Read before the Am. Soc. of Heat & Ven. Engs. Cooling rooms is treated as negative heating, exterior things being heated by heat abstracted from the enclosure. Equations for positive heating apply to negative heating when signs are changed. A study in artificial refrigeration. Discussion. 6000 w. Heat & Ven—Feb., 1896.

**Skating Rink.**—See **SKATING RINK.**

**Thermodynamics.**—Refrigeration and Thermodynamics. J. E. Johnson, Jr. Part first discusses the relation between science and practice, steam engineering refrigeration and thermodynamics, etc. Serial. Ice & Refrig—Aug., 1898.

**Toledo, O.**—Cold Storage in Toledo. Illustrated description of the Toledo Cold Storage Co.'s ice-making plant, its construction, equipment and capacity. 2000 w. Ice & Refrig—May, 1900.

## REFRIGERATOR CAR.

See **CAR—Refrigerator.**

## REFRIGERATOR SHIP.

See **STEAMSHIP—Cold Storage.**

## REFUSE CART.

See also **STREET CLEANING.**

The Design of Refuse Carts. Report made by H. Law to the London County Council on the proper construction of these carts. 800 w. Eng Rec—Sept. 16, 1899.

The Removal of House Rubbish (Die Beseitigung des Hausmülls). An account of the

Kimsbruner system in which the closed bodies of the collecting carts are made removable for the better delivery of the rubbish to the barges. 1200 w. Gesundheits Ingenieur—Oct. 31, 1898.

**REFUSE DISPOSAL.**

See also **FURNACE—Bagasse and Refuse; GAS ENGINE—Garbage Fuel; SANITATION; SANITARY ENGINEERING; SEWAGE DISPOSAL; STREET CLEANING.**

Disposal of Town Refuse. Interesting details from a paper by Brierley Denham Healey, read before the Soc. of Engs., concerning cost and efficiency of various systems. 1600 w. Engr, Lond—Aug. 24, 1900.

Garbage Disposal. Thomas B. Carpenter. Reviews methods old and new, but concludes that no perfectly satisfactory method for all times and all places has yet been devised. 3300 w. San—May, 1898.

Review of Different Methods of Treating Refuse (Considérations sur les Divers Modes de Traitement des Ordures Ménagères). Ach. Livache. A general discussion of the various economical methods of garbage disposal, with many references to American and British practice. 7000 w. Bull de la Soc d'Encour—May 31, 1900.

The Disposal of Garbage. Charles S. Hill. Considers this a new and important field for engineering effort, and discusses its general features. 3500 w. Ill Soc of Engrs & Surv—11 An Rept., 1896.

The Disposal of Towns' Refuse. W. M. Watson. Part first discusses the various kinds of refuse to be disposed of in towns, the manner of utilizing most of it, and the destruction furnace, the heat of which can be used for generating steam for power, etc. Serial. Can Eng—Dec., 1897.

The Economical Disposal of Town Refuse. Brierley Denham Healey. Explains the various systems adopted for burning this refuse, and of utilizing the heated gases in such a manner as to make the process economical. Ill. 8300 w. Soc of Engs, Lond—May 7, 1900.

The Towns' Refuse Problem. Concerning the constituents of refuse and the best means of disposal. Serial. Elec Rev, Lond—June 1, 1900.

The Use of Garbage as Fuel. Explanation of conditions of hygienic cremation of garbage which render the process of doubtful utility in connection with commercially operated boilers. 9000 w. Eng Rec—March 5, 1898.

The Vexed Question of Garbage Disposal. Rudolph Hering. Reviewing the various methods, with special attention to that of cremation. Ill. 2800 w. Eng Mag—June, 1897.

The Disposal of Municipal Waste. W. F. Morse. Gives an outline of methods and apparatus and some of the results. 3800 w. Pro Age—Nov. 15, 1897.

The Utilization of City Refuse. W. F. Morse. Brief notes on the success attained in utilizing the heat from the burning of refuse. 1000 w. Munic Engng—May, 1899.

The Next Step in the Work of Refuse and Garbage Disposal. W. F. Morse. Read at meeting of the Am. Pub. Health Assn., at Minneapolis. Reviews the progress recently made, and the points where improvements are needed, giving an account of works at Boston and in English cities. 10500 w. San—Dec., 1899.

The Utilization of City Refuse. W. F. Morse. Remarks on investigations made, with a description of the plant of the Boston City Refuse Disposal Station, are given in part first. Serial. San—March, 1899.

**America.**—The Disposal of Garbage and Refuse. Letters from James H. Fuertes and Rudolph Hering called forth by an editorial on this subject, published in this paper on Nov. 11, with editorial replies. 2800 w. Eng News—Nov. 25, 1897.

The Unsatisfactory Condition of Garbage Disposal in America. Editorial comment with criticism of the paper of Rudolph Hering, published in this journal on Nov. 4, 1897. 1200 w. Eng News—Nov. 11, 1897.

**American Public Health Assn.**—Disposal of Garbage and Refuse. Report of the committee on this subject, presented at the meeting of the American Public Health Assn., at Philadelphia. 4200 w. Eng Rec—Nov. 8, 1897.

Garbage and Refuse Disposal of Cities. Report of the Committee on Garbage and Refuse, of the American Public Health Assn. 4500 w. Munic Engng—Dec., 1897.

**Animal Wastes.**—The Removal and Utilization of Animal Wastes and Bodies (Die Beseitigung und Verwertung von Fleischabfällen und Tierischen Kadavern). Dr. Haefcke. Description of the Otto apparatus for recovering all valuable matter from animal wastes, avoiding injury to public health. 1500 w. Zeitschr d Ver Deutscher Ing—April 16, 1898.

**Bagasse.**—Megass and Refuse Furnaces. William Price Abell. Illustrated detailed description of furnace for utilizing refuse as fuel, and a general and practical discussion of the subject. 2200 w. Engr, Lond—Jan. 10, 1896.

See also **FURNACE.**

**Barren Island, N. Y.**—Refuse Disposal at Barren Island, New York. Reviews the report of Dr. E. L. Martin, J. B. Taylor and John Bogart on the nature and offensiveness of the plants where the garbage and dead animals of New York are converted into fertilizers and soap grease. 2000 w. Eng Rec—Feb. 4, 1899.

The Barren Island Garbage Disposal Plant. Olin H. Landreth. Report on the remodeled plant reducing the garbage of Manhattan and Brooklyn, New York City. 1500 w. Eng Rec—Aug. 27, 1898.

The Barren Island Garbage Reduction Works, Greater New York. An account of the disposition of the garbage of Greater New York, and an illustrated detailed description of the plants on Barren Island. Also editorial. 7700 w. Eng News—Feb. 1, 1900.

The Utilization of New York Garbage. An illustrated description of the plant on Barren Island for the disposal of garbage. 1600 w. Sci Am—Aug. 14, 1897.

**Bath, Eng.**—The Bath Refuse Destructors. Illustrated detailed description. 1300 w. Engng—Jan. 3, 1896.

**Berlin.**—Experiments with Rubbish Destructors in Berlin (Die Versuche mit der Müllverbrennung in Berlin). A general report of the official tests of the destructors at Berlin, with data as to capacity, operation and working expenses. 2 articles. 5000 w. Gesundheits Ingenieur—April 15, 30, 1898.

The Berlin Investigations of Dust-Burning (Die Müllverbrennungs-Versuche in Berlin). Abstract from the report of Messrs. Bohm and Grohn, with tabulated statement of the cost and performance of the various destructor furnaces tested. 3500 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1898.

The Disposal of Garbage and Refuse. Rudolph Hering. An account of the cost of construction and operation of the Berlin, Germany, works. Ill. Serial. Eng Rec—Nov. 20, 1897.

The New Refuse Destructors in Berlin (Der Nene Müllschmelzofen in Berlin). W. Häntzschel. A description of the new Wegener refuse destructors now in use in Berlin. The furnaces are fed with powdered coal, and very successful results are reported. 2000 w. Gesundheits Ingenieur—June 15, 1899.

**Boston.**—The Utilization of City Refuse in Boston, Mass. Illustrated description of a plant for sorting the combustible refuse of the city and burning the useless portions. 1800 w. Eng Rec—Feb. 25, 1899.

**Bradford, Eng.**—Garbage Cremation at Bradford, England. Describes methods of disposing of most of the ashes and garbage from a population of 300,000, with results of a 278-hour test of plant. 500 w. Eng Rec—Sept. 29, 1900.

The Disposal of House Refuse in Bradford. J. McTaggart. Paper read before the British Association, describing the refuse destructors at Bradford, England, where the town refuse is burned, generating steam, and the residual clinker used for various purposes. 4000 w. Elec Rev, Lond—Sept. 14, 1900.

The Disposal of Towns' Refuse. Ed. C. de Segundo. Reviews Mr. McTaggart's paper, read before the British Assn. 1200 w. Elec Rev, Lond—Sept. 21, 1900.

The Disposal of House Refuse in Bradford. John McTaggart. Read before the British Assn. Describes the refuse destructors, and methods of utilizing the residuum, giving results of working tests. 4200 w. Engng—Sept. 21, 1900.

The Horsfall Destructor. Illustrates and describes the destructors at Bradford, Eng., which have several improvements of interest. 2500 w. Engng—Aug. 12, 1898.

**British.**—Garbage Destructors. A. E. Brooke Ridley. Briefly reviews the three principal systems of destructor plants as used at Shoreditch, Ealing, and Oldham. Ill. Elec, N. Y.—May 11, 1898.

Garbage Disposal in England. James H. Fuertes. Abstract of a paper by Dr. J. Spottiswoode Cameron, published in "British Medical Journal," with other information compiled and prepared by the writer. 2200 w. Eng News—July 2, 1896.

Refuse Cremation at Edinburgh, Bradford and Oldham. An illustrated report by Lord Kelvin and Prof. A. Barr, on the construction and operation of the plants in the cities named. 4000 w. Eng Rec—May 6, 1899.

Refuse Destructors. F. L. Watson. A paper upon the designing and construction of refuse destructors, with descriptions of the most important forms used in the United Kingdom. 2000 w. Engng—Sept. 9, 1898.

**Brownlee Furnace.**—See **New Brighton, N. Y.**

**Calorific Power.**—Refuse and Its Calorific Power. Ed. C. de Segundo. Remarks on investigations made which are considered inadequate for furnishing reliable data. 1700 w. Elec Rev, Lond—Jan. 12, 1900.

**Cambridge.**—See **SANITARY ENGINEERING—European.**

**Chicago.**—Garbage Disposal. Arthur R. Reynolds. Read before the Am. Soc. of Munc. Engs. A study concerning the wastes of Chicago, but having general application. Considers collection and disposal. 1600 w. Munic Engng—Jan., 1899.
See **Johnson Crematory.**

**China.**—See **SEWAGE DISPOSAL.**

**Cincinnati, O.**—Garbage Disposal at Cincinnati. Describes the method of collecting the garbage by city employés and delivering it to a company for disposal by reduction. 700 w. Eng Rec—Oct. 14, 1899.

Notes on Garbage Disposal at Cincinnati, Ohio. Brief account of the system employed. 1200 w. Eng News—April 26, 1900.

See **Simonin Process.**

**Cleveland, O.**—Garbage Reduction at Cleveland, O. Illustrated description of the system and plant. 1400 w. Eng News—May 31, 1900.

**Columbus, O.**—Garbage Reduction at Columbus, O. Describes the manner of collecting, and treatment at the reduction works. 2200 w. Eng News—July 19, 1900.

**Colwell Furnace.**—The Colwell Furnace for Light, Inflammable Refuse, New York City. Detailed description of the apparatus and of the system employed in collecting, sorting, and treating the refuse material. Ill. 1400 w. Eng News—Nov. 21, 1895.

**Country Places.**—Scavenging, with Special Reference to Rural Districts. George Mackay. Its importance and effect upon the health and comfort of the community, with description of system recommended. 3500 w. San Rec—Nov. 6, 1896.

The Disposal of Waste in Country Places. Harvey B. Bayshore. Means and methods for the sanitary disposal of wastes and refuse from country homes. 1200 w. San—March, 1896.

**Darwen, Eng.**—See **ELECTRIC LIGHTING.**

**Detroit.**—Garbage Disposal at Detroit. An interesting description of the reduction process taken from the annual report of Dr. Walter Kempster, of Milwaukee, a delegation of officials having visited the plant. 900 w. Eng Rec—Aug. 6, 1898.

**Dust.**—Dust Destructors. George Watson. Read at meeting of Gloucestershire Eng. Soc. and reported in the "Gloucester Journal." Abstract. Deals with the dust destructor from the earliest to the latest developments, especially describing the Horsfall destructor furnace. Discussion. 6000 w. Elec Eng, Lond—Dec. 24, 1897.

The Cremation of Dust-Bin Refuse. Editorial on the discussion of George Watson's paper on refuse destructors, read before the Gloucestershire Engineering Society. 1500 w. Engng—Feb. 11, 1898.

Is Dust-Bin Refuse a Fuel? Norton H. Humphreys. An examination of the fuel used in the Shoreditch district, and why it can be used for steam-raising purposes. Does not consider ordinary household refuse inflammable. 1700 w. Jour Gas Lgt—Jan. 25, 1898.

**Ealing, Eng.**—See **SEWAGE DISPOSAL.**

**Edinburgh.**—Refuse Disposal in Edinburgh. Editorial review of the methods and expense in this city, showing that this problem must be solved for each city independently. 800 w. Eng Rec—Aug. 6, 1898.

Refuse Destruction at Edinburgh. An illustrated account of the station and its equipment, the present condition and the history. 2800 w. Engr, Lond—Aug. 26, 1898.

**Electric Stations.**—Combined Destructor and Electric Light Plants. Ernest Kilburn Scott. Calls attention to some points worth considering before deciding to utilize destructor heat for electric-lighting purposes. 1200 w. Elec Rev, Lond—Dec. 9, 1898.

Electric Supply and the Destruction of Town Refuse. F. J. Warden-Stevens. Describes the usual form of destructor, and its working, showing how much heat may be obtained per pound of refuse, and how far the heat from the destructor is usable for electric supply. 2800 w. Arch, Lond—May 14, 1897.

English Experience with Garbage as Fuel for Electric Light Stations. A. H. Campbell. Abstract of a paper presented at a recent meeting of the Munic. & Co. Engs., England. Indicates a belief in the possibilities of utilizing garbage for this purpose. 600 w. Eng News—July 13, 1899.

Garbage as a Fuel for Electric Light Stations. A discussion of this subject suggested by the recent installation at Shoreditch, London, setting forth some of the reasons why the success of the plan is very problematical in England and still more doubtful in America. 2000 w. Eng News—Aug. 26, 1897.

See also **St. Helens; Shoreditch; FUEL—Electric Energy.**

**European Cities.**—The Present European Practice in the Disposal of the Wastes of Large Cities. James H. Fuertes. Deals with the receptacles, collection and disposal of refuse as carried out in various places. Ill. 5000 w. Trans Assn of Civ Engs of Cornell Univ—1898.

**Furnaces.**—Refuse Furnaces. George Watson.. Abstract of a paper read before the Institution of Civil Engineers, England, on the practical features of managing cremators. 2500 w. Eng Rec—Aug. 26, 1899.

See also **Brownlee; Colwell; Dust; Henry-Campion; Horsfall; Johnson; Morse-Boulger; Thackeray; Whiley; Willoughby.**

**Gas Engines.**—See **GAS ENGINE—Garbage Fuel.**

**Germany.**—Garbage Cremation Experiments in Germany. Condensed translations of three progress reports sent to Mr. Rudolph Hering from professional engineers in Germany. An exceedingly valuable and suggestive contribution to the literature of garbage cremation. 4500 w. Eng Rec—June 20, 1896.

See also **Berlin; Hamburg.**

**Halifax, N. S.**—Garbage Collection and Disposal at Halifax, Nova Scotia. Instructions to householders, and specifications under which the contract for removal was awarded. 2200 w. Eng News—Aug. 19, 1897.

**Hamburg.**—The Bullerdeich Destructor Plant for the City of Hamburg (Die Städtische Verbrennungsanstalt für Abfallstoffe am Bullerdeich zu Hamburg). Describes the Horsfall and Whiley garbage destructor cells as used at Hamburg. The plant has a capacity of nearly 80000 tons per year, and the destruction costs 0.84 mark per ton. 2500 w. Gesundheits Ingenieur—Dec. 31, 1897.

The Disposal of Garbage and Refuse. Rudolph Hering. Gives information of the construction, cost, and operation of the Hamburg, Germany, works, with illustrations. 4500 w. Eng Rec—Oct. 23, 1897.

**Hamburg and Leeds.**—Garbage Cremation in Europe. James H. Fuertes. Describes cremation as the author personally saw it carried out in the city of Hamburg, and also in Leeds, Eng., with some experimental data. 2800 w. Eng Rec—July 11, 1896.

**Henry-Campion Incinerator.**—The Henry-Campion Destructive Incinerator. Illustrated description of a destructor furnace invented by G. Henry and J. M. Campion, Executive Engineers of Umballa, India. 1300 w. Ind Engng—Aug. 8, 1896.

**Holthaus System.**—See **Syracuse, N. Y.**

**Horsfall Furnace.**—The Horsfall Destructor. Abstract of report of Lord Kelvin and Professor Barr upon the tests of the Horsfall refuse destructors at Edinburgh, Bradford and Oldham. 1500 w. Engr, Lond—March 17, 1899.

Refuse Destruction. Editorial on the interesting report of Messrs. Kelvin and Barr on the subject of refuse destruction in connection with the Horsfall furnace. 2000 w. Engng—April 7, 1899.

The Modified Horsfall Crematory. Illustrated description of a form of destructor designed to burn very wet city refuse, like swill, sewage sludge or night soil. 700 w. Eng Rec—Feb. 8, 1900.

See also **Bradford, Eng.**; **Edinburgh**; **Hamburg.**

**Johnson Crematory.**—The Johnson Garbage Crematory. Illustrated description of the experimental crematory at Chicago, Ill., with an account of its performance in recent tests. The expense of cremation has been found to be 28.2 cents per ton. 1000 w. Eng News—Feb. 6, 1896.

**Leeds.**—Cost in Leeds of Destroying Refuse by Heat. Dr. Spottiswoode Cameron and Mr. George Darley. Tabulated data and explanatory description of experiments to determine cost. 800 w. San Rec—Oct. 9, 1896.

See also **Hamburg and Leeds.**

**Lewisham, Eng.**—See **Willoughby Destructor.**

**Leyton, Eng.**—A Test of a Refuse Crematory. Describes a test of a plant at Leyton, England, which burns about 1700 tons of refuse and sewage sludge annually, the heated gases being used under two 96 h. p. boilers. 800 w. Eng Rec—March 5, 1898.

The Leyton Sewage and Destructor Works. Illustration of works, with description of process. 1300 w. Engr, Lond—Feb. 4, 1898.

Refuse Destructor at Leyton. Illustrated description of plant designed to burn unscreened towns' refuse and compressed sludge. 1300 w. Engng—Nov. 27, 1896.

**Liverpool.**—Treatment of Refuse in Liverpool Historical. Covers the last fifty years. 2000 w. Arch, Lond—Aug. 7, 1896.

**Massachusetts.**—The Sanitary Disposal of Garbage. Abstract of discussion taken from Proceedings of the Massachusetts Assn. of Boards of Health. Discusses the feeding garbage to stock, burying, cremation, reduction, etc. 6500 w. San—Oct., 1897.

**Megass.**—See **Bagasse.**

**Merz Process.**—Garbage Disposal. H. C. Garneau. Description of process patented by Adolf Merz, of Brunn, Moravia, and in use by the St. Louis Sanitary Co. 1500 w. Yale Sci M—Jan., 1897.

**Montreal.**—Notes on the Operation of the Montreal Garbage Furnace. Notes on the operation of a furnace built on English lines which claims to burn the garbage with practically no expense for fuel. 1100 w. Eng News—Dec. 7, 1899.

**Morse-Boulger.**—The Morse-Boulger Garbage and Refuse Destructor. Description with a statement of the new principles claimed for the system. 1000 w. Eng Rec—May 15, 1897.

**Munich.**—Experience in the Municipal Utilization of House Refuse (Erfahrungen in der Städtischen Hausmüllverwerthung). Theodor Koller. Discussing the various methods of destroying refuse to the best advantage, with especial reference to the practice in the city of Munich, Bavaria. 2500 w. Glaser's Annalen—June 15, 1899.

**New Brighton, N. Y.**—The Garbage-Disposal System of New Brighton, N. Y. Information relating to the Brownlee crematory in use on Staten Island. 900 w. Eng Rec—March 13, 1897.

**New Orleans.**—See **Simonin Process.**

**New York.**—An Inequitable Proposal for Disposing of the Street Sweepings of New York. An editorial criticism of the conditions named by the street cleaning department, under which proposals for the final disposition of street sweepings, ashes and other refuse collected in New York City were invited, and which failed to draw out proposals. It is shown that, under the conditions specified, proposals could not reasonably have been expected. 2000 w. Eng Rec—Dec. 21, 1895.

Disposal of the Wastes of New York City. Illustrated account of the arrangements for the disposal of paper and refuse. 1600 w. Sci Am—Aug. 28, 1897.

Garbage Cremation in New York. Shows that the discontinuance of cremation was due to local conditions of haul and not to failure of destructors. 500 w. Eng Rec—March 31, 1900.

The Disposal of Household Refuse in New York (L'Enlevement et le Traitement des Ordures Ménagères à New York). An illustrated description of the methods for handling garbage and light refuse, compiled from American sources. 2000 w. La Rev Tech—June 10, 1898.

The Final Disposition of the Wastes of New York City. Abstracts of advance sheets of a forthcoming report, on the disposal of garbage, street-sweepings, store and other refuse of New York, by Col. G. E. Waring, Com. of Street Cleaning. 600 w. Eng News—Feb. 20, 1896.

Final Disposition of the Wastes of New York City. Extended abstract of a report by George E. Waring, Jr., Commissioner of Street Cleaning of New York. 2000w. Eng Rec—July 18, 1896.

See also **Barren Island**; **Colwell Furnace**; **Philadelphia**; **San Francisco**; **STREET CLEANING.**

**New York, 1898.**—Refuse Disposal in New York in 1898. Describes the experience with garbage reduction and cremation in the various boroughs, and gives the cost of sorting salable refuse. 1100 w. Eng Rec—June 10, 1899.

**Paris.**—Monograph on the Refuse of Paris (Notice Monographique sur les Ordures Ménagères de Paris). Paul Vincey. A very full account of the system of sorting and removing the garbage and wastes of Paris. Serial. Bull Soc d'Encour—Aug., 1900.

The Incineration of the Sewage of Paris (L'Incineration des Gadoues de Paris). A discussion of the various processes for incinerating solid refuse, with especial reference to the introduction of such apparatus into Paris. Descriptions of the Oldham, Javel and Horsfall furnaces. 3000 w. La Rev Tech—Feb. 25, 1897.

**Philadelphia and New York.**—Treatment of Household Garbage in Philadelphia and New York (Traitmente des Ordures Ménagères à Philadelphie et à New York). Discussing the feasibility of introducing an incinerating plant in Paris, similar to those used in the American cities. 4500 w. Génie Civil—June 5, 1897.

**Pittsburg.**—Garbage Reduction Works at Pittsburg and Allegheny, Pa. Description of the plant and its operation. 3000 w. Eng News—March 29, 1900.

**Portland, Ore.**—The Garbage Crematory at Portland, Ore. A. McL. Hawks. Information collected for Mr. Rudolph Hering and published with his consent. Illustrated description. 800 w. Eng News—Aug. 20, 1896.

**St. Helens, Eng.**—Destructor and Electric Power Station at St. Helens. J. S. Highfield. A short account of the works and results obtained in a combination destructor and electric supply plant which has been working six months. 900 w. Elec Rev, Lond—July 6, 1900.

**St. Pancras, London.**—See **ELECTRIC STATION.**

**San Francisco.**—How San Francisco Disposes of Its Garbage. Compares the methods of New York and San Francisco, giving an illustrated description of the Thackeray process of incineration used by the latter city. 2000 w. Sci Am—Oct. 22, 1898.

The Thackeray Garbage Furnaces at San Francisco, Cal. F. J. Mills. Illustrated description of the largest single plant for burning garbage in the United States, and possibly in the world, with editorial comment. 4700 w. Eng News—May 17, 1900.

**Scavenging.**—Scavenging Disposal of Refuse. Charles Mason. Lecture delivered at the Sanitary Institute. Systems of collecting as well as final disposal are briefly considered, and the filling of city lots with refuse is deprecated as opposed to sanitary principles. 1700 w. San Rec—May 8, 1896.

See also **Country Places.**

**Seattle.**—See **Tacoma and Seattle.**

**Shoreditch, Eng.**—Description of the Shoreditch Refuse Destructor Works. G. Manville. With an introductory consideration of principles involved. 4500 w. Ind & Ir—Nov. 29, 1895.

Refuse and Light. Editorial approval of a combined electricity and dust destruction undertaking, with information concerning the plant. 2500 w. Engng—July 2, 1897.

Shoreditch Electricity Works. Illustrated detailed description of buildings, refuse destructors and boilers, steam and exhaust pipes, generating plant, switchboards, public lighting, mains, etc. 5200 w. Elec Eng, Lond—July 2, 1897.

The Use of Dust Destructors as Steam Producers for Electricity Supply Stations. E. Manville. Paper read before the Northern Society of Electrical Engineers. A description of the two installations being erected for the Vestry of Shoreditch and the Corporation of Swansea on what the writer believes to be the most suitable lines. 6000 w. Elec Plant & Ind, Lond—Dec. 1, 1895.

**Simonin Process.**—Garbage Utilization at Cincinnati and New Orleans. Illustrated description of apparatus, and the Simonin process of treating garbage, as carried out in the cities named. 5000 w. Eng News—Oct. 8, 1896.

**Small Towns.**—See **SANITATION.**

**Street Cleaning.**—Garbage Disposal and Street Cleaning. W. C. Woodward. Read before the A. S. M. I. An outline of the best methods of securing satisfactory results. 1100 w. Eng Rec—Oct. 14, 1899.

See also **STREET CLEANING.**

**Swansea, Wales.**—See **Shoreditch, Eng.**

**Syracuse, N. Y.**—Garbage Disposal Works, Syracuse, N. Y. Illustrated description of works on the improved Holthaus system. 1100 w. Eng News—Oct. 11, 1900.

**Tacoma and Seattle.**—Garbage Disposal at Tacoma and Seattle. A. McL. Hawks. Illustrated description. 1400 w. Eng News—July 9, 1896.

**Thackeray Furnace.**—See **San Francisco.**

**Toronto.**—Garbage Disposal at Toronto, Ont. Illustrated description of the method of collecting and of the cremators built by the city. 1300 w. Eng Rec—Oct. 21, 1899.

**Torquay, Eng.**—Refuse Disposal and the Results Obtained from a Six Months' Working of the Refuse Destructor at Torquay. Henry A. Garrett. Read before the Inst. of Mech. Engs., England. A record of the writer's experience at Torquay, with attention to important points in connection with refuse disposal. 2500 w. Engng—Aug. 18, 1899.

Refuse Destructor Trials, Torquay, England. An account of four tests under different conditions of weather and refuse composition. 1400 w. Eng Rec—Sept. 2, 1899.

**United Kingdom.**—See **British.**

**United States.**—See **America.**

**Waste Liquids.**—The Disposal of Waste Liquids from Garbage Reduction. Describes a method of evaporating these liquids, which prevents odors and yields a revenue. 700 w. Eng Rec—May 7, 1898.

**Whiley System.**—See **Hamburg.**

**Willoughby Destructor.**—The Willoughby Refuse Destructor. Illustrated description of a destructor that has been working with satisfaction at Lewisham, Eng. It consists essentially of a furnace and a revolving cell. 800 w. Eng, Lond—Sept. 17, 1897.

**Woolf Electrolytic.**—See **SANITATION.**

## REICHSANSTALT.

**Charlottenburg.**—See **LABORATORY—Reichsanstalt.**

## REINFORCED CONCRETE.

See **CONCRETE REINFORCED.**

## REPAIR SHIP.

**"Vulcan."**—The Work of the Naval Repair Ship "Vulcan." Gardiner C. Sims and W. S. Aldrich. A noteworthy account of the attempts to raise the sunken Spanish wrecks, and the true story of the loss of the "Maria Teresa." 6000 w. Eng Mag—July, 1899.

The Work of the Naval Repair Ship "Vulcan." Gardiner C. Sims and W. S. Aldrich. Giving an authoritative account of the equipment and work of the floating machine-shop of the American navy. 6000 w. Eng Mag—June, 1899.

U. S. S. "Vulcan," a Floating Machine Shop. Description from a lecture at the Naval War College, by W. M. McFarland; also brief descriptions of repair ships of other nations. 2800 w. Am Mach—Aug. 18, 1898.

The Work of the U. S. S. "Vulcan." Facts given by William S. Aldrich in a lecture before the junior members of the A. S. M. E. on March 7, relative to the work while the ship was with Sampson's fleet. 2000 w. Mach, N. Y.—April, 1899.

## RESCUE APPLIANCE.

See **COAL MINE EXPLOSION—Rescue Appliance; LIFE-SAVING APPLIANCE; MINE ACCIDENT—Rescue Appliance; RESPIRATOR.**

## RESERVOIR.

See also **DAM; IRRIGATION; TANK; WATER SUPPLY; WATER WORKS.**

**Alsace-Lorraine.**—See **Lorraine; Vosges.**

**Altoona, Pa.**—See **Flood-Water Channel.**

**Asphalt Lining.**—Asphalt Lining for Water-Works Reservoirs. L. J. Le Conte. Abstract of a paper read at the annual convention of the American Water Works Assn. Account of experiences with asphalt on the Pacific coast for the purpose named. 2800 w. Eng News—June 11, 1896.

Specifications for Asphalt Reservoir Linings at Philadelphia. These specifications on asphalt reservoir linings are said to be the first in the East. Three methods are specified but bids will be received from contractor's designs also. 1400 w. Eng News—March 12, 1896.

See also **Concrete; Indio; Linings; Philadelphia; Whitby; ASPHALT—Water Action.**

**Asphalt and Brick Linings.**—Asphalt and Brick Reservoir Linings. Illustrated description of method of lining reservoirs with concrete base, asphalt and burlap water-proofing courses and brick paving. 600 w. Eng Rec—Oct. 6, 1900.

**Assouan, Nile.**—See **DAM.**

**Attica, Ind.**—See **Covered.**

**Aussig, Bohemia.**—Reservoirs of Rammed Béton (Wasserbehalter aus Stampfbéton). Describing and illustrating a roofed reservoir of béton of about 80,000 gallons capacity, at Aussig in Bohemia. 1200 w. Zeitschr d Oesterr Ing un Arch Ver—April 23, 1897.

**Belgium.**—See also **Lorraine.**

**Bogamdani, India.**—The Bogamdani Tank Restoration. Some interesting engineering details in connection with this project are noted. 1000 w. Ind Engng—Oct. 30, 1897.

**Boston Water Works.**—Reservoir No. 5; Boston Water Works. Illustrated description of interesting features of the work on this reservoir, with other information. 1400 w. Eng News—March 4, 1897.

The Construction of the Fells Reservoir for the Metropolitan Water Works. John L. Haward. A well illustrated paper giving an account of this part of the works for supplying Boston and vicinity with water. 4400 w. Jour N Eng Water Works Assn—Sept., 1900.

See also **Wachusett; DAM—Wachusett; WATER WORKS.**

**Brightwood.**—See **Washington, D. C.**

**British.**—Storage Reservoirs in England (Stauweiher in England). Thomas Hofer. Notes upon English reservoirs made during a journey of inspection. 4000 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1900.

**Brooklyn.**—See **By-Pass; WATER SUPPLY.**

**Buenos Ayres.**—Service Reservoir at Buenos Ayres. Illustrated description of this handsome feature of the city. The style of architecture is French Renaissance, with terra-cotta decorations. 700 w. Engng—Feb. 7, 1896.

**Bury, Eng.**—New Reservoir, Bury. Illustrated detailed description. Further illustrations to follow. 1000 w. Eng, Lond—Aug. 14, 1896.

**By-Pass.**—The Ridgewood Reservoir By-Pass. Illustrated description of this work in Brooklyn. The by-pass main is 5 ft. in diameter. 900 w. Eng Rec—Feb. 26, 1898.

**Cambridge, Mass.**—Payson Park Reservoir, Cambridge, Mass. Description of the construction of a 1,500,000,000 gallon storage reservoir at Hobbs' Brook, with connecting pipe lines. The construction of the central concrete core for the embankment, is an interesting feature. 2700 w. Eng Rec—Dec. 14, 1895.

Special Features of the Reservoirs at the Cambridge, Mass., Water Works. Illustrates and describes the overflow and aerating chambers of the Hobbs Brook reservoir,, and the gate-house, and asphalt lining of the Payson Park reservoir. 600 w. Eng News—Nov. 24, 1898.

**Cleaning.**—Cleaning Reservoirs. Dow R. Gwinn. Read at meeting of the Am. Water Works Assn. Gives the writer's experience in this work. 1000 w. Munic Engng—July, 1898.

**Cleaning Broom.**—Revolving Broom for Cleaning

Sides of Open Reservoirs. Illustrated description. 200 w. Eng, Lond—Sept. 11, 1896.

**Cleaning, Cincinnati.**—Cleaning a Reservoir at Cincinnati. Willis P. Thorp. Describes the cleaning process used in removing the sediment from the west basin of the Eden reservoir, giving some information of former methods used. Ill. 1400 w. Fire and Water—Jan. 15, 1898.

**Compensating Riparian Rights.**—See **WATER RIGHTS—Compensating Reservoirs.**

**Concrete.**—See **Asphalt; Aussig; Haverhill, Mass.; Madrid; Port Deposit; Waalheim; Whitby; CONCRETE REINFORCED.**

**Covered.**—Covered Reservoirs and Their Design. Freeman C. Coffin. A brief consideration of a few types of the reservoirs of this class which have been built, a study of the elements which enter into the design and an investigation of the cost of various sizes and depths. Ill. 9500 w. Jour Assn of Engng Socs—July, 1899.

Covered Reservoirs and Their Design. Freeman C. Coffin. Considers the reservoirs built, the design, etc., and the cost of various sizes. 2 plates. 11200 w. Jour N E Water Wks Assn—March, 1900.

Covered Reservoirs. Frank L. Fuller. Illustrates and describes reservoirs from the writer's designs. 3800 w. Jour Assn of Engng Socs—Sept., 1899.

The Attica and Delphi Covered Reservoirs. A description of two circular basins, with brick walls and concrete bottoms, both presenting valuable facts concerning water-proof masonry. 1200 w. Eng Rec—March 24, 1900.

See also **Aussig; Madrid; Pasadena; Port Deposit; Quincy; Vienna; GROINED ARCH—Reservoir; RESERVOIR ACCIDENT—Wellesley.**

**Croton.**—The New Reservoir for New York. From the N. Y. "Sun." Interesting information in connection with the water supply of the past fifty years, and the new reservoir, which is to cost fully $10,000,000. 1400 w. Eng—May 8, 1897.

**Delphi, Ind.**—See **Covered.**

**Denver, Col.**—Denver's Great Storage Reservoir. Brief illustrated description. 1200 w. Fire & Water—Oct. 28, 1899.

**Discharge Tunnels.**—Discharge Tunnels from Reservoirs. James A. Paskin. Points in construction that demand special attention under special conditions. 2200 w. Eng, Lond—July 31, 1896.

Discharge Tunnels from Reservoirs. James A. Paskin. Read before the British Assn. of Water Works Engineers. Summary of a practical discourse in which the outlets of reservoirs are chiefly considered. 2800 w. Jour of Gas Lgt—Aug. 25, 1896.

Discharge Tunnels from Reservoirs. James A. Paskin. Read before the British Assn. of Water Works Engs., at Nottingham. Consideration of important features in the construction of these outlets. 1600 w. Eng Rec—April 17, 1897.

**Double Bottom.**—Precautions in the Construction of Large Masonry Reservoirs. M. Dutoit. Translated from the "Annales des Ponts et Chaussees." The method and reason for the construction of double bottomed reservoirs. Ill. 4000 w. Eng News—Dec. 26, 1895.

**Earthen.**—The Storage of Water in Earthen Reservoirs. Samuel Fortier. Opinions expressed, suggestions offered and consideration of practical features relating to reservoir dams and the storage of water. 7400 w. Trans Can Soc of Civ Engs—Oct., 1896.

The Storage of Water in Earthen Reservoirs. Samuel Fortier. A paper read before the Canadian Soc. of Civ. Engs. A very able and elaborate article. The problem discussed is stated and partly handled in the first part, numerous data being presented, and an account of experiments in compacting soils and sub-soils, carried out at the experiment station of Utah is given. Serial. Can Eng—Aug., 1896.

**Embankments.**—Notes on Sinking, Timbering, and Refilling Concrete, and Puddle Trenches for Reservoir Embankments. W. Watts. Summary of a practical dissertation by an experienced water works engineer. 2400 w. Jour of Gas Lgt—Aug. 25, 1896.

Notes on Sinking, Timbering and Refilling Concrete and Puddle Trenches for Reservoir Embankments. William Watts. The paper gives an epitome of results of the author's experience in carrying out large reservoir undertakings. 4300 w. Engr, Lond—Oct. 23, 1896.

Reservoir Embankments, with Suggestions for Avoiding and Remedying Failures. William Fox. Read before the Soc. of Engs., London. General remarks followed by description of difficulties and means adopted to overcome them. The subject is confined to embankments constructed across natural valleys. Ill. 5000 w. Ind & Ir—March 11, 1898.

**Fay Lake, Arizona.**—See **Gates.**

**Flood-Water Channel, Altoona.**—Flood-Water Channel of the Altoona, Pa., Reservoirs. Charles W. Knight. Illustrated detailed description of a channel built to keep out accumulations brought down the valleys by the floods. 2000 w. Jour N E W Wks Assn—Dec., 1899.

Flood-Water Channel, Altoona Reservoir. Illustrates main features of an unusual engineering work built to protect the basin from becoming clogged. 1200 w. Eng Rec—Sept. 23, 1899.

**Flood Water Channel, Vienna.**—See **Vienna Flood.**

**France.**—See also **Lorraine; Vosges.**

**Gate.**—See also **GATEHOUSE.**

**Gates, Fay Lake, Arizona.**—Twin Gates for the Fay Lake Reservoir, Arizona. Brief illustrated description of a vertical lift reservoir outlet gate of simple design, presenting some novel features. 250 w. Eng News—Sept. 7, 1899.

**Grand Rapids, Mich.**—See **RESERVOIR ACCIDENT.**

**Groined Arch.**—See **GROINED ARCH—Reservoir.**

**Ground Water.**—An Artificial Ground Water Reservoir. Describes a sunken masonry dam storing 5,700,000 cu. ft. in a gravel bed. 700 w. Eng Rec—May 28, 1898.

See also **GROUND WATER.**

**Haverhill, Mass.**—A New High-Service Reservoir, Haverhill, Mass. Illustrated description of a 9,000,000 gal. reservoir in which the bank has a peculiar concrete lining. 1300 w. Eng Rec—Feb. 25, 1899.

**Indio, Calif.**—A Small Asphalt-Lined Reservoir at Indio, Cal. J. B. Lippincott. Description. Composition of the asphalt concrete. Experience and general remarks. 600 w. Eng News—July 16, 1896.

**Irrigation.**—See **IRRIGATION.**

**Jerome Park, N. Y.**—Constructing the Jerome Park Reservoir. Illustrated description of the methods employed in constructing a 2,000,000,000 gal. reservoir for the New York water-works; the excavation is mainly by steam shovels, with blasting, and the concrete plant is out of the ordinary. 2500 w. Eng Rec—Feb. 17, 1900.

Construction of the Jerome Park Reservoir. Describes the site and plan of construction, with the work now being executed. 2400 w. Eng Rec—Dec. 4, 1897.

The Jerome Park Reservoir. Description with illustrations and interesting information. 2200 w. Fire & Water—May 15, 1897.

See also **WATER SUPPLY—New York.**

**Linings.**—Recent Reservoir Linings. Illustrated account of the methods followed at Black Hawk, Col., and Coatsville, Pa., in laying brick and asphalt linings, and at Lancaster, Ohio, with a concrete and brick lining. 1000 w. Eng Rec—June 24, 1899.

See also **Asphalt Lining; Concrete.**

**London.**—See also **Staines, Eng.; WATER SUPPLY.**

**Lorraine.**—See also **Vosges.**

**Lorraine, Belgium, France.**—Various Reservoirs in Lorraine, Belgium and France (Verschiedene Stauweiheranlagen in Lothringen, Belgien und Frankreich). Thomas Hofer. A general description of reservoirs and canals inspected by the author, with plates showing dam and channel construction. 4000 w. 8 plates. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1900.

**Losses.**—The Loss of Water from Reservoirs by Seepage and Evaporation. L. G. Carpenter. Gives the results of a series of observations to determine the loss from seepage, on reservoirs near Fort Collins, Colo., with observations on evaporation. 9500 w. State Agricul Col, Ft. Collins, Colo—Bulletin 45—May, 1898.

**Madrid.**—Construction of a Water-Works Reservoir in Madrid (Construcción de un Tercer Depósito de Aguas en Madrid). An illustrated account of the construction of a cellular covered reservoir, 356 by 216 metres in size, in Madrid. It is built of brick and Portland cement and the roof rests on steel beams supported by brick pillars. Its total capacity is 471,520 cubic metres. 2400 w. Revista de Obras Publicas—Nov. 10, 1898.

**Minneapolis.**—New Reservoirs of the Minneapolis Water-Works. Illustrated description of the work in progress for the improvement and increase of the water supply of the city. 2400 w. Eng Rec—Sept. 11, 1897.

The New Distributing Reservoir for the Water-Supply System of Minneapolis. C. H. Kendall. Description and information of the reservoir and filter plant being constructed at this city. 1700 w. Eng's Year Book, Univ of Minn—1897.

**Mississippi.**—See **RIVER REGULATION—Mississippi**

**Mt. Nebo, Utah.**—See **IRRIGATION—Utah.**

**New York.**—Removal of a Famous Engineering Landmark. Gives illustrations of the 42nd st. reservoir in New York City and a brief account of the scheme of which it formed a part, and its removal now in progress. 1100 w. Sci Am—Sept. 2, 1899.

The Water Supply of the City of New York. Information relating to the Forty-Second street reservoir and the arrangements for abandoning it. 800 w. Fire & Water—Nov. 6, 1897.

See also **Croton; Jerome Park.**

**Parks.**—The Relation of Reservoirs to Parks. Frederick Law Olmstead, Jr. An illustrated article giving many suggestions for the treatment of distributing reservoirs, so that they may add to the beauty of their surroundings, as well as serve for holding water. 5500 w. Munic Engng—Feb., 1900.

**Pasadena, Calif.**—Covered Reservoirs at Pasadena, Cal. T. D. Allin. Illustrates and describes the work of covering the reservoirs, five being covered with flat roofs. 1600 w. Eng News—Aug. 17, 1899.

**Philadelphia.**—Queen Lane Reservoir,Philadelphia. The article upon this interesting problem is very well illustrated by sections, details, maps and plans. The best methods to prevent leaking are discussed. 2200 w. Eng Rec—March 14, 1896.

The Repairs to the Queen Lane Reservoir, Philadelphia, Pa. Gives investigations made to determine the power of asphalt to resist percolation of water, as some of the work failed to give satisfaction. 1300 w. Eng Rec—March 27, 1897.

See also **Asphalt Lining.**

**Pittsburg.**—The New Highland Reservoir, No. 2, Pittsburg, Pa. Plans and description of new reservoir built to save the expense of pumping the whole supply to unnecessary height, and to decrease the wear and tear on the mains. 1200 w. Eng Rec—June 19, 1897.

**Port Deposit, Md.**—A Small Concrete and Expanded Metal Reservoir. Illustrated description of a covered circular tank built without centers and provided with expanded metal reinforcement of top, bottom and sides. 1100 w. Eng Rec—Oct. 20, 1900.

**Queen Lane.**—See **Philadelphia.**

**Quincy, Ill.**—Covering a Storage Reservoir at Quincy, Ill. Dow R. Gwinn. Describes the construction of roof of white pine, built to lessen the trouble from vegetable growths. Ill. 1500 w. Eng News—June 9, 1898.

The Quincy, Ill., Settling Reservoir. Dow R. Gwinn. Illustrated description of a covered masonry basin with electric water-level annunciator. 1000 w. Eng Rec—June 4, 1898.

**Railway Water Station.**—A Storage Reservoir for a Railroad Water Station. Augustus Torrey. Describes a novel plan used in constructing a waste weir. 1000 w. Jour of W Soc of Engs—Aug., 1898.

See also **RAILWAY WATER STATION.**

**Reinforced Concrete.**—See **Concrete; Port Deposit; Waalheim: CONCRETE REINFORCED.**

**Ridgewood, Brooklyn.**—See **By-Pass.**

**St. Etienne, France.**—See **WATER SUPPLY.**

**Spot Pond, Mass.**—The Improvement of Spot Pond. Describes the method of cleaning and enlarging a natural pond of 296 acres to form a large distributing reservoir. 3000 w. Eng Rec—June 16, 1900.

**Staines, Eng.**—The Staines Reservoirs. Perry F. Nursey. Brief history of project, and the difficulties met, by which London is to be provided with an adequate water supply. The first sod was turned April 30, which inaugurated the important undertaking. 2700 w. Ind & Ir—May 6, 1898.

The Staines Reservoirs Scheme. A description of the works, with map. 800 w. Jour Gas Lgt. May 10, 1898.

The Staines Reservoirs Scheme. On the progress of the work of building storage reservoirs in the valley of the Thames to furnish London with additional supply of water. 1600 w. Jour Gas Lgt—July 3, 1900.

See also **WATER SUPPLY—London.**

**Steel Construction.**—See **DAM—Steel.**

**Storage.**—The Influence of Storage Reservoirs upon Water Power Plants (Einfluss der Teiche auf den Betrieb der Wassertriebwerke). Tiegel v. Lindenkron. An elaborate mathematical investigation of the water storage reservoir problem, using both analytical and graphical methods. 5000 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1899.

See also **Denver; Railway Water Station; Trenton; IRRIGATION—Storage Reservoir.**

**Theory.**—The Control of Bodies of Water and the Action of Reservoirs in General (Die Seeretention, sowie das Wirken der Reservoire im Allgemeinen). A mathematical investigation of reservoirs, taking into account various rates of inflow and outflow. 6000 w. 1 plate. Oesterr Monatschr f Oeffent Baudienst—Jan., 1897.

**Trenton.**—The Trenton Reservoir. Illustrated description of a large storage reservoir now in process of construction, which will have a capacity of 104,000,000 gallons, and cost nearly $350,000. 1200 w. Eng Rec—April 3, 1897.

**Twin Lakes, Col.**—The Twin Lakes Reservoir, Colorado. W. P. Hardesty. Describes the great natural advantages, and the work necessary in adapting the site for the conservation of water supplies. 1100 w. Eng News—June 30, 1898.

**Vienna.**—Extension of a Covered Water-Works Reservoir at Vienna. Trans. from the "Journal of the Austrian Soc. of Engs. & Archs. Interesting illustrated description. 500 w. Eng News—May 21, 1896.

See also **WATER SUPPLY; WATER WORKS.**

**Vienna Flood.**—The Wolfsgraben Reservoir and the High Water of July 30, 1897 (Das Wolfsgraben-Reservoir und das Hochwasser vom 30 July, 1897). An interesting account of the relief of the reservoir of the Vienna water supply during heavy flood. With photographs of the overflow canal taken at close intervals of time. 3500 w. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1897.

**Vosges.**—Reservoirs in the Vosges (Die Stauweiher in den Vogesen). Thomas Hofer. Describing several important reservoirs in the Vosges mountains in Alsace-Lorraine, with sections of the dams, and plans of the water areas. 3000 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1900.

See also **Lorraine.**

**Waalheim, Belgium.**—Reservoir of 3,000 Cubic Metres Capacity in Reinforced Concrete (Reservoir de 3,000 Métres Cubes de Capacité en Ciment Armé). Illustrated description of a reservoir at Waalheim, in Belgium, constructed with concrete reinforced by expanded metal. Full details are given. 1200 w. Revue Technique—Sept. 10, 1900.

**Wachusett, Mass.**—A Great Excavation and Embankment Contract. Gives a summary of the important requirements for clearing most of the Wachusett reservoir basin. 1200 w. Eng Rec—June 10, 1899.

Greater Boston's New Reservoir. Charles H. Bemis. An illustrated account of a great undertaking, the cost of which may reach $50,000,000. The reservoir will be nearly nine miles long, and will cover 4,195 acres to a depth of 46 feet. 2000 w. Harper's Wk—Jan. 16, 1897.

The Wachusett Reservoir. Illustrated description of the methods employed in stripping a basin 8¼ miles long 2 miles wide at one place, and 6.6 sq. miles in area. Also describes a method of sinking 51-ft. sheet piles with a water jet. 4000 w. Eng Rec—Jan. 20, 1900.

See also **DAM.**

**Washington, D. C.**—The Brightwood Reservoir, Washington, D. C. Illustrated description of a 415x300-ft. distributing reservoir with concrete lining of unusual construction and a cast-iron gate house. 1500 w. Eng Rec—March 3, 1900.

**Water Rights.**—See **WATER RIGHTS—Compensating Reservoirs.**

**Whitby, Eng.**—A Concrete-Asphalt Reservoir Lining. Describes the lining of a basin having a capacity of 15,600,000 gallons, at Whitby, Eng., with two layers of concrete with asphalted canvas between them. 1600 w. Eng Rec—Dec. 16, 1899.

**Woonsocket, R. I.**—Woonsocket Water-Works Reservoir and Dam No. 3. Byron I. Cook. Illustrated description of this work in Rhode Island followed by discussion. 5500 w. Jour N Eng Water Works Assn—Sept., 1897.

**Worcester, Mass.**—Recent Reservoir Construction, Worcester, Mass. Illustrated description of reservoirs with special spillways and aerating details. 700 w. Eng Rec—June 23, 1900.

The Worcester Distributing Reservoir. Walter E. Hassam. Brief description of work undertaken with view to the future supply of water to the fast-growing city of Worcester, Mass. Ill. 1800 w. Jour of N Eng Water Works Assn—March, 1898.

**Yonkers, N. Y.**—The Fort Field Reservoirs, Yonkers, N. Y. Illustrated description. 800 w. Eng Rec—July 25, 1896.

**RESERVOIR ACCIDENT.**

See also **DAM FAILURE.**

**Grand Rapids, Mich.**—The Failure of the Distributing Reservoir of the Water Works of Grand Rapids, Mich. An illustrated account of the accident, believed to be due to overfilling the reservoir. 1200 w. Eng News—July 12, 1900.

The Grand Rapids Reservoir Accident. Lewis D. Cutcheon. Illustrated description of the wash-out of the earth bank of a 6,000,000 gallon reservoir, due to lack of overflow provision. 1200 w. Eng Rec—July 14, 1900.

**Wellesley, Mass.**—Accident to a Concrete-Covered Reservoir at Wellesley, Mass., While Under Construction. Illustrated account of the falling of a portion of the roof of a concrete-covered reservoir. 450 w. Eng News—Sept. 30, 1897.

**RESERVOIR FAILURE.**

See also **DAM FAILURE.**

**Responsibility.**—The Relative Responsibilities of Engineer and Contractor. Review of a decision of the Pennsylvania Supreme Court that a contractor, who builds a reservoir in accordance with plans, specifications and engineering directions, cannot be held liable for the failure of the reservoir to hold water. 700 w. Eng Rec—Feb. 17, 1900.

**RESIDENCE PARK.**

**Vienna Suburb.**—The Project of a Residence Colony on the Cobenze Property (Das Project einer Villencolonie auf der Gutsbesitzung Cobenze). Karl Mayreder. An account of the extensive plans for laying out a residence park in the vicinity of Vienna. 4500 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—July 14, 1899.

**RESIN GAS.**

**Staunton, Va.**—A Southern Resin Gas Plant. F. H. Shelton. Notes of a plant which supplies light to the Western Home of the Insane, at Staunton, Va. 1100 w. Am Gas Light Jour—Feb. 6, 1899.

**RESIN OIL.**

**Resistance.**—See **INSULATION—Temperature Effect.**

**RESISTANCE BOX.**

See **RHEOSTAT.**

**RESISTANCE OF MATERIALS.**

See **MATERIALS' STRENGTH; TESTING.**

**RESPIRATOR.**

See also **COAL MINE EXPLOSION—Rescue Appliances; MINE ACCIDENT—Rescue Appliances.**

Comparative Experiments with the Neupert and Walcher-Gärtner Rescue Apparatus. R. Heller, in "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Experiments made to ascertain the effect on respiration and circulation by the wearing of the apparatus and whether any and what kind of pathogenic symptoms supervened. 1300 w. Col Guard—July 1, 1898.

Comparative Tests of the Neupert Respirator and the Walcher-Gärtner Pneumatophor (Versuche mit O. Neupert's Rettungsapparat, nebst einem Vergleichenden Versuch mit dem Walcher-Gärtner'schen Pneumatophor). R. Heller. The tests were made for periods of two hours at a time, and demonstrated that the oxygen in the air could be replaced, and the carbonic acid removed satisfactorily. 4000 w. Oesterr Zeitschr f Berg u Hüttenwesen—May 21, 1898.

Improved Life Saving Respirators (Les Nouveaux Appareils Respiratoires de Sécours). H. Schmerber. Describing particularly the Pneumatophore of Walcher & Gärtner, and also the Mayer & Pilar apparatus. The carbonic acid of the breath is absorbed by caustic potash, and a supply of compressed oxygen is carried. 2500 w. Génie Civil—Oct. 1, 1898.

Respirators for Mining Work (Ueber Athmungsapparate beim Bergbaubetriebe). Johann Mayer. A general review of the various respirators for enabling exploration and relief to be done in gaseous or burning mines. The Neupert respirator, with oxygen reservoir and carbonic acid absorbent is illustrated. Serial. Part I. 2000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 1, 1898.

Respiratory Apparatus for Rescue Work in Mines. J. Mayer. From "Oesterreichische Zeitschrift für Berg- und Hüttenwesen." Considers the classification of rescue apparatus, its importance to the mining industry, and gives illustrated description of design constructed by O. Neupert's Successors (Vienna), in conjunction with J. Pilar. 2300 w. Col Guard—Feb. 11, 1898.

**Fleuss.**—New Respiratory Apparatus for Use in Mines. From "Le Génie Cicil." Gives a brief description of the Fleuss apparatus, and describes two new types recently adopted in Austria-Hungary. Ill. 2300 w. Sci Am Sup—Nov. 19, 1898.

The Improved Fleuss Breathing Apparatus as a Life-Saving Appliance, etc., for Use in Coal Mines. George H. Winstanley. Read before the Manchester Geological Soc. Describes the apparatus and its action. 3000 w. Col Guard—Jan. 15, 1897.

**Pneumatopher.**—The Walcher "Pneumatophor" (Der von Walcherscho "Pneumatophor"). An apparatus for enabling explorations to be made in mines containing irrespirable gases. The same air as used again and again, the carbonic acid being absorbed by caustic soda, and fresh oxygen supplied. 5000 w. Glückauf—Dec. 4, 1897.

Employment of the Pneumatophore in Irrespirable Gases. Bergrat Behrens. From a communication to "Glückauf." Reports experiments made at the Shamrock Colliery in Westphalia, to determine the extent to which the apparatus could be used in an underground fire. The trials show that a certain amount of instruction and practice is required for its use. 2000 w. Col Guard—April 29, 1898.

An Apparatus for Breathing in Mines. Richard Cremer. Describes the pneumatophor, an invention to enable rescuers to enter immediately, without danger, those parts of a mine full of after-damp, and to enable a miner to save himself. Ill. 1400 w. Eng and Min Jour—July 31, 1897.

The Pneumatophor and Its Value for Saving Life After Colliery Explosions. Richard Cremer. Read before a recent meeting at Sheffield, Eng. Presents the advantages of this apparatus, describes it, and its manipulation. 1500 w. Ir & Coal Trds Rev—April 8, 1898.

The Practical Use of the Pneumatophore (Die Benutzung des Pneumatophors im Ernstfall). H. Lüthgen. An account of a mining accident, and the use of an apparatus containing oxygen, which is used for breathing when in an atmosphere of dangerous gases. 1500 w. 1 plate. Glückauf—July 14, 1900.

**RESTAURANT.**

See also **HOTEL.**

**Prince's Hall, London.**—A Restaurant de Luxe. Illustrated description of an elegantly appointed establishment opened in the Prince's Hall, Piccadilly. 800 w. Arch, Lond—June 12, 1896.

**San Francisco.**—The New Poodle Dog Restaurant Building. Illustrates and describes a newly erected building in San Francisco. 3000 w. Cal Arch't—Dec., 1898.

**RETAINING WALL.**

See also **RESERVOIR—Embankment.**

Computations for Retaining Walls (Calcul des Murs de Soutènement). S. Pichault. A very complete mathematical treatment of the pressure of earth upon retaining walls for various surchargings; with bibliography of authorities. 15000 w. Mem de la Soc Ing Civ de France—Aug., 1899.

**Chicago.**—Construction of Retaining Walls for the Sanitary District of Chicago. James W. Beardsley. Illustrated detailed description of the work, with discussion. 6800 w. Jour W Soc of Engs —Dec., 1898.

**Concrete Reinforced.**—Retaining Wall of Concrete with Metal Skeleton. From "Le Génie Civil." Illustrates and describes the construction of a temporary street below the general surface, in connection with the Paris Exposition. An application of the Hennebique system of combined concrete and steel was used. 700 w. Eng News —Feb. 15, 1900.

**Earth Pressures.**—Earth Pressures on Retaining Walls. G. C. Maconchy. Indicates a simpler and more direct method of calculating the overturning moments, and endeavors to bring the theory within the range of practical utility. Part first recapitulates some of the existing methods. Serial. Engng—Aug. 26, 1898.

Experiments on Earth Pressure Against Retaining Walls. A. A. Steel. Abstract of a graduating thesis at the University of Nebraska. An account of experiments to determine facts. Ill. 3000 w. Eng News—Oct. 19, 1899.

The Pressure of Earth Upon a Retaining Wall (Poussée des Terres sur un Mur de Soutènement). M. Hisely. A mathematical treatment, developing a general graphical solution of the problem applicable to any character of load. 5000 w. Ann des Ponts et Chaussées—1 Trimestre, 1899.

See also **EARTH PRESSURE—Graphic Methods.**

**Expansion Joints.**—Expansion Joints for Retaining Walls on the St. Charles Air Line Ry., Chicago. Describes a novel feature introduced in the construction, which is of interest to engineers. 450 w. Eng News—March 9, 1899.

**Graphical Statics.**—See **Earth Pressure; EARTH PRESSURE—Graphic Methods.**

**Theory.**—A Rational Theory of Retaining Walls (Rational-Theorie der Stutzmauern). R. Iszkowski. A general discussion of the subject of earth pressure in retaining wall design, with tables, formulas and a sheet of diagrams. 3500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst —June, 1898.

**RETORTS.**

See **GAS RETORT.**

**REVENUE CUTTER.**

**Great Lakes.**—Single Screw U. S. Revenue Cutter for the Great Lakes. Illustrated description of the vessel for the construction of which bids were recently opened at Washington. 1100 w. Marine Engng—April, 1900.

See also **United States.**

**"Gresham," Trial.**—Contract Trial of the "Gresham." C. A. McAllister. Describes this single-screw steel revenue cutter, built by the Globe Iron Works Co. of Cleveland, O., giving dimensions, ratios, etc., of the engine, and account of trial trip with data. Ill. 3500 w. Jour Am Soc of Nav Engs—May, 1897.

**"Manning."**—Progressive Speed Trials of the U. S. S. "Manning." Cecil H. Peabody. Observations taken during the tests and analysis of progressive speed trials. Plates. 2200 w. Soc of Nav Archts & Marine Engs. No. 12.—Nov., 1899.

**"Manning" and "McCulloch."**—The Contract Trial of the U. S. Revenue Cutters "Manning" and "McCulloch." C. A. McAllister. Describes these single-screw, composite vessels, and their machinery, with account of trials and other data. Ill. 3800 w. Jour Am Soc of Nav Engs—Nov., 1897.

**"McCulloch."**—U. S. Revenue Cutter "McCulloch" for Service in Behring Sea. Illustrated description with trial trips and data. 1700 w. Marine Engng—June, 1897.

**United States.**—New Revenue Cutters. Illustrated description and plans of two vessels of the first class, one for coast service and the other for the Great Lakes. 1500 w. Marine Rev—Sept. 28, 1899.

**United States, No. 3.**—United States Revenue Cutter No. 3. Illustrated detailed description. 1600 w. Am Mach—May 7, 1896.

**REVENUE CUTTER SERVICE.**

The United States Revenue Cutter Service. H. D. Smith. Historical account of the service, its hardship and danger, giving interesting incidents. Ill. 4800 w. Century Mag—Feb., 1898.

**REVOLVER.**

See **PISTOL.**

**RHEOSTAT.**

See also **CONTROLLER; ELECTRIC HEATING; ELECTRIC RESISTANCE; ELECTRIC SWITCH.**

Metallic Resistances. Kilburn Scott. Tables giving resistance, weight, current-carrying capacity, size of mandril, etc., of various alloys suitable for resistance frames and of Hadfield's "Resista," with notes, are given in part first. Serial. Elec Rev, Lond—July 15, 1898.

New Forms of Electrical Resistance Boxes (Neue Formen Elektrischer Widerstandssätze). Dr. Feussner. A description of boxes adapted both for measurement and regulation. 4000 w. Elektrotech Zeitschr—Aug. 24, 1899.

Progress in the Construction of Electrical Resistances (Fortschritte im Bau Elektrischer Widerstände). D. M. Levy. With numerous illustrations of improved resistance boxes in which strips of metal are used instead of coils of wire. 2000 w. Elektrotech Zeitschr—Sept. 21, 1899.

**Arrangement.**—An Arrangement of Resistance Boxes. A. O. Benecke. Diagrams with explanation of improved arrangement. 300 w. Elec—Sept. 16, 1896.

**Design.**—On the Construction and Calculation of Rheostats. P. M. Heldt. Considers only rheostats in which the resistance material is metallic wire. Illustrated description of dynamo field rheostats, motor-starting rheostats and motor-regulating rheostats. 2500 w. Am Elect'n—March, 1897.

**Elevators.**—Automatic Reversing and Starting Resistances for Electric Elevators (Selbstthätige Umkehr-Anlasswiderstände für Elektrische Aufzüge). An illustrated description of apparatus used in connection with motors for operating electric elevators. 700 w. Elektrizität—April 28, 1900.

Practical Construction of Rheostats for Electric Elevators. F. M. Everett. Considers the requirements and the existing conditions under which the rheostat is to operate, with drawings illustrating types used upon modern electric-elevator engines. 1400 w. Technograph—No. XI.

**Ferrand Carbon.**—The Ferrand Automatic Rheostat (Rhéostat Automatique, Système J. Ferrand). The Ferrand rheostat is arranged with discs of carbon of which the resistance is automatically varied by change of pressure. 1200 w. L'Electricien—May 28, 1898.

**Heating Error.**—Some Data on the Heating Error in Resistance Coils. Frank A. Laws. Describes experiments performed under the direction of the writer to supply important data on this subject. The results are given in the form of plots. 1100 w. Tech Quar—Sept., 1897.

**Iron-Wire.**—Calculation of Electric Resistance Frames. E. Kilburn Scott. Tabulated particulars of iron-wire resistances, with explanatory notes. 1500 w. Prac Eng—May 20, 1898.

**Liquid.**—Liquid Rheostats. H. S. Webb. Tests made to obtain data from which the dimensions of a liquid rheostat for the dissipation as heat of a given amount of energy could be calculated, when the maximum current and E. M. F. are known. 1200 w. Am Elect'n—Feb., 1898.

See also **Water.**

**Polyphase Motor.**—A Simple Starting Device for Polyphase Motors (Ein Einfacher Anlasser für Drehstrommotoren). Dr. F. Niethammer. With diagrams showing the arrangement of resistances adopted by various constructors. 1500 w. Elektrotech Zeitschr—Aug. 24, 1899.

**Rating Spirals.**—The Rating of Resistance Spirals. V. Zingler. Gives an improved method of rating spirals of wire. It no longer becomes necessary to take a certain section of wire for the current, and measure off the ohms required by a bridge. Serial. Elec Rev, Lond—Sept. 24, 1897.

**Starting.**—Concerning Starting and Reversing Resistances for Shunt Motors (Ueber Anlass- und Umkehr-Anlasswiderstände für Nebenschlussmotoren). E. Egger. Describing a system of magnet winding intended to increase the starting torque and diminish sparking. The method is fully shown by diagrams. 4000 w. Elektrotech Zeitschr—Feb. 3, 1898.

Concerning Starting Resistance for Motors (Ueber Anlasswiderstände für Nebenschlussmotoren). A paper by Herr Menges describing a method of introducing a starting resistance which is afterwards short circuited. 1500 w. Electrotech Zeitschr—Dec. 2, 1897.

Starting Box with Under-Load and Over-Load Circuit Breaker. Illustrated description of a needed device. 800 w. Am Mach—Aug. 27, 1896.

Starting Resistances. E. A. N. Pochin. Considers the different actions of liquid starting resistance and wire resistance. Ill. 2000 w. Elect'n—May 7, 1897.

The Design and Construction of a Motor Starting Box. E. D. A consideration of the main points of a starting rheostat for a motor of five horse-power capacity, built for 230 volt circuits. Ill. 1100 w. Elec Ind—Nov., 1895.

The Graduation of Starting Resistances for Direct-Current Motors (Die Stufung von Anlassern für Gleichstrommotoren). Rudolf Krause Directions for the proper design of starting resistances, with diagrams and formulae. 600 w. Elektrotech Zeitschr—April 26, 1900.

See also **Polyphase Motor.**

**Water.**—A Practical Resistance Load (Ein Praktischer Belastungs-Wiederstand). A resistance for testing generators, etc., composed of sheet-iron plates immersed in casks of water. A constant stream of water flows through the casks, maintaining a uniform temperature. 1500 w. Deutsche Zeitschr f Elektrotecknik—Feb., 1897.

A Simple Rheostat for Heavy Currents (Ueber einen Einfachen Starkstrom Widerstand). Describes a form of water resistance composed of metal plates in a cemented trough of water. 1200 w. Zeitschr f Elektrotechnik—Dec. 15, 1897.

Practical Use of Water Rheostats. Edward J. Willis. Also, A Note on Water Rheostats. E. A. Merrill. A few points and suggestions to those who have charge of such work. 2800 w. Am Elect'n—Dec., 1897.

**RICE CULTURE.**

Rice Culture in Southwestern Louisiana. H. H. Childers. Illustrated popular description. 1200 w. Sci Am—May 9, 1896.

**RIFLE.**

See also **ARMAMENT; ARTILLERY; GUN; PISTOL; SHOT GUN.**

**Krag-Jorgensen.**—Manufacture of Krag-Jorgensen Rifles at the Springfield Armory. Part first gives an illustrated description of the famous Springfield Armory in which all types of small arms for the United States have been made since the Revolution. Serial. Sci Am—April 29, 1899.

The United States Armory at Springfield, Mass. D. E. MacCarthy and F. J. M. Illustrated description of the oldest and most famous of the U. S. workshops and the manufacture of the army magazine rifle, known as the Krag-Jorgensen. Serial. Am Mach—March 22, 1900.

**Magazine.**—The Genesis of the Magazine Shoulder Gun. E. G. Parkhurst. Illustrated detailed description and history of the John Cookson gun, made in 1586. 1600 w. Am Mach—May 17, 1900.

**Springfield.**—The Springfield Rifle. D. W. Flagler. An interesting discussion from the annual report of the Chief of Ordnance, concerning the relative merits of the Springfield rifle and the magazine gun. 1500 w. Ir Age—Nov. 24, 1898.

**Springfield Armory.**—See **Krag-Jorgensen.**

**RIFLE BARREL.**

**Manufacture.**—The Manufacture of Military Rifle Barrels. E. G. Parkhurst. Illustrated detailed description of the work as carried out by the Pratt & Whitney Co. 5000 w. Am Mach—April 26, 1900.

**RIFLING.**

**Navy Gun.**—See **GUN—Rifling.**

**RIM TENSION.**

See **CENTRIFUGAL FORCE—Diagram.**

**RING STRESSES.**

See **MATERIALS' STRENGTH.**

**RIPARIAN RIGHTS.**

See **WATER RIGHTS.**

**RIVER.**

See also **CANAL; DREDGING; FLOOD; FLOOD PREVENTION; HYDRAULICS; HYDROGRAPHY; RIVER REGULATION; WATERWAY.**

Rivers and Canals, and How They Serve Their Purposes. Review of work on this subject by L. F. Vernon Harcourt, with interesting extracts. 3000 w. Trans—July 17, 1896.

**Am. Soc. C. E.**—River Hydraulics. James A. Seddon. An outline of the methods and results of a systematic study of data taken on the Mississippi River and its tributaries. 5500 w. Pro Am Soc of Civ Engs—Oct., 1899.

River Hydraulics. Continued discussion of paper by James A. Seddon. 2000 w. Pro Am Soc Civ Engs—Jan., 1900.

River Hydraulics. Continued discussion of paper by James A. Seddon. 3000 w. Pro Am Soc of Civ Engs—March, 1900.

**Asia.**—The Rivers of Asia. E. A. Sibold. Part first gives information concerning the rivers of the Sistan basin. Map. Serial. Ind Engng—April 16, 1898.

**Colombia.**—Colombia: Region of the Magdalena; Trade of Barranquilla. The river system of the country and facilities for the establishment of ports, with reference to present and future commercial requirements are discussed. 4200 w. U S Cons Repts—July, 1896.

**Hydraulics.**—See **Am. Soc. C. E.; HYDRAULICS; HYDROGRAPHY; RIVER DISCHARGE; WATER FLOW.**

**Mississippi.**—The Hydrology of the Mississippi. James L. Greenleaf. A brief but interesting discussion from the point of view of the engineer, based upon a report made by the author in the tenth census of the United States. Sixteen branches of the Mississippi are considered, and diagrams and tables accompany the discussion. 5500 w. Am Jour of Sci—July, 1896.

See also **Am. Soc. C. E.; DREDGING; RIVER REGULATION.**

**Missouri.**—The Missouri River. George S. Morison. One of a course of lectures delivered to the students of the School of Mines, Columbia College, under the auspices of the Department of Civil Engineering. The effects of silt-transportation as shown by map of points along the river taken at intervals. Ill. 5000 w. Sch of Mines Quar—Nov., 1895.

**Nile.**—The River Nile. E. A. S. A sketch map showing the numerous sources of the river is given, and part first gives information concerning the lakes. Serial. Ind Engng—March 18, 1899.

See also **RIVER REGULATION.**

**San Juan.**—See **DAM; HARBOR.**

**Solid Matter.**—The Suspension of Solids in Flowing Water. Elon Huntington Hooker. An important and laborious dissertation with formulae and tabulated data. 30000 w. Trans Am Soc of Civ Engs—Aug., 1896.

The Transportation of Solid Matter by Rivers. William Starling. An interesting study of this subject, giving theories of noted writers. 9000 w. Trans Assn of Civ Engs of Cornell Univ—June 18, 1896.

See also **FLOATING SAND.**

**South American Rubber District.**—Rivers of the South American Rubber Country. Hawthorne Hill. An account of the badly obstructed rivers of this region, and the benefits to trade—especially in crude india-rubber—that would follow the overcoming of these difficulties in transportation. 1000 w. Ind Rub Wld—April 10, 1896.

**Subterranean.**—An Underground River. Remarkable subterranean stream of pure water flowing from the White Mountains, first discovered by the late Prof. Denton. 1500 w. Bos Jour of Com—Sept. 26, 1896.

**Tiber.**—The Tiber (Le Tibre). M. Ronna. An historial and technical review of the engineering works on the Tiber, from ancient times down to the present, including bridges, quays, harbors, and the general hydrography of the stream. An interesting and valuable paper. 25000 w. Bull de la Société d'Encour—Sept., 1898.

The Works on the Tiber (Les Travaux du Tibre). M. Ronna. A second paper upon the improvement works on the Tiber, describing the bridges, embankments and other works executed from 1870 down to the present time. A very complete and valuable paper, fully illustrated. 30000 w. Bull de la Société d'Encour—Nov., 1898.

**Tidal.**—Characteristic Particulars about a Tidal River. Leveson Francis Vernon-Harcourt. Summary of the various particulars of a tidal river, which are of importance in determining its precise condition, and enabling its capabilities for navigation to be compared with those of another river. Ill. 5500 w. Ind Engng—Sept. 17, 1898.

**Volga.**—The River Volga. C. H. Moberly. The importance of the river as the great water highway of Russia, with a general description, to be followed with particulars of the several sections, and some account of the rise and development of the navigation. Serial. Engng—July 23, 1897.

See also **RIVER REGULATION.**

**White Mountain Subterranean.**—See **Subterranean.**

**Yangtze-Kiang.**—See **CHINA.**

**RIVER CHANNEL.**

See also **RIVER REGULATION.**

**Bridge Site.**—See **WATER CURRENT—Engineering Works.**

**RIVER DISCHARGE.**

See also **FLOOD; HYDRAULICS; HYDROGRAPHIC SURVEY; HYDROGRAPHY; IRRIGATION; WATER FLOW; WATER POWER.**

Gauging of Streams. William G. Price. A description of some of the methods of velocity measurements used by the writer, including the use of the current meter and the rod float. Discussion. 6500 w. Jour W Soc of Engs—June, 1898.

**California.**—Low Water Measurements in the State of California During the Summer of 1898. J. B. Lippincott. Tabulated summary of work and explanation of its value. 700 w. Eng News—Jan. 12, 1899.

**Cedar River, Wash.**—Gauging of Cedar River, Washington. Theron A. Noble. An explanation of methods used and data obtained in preparation for the installation of a water-power plant on Cedar River, the object being to transmit power to Seattle and Tacoma. Ill. 8500 w. Pro Am Soc of Civ Engs—Sept., 1898.

**Danube.**—See **HYDROGRAPHIC SURVEY—Danube.**

**France.**—A Study of Gauging Statistics (Etude sur la Statistiques des Jaugeages). M. Bresse. Giving a very full résumé of the measurements of flow of the principal rivers of France under various conditions, considered in connection with the basins which they drain. 20000 w. 5 plates. Ann des Ponts et Chaussées, Part III., 1897.

**Graphical Computation.**—Method for Approximate Gauging of Rivers. C. E. Grunsky. Extract from a report to California Commissioner of Public Works. A method of computing discharge graphically by means of curves. 900 w. Eng Rec—March 7, 1896.

**Head Register.**—See **WATER FLOW—Discharge Recorder.**

**Hemlock Lake, N. Y.**—Description of the Method of Gauging the Discharge Through the Outlet of Hemlock Lake, N. Y. John F. Skinner. Describes the method used to ascertain the discharge of Hemlock Lake, the source of the water supply of Rochester, N. Y., through its outlet. 1800 w. Trans Assn of Civ Engs of Cornell Univ—1898.

**Hungary.**—Gauging in Hungary (Jaugeages en Hongrie). Joseph Pĕch. Describes at length, with many illustrations, a new method of gauging streams in use by the hydrographic department of the Hungarian Government. 8500 w. Ann des Ponts et Chaussées—3e. Trimestre, 1898.

**Mississippi.**—The Chronology of the Mississippi System. James L. Greenleaf. Discusses the conditions that influence the chronology of flow, especially the variation in intensity of rainfall and temperature. Map. 2200 w. Sch of Mines Quar—April, 1898.

The Discharge of the Mississippi River. William Starling. A very exhaustive paper showing the great difficulty of obtaining uniform results. The work in its general principles, the use of formulae, and system of observations is given in full; also the results of previous work. Map. 50000 w. Trans Am Soc of Civ Engs—Nov., 1895.

**Montana.**—See **HYDROGRAPHIC SURVEY.**

**Niagara, Buffalo.**—Discharge Measurement of the Niagara River at Buffalo, N. Y. Clinton B. Stewart. Describes the apparatus and methods used, the computations, etc. Ill. 10500 w. Jour W Soc of Engs—Dec., 1899.

Discharge Measurement of the Niagara River at Buffalo, N. Y. Discussion of paper by Clinton B. Stewart. 7000 w. Jour W Soc of Engs—Feb., 1900.

Discharge Measurement of the Niagara River at Buffalo, N. Y. An outline of the work performed, with some general conclusions. 900 w. Eng News—Dec. 28, 1899.

**Pennsylvania.**—See **RAINFALL—Pennsylvania.**

**Rainfall.**—See **RAINFALL—Run-Off; Stream Flow.**

**St. Lawrence.**—The Discharge of the St. Lawrence River. C. H. McLeod. Investigations made by the students of McGill University under the direction of the writer and assistants. Illustrated by diagrams. 1800 w. Trans Can Soc of Civ Engs—June, 1896.

**Sudbury, Boston.**—Run-Off of the Sudbury River Drainage Area, 1875-99, Inclusive. Charles W. Sherman. This watershed is one of the principal sources of the Boston water supply. Tabulated reports for the twenty-five years are given. 700 w. Eng News—May 31, 1900.

**United States.**—Stream Measuring in the United States. F. H. Newell. Introduction of a report for 1897, reprinted from the U. S. Geological Survey annual report. Ill. Serial. Sci Am Sup—Nov. 11, 1899.

**Virginia and West Va.**—See **WATER POWER.**

**Wyoming.**—Stream Gaugings. Clarence T. Johnson. Explanation of methods as used in Wyoming. Ill. 2300 w. Pro Purdue Soc of Civ Engs—1897.

See also **IRRIGATION—Wyoming.**

**RIVER GAUGE.**

See also **RIVER LEVEL; TIDE GAUGE.**

An Electric Recording River Gauge. Illustrated description of an instrument for making a continuous record of the height of a river about half a mile from the recording station. 900 w. Eng Rec—March 10, 1900.

**RIVER IMPROVEMENT.**

See **RIVER REGULATION.**

**RIVER LEVEL.**

See also **HYDRAULICS; HYDROGRAPHIC SURVEY; HYDROGRAPHY; RIVER DISCHARGE; RIVER GAUGE.**

The Practical Value of Water-Level Observations (Beitrag zur Praktischen Verwertung der Wasserstands-Beobachtungen). A. Herbst. An examination of the systematic records of river levels and a discussion of the method of comparing diagrams of such records to obtain average results. 10000 w. 3 plates. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1898.

**RIVER POLLUTION.**

See also **FACTORY WASTE; SEWAGE; SEWAGE DISPOSAL; SEWERAGE; WATER POLLUTION; WATER PURIFICATION.**

Pollution of Rivers from an Engineer's Point of View. Reginald E. Middleton. Discusses the various sources of pollution and the means of purification. 2500 w. Jour of the San Inst—April, 1898.

**Bath, Eng.**—Alleged River Pollution by the Bath Gas Company. A statement of a case in the English courts. Judgment not given. 5000 w. Gas Wld—May 13, 1899.

**California.**—An Injunction Against Sewage Pollution of a California Stream. Review of an important decision of the Supreme Court. 900 w. Eng Rec—June 25, 1898.

**Chicago Drainage Canal.**—Pollution of Streams, with Special Reference to the Chicago Drainage Channel. B. H. Colby. Discusses the contamination of streams and the serious results, especially considering what should be done in St. Louis. Refers to the danger from the Chicago drainage channel, and urges filtration. 4200 w. Jour Assn of Engng Socs—Feb., 1900.

**Connecticut.**—The End of River Pollution in Connecticut. A statement of the grounds on which the Connecticut Supreme Court has forbidden the pollution of rivers by sewage. 1200 w. Eng Rec—Jan. 20, 1900.

**Cumberland, Md.**—The Pollution of the Water Supply of Cumberland, Md., by a Paper Pulp Mill. Churchill Hungerford. Describes the forms of contamination from the process used and gives brief summary of suit by the city of Cumberland, Md. 1400 w. Eng News—Feb. 10, 1898.

**Great Britain.**—The Prevention of Pollution of Streams and Rivers. Part of a paper read by Dr. Childs at the recent Sanitary Congress at Birmingham, Eng. On the defects in the Rivers' Pollution Act, and needed amendments; the methods employed by the joint committees, and results attained. 3800 w. Builder—Dec. 31, 1898.

**Factory Waste.**—See also **FACTORY WASTE.**

**Mersey and Irwell.**—See **FACTORY WASTE.**

**New Jersey.**—I. Report of the New Jersey River Pollution Commission. II. An Important Decision on River Pollution by Sewage in New Jersey. Gives that portion of the report which refers to the condition of the lower Passaic River, in the first article. The second gives an important decision rendered by the Chancery Court of New Jersey. 3300 w. Eng News—March 9, 1899.

Sewage Disposal in New Jersey. Review of two decisions of the court of final jurisdiction permitting the discharge of sewage into streams, subject only to the payment of damages to riparian owners along the non-tidal portions of the rivers. 900 w. Eng Rec—March 31, 1900.

The New Jersey Sewage Disposal Law. A discussion by James Owen, of the law prohibiting the pollution of New Jersey streams after 1904. 1800 w. Eng Rec—Aug. 4, 1900.

The Prevention of Water Pollution in New Jersey. Editorial discussion of recent legislation in New Jersey. 3000 w. Eng News—April 5, 1900.

See also **SEWERAGE.**

**Passaic, N. J.**—Report of the Passaic Valley Sewerage Commission. Gives recommendations of the Commission to remedy the pollution of this stream. Also editorial comment. 2200 w. Eng News—March 11, 1897.

Sewage Disposal and Stream Pollution in the Lower Passaic Valley, New Jersey. Editorial on the situation in the lower Passaic Valley, with some of the proposals for the solution of the question. 2000 w. Eng News—Feb. 24, 1898.

The Pollution of the Passaic River. Review of two decisions restraining the cities of Paterson and Newark from discharging sewage into a large stream. 700 w. Eng Rec—March 18, 1899.

**Potomac.**—The Pollution of the Potomac River. Statements from two papers read before the National Geographic Society, at Washington, one by A. A. Davis, describing the physical characteristics, drainage area, sources of pollution, etc., and the other by E. K. Sprague, dealing with the bacterial side of the subject. 1000 w. Eng News—Dec. 30, 1897.

**Petroleum Waste Products.**—See **PETROLEUM REFINERY—Waste Products.**

**Sewage Purification.**—Stream Contamination and Sewage Purification. Informal discussion at the annual convention, June 28, 1899. 13500 w. Pro Am Soc of Civ Engs—Aug., 1899.

See also **FACTORY WASTE; SEWAGE DISPOSAL; WATER POLLUTION; WATER PURIFICATION.**

**Standards.**—Rivers Pollution Standards. W. Naylor. Discusses standards suggested, and their applicability, urging the necessity of a uniform standard and method of analysis. Discussion. 5400 w. Jour of San Inst—April, 1898.

**Thames.**—The Conservation of the Thames. On the progress made in improving the general sanitary condition. 1800 w. Engr, Lond—June 1, 1900.

**Trade Waste.**—See **FACTORY WASTE.**

**United States.**—A National Investigation of River Pollution. A statement of the importance of a national study of the subject and of avoiding irresponsible appeals calculated to cast ridicule on national sanitation. 1000 w. Eng Rec—Dec. 30, 1899.

Proposed State Legislation to Prevent Water Pollution. Editorial discussion of bills before different states. 3600 w. Eng News—March 16, 1899.

**Yorkshire, West.**—See **FACTORY WASTE.**

## RIVER REGULATION.

See also **BREAKWATER; BULKHEAD; DIKE; DOCK; DRAINAGE; DREDGING; FLOOD; FLOOD PREVENTION; HARBOR; JETTY; LEVEE; PIER; RIVER; WATER CURRENTS; WATERWAY.**

On the Regulation of Rivers (Ueber Flussregulirungen). Ignaz Pollak. A general discussion of the improvement of rivers, tending to show that mere straightening is not effective; with diagrams. 7000 w. Zeitschr d Oest Ing u Arch Ver—Aug. 3, 1900.

**Algeria.**—See **RAILWAY CONSTRUCTION.**

**Austria.**—The River Bank Protection Works for the Bukowina Local Railway (Die Uferschutzbauten bei den Bukowinaer Localbahnen). R. Ziffer. An excellent account of the effective methods used for protecting the banks of mountain torrents in the Carpathians. Two plates. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1898.

The Regulation of a Section of the Goldbach in Gross-Otschehau (Die Regulirung einer Theilstrecke des Goldbaches in Gross-Otschehau). F. Krivanec. Describing the improvement of the slopes and protection of the banks by fascines. 3000 w. Oesterr Monatschr f d Oeffent Baudienst—March, 1900.

The Regulation of Mountain Streams (Ueber die Regulirung von Gebirgswässern). F. Wang. Describing the methods used in Galicia, Bohemia, and the Tyrol for the protection of the banks of mountain streams from erosion in times of overflow. 2000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—May, 1898.

Work Done for the Controlling of Irregular Streams in Austria (Die Bisherige Thätigkeit auf dem Gebiete der Wildbachverbauung in Niederösterreich). An account of the work already done to prevent disastrous overflows from brooks and small streams in Lower and Upper Austria, with tables. 3300 w. Oesterr Monatschr f d Oeffent Baudienst—April, 1900.

**Austria-Hungary.**—See also **Bank Protection; Bohemia; Danube; Shifting Channels; Theiss; Wottawa; FLOOD; FLOOD PREVENTION.**

**Bank Protection.**—A Discussion on the Protection of River Banks (Vereins-Angelegenheiten. Einleitung zu einer Besprechung über Uferversicherungen). Paul Klunzinger. An address before a branch of the Oest. Ing. und Arch. Verein, giving an illustrated description of various methods of construction. 3000 w. Zeitschr d Oest Ing u Arch Ver—July 20, 1900.

Protecting Banks Against River Currents. Illustrates and describes the protection given the banks of the Missouri River by the use of woven willow mattresses. 600 w. Ry & Engng Rev—March 17, 1900.

The Protection of the Banks of Wild Streams (Uferschutz bei Wildwässern). A. Lernet. Showing the practical arrangements of fascines and stone work for the protection of mountain torrents not otherwise regulated. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 9, 1900.

See also **Austria; Fascines; Mississippi; Villa Mantle.**

**Bank Protection, Germany.**—Protection of River Banks. Robert Grimshaw. Illustrated account of how river banks in Germany are protected. 2200 w. Engr, Cleveland, O.—May 2, 1898.

**Bavaria.**—See **Fascines.**

**Big Sandy.**—The Improvement of the Big Sandy River. Illustrates and describes the type of movable dam used in the improvement of this river in West Virginia and Kentucky. 6000 w. Eng Rec—Sept. 9, 1899.

See also **DAM—Needle.**

**Bohemia.**—The Regulation of the Elbe and Moldau, and their Tributaries in Bohemia (Die Flussregulirungen an der Elbe, Moldau und deren Nebenflüssen in Böhmen). Hugo Franz. A general review of the improvements made during the past 50 years, with map and tables of data. 7500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1898.

The Status of the Canal Work on the Moldau and Elbe in Bohemia (Ueber den Stand der Canalisirungsarbeiten an der Moldau und Elbe in Böhmen). An official illustrated report upon these important river improvements which form a part of the great internal water-ways system now being developed in Germany. 3000 w. 3 plates. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1898.

The Work of the Commission for Canalizing the Moldau and Elbe Rivers in Bohemia in 1899 (Die Thätigkeit der Commission für die Canalisirung des Moldau-und Elbeflusses in Böhmen im Jahre, 1899). An illustrated account of the improvements in progress on these rivers. 1800 w. Oest Monatschr f d Oeffent Baudienst—June, 1900.

See also **Wottawa.**

**Chagres.**—See **CANAL—Panama.**

**Chemung, Corning, N. Y.**—The System of Protection of Corning, N. Y., from Floods in the Chemung River. Describes the location of the city and the earthen dikes used to confine the river, giving extracts from the specifications which explain the method of construction. Ill. 2500 w. Eng News—Sept. 2, 1897.

**Chicago.**—Obstructive Bridges and Docks in the Chicago River. G. A. M. Liljencrantz. Notes on the various obstructions to navigation found in the Chicago River, considering it as it is, as it will be, and as it might be. Illustrated by sketches. Discussion and correspondence. 11300 w. Jour W Soc of Engs—June, 1898.

The By-Pass Channel for the Chicago River. Illustrated detailed description. 1800 w. Eng News—Feb. 16, 1899.

The Improvement of the Chicago River Necessary for the Drainage Canal. E. T. Ericksen. Illustrated description of this interesting engineering work. 5200 w. Wis Engr—Jan., 1900.

**Commercial Effects.**—Commerce and Deep Waterways. Lewis M. Haupt. An extremely interesting paper on the transportation losses due to low water, with especial reference to the Ohio River near Pittsburg. Ill. Serial. Jour Fr Inst—Feb., 1896.

**Danube.**—The Regulation of the Danube at Ratisbon (Die Donau bei Regensburg). A. Herbst. A general account of the improvement of the river by limiting the width of the channel, by dredging, and by the construction of new quay walls. 600 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—May, 1898.

Report of the Commission for the Regulation of the Danube at Vienna (Bericht der Donau-Regulirungs-Commission in Wien). The official report of the commission for the work done in 1895. 7500 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1897.

The Completion of the Regulation of the Danube in Lower Austria (Die Vollendung der Donau-Regulirung in Niederösterreich). An official report upon the work from 1862 to the present time, especially with regard to the financial side of the question. 7000 w. Oesterr Monatschr f d Oeffent Baudienst—April, 1898.

Opening of the Danube to Navigation. From "Illustrirte Zeitung." Illustrated historical account of this great engineering work. 3000 w. Sci Am Sup—Nov. 7, 1896.

The Navigation of the Danube between Stenka and the Iron Gates (Die Schiffbarkeit der Regulirten Donau-Katarakte Zwischen Stenka und dem Eisernen Thor). Hans Arnold. An illustrated account of the operation of the canalized portion of the Danube at the Iron Gates, together with a description of the proposed utilization of the water power. 6000 w. Zeitschr d Ver Deutscher Ing—Dec. 10, 1898.

The Iron Gates of the Danube. Illustrated description of this difficult work, now nearing completion. 5300 w. Eng, Lond—Oct. 2, 1896.

The Opening of the Iron Gates. Editorial on the removal of the obstructions to navigation in the Danube. 1800 w. Trans—Oct. 2, 1896.

The Regularization of the Danube. Some historical particulars and features of the task, with account of the character of the work and difficulties encountered. 4000 w. Engng—Oct. 2, 1896.

The Regulation of the Lower Danube (Die Regulirungsarbeiten an der Unteren Donau und deren Resultate). A fully illustrated account of the canalization of the Iron Gates and the other improvements which have made the lower Danube navigable. Two articles. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—May 14 and 21, 1897.

The Regulation of the Rivers of Hungary (Ueber die Flussregulirungen in Ungarn). Discussing principally the improvements in the middle Danube between Duna-Radvány and Báziás. 5000 w. 1 map. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1897.
See also TOWAGE.

**Debris.**—The Laws of the Motion of Debris (Die Gesetze der Bewegung des Geschiebes). A valuable discussion of the motion of stones and debris in mountain torrents, with investigations as to the erosion and modification of channel profiles. 7500 w. Oesterr Monatschr f d Oeffent Baudienst—Feb., 1897.

**Delaware.**—The Improvement of the Channel of the Delaware River. Walter Atlee. Illustrated description of improvements already made. Followed by discussion. 11000 w. Jour Fr Inst—Dec., 1896.

**Delaware and Schuylkill.**—The Improvement of the Delaware and Schuylkill Rivers. Walter Atlee. The paper gives some idea of the magnitude and difficulty of the work which has been accomplished, describes the work and illustrates Philadelphia Harbor, gives costs and other interesting data. 5000 w. R R Gaz—July 24, 1896.

**Elbe and Moldau.**—See Bohemia.

**Elbe and Saale.**—The Regulation of the Elbe and the Saale (Die Regulirung der Elbe und der Saale). V. Witasek. With map of the lower Saale, and plan and sections of the dike on the Elbe near Magdeburg, and view of the movable dam at Pretzien. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—July 2, 1897.

**Fascines.**—River Regulation by Suspended Fascines in Bavaria. The devices used by European engineers in directing the courses of rivers are well described, and illustrated by eleven drawings. 1500 w. Eng News—March 26, 1896.
See also Austria; Bank Protection; Mississippi.

**Flon, Lausanne.**—The Correction of the Flon and its Affluents at Lausanne (Correction du Flon Lausannois et de ses Affluents). An illustrated account of the improvements of a mountain torrent which has been a constant source of danger from sudden inundations. Gives a good idea of Swiss hydraulic problems. 4500 w. La Rev Tech—March 10, 1897.

**Forestry.**—See FORESTRY—River Regulation.

**Fraser, B. C.**—Fraser Valley Reclamation. R. E. Palmer. Read before the Canadian Soc. of Civ. Engs. A description of two sluice boxes built by the writer when three different and distinct boxes in each case had succumbed to the effect of freshets. 3500 w. Can Eng—Aug., 1898.

Fraser Valley Reclamation. R. E. Palmer. Describes the system of reclamation adopted, with plate showing a longitudinal section through the foundation. 3500 w. Can Soc of Civ Engs—April 8, 1897.

Sluice Box and Flood Gate Construction; Fraser Valley Reclamation, British Columbia. R. E. Palmer. Extract from paper read before the Canadian Soc. of Civil Engs. Describes the design and construction. Ill. 1200 w. Eng News—July 22, 1897.

**Fulda, Germany.**—The Canal Works on the Fulda Between Cassel and Münden (Die Canalisirung der Fulda zwischen Cassel und Münden). A. Herbst. With profile, and plans and sections of canal locks. 3500 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—March, 1898.

**Gohna Landslip and Flood.**—The Gohna Landslip and Flood. Means adopted by the government to prevent loss of life and property within range of the enormous volume of water that was expected to escape from the bursting of the dam formed in the river Birahi Gunga, one of the tributaries of the Ganges, by reason of a great landslip that blocked the stream in 1893. This is claimed to be the first authoritative account yet published. 4400 w. Eng, Lond—April 24, 1896.

**Goldbach, Austria.**—See Austria.

**Great Kanawha, W. Va.**—The Improvement of the Great Kanawha River, W. Va. Illustrates and describes the government improvements, which aim to furnish a depth of at least 6 feet of water over the entire length throughout the whole of the year. 2500 w. Eng Rec—May 27, 1899.
See also DAM—Movable; LOCK.

**Hooghly.**—The River Hooghly. M. B. The improvement of this river, on which stands the metropolis of India. Serial. Ind Engng—May 22, 1897.

**Hungary.**—See Bank Protection; Danube; Theiss.

**Illinois.**—The Illinois River. A statement of the conflicting projects for its improvement, drawn up by U. S. engineers for navigation purposes alone, and by Chicago engineers to prevent floods due to the discharge from the Chicago drainage canal. 800 w. Eng Rec—June 9, 1900.

The Streams of Illinois and Their Future Development. Eben J. Ward. Discusses the importance of the improvement of natural water courses, the favorable situation of Illinois, the connection of Lake Michigan and the Mississippi, cost, etc., with discussion. 7000 w. An Rept of Ill Soc of Engs & Surv—1897.

**Indus.**—The River Indus and the Best Method of Embanking It. G. M. R. Traces briefly the stages through which the river must have passed, and offers methods for improving its condition. 10800 w. Indian Forester—April, 1896.

**Iron Gates.**—See Danube.

**Italian Legislation.**—The Regulation of Torrents and Mountain Streams (La Sistemazione dei Torrenti e dei Bacini Montani). A summary of Italian legislation on this point, now becoming very important in Italy. 1500 w. Giorn del Lav Pubb e delle Str Ferr—Jan. 11, 1899.

**Levees.**—See **Mississippi; LEVEE.**

**Loire.**—The Navigation of the Loire (La Loire Navigable). An appeal for river improvements in aid of the navigation of the Loire, citing the important commercial and manufacturing interests of France affected thereby. 3500 w. La Rev Tech—Jan. 10, 1898.

**Mississippi.**—The Great Reservoir System of the Upper Mississippi. W. S. Harwood. Illustrated account of this unique enterprise, by which the water of the river is controlled in flood and drought, aiding navigation, commerce, and preventing deterioration of water used for domestic purposes and furnishing water for irrigation. 4000 w. Harper's Wk—Jan. 9, 1897.

Bank Revetment on the Lower Mississippi. H. St. L. Coppée. The various methods of channel protection and divergence are explained, with illustrated descriptions of the mattresses, spurs, anchors, barges, and other devices used. The article is exhaustive and detailed. 27500 w. Trans Am Soc of Civ Engs—Jan., 1896.

Bank Revetment on the Mississippi River. H. St. L. Coppée. A description of the methods adopted for the protection of the Mississippi's banks with a view to continuous deep-water navigation. Ill. 4000 w. Eng Mag—June, 1896.

High-Water Protection Methods on Lower Mississippi River. Wm. J. Hardee. Paper before the Louisiana Engineering Society, containing a discussion of the levee system and suggestions for improvements. 9500 w. Jour Assn of Engng Socs—Aug., 1900.

New Orleans' Danger. From the "N. Y. Sun." An account of the trouble from caving banks at the Mississippi, which threaten some of the most valuable sections. 2300 w. Bos Jour of Com—Sept. 3, 1898.

Reservoirs and the Control of the Lower Mississippi. James A. Seddon. A consideration of drainage systems and their combinations, with their problems, giving a summary of twenty years' experience. Also discussion. Plates. 31000 w. Jour W Soc of Engs—Aug., 1900.

The Levees of the Mississippi River. William Starling. A valuable and exhaustive article on the construction, care of, and repair of river embankments. Inset. 15500 w. Engng News—Jan. 30, 1896.

The Problem of the Mississippi. Herman Haupt. A discussion of the problem of maintaining a navigable channel in low water and preventing the destruction of life and property by floods. 3500 w. Jour Fr Inst—April, 1899.

The Proposal to Improve Mississippi River Navigation by Contract. Showing that the proposed private contract method would double the cost for the same amount of work done. 900 w. Eng News—April 16, 1896.

The Present Aspect of the Mississippi River Navigation Improvement. J. B. Johnson. A review of the organization and plan of work of the Mississippi River Commission and a note on the efficiency of the new 600 cu. yd. per hour suction dredge. 2000 w. Eng News—Feb. 6, 1896.

The Mississippi River Improvement. A reply of Mr. J. A. Ockerson to an article by Prof. Johnson criticising the work of the Mississippi River Commission. 2000 w. R R Gaz—Feb. 28, 1896.

The Mississippi River Navigation Improvement. J. A. Ockerson. A communication in which the writer corrects some misstatements in a previous number, with a reply from J. B. Johnson. 3800 w. Eng News—March 5, 1896.

See also **Mississippi; DREDGE; DREDGING; FLOOD; LEVEE.**

**Mississippi Delta.**—The Problem of Deep Water Navigation Through the Passes from the Mississippi River to the Gulf of Mexico. J. A. Ockerson. An account of the character of the passes and the work done on them, with the questions that must be considered in the selection of a proper site for carrying on successful works of channel improvement. Maps. 4000 w. Jour Assn of Engng Soc—Feb., 1897.

The Proposed Improvement of the Mouth of the Mississippi. From the New Orleans "Daily Picayune." Abstract of arguments submitted by a committee in connection with a proposed deeper channel at the entrance of the river. 900 w. Eng News—Feb. 24, 1898.

Improvement of the Mouth of the Mississippi River. Thomas L. Raymond. Read before the Louisiana Engng. Soc. Reviews the conditions prevailing at or near the mouth and the methods which have been tried or suggested, and states the advantages of the jetty system. 4000 w. Eng News—March 31, 1898.

Improvement of the Mississippi River Delta. Thomas L. Raymond. Briefly reviews methods tried in the past, and describes the jetty system, the only successful plan found. 4400 w. Jour Assn of Engng Socs—Oct., 1898.

Proposed Improvements of the Southwest Pass at the Mouth of the Mississippi. Brief sketch of the proposed work, with map. 2100 w. Eng News—Feb. 15, 1900.

The Improvment of the South Pass of the Mississippi River. William Starling. Map with description of the delta and passes, and full account of work on the South Pass. 10000 w. Eng News—Aug. 23, 1900.

The Problem at the Mouth of the Mississippi River. Advocates the improvement of Southwest Pass rather than South Pass. 1200 w. Eng Rec—Sept. 15, 1900.

The Projected Improvement of the Southwest Pass. William Starling. Describes the present condition of the pass and gives a full detailed discussion of the project. 14500 w. Eng News—Oct. 4, 1900.

See also **Mississippi; DREDGE; DREDGING.**

**Missouri.**—See also **Bank Protection.**

**Moldau and Elbe.**—See **Bohemia.**

**Monongahela Navigation Co.**—The History of the Monongahela Navigation Co. From the Pittsburg "Times." The history from 1832 is reviewed, with information regarding further improvement. 900 w. Eng News—Jan. 7, 1897.

**Moselle.**—The Moselle Canal Day in Metz (Der Moselkanaltag in Metz). Projects for the improvement of the Moselle River, so as to make it navigable up to Metz, discussed at a meeting of the Verband für Kanalisirung der Mosel und Saar. 5500 w. Stahl und Eisen—Aug. 1, 1900.

**Mountain Streams.**—See **Austria; Bank Protection; Fascines; Switzerland.**

**Nile.**—Harnessing the Nile. Frederic Courtland Penfield. An account of the gigantic engineering undertaking, which will create a large lake in the desert of Africa, and control it so that the water may be turned into distant channels at will. Ill. 3500 w. Century Mag—Feb., 1899.

Special Repairs to the Barrage. Sir W. E. Garstin. From the Administration Report of the Irrigation Department, Egypt. Particulars regarding the operation of stock-ramming and cement-grouting as carried out on the Nile Barrages. 3800 w. Ind Engng—April 9, 1898.

The Engineering Control of the Nile. Considers the means which have been and are to be adopted for the control of this river. Serial. Builder—Oct. 21, 1899.

The Utilization of the Nile. Illustrated description of the barrages at Assouan and Assiout, designed to pass great volumes of water through sluices if necessary. Also describes a system of cast-iron sheet piling. 1300 w. Eng Rec—Dec. 30, 1899.

Utilization of the Nile. An illustrated description of the finally sanctioned design of the dam at Assouan and the barrage at Assiout. 1800 w. Engr, Lond—Nov. 3, 1899.

See also **DAM—Assouan; IRRIGATION—Egypt.**

**Non-Tidal.**—The Improvement of Non-Tidal Rivers by Regulation. Abstract of report by G. T. Nelles on the improvement of a river without sufficient probable traffic to warrant its canalization. 4500 w. Eng Rec—Sept. 1, 1900.

**Oder, Germany.**—See **CANAL—Breslau.**

**Ohio.**—See also **Commercial Effects.**

**Parret, Eng.**—River Parret Improvement Scheme. H. G. Foster Barham. A canal scheme is discouraged and the river improvement thoroughly discussed from a practical standpoint. The report is thorough and detailed. 7000 w. Eng, Lond—Feb. 14, 1896.

See also **CANAL—Bridgwater, Eng.**

**Piling.**—Stream Regulation by the Use of Piling Flussverabbauung nach dem Pfahlbau-System). A. Schindler. A discussion of a method of regulating and improving the beds of streams by forming an outline of piling to be filled in by the débris. Serial. Schweizer Bauzeit—Jan. 6, 1900.

**Po Embankments.**—The Embankments of the River Po. Frank D. Adams. Interesting facts relating to this embankment and the rapid advance of the sea upon the shores of Lombardy and adjacent shores of the Adriatic. 1500 w. Science—May 22, 1896.

**Rhine.**—Rock Dredging on the Rhine. Brief illustrated description of an important work in progress in the bed of the Rhine, with methods employed and appliances used. 2000 w. Eng, Lond—Jan. 8, 1897.

The Correction of the Rhine in the St. Gall-Vorarlberg Valley (Die Korrektion der Gewässer im St. Gallisch-Vorarlbergischen Rheinthale). J. Wey. An account of the improvements of the Rhine as it enters the Lake of Constance, including the reinforcing of the banks and the straightening of the channel by extensive canal works. Two articles. 1 plate. 4000 w. Schweizer Bauzeit—July 16, 23, 1898.

The Regulation and Information Service on the Rhine in the Vorarlberg (Der Wasserwehr-und Nachrichtendienst am Rhein in Vorarlberg). An account of the methods used for regulating the upper Rhine; also the telephone service for communicating warnings of sudden freshets. 3000 w. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1899.

The Regulation of the Rhine (Die Rhein-Regulirung). An account of the proposed regulation of the Rhine at its discharge into the Lake of Constance in order to avoid the frequent overflows. The cost is estimated at over $3,000,000. 4500 w., and topographical map. Oesterr Monatschr f d Oeffent Baudienst—May, 1897.

The Regulation of the Rhine (Die Rhein-Regulirung). P. Krapf. A very complete account of the correction of the Rhine above the Lake of Constance with plates of maps, profiles, canal sections, and dredges. 6000 w. 4 plates. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1898.

The Rhine (Le Rhin). A review of the growth of traffic on the Rhine and some account of the improvements which have increased the navigable capacity of the river. 1800 w. Moniteur Industriel—Oct. 1, 1898.

**Saale.**—See **Elbe and Saale.**

**Scheldt.**—The Relation between the Configuration of the River Bed and the Depth of the Channel in the Lower Scheldt, Belgium (Hydraulique Fluviale. Etude sur la Corrélation entre la Configuration du Lit et la Profondeur du Chenal dans l'Escaut Maritime). M. Fargue. It was found that the depth was greatest where the concavity of the curves was sharpest. Illustrated by maps and diagrams. 2800 w. 2 plates. Ann d Ponts et Chaussées—1st quarter, 1900.

**Shifting Channels.**—Notes on the Regulation of Rivers with Shifting Channels (Beitrag zur Frage der Regulirung Geschiebeführender Flüsse). R. Iszkowiski. Discussing the especial question of the practicability of straightening winding river courses and recovering the land for agricultural purposes. 2500 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1898.

**Spree, Berlin.**—The River Spree at Berlin (Die Spree in Berlin). Official account of the river improvements and canalization in Berlin and vicinity. 7500 w. 1 plate. Oesterr Monatsch f d Oeffent Baudienst—Sept., 1897.

**Switzerland.**—Some Mountain Torrents of Switzerland. On the work necessary to defend against or regulate a torrent. Treats of cases where the water cuts away the ground on account of transverse currents, and where the torrent bed is gradually deepening. Ill. Serial. Engr, Lond—Aug. 4, 1899.

See also **Flon, Lausanne.**

**Thames.**—Deepening the Thames. From the London "Times." Describes an improvement that will affect the navigable channels of the river between Gravesend and the Nore. 1200 w. Arch, Lond—Nov. 6, 1896.

Lower Thames Navigation. The imperative nature of improvements in the navigability of the Thames River, made necessary by the modern increase in size of vessels, and the specific improvements needed are discussed editorially. 2000 w. Engng—April 24, 1896.

**Theiss, Hungary.**—The Regulation of the Theiss in the Bodrogköser District (Die Bodrogközer Theiss-Regulirung). Describing the river improvements intended to prevent the disastrous inundations of an important agricultural district of Hungary by the river Theiss. 3000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1898.

**Tiber.**—See **RIVER.**

**United States, Southern.**—See **Water Hyacinth.**

**Villa Mantle.**—The Villa Mantle for Protecting River Banks. The device consists of perforated clay brick, strung on zinc or other wire, and sunk on the bank to be protected. It has been used in Italy and France. Ill. 300 w. Engng—Dec. 27, 1895.

**Volga Delta.**—The Improvement of the Mouths of the Volga. Brief account of the commencement of a series of improvements in the navigation. 900 w. Eng, Lond—Oct. 13, 1899.

See also **RIVER.**

**Water Hyacinth.**—The Water Hyacinth. Describes the results of the government investigating board charged with finding some means of exterminating this plant, which is rapidly clogging many navigable streams in Florida and Louisiana. 700 w. Eng Rec—Feb. 4, 1899.

Water Hyacinth Obstruction in Southern Rivers. Reviews the results of the experiments and investigations conducted by the Board appointed by the government. 1400 w. Naut Gaz—Feb. 2, 1899.

**Weser.**—Improvement Works on the River Weser (Wasserbauten an der Weser). A. Herbst. A description, based upon a personal tour of inspection by the official engineer of the Austrian Department of the Interior, with plate of channel sections and topographical map. 4500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1897.

**Wottawa, Bohemia.**—The Regulation of the Wottawa at Strakonitz, Bohemia (Die Regulirung der Wottawa bei Strakonitz). F. Stupecky. A report upon the regulation of a feeder of the Moldau, showing how the flooding of the surrounding country was prevented by providing a permanent channel. 5000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1899.

## RIVET.

See also **RIVETED JOINT; RIVETING.**

**Countersinking.**—See **SHIPBUILDING—Countersinking.**

**Nickel-Steel.**—Nickel-Steel Rivets. Summary of report of Maunsel White on important experiments made at the works of the Bethlehem Iron Co., for the purpose of ascertaining the reliability and efficiency of nickel-steel for general riveting, and to observe the effect of the material at different degrees of heat. Ill. 1000 w. Jour Am Soc of Nav Engs—Nov., 1898.

**Shearing Strength.**—The Shearing Resistance of Steel Rivets. An editorial review of the basis of current practice. 800 w. Eng Rec—July 2, 1898.

The Shearing Strength of Rivet Steel. Arthur N. Talbot. Presents the results of a series of tests made in the Laboratory of Applied Mechanics of the Univ. of Illinois. Ill. 1800 w. Technograph, No. 12—1897-98.

**Shipbuilding.**—See **SHIPBUILDING—Countersinking; Riveting.**

## RIVETED JOINT.

**Formulæ.**—General Formulas for Efficiency and Proportions of Riveted Joints. John H. Barr. Considers single riveted lap joints, double riveted butt joints, two welts, and general equations. 1600 w. Sib Jour of Engng—Oct., 1900

**Frictional Resistance.**—Experiments on the Frictional Resistance of Riveted Joints (Untersuchungen über den Reibungswiderstand von Nietverbindungen). An account of the very important tests made in Holland by J. Schroeder Vander Kolk for the Dutch government, with many diagrams and details for various kinds of riveting under different conditions. Two valuable papers. 12000 w. Zeitschr d Ver Deutscher Ing—June 26, July 3, 1897.

Experiments on the Resistance of Riveted Plates to Slipping (Expériences sur la Résistance des Tôles Rivées au Glissement). A full account of the experiments made in Holland by Schroeder Vander Kolk with details of the apparatus and diagrams from the autographic records of the testing machine. Three articles. 7500 w. Génie Civil—Dec. 25, 1897, Jan. 1, 8, 1898.

Experiments on the Frictional Resistance of Riveted Joints. Schroeder Vander Kolk. A paper before the Royal Institution of Engineers of Holland, translated from the "Zeitschrift des

Vereines Deutscher Ingenieure." Gives conclusions from careful experiments made to determine the degree of influence exerted by frictional resistance on the strength and general efficiency, with particular reference to railway bridge design. 800 w. Prac Eng—Jan. 14, 1898.

Riveted Joints. Joseph R. Worcester. The subject of increase of strength of riveted joints under ordinary working strains, due to the friction of the contact surfaces of the plates or shapes riveted together, and the question of how much of the strength of the joint is due to this friction. Data and conclusions, tests and experiments, with discussion. 9500 w. Jour Assn of Engng Socs—July, 1896.

**Tests.**—Tests of Riveted Joints Made at the Watertown Arsenal, Mass., for Messrs Edward Kendall & Sons, Cambridgeport, Mass., May 29, 1896. Description and results of tests, supplied by the designers and makers of the joints. 2200 w. Jour Am Soc of Naval Engs—Nov., 1896.

**RIVETER.**

See **RIVETING.**

**RIVET HOLES.**

**Spacing.**—Spacing Rivet Holes. John Randol. Describes the way this problem was solved by Mr. Aue, superintendent of the De la Vergne shops. Ill. 1300 w. Am Mach—July 22, 1897.

See also **INDEX PLATE.**

**RIVETING.**

**Boilers.**—Causes of Certain Steam Boiler Explosions (Causes d'Explosion de Certaines Chaudières). A review of M. Fremont's paper upon the injury to the metal which is caused by careless treatment in riveting. Serial. Génie Civil—July 9, 1898.

Systems of Riveting for Boiler Construction (Entwerfen von Dampfkesselnietungen). H. Dieckhoff. A mathematical investigation, comparing the rules of the City of Hamburg, the German Lloyds, the Bureau Veritas, and the Lloyds Register with diagrams of many arrangements showing the percentage of full strength obtained. 3000 w. Zeitschr d Ver Deutscher Ing—Aug. 6, 1898.

See also **BOILER—Riveted Seams.**

**Electric.**—Riveting by Electricity. F. von Kodolitsch. Read at meeting of Inst. of Naval Archts., London. On the superiority of the electric system in the writer's opinion, with an illustrated description of a machine. 700 w. Engr, Lond—April 1, 1898.

**Girder.**—Field Riveting a Plate Girder Span. Illustrates rapid methods of riveting with pneumatic tools, operated by a locomotive air-pump. 700 w. Eng Rec—Feb. 19, 1898.

**Hydraulic.**—A Large Hydraulic Riveter. Illustrated description of a machine designed by Ernest W. Naylor, for use in the Altoona shops. 800 w. Am Mach—Aug. 16, 1900.

Hydraulic Diveting Plant—Chicago & Northwestern Railway. Description with illustrations of the general arrangement of the machinery. 700 w. Am Eng & R R Jour—June, 1897.

Upsetting Cold Steel Rivets by Hydraulic Pressure. Brief illustrated description of method employed in riveting the fly-wheels at the power plant of the Metropolitan St. Ry., in New York. 500 w. Mach, N. Y.—Sept., 1900.

**Navy Rules.**—Naval Practice in Ship Rivets and Riveting. J. H. Linnard. Read at meeting of the Soc. of Naval Archts. & Marine Engs. Rules for riveting are given in tabulated form, the great importance of the subject shown, and general information given. 2400 w. Eng News—Nov. 26, 1896.

Rules Adopted by United States Navy Department for Riveting Naval Vessels. Instructions recently issued for the purpose of standardizing the type of rivets used for naval vessels, with general rules for spacing. Ill. 1400 w. Marine Engng—Jan., 1898.

**Pneumatic.**—Pneumatic Percussion Riveters. An illustrated description of a machine now extensively used for bridge, boiler and structural work, for work previously done by hand. 1000 w. Eng News—March 3, 1898.

Portable Pneumatic Riveters. Describes results obtained in a large shipyard. 800 w. Eng Rec—Nov. 19, 1898.

Portable Pneumatic Riveters in Shipbuilding. W. I. Babcock. A discussion of the advantages of power riveting in general, and of the especial applicability of pneumatic riveting to shipbuilding. 3000 w. 12 plates. Trans Soc N A & M E—1898.

Portable Pneumatic Riveters in Shipbuilding. W. J. Babcock. Read at meeting of the Inst. of Naval Archts. Describes methods used in the yards of the Chicago Shipbuilding Co. 3000 w. Engr, Lond—March 31, 1899.

Portable Pneumatic Riveters in Shipbuilding. W. J. Babcock. Read before the Inst. of Naval Archts., at the London meeting. Description and photographs showing the methods used. 2800 w. Engng—July 21, 1899.

See also **COMPRESSED AIR; SHIP-BUILDING.**

**Pneumatic Field.**—Pneumatic Field Riveting in Railway Bridge Work. Extracts from a report to the Assn. of Ry. Supts. of Bridges and Buildings, giving a statement of advantages of power riveting on three large railway systems. Also editorial discussion. 2500 w. Eng Rec—Oct. 27, 1900.

See also **Girder.**

**Tools.**—Riveting Tools. A. H. Cleaves. Describes tools used and plan of work in riveting a number of thin brass pieces. Ill. 700 w. Am Mach—Nov. 4, 1897.

**ROAD.**

See also **BOULEVARD; CYCLEWAY; PARK; PAVEMENT; PUBLIC WORKS; ROAD TRAFFIC; SPEEDWAY; STREET; TRANSPORTATION.**

A Few Things to be Remembered in Building Good Roads. William H. Barnes. The importance of good drainage and having the bed well prepared, pointing out some of the more common faults in road building. 1700 w. Stone—Feb., 1898.

Fallacies in Good-Road Economics. Ira O. Baker. Discusses wagon transportation, and the real advantages of good roads. 5800 w. Tech, No. 14—1899-1900.

Road Building. An informal discussion before the Society, printed that the views expressed may be brought before all the members. 16500 w. Pro Am Soc of Civ Engs—Oct., 1898.

Road Building. An informal discussion by T. H. McCann, F. G. Cudworth, and M. D. Burke. 3300 w. Pro of Am Soc of Civ Engs—Nov., 1898.

Road Construction and System of Control. A. W. Campbell. Read before the Canadian Soc. of Civ. Engs. Discusses what constitutes a good road, and gives the progress in this direction as shown in various countries. 5400 w. Adv Proof—Can Soc of Civ Engs—Oct. 25, 1900.

Road Materials and Construction. W. M. Watson. Reviews various systems of construction, referring to the old Roman roads, and later methods used by Macadam and others. 1300 w. Can Eng—May, 1898.

Roads. Francis V. Greene. An address given before the students of Union College, Schenectady, N. Y., and printed in the journal of the Massachusetts Highway Assn. Extract. Discusses the relation which roads bear to civilization, and defines some of the principles in accordance with which they should be constructed. 4800 w. Brick—Nov., 1897.

Roads: Their Construction and Maintenance. Part first considers the nature of the materials available, their merits and disadvantages. Serial. Builder—July 1, 1899.

Some Considerations About Roads. N. S. Frost. Extracts from a paper read at a recent meeting at Petaluma, Cal. On the direction of roads, grades, drainage and surface. 1500 w. Min & Sci Pr—Jan. 8, 1898.

Some Features of Stone Road Construction. Benjamin Franklin. Discusses (1) The use of clay or loam as a "binder" on stone roads; (2) The thickness of stone roads; (3) The comparatime merits of Macadam and Telford roads. Also followed by general discussion. 8300 w. Pro Engs' Club of Phila—Jan., 1898.

The Development of Roads and Street Pavements. Francis W. Blackford. Describes ancient and modern road construction, and the various forms of paving, favoring properly constructed wooden blocks and asphalt pavings. 5800 w. Jour Assn of Engng Socs—April, 1899.

I. The Improvement of Transportation in Country Districts. E. E. Russell Tratman. A review of possible improvements. II. Brick and Macadam Country Roads. J. E. Miller. Report on a hard road construction. III. Improving the Roads of Illinois. J. T. Schmeltzer. With report of committee, and discussion. 8500 w. Ill Soc of Engs & Surv—1898.

Various Phases of the Road Question. Roy Stone. Considers questions of legislation, of public finance, and the forming of public opinion, methods of importance. Discussion. 8500 w. Pro Engs' Club of Phila—March, 1898.

**America.**—See **France vs. America; United States.**

**Bogs.**—Roadway Across Bogs. R. J. Howley. Describes the methods of building embankments for railways and highways across Irish bogs. 2200 w. Eng Rec—Aug. 19, 1899.

See also **Ireland.**

**Bosnia and Herzegovina.**—See **TRANSPORTATION.**

**Brick Pavement.**—See **BRICK PAVEMENT—Roads.**

**British.**—British Highways. Extract from a report prepared by the chief engineering inspector of the local government board. 9500 w. U S Cons Repts—Sept., 1896.

The Improvement of Our Roads. A. Moresby White. Reviews the Highway Acts of Great Britain; discusses the construction of roads; repairing, and various improvements. General discussion. 8000 w. Jour Soc of Arts—May 11, 1900.

The Maintenance and Construction of Main Roads in England and Wales. Abstract of an article by W. Rees Jeffreys in the "C. T. C. Gazette." Considers legislative changes needed. 1500 w. Auto Jour—Oct., 1900.

The Management and Position of Rural Roads. The system under which rural highways are managed in England. 1700 w. Builder—Oct. 31, 1896.

See also **English Lake District; Kent.**

**Brooklyn Shore.**—The New Shore Road in Brooklyn, N. Y. An account of a proposed drive which when completed promises to be one of the most attractive in the world. 1000 w. Eng Rec—Nov. 21, 1896.

**Caucasus.**—A Russian Military Highway. Marsden Manson. An account of the road over the Caucasus. 800 w. Eng Rec—Jan. 28, 1899.

**Cost of Hauling.**—See **ROAD TRAFFIC..**

**Cuba.**—Engineering Work in Santiago and Puerto Principe. Illustrated description, mainly of work on mountain highways. 3000 w. Eng Rec—Oct. 6, 1900.

**Drainage.**—See **ROAD DRAINAGE.**

**East Orange, N. J.**—The Better Maintenance of Highways in the Township of East Orange, N. J. William S. Bacot. The article contains some valuable suggestions on the organisation required to maintain good roads. 1100 w. Eng News—Feb. 6, 1896.

**Electric Tramway.**—See **ELECTRIC TRAMWAY—Country Roads.**

**Electric Tramway Improvement.**—The Modern Electric Railway and Permanent Street Improvement. C. E. McDowell. Gives instances of permanent improvement of the highways by trolley companies, and the benefits to suburban districts. 2300 w. Stone—Feb.-March, 1900.

**English Lake District.**—Proposed Road Through the Sty Head Pass. An account of a new coaching road to be built from Borrowdale to Wasdale, England, which will open up some of the finest scenery of the Lake District. 1200 w. Engr, Lond—Dec. 31, 1897.

**Europe.**—European Roads. William R. Hoag. Some reference is made to early road-building, which was begun in England and followed by other countries. The questions of expense and construction are briefly considered. 3000 w. Jour Assn of Engng Soc—April, 1897.

A Chapter on Country Roads. A paper by Wm. R. Hoag, on European Roads, presented before the Engs.' Club of Minneapolis; a letter by W. E. Curtis in the "Chicago Record," stating what is being done by the government; brick and steel roadways, convict labor, etc., are discussed. 6500 w. Brick—July, 1897.

**Fife, Scotland.**—See **Macadam.**

**France.**—Note on the Maintenance of the French National Highways (Note sur l'Aménagement de l'Entretien des Routes Nationales par Rechargements Cylindrés et sur les Resultats Obtenus dans l'Arrondissement du Sud du Departement des Ardennes). M. Perrin. An account of the system followed, with tables. 3000 w. Ann d Ponts et Chaussées—1st quarter, 1900.

Road Building and Maintenance in France. Harry Fielding Reid. From the Maryland Geological Survey, Vol. III. Gives statistics of cost of construction and maintenance, describing the systems of inspection, maintenance and construction. 2200 w. Stone—June, 1900.

**France vs. America.**—Good Roads. Daniel B. Luten. A criticism of American methods of road improvement, with reference to the system in France, and discussion of cost. 1800 w. Technic—1897.

**Geneva, N. Y.**—Road Construction at Geneva, N. Y. Describes the manner in which an 8000 population town is working out its good-roads problem. 1000 w. Eng Rec—June 24, 1899.

**Haulage Cost.**—See **ROAD TRAFFIC.**

**History.**—Ancient and Modern Highways. Charles Livy Whittle. An interesting illustrated review of the progress in road making among various nations, and from earliest times. 6800 w. States Duty—Nov., 1898.

Sketch History of Road Paving. W. J. E. C. Interesting facts relating to ancient and modern roads. 2500 w. Ill Car & Build—Oct. 9, 1896.

See also **Roman.**

**Illinois.**—Wagon Roads of Illinois. P. C. Knight. Calls attention to some common errors in road construction, with theories of the writer in regard to the improvement of dirt roads. 1000 w. Ill Soc of Engs & Surv—11 An Rept, 1896.

**Ireland.**—Country Road Construction in Ireland. Description of the methods followed in building roads over bogs and uplands where only local limestone is available on account of expense. 3100 w. Eng Rec—May 13, 1899.

See also **Bog.**

**Karlstadt, Croatia.**—The Karlstadt Imperial Road Between Jugorje and Möttling (Die Umlegung der Karlstadter Reichsstrasse, zwischen Jugarje und Möttling). Karl Grünhut. With topographical map, and profiles, together with tables showing the influence of grades on the cost of transport. 4000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1899.

**Kent, Eng.**—Road Maintenance in Kent, England. Extracts from a paper by F. W. Ruck, on the methods of maintenance 745 miles of main road in a country where the traffic is very heavy. 2000 w. Eng Rec—Oct. 13, 1900.

**Lancaster, Mass.**—Road Building in Lancaster, Mass. Harold Parker. From the "Journal of Massachusetts Highway Assn." The conditions of the country and the methods used in keeping about 100 miles of public highway in good order. 900 w. Eng News—Aug. 6, 1896.

**Macadam.**—A Notable Departure in Macadam Road Construction. Discusses the value of Macadam roads, their cost, and wearing qualities; calls attention to an improved construction recently tried in Monmouth, Ill., which consists of a combination of brick pavement and macadam; gives cross-section. 1600 w. Eng News—Dec. 10, 1896.

Disputed Points in Connection with the Construction and Maintenance of Macadamized Roads. H. Irwin. A discussion on this subject by members of the Am. Soc. of Civ. Engs., gave diverse opinions, and the aim of the paper is to ascertain how far these opinions might be accounted for by difference in local conditions. Serial. Can Engr—Jan., 1899.

The Maintenance of Macadamized Roads. Thomas Aitken. A paper read before the Inst. of Civ. Engs. on the use of machinery for repairing roads in the county of Fife, Scotland. Stone breaking, rolling, and cleaning the surface are fully described. 2500 w. Eng Rec—Nov. 9, 1895.

The Thickness of Macadam Material. Illustrates the difference between old and modern roads, and discusses the thickness required to resist the pressure from traffic. 800 w. Sci Am Sup—July 21, 1900.

See also **Tar Macadam; Telford and Macadam; BRICK PAVEMENT—Roads; PAVEMENT.**

**Rangoon.**—See **PAVEMENT—Wood Rangoon.**

**Madagascar.**—The Work of General Gallieni in Madagascar. From "Le Monde Illustre." An account of road construction on the Indian Ocean side of the island, which will in time be mentioned as one of the most beautiful roads in the world. Ill. 900 w. Sci Am Sup—July 8, 1899.

See also **MADAGASCAR.**

**Massachusetts.**—Notes on Road Construction and

Maintenance. A statement of experience gained during 1899 on the Massachusetts State roads, together with a brief description of the methods of constructing roads for traffic of different sorts in Great Britain. 1500 w. Eng Rec—April 21, 1900.

State Highways in Massachusetts. Editorial giving a statement of methods of selecting state roads and pointing out defects in present laws. 1500 w. Eng Rec—March 26, 1898.

State Roads of Massachusetts. Albert A. Pope. Some information of the work already accomplished in this state. 1500 w. State's Duty—May, 1897.

The Construction Methods of the Massachusetts Highway Commission. A description of the different classes of roads with some of the general principles. 3000 w. Eng Rec—April 3, 1897.

The Massachusetts State Highway Report for 1898. Explains the reasons for the extra cost of the Massachusetts state roads as compared with those in New Jersey and gives an account of the methods of repairing roads which have proved most satisfactory. 3000 w. Eng Rec—March 25, 1898.

See also **ROAD MATERIALS—Tests.**

**Massachusetts Specifications.**—Specifications for the State Highways of Massachusetts. Adopted by the Mass. Highway commission and includes specifications on earthwork, rock excavation, rubble masonry, broken stone, telford gravel foundation, vitrified clay pipe, drains, finishing, gutters, etc. 2200 w. Eng News—April 9, 1896.

**Materials.**—See **ROAD MATERIAL.**

**Military.**—Roads and Railways in Military Operations (Ueber Strassen und Eisenbahnen im Aufmarsch-und Operationsraum eines Heeres. Tertiärbahnen für den Localverkehr als Kriegsbahnvorrath). Col. Tilschkert. A paper before the Verein f. d. Förderung d. Local und Strassenbahnwesens, advocating stone tracks with automobiles, and other auxiliary means of transportation. 6000 w. Mitt d Ver f d Förderung d Local u Strassenbahnwesens—May, 1900.

Road Mauual for the U. S. Armies of Invasion. Reprint of instructions for use of the forces invading Spanish colonies, prepared by Gen. Roy Stone, of Gen. Miles' staff. 1400 w. Eng Rec—July 2, 1898.

**Mining Lands.**—Road-Making on Mining Lands. Walter J. May. Some hints on the making of good roads out of available material. 900 w. Col Guard—Nov. 10, 1899.

**Mining Purposes.**—Roads for Mining Purposes. C. C. Longridge. Discusses the principles and problems of construction of mining roads, routes, gradients, drainage, etc. 3500 w. Engng—July 13, 1900.

See also **TRANSPORTATION.**

**Monmouth, Ill.**—See **Macadam.**

**Montana Law.**—The New Road Law of Montana. M. S. Parker. Discusses the recently enacted law, making county surveyors general superintendents of all roads in their counties. 2000 w. Jour Assn of Eng Soc—Sept., 1897.

**Mountain.**—Notes on the Construction of Mountain Roads (Beitrag zur Anlage von Gebirgs-Kunststrassen). J. Rossmanith. A mathematical examination of the considerations which enter into the construction of mountain highways, including questions of grade, curve and capacity. 4000 w. Oesterr Monatschr f d Oeffent Baudienst—Aug., 1899.

See also **Tyrol.**

**New Jersey.**—New Jersey Roads. A review of the methods of building and repairing state roads. 1400 w. Eng Rec—Feb. 25, 1899.

New Jersey State Roads. A review of the successful and satisfactory law regulating state road work. 2000 w. Eng Rec—Feb. 19, 1898.

Road Construction in New Jersey. A statement of the special road work in the State during 1899, and a report of the methods of construction and repair found most satisfactory. 3000 w. Eng Rec—March 24, 1900.

State Aid Roads in New Jersey. C. E. McDowell. Information concerning the roads started or completed. 3000 w. Stone—Oct., 1899.

See also **East Orange.**

**New Jersey Coast.**—Stone Road Building on the Jersey Coast. C. E. McDowell. An illustrated account of good road building. 1600 w. Stone—Sept., 1900.

**New York.**—Good Roads in New York State. Describes the methods of construction and gives an account of what has been done. 1300 w. Eng Rec—May 20, 1899.

The Maintenance of Highways. A review of recent advice by the State Engineer of New York. 1800 w. Eng Rec—Nov. 18, 1899.

**New York Law.**—The New York Road Improvement Law. A statement of the provisions of the new State act. 800 w. Eng Rec—April 2, 1898.

**New York Specifications.**—State Road Construction, New York. Extracts from a specification for a New York State highway, which enters into details in an unusually minute manner. 1900 w. Eng Rec—Aug. 5, 1899.

**Nuuanu Pali.**—See **HAWAII.**

**Ontario.**—Road Making in Ontario. Gives the results of the recent attempts to improve the roads of the province, and the methods which seem most promising in securing better highways without prohibitive expense. 1700 w. Eng Rec—June 10, 1899.

See also **Tar Macadam.**

**Paving.**—See **History; BRICK PAVEMENT; PAVEMENT.**

**Pittsburg Exposition.**—First Report of Committee on Roads. A list of specimens of stone pavements imported and exhibited at the Pittsburg Exposition, with discussion of these and other systems. Ill. 6500 w. Pro Engs' Soc of W Penna—Sept., 1897.

**Plateway.**—See **TRACKWAY.**

**Rail.**—See **TRACKWAY.**

**Rhode Island.**—Highway Improvements in Rhode Island. Description of state road construction. 1000 w. Eng Rec—April 16, 1898.

**Roman.**—The Roman Highways. D. R. McAnally. Describes these remarkable roads and their construction. 1500 w. Ap Pop Sci M—June, 1898.

See also **History.**

**Spain.**—Country Roads (Caminos Vecinales). Discussing a proposition that the people of Segovia, Spain, be allowed to build needed roads without securing government consent, which, it is claimed, is withheld. 3000 w. Revista de Obras Publicas—Dec. 14, 1899.

**Specifications.**—See **Massachusetts Specifications; New York Specifications.**

**Surfacing.**—The Surfacing of Roads, from the Wearing, Hygienic and Economic Points of View (Delle Pavimentazioni Stradali sotto l'Aspetto della Viabilità, dell'Igiene e dell'Economia). Report to the Società degli Ingegneri e degli Architetti Italiani by a committee. It contains an interesting history of road-making and data of cost and wearing qualities of asphalt, wood blocks, various kinds of stone pavements, macadam and telford roads. Serial. Annali d Soc d Ing e d Archit Ital—Sept., Oct., 1898.

**Tar-Macadam.**—Tar-Macadam Pavement in Ontario. Information concerning a pavement recommended for excellence, durability, and cheapness. 600 w. U S Cons Repts, No. 815—Aug. 23, 1900.

Tar in Road Making. Extracts from paper of A. H. Campbell read at Edinburgh meeting of the Assn. of Municipal & County Engrs., in the use of tarred macadam in the construction of roadways. 1800 w. Gas Wld—July 9, 1898.

Use of Tar in Road Making. A. H. Campbell. Extract from a paper read before the Assn. of Munic. and Co. Surv's, on the construction of roads of tarred macadam. 2000 w. Gas Engs' Mag—April 10, 1899.

**Telford and Macadam.**—Road Making and Road Metal. Considers the methods of Telford and Macadam, and the materials used. 1900 w. Auto Jour—July, 1900.

**Track.**—See **ELECTRIC TRAMWAY—Country Roads; TRACKWAY.**

**Trackway.**—See **TRACKWAY.**

**Tyrol.**—The Road Construction System in the Tyrol. (Der Ausbau des Concurrenzstrassennetzes in Tirol). With map showing the extent to which the official plans have thus far been executed. 2000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—June, 1898.

**United States.**—American Highways. Charles A. Bell. A résumé of a book by Nathaniel Southgate Shaler, giving intelligent guidance on this subject. 3300 w. Chau—July, 1897.

See also **France vs. America.**

**U. S. Legislation.**—Recent Legislation on Improved Roads. J. L. Van Ornum. A digest of road legislation in the United States, with editorial comment. 4500 w. Eng News—March 25, 1897.

**Vermont.**—Highway Improvement in Vermont. Illustrated account of the work done by the State Highway Commission, with extract from second annual report. 1800 w. Munic Engng—Jan., 1897.

**Water Construction.**—Water as a Road Maker. William M. Bristol. Describes a case where water was used in road construction. Ill. 900 w. Min & Sci Pr—May 20, 1899.

**ROAD DRAINAGE.**

Drainage of Country Roads. E. A. Whitman. Discusses surface and sub-surface drainage, drains, culverts, etc. 2600 w. Jour Assn of Engng Soc—April, 1897.

Needed Legislation on the Drainage of Public Highways. B. B. McGowen. Suggestions which the writer thinks would secure good roads the year around; followed by discussion. 2500 w. Brick—March, 1896.

Road Drainage. Arthur Newhall Johnson. Extract from an article in the report of the Maryland Geol. Survey for 1899. Illustrated description of methods. 2200 w. Brick—Aug. 1, 1900.

**ROAD LOCOMOTIVE.**

See also **AUTOMOBILE; TRACTION ENGINE.**

**ROAD MATERIALS.**

Qualities of Good Road-Metals. Harry Fielding Reid. From the Maryland Geological Survey. On the methods of selecting and testing road material. 2800 w. Stone—July, 1900.

**Rocks.**—Rocks Suitable for Road-Making. N. S. Shaler. Brief discussion of varities and their fitness and unfitness for road-making. 700 w. Stone—Nov., 1896.

**Specifications.**—See **ROAD.**

**Tests.**—Apparatus and Methods Used in Testing Road Building Stone. From a report by T. C. Mendenhall, W. E. McClintock, and C. W. Ross, Highway Commissioners of Mass. Tests described were made to determine the nature of the qualities which constitute fitness or unfitness of different kinds of rocks for road making. 900 w. R R Gaz—Aug. 26, 1898.

Description of Apparatus and Methods Used by the Massachusetts Highway Commission in Investigating the Properties of Road Building Stone. Describes the work as carried on in the engineering laboratory of Harvard University. 1600 w. Stone—April, 1899.

Tests of Road Materials. Editorial description tests employed in Massachusetts and France to determine the relative values of stone for highway construction. 900 w. Eng Rec—April 23, 1898.

See also **ROAD—Massachusetts.**

**ROAD ROLLER.**

See **STEAM ROLLER.**

**ROAD TRACTION.**

See **ROAD TRAFFIC; TRACKWAY; TRACTION ENGINE.**

**ROAD TRAFFIC.**

See also **ROAD; STREET; TRACKWAY; TRANSPORTATION.**

**Cost.**—The Comparative Costs of Highway Haulage (Sue Confrouto Economico dei Tracciati Stradali). D. Ruggeri. A rather elaborate study of methods of comparing costs of haulage on different roads and of calculating approximate costs for moving freights on highways in contemplation, with the bearing of these costs on the design of such roads. Serial. 1st part. 5000 w. Annali d Soc d Ing e d Archit Ital—Sept-Oct., 1898.

The Cost of Hauling Freight on Common Roads. Abstract from a Dept. of Agriculture Report, giving the results of the investigations and further information contributed editorially. 2200 w. Eng News—Dec. 5, 1895.

**Heavy Wagons.**—The Restriction of Traffic on Highways. A review of a decision of the Maine Supreme Court that it is unreasonable to force heavily laden wagons from improved roadways, unless suitable roads are provided for them. 700 w. Eng Rec—Feb. 10, 1900.

**Plateways.**—See **TRACKWAY.**

**ROCK.**

See **GEOLOGY; ROAD; ROAD MATERIAL; STONE.**

**ROCK CRUSHER.**

See **CRUSHING MACHINERY; GOLD MILLING; ORE CRUSHER; STONE CRUSHER.**

**ROCK DRILL.**

See also **COAL MINING MACHINERY; COMPRESSED AIR; MINING MACHINERY; TUNNEL.**

Mechanical Rock-Drilling in Mines. M. J. Kersten. Describes various types of rock-drills, and methods of working them. Ill. 2700 w. Col Guard—June 3, 1898.

**Davis Calyx.**—The Davis Calyx Drill. An illustrated description of a drill, the special features being the cutter, which is of hardened steel; and the calyx, an apparatus for catching the particles of rock. 1600 w. Ir & Coal Trds Rev —Jan. 28, 1898.

The Davis Calyx Drill. Illustrates and describes this drill and its achievements, stating the principal advantages. 1800 w. Col Guard —Feb. 17, 1899.

**Electric.**—A German Electric Drill. W. Meissner. Illustrates and describes features of a machine which is soon to put in operation in Colorado. 1500 w. Mod Mach—Nov., 1898.

Electric Rock Drill. An illustrated description of an electric percussion rock drill in actual operation. 1400 w. Stone—Dec., 1895.

The Siemens & Halske Electric Rock Drill (Die Elektromotor—Schlagbohr Maschine, System Siemens & Halske). Describing especially the use of the drill in the Nassbach tunnel in Austria. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 3, 1897.

See also **ELECTRIC EQUIPMENT; MINING MACHINERY; SALT—Galicia; Salzburg; TUNNEL—Gardanne-Marseilles.**

**Gas.**—The Gas Rock-Drill. Description given by Mr. Consul Powell in his report on the trade and commerce of Philadelphia. 1200 w. Col Guard—June 8, 1900.

**Heise Hand.**—Improved Heise Hand Drills (Verbesserungen der Heiseschen Handbohrmaschine). A short account, calling attention to improvements. 600 w. 1 plate. Glückauf—April 1, 1900.

**Ingersoll-Sergeant.**—The Plant and Product of the Ingersoll-Sergeant Drill Co. Charles W. Melcher. History of the company and description of the plant and the class of machinery manufactured by them. Ill. 3000 w. Jour W Soc of Engs—Oct., 1897.

See also **STOPING.**

**Liesens Hand.**—New Rotary Hand-Worked Rock-Drill (Liesens System). Translated from Revue Universelle des Mines. Communication made to the Assn. des Ingénieurs sortis de l'Ecole de Liége (Section de Charleroi). Briefly notices the hand-drilling machines in present use, with a description of the Liesens system. Ill. 1600 w. Col Guard—Feb. 5, 1897.

**Pacific Coast.**—Machine Mine Rock Drills on the Pacific Coast. A. E. Chodzko. Brief description of the rock drills obtainable in San Francisco, and some facts relating to their use. Serial. Min & Sci Pr—Oct. 13, 1900.

**Sharpening Machines.**—Rock Drill Sharpening Machines. Illustrates and describes the various British patents of these machines, with comments on the types. 1600 w. Col Guard—Dec. 9, 1898.

**Stoping.**—Stoping with Machine Drills. B. L. Thane. An account of what was accomplished with a "Baby Ingersoll" drill in the Chief Mine, at Sundrum, Alaska. 2400 w. Trans Am Inst of Min Engs—Sept., 1899.

**ROCK SALT.**

See **SALT.**

**ROD.**

**Strength.**—See **MATERIALS' STRENGTH; TESTING—Rods.**

**ROD MILL.**

See **ROLLING MILL—Joliet; Rod.**

**ROENTGEN RAYS.**

See also **CATHODE RAY; ELECTRO-PHYSICS; INDUCTION COIL; INTERRUPTER; RADIOGRAPHY.**

Photographing the Unseen—A Symposium on the Roentgen Rays. The contributors to this symposium are Thomas C. Martin, Editor of the "Electrical Engineer;" R. W. Wood, Berlin, Germany; Elihu Thomson, Lynn., Mass.; Sylvanus P. Thompson, London, Eng.; J. C. McLennan, Univ. of Toronto; William J. Morton, New York, and Thomas A. Edison, all noted as able electricians, and some of them of world wide fame as physicists. What they have to say of the past, present and probable future of this new field is of great interest. Ill. 6000 w. Century Mag—May, 1896.

Röntgen Photography. H. S. Carhart. Observations on experiments made by writer. 400 w. W Elec—March 7, 1896.

Prof. Roentgen's Alleged Discovery. Editorial on the claim that it is possible to photograph objects behind opaque substances. A review of what is reported as having been accomplished with comments. 1800 w. Elec—Jan. 22, 1896.

Photography with Invisible Radiations. Editorial on the importance of a correct knowledge of the new phenomena, and the value of investigations. 1000 w. Elec—Feb. 26, 1896.

Photographing the Unseen; or, the New Electro-Photography. Review of the discovery of Prof. Röntgen, with illustrations showing the results of his work. 1000 w. Elec Rev, Lond—Jan. 24, 1896.

The Roentgen Ray Photography. Edwin H. Hall. From the N. Y. "Sun." A review of investigations that led up to the recent discovery by Roentgen. 1500 w. Elec Eng—Feb. 1, 1896.

An Excursion into the Domain of the X-rays (Streifzüge durch das Gebiet der X Strahlen). Dr. Kalischer. A general description of the phenomena of radiography, describing the apparatus and effects. Serial. Elektrotech Zeitschr—June 16, 1898.

On the Rays of Lenard and Röntgen. Oliver Lodge. A review of the events and experiments in this field, with a consideration of the facts established and views entertained. 4000 w. Elect'n—Jan. 31, 1896.

New Physical Phenomena of Roentgen Rays. Charles Lester Leonard. Extract from a paper read before the Am. Phil. Soc. New phenomenon observed with experiments and conclusions. 1200 w. Elec World—Dec. 5, 1896.

Progress in the Technics of Röntgen Rays (Fortschritte der Röntgentechnik). Max Levy. A discussion of the theory of the production of Röntgen rays, and a description of the best apparatus for the purpose. 4000 w. Elektrotech Zeitschr—Sept. 22, 1898.

The X-Rays. Hugo Münsterberg. A review of Prof. Röntgen's discovery, and an editorial note which shows that others have been at least on the threshold of the same discovery for some time. List of scientists in the United States and Europe who have repeated Prof. Röntgen's experiments with confirmatory results. 1800 w. Sci—Jan. 31, 1896.

The Roentgen Rays. Henry Morton. States facts long known which in some cases seem to have been forgotten, and points out the true characteristics of Roentgen's discovery. 2800 w. Engng—April 17, 1896.

Roentgen Rays. Henry Morton. States facts which explain the true character of Röntgen's discovery and the mixed or uncertain character of many experiments recently made by others. Prof. Morton says that many experimenters who have been producing shadowgraphs with sunlight, electric lights, and the like have not been repeating Röntgen's operations but only applying facts known for fifteen years or more. 2400 w. Stev's In—April, 1896.

Recent Work with Röntgen Rays. Notes on papers and communications received during the last few days previous to date, and supplementary to J. J. Thomson's article in last number of same paper. 5500 w. Nature—April 30, 1896.

On Röntgen's Rays. Correspondence with "Nature" upon the new discovery by Alfred Schuster and J. T. Bottomley. 1800 w. Nature—Jan. 23, 1896.

The Röntgen Rays. A summary of the more important results obtained since the publication of Prof. Röntgen's paper. 4800 w. Nature—Feb. 20, 1896.

Recent Work on the X-Rays. A general résumé of progress compiled from many sources, largely from the technical periodicals of Europe and America. 3000 w. Pop Sci M—May, 1896.

Photographic Experiments in Chicago with Röntgen Rays. Frank L. Perry. Illustrated description of experiments made. 1600 w. W Elec—Feb. 15, 1896.

The X-Rays and the New Photography. A review of experiments and discoveries of various investigators in this field. 2500 w. Elec Rev, Lond—March 6, 1896.

Roentgen's Shadowgraphs. R. H. Read. Describes a test by an English experimenter. 500 w. Elec Rev—Feb. 12, 1896.

Dark Light Photography. C. J. Reed. An article on the work of Prof. Röntgen in photographing without light. 1000 w. Elec Wld—Feb. 1, 1896.

Röntgen's Rays. A collection of opinions, experiments, explanations, and experiences of eminent scientists, given under various headings. 5400 w. Sci Am Sup—April 4, 1896.

The Progress of the Technique of Röntgen Rays (Die Fortschritte der Roentgentechnik). A general review of the advance which has been made in the technique of radiography since the original discovery of Prof. Röntgen. 3000 w. Schweizerische Bauzeitung—Nov. 5, 1898.

Photography of Invisible Objects. J. J. Stewart. A short statement of the facts discovered and the methods of experimenting employed by Prof. Röntgen. Ill. 1500 w. Knowledge—March 2, 1896.

Sciagraphic Experiments. W. M. Stine. An account of investigations directed towards the character of the new radiant. 2500 w. Elec Eng—March 11, 1896.

Sciagraphs and Electrographs. W. M. Stine. Illustrations and descriptions of supposed sciagraphs, investigated with the view of discriminating between true and spurious sciagraphs. 1500 w. W Elec—March 7, 1896.

On the Röntgen Rays. G. G. Stokes. An extract from an address to the Victoria Inst. A review of what is known regarding these rays, and the previous work which gradually led to them. 4200 w. Nature—Sept. 3, 1896.

Professor Röntgen's Discovery. A. A. C. Swinton. The writer describes experiments confirmatory of Röntgen's discovery. He obtains better results with high frequency currents than with even a large sized Rhumkorff coil. 800 w. Nature—Jan. 23, 1896.

Some Recent Röntgen Ray Work. Elihu Thomson. Illustrated description. 800 w. Elec Wld—Oct. 10, 1896.

The Röntgen Rays. J. J. Thomson. Some remarks on the investigations of M. Henri Becquerel interesting on account of the differences as well as the analogies disclosed between uranium radiation and the Röntgen rays, followed by review of late experiments and progress. 2200 w. Nature—April 23, 1896.

Latest Developments with the X-Rays. John Trowbridge. Discusses the present state of knowledge, the art of using the X-rays, the methods of obtaining them, and information gained by their use. 4800 w. Ap Pop Sci M—April, 1900.

Roentgen Phenomena—Theory and Practice. Elmer G. Willyoung. An examination of the characteristics of the X-rays and what can be done with them. 5500 w. Pro Engs' Club of Phila—Nov., 1896.

An Interesting Review of X-Ray Practice. Elliott Woods. Gold-foil screen described. Many important experiments and suggestions. 2200 w. Elec Rev—Sept. 15, 1897.

Speculations Concerning Roentgen Rays. Francke L. Woodward. A brief statement of things noticed during the writer's researches, with suggestion of a possible explanation. 900 w. Elec Eng, N. Y.—Oct. 13, 1898.

Roentgen or X-Ray Photography. Illustrated description of experiments of Prof. Wright, at Yale. 1800 w. Sci Am—Feb. 15, 1896.

**Absorption.**—The Absorption of X-Rays (L'Absorption des Rayons X). Experimental investigations as to the variation of opacity of various thicknesses of different materials. 1200 w. Comptes Rendus—Aug. 23, 1897.

**Air Conductivity.**—Do the Röntgen Rays Make Air a Conductor? G. M. Minchin. Experimental study and explanations, reaching a negative result. 2300 w. Elect'n—April 9, 1897.

**Am. Inst. El. Eng. Discussion.**—The Roentgen Ray and Its Relation to Physics. A topical discussion. Prof. Henry A. Rowland makes the opening remarks and is followed by M. I. Pupin., Elihu Thomson, A. E. Kennelly and others. 19000 w. Trans Am Inst of Elec Engs—Dec., 1896.

**Anti-Cathode Tube.**—A New Röntgen Tube with Ernst Pabst's Anti-Cathode (Ueber eine Neue Röntgenröhre mit Ernst Pabst's Anti-Kathode). F. Kurlbaum. Showing the advantage of coating the anti-cathode with platinum black, which has high emissive power and so keeps down the temperature. 700 w. Elektrotech Zeitschr—March 22, 1900.

**Apparatus.**—Apparatus for Roentgen Work. E. A. Robins, in the Photogram. The construction of induction coils and other pieces of apparatus in connection with the production of X-Rays. Ill. 2700 w. Sci Am Sup—July 17, 1897.

Improved Radiographic Apparatus. From "Illustrirte Zeitung." Illustrated description of improved apparatus, with brief reference to the applications now in use. 1300 w. Sci Am Sup—Aug. 20, 1898.

Roentgen Ray Apparatus. The latest tubes employed for producing esographs are described and other apparatus used in the work. 2300 w. Elec Rev, Lond—Nov. 20, 1896.

The Decreasing Demand for X-Ray Apparatus. W. J. Clarke. Thinks the reasons are explained by the high price, the apparatus being too complicated, and often difficult to handle. 900 w. Elec Eng, N. Y.—Aug. 11, 1898.

See also **Influence Machine; Static Machine; Tube; INTERRUPTER.**

**Battelli's Experiments.**—The Röntgen Rays. The conclusions from an exhaustive series of experiments by Battelli, throwing much light on the origin of the Röntgen rays, and their relation to the cathode rays. 1500 w. Elec Rev, Lond—June 12, 1896.

**Battery Current.**—The Production of the X-Rays by a Battery Current. John Trowbridge. A successful new method of generating these rays and the advantage. 1200 w. Am Jour of Sci—June, 1900.

**Bulb.**—I. Centralizing X-Ray Bulb. II. External Electrodes Vacuum Bulb. William James Morton. Experiments explained. Ill. 800 w. Elec Eng—April 8, 1896.

**Coal Tests.**—See **COAL TESTS—Röntgen Ray.**

**Contact Electricity of Metals.**—On the Effect of the Röntgen X-Rays on the Contact Electricity of Metals. James R. Erskine Murray. The experiments described were made in the Cavendish Laboratory of the University of Cambridge, at Prof. J. J. Thomson's suggestion, in order to find whether the contact potential of a pair of plates of different metals is in any way affected by the passage of the Röntgen X-Rays between the plates. 1200 w. Elect'n—April 24, 1896.

**Cool Anti-Cathode.**—Radiograph Tube with Cool Anti-Cathode (Ampoule Radiographique à Anticathode Froide). MM. Buguet and Chabaud. A communication to the French Academy describing a method of cooling the terminal in a Crookes tube by means of a circulation of water or mercury. 1000 w. Comptes Rendus—Oct. 16, 1899.

**Custom House.**—The X-Rays in the Custom House. Brief explanation of the method, with illustrations. 1800 w. Sci Am—Aug. 7, 1897.

**Dartmouth Laboratory.**—Further Experiments with X-Rays. Edwin B. Frost. Experiments made at the Dartmouth Laboratory. 1800 w. Science—March 27, 1896.

**Diffraction.**—A New Form of Cathode Discharge and the Production of X-Rays, Together with Some Notes on Diffraction. R. W. Wood. Presents a new method of producing the rays, with its advantage, and describes its behavior. 3300 w. Phys Rev—July, 1897.

**Diffusion.**—Röntgen Ray Diffusion Phenomena. Elihu Thomson. Illustrated description of a tube designed by the writer for obtaining strong radiation, and the tests made with it. 900 w. Elec Rev, Lond—July 2, 1897.

**Discharge of Conductors.**—Note on the Mechanism of the Discharge of Conductors Struck by X-Rays (Sur le Mecanisme de la Déchargé des Conducteurs Frappés par les Rayons X). G. Sagnac. Describing experimental investigations into the emission of secondary rays from a metal upon which X-rays impinge. 1800 w. Comptes Rendus—Jan. 8, 1898.

**Discharge of Electrified Bodies.**—The Discharge of Electrified Bodies by the X-Rays. Clement D. Child. Reviews briefly articles already published on this subject, and gives experimental work. Serial. Phys Rev—Oct., 1897.

On the Fall of Potential at the Surface of a Metal When Exposed to the Discharging Action of the X-Rays. C. D. Childs. An account of experiments made, giving results. 1800 w. Phys Rev—May, June, 1898.

The Effect of the Density of the Surrounding Gas on the Discharge of Electrified Metals by X-Rays. C. D. Child. Experimental work with brief account of results. 2000 w. Science—May 21, 1897.

**Duration of Emission.**—The Duration of the Emission of Röntgen Rays (Sur la Durée d'Emission des Rayons Röntgen). Bernard Brunhes. A communication to the French Academy describing experiments modeled on those of Wheatstone, by which the duration of emission is found to be of the order of one ten-thousandth of a second. 900 w. Comptes Rendus—April 9, 1900.

**Edison's Experiments.**—Edison's Röntgen Rays Experiments. Edwin J. Houston and A. E. Kennelly. An interesting résumé of the result of Mr. Edison's experiments to date on Röntgen rays. The most notable conclusion reached is that there is no apparent advantage in obtaining a very high vacuum in the ray lamp and a criterion is given by means of which the proper degree of vacuum may be recognized. 1300 w. Elec Wld—March 21, 1896.

Experiments with Roentgen Rays. Thomas A. Edison. Investigations on fluorescing salts, and experiments with vacuum tubes. 600 w. Elec Eng—March 25, 1896.

The Edison X-Ray Experiments, Apparatus and Fluoroscope. Illustrated description indicating mode of application to surgical examinations. 1100 w. Sci Am—April 4, 1896.

**Edison's Fluoroscope.**—Edison's Fluoroscope. Illustrated description of a device that promises to be of great value to the medical profession. 600 w. Elec Rev—April 1, 1896.

**Electrification of Air.**—Electrification of Air by Roentgen Rays. Lord Kelvin, Dr. J. C. Beattie and Dr. Smoluchowski de Smolan. Read before the Royal Soc. of Edinburgh. Illustrated description of arrangements of the test whether or not Roentgen rays have any electrifying effect on air. 800 w. Nature—Dec. 31, 1896.

**Electrification of Gases.**—On the Electrification of Gases Exposed to Röntgen Rays, and the Absorption of Röntgen Radiation by Gases and Vapors. E. Rutherford. Experiments which have been made to investigate the way in which electrified gases can be obtained by means of the Röntgen rays, and also to examine the properties of the charged gas. 4500 w. Elect'n—April 23, 1897.

Endoscopy. G. Brunel, in "La Revue des Revues." An account of numerous and beneficial applications of the X-rays. 1800 w. Sci Am Sup—Aug. 14, 1897.

**Fluorescence of Metallic Salts.**—On the Sensitiveness of Certain Salts to the X-Rays. Thomas A. Edison. Brief description of the writer's recent researches on the fluorescence of metallic salts. 500 w. Elec Rev—April 1, 1896.

**Fluorometer.**—The Fluorometer. Describes and illustrates an instrument used to establish with precision the location of any foreign object within the human organism, which is comparatively impermeable to the X-rays. 1500 w. Sci Am—Feb. 12, 1898.

**Fluoroscope.**—See **FLUOROSCOPE.**

**Gold-Foil Screens.**—Gold-Foil Screens for X-Ray Practice. J. Elliott Woods. Further experiments with defence of previous arguments. 2000 w. Elec Rev, N. Y.—Dec. 1, 1897.

**Hittorf Tube.**—Some Experiments with Hittorf Tubes and Röntgen Rays. Antonio Roiti. Experiments made by writer. Treats of shadows and penumbras; the behavior of a tube during exhaustion; shadows directly magnified; fluorescence does not appear to be a necessary condition for the emission of Röntgen rays; complications and phenomena and the necessity for describing minutely all the circumstances in which the observations are made; and applications to petrography. 3300 w. Elect'n—May 29, 1896.

**Human Soft Tissues.**—Application of Röntgen Rays to the Soft Tissues of the Body. John Macintyre. Illustrated account of examples obtained in this branch of the art. 2800 w. Nature—Sept. 10, 1896.

**Influence Machine.**—A Simple Form of Influence Machine for X-Ray Work. William Cotton. Abstract from the "Bristol Medico-Chirurgical

Journal." Describes a sectorless Wimshurst machine and gives the results obtained. 4000 w. Elect'n, Lond—Oct. 27, 1899.

The Pidgeon Influence Machine. Illustrates and describes a machine adapted for X-ray purposes. 2000 w. Elec Rev, Lond—Nov. 10, 1899.

**Instantaneous.**—Recent Progress in Instantaneous Radiography (Les progrès Récents de la Radiographie Instantanée). An account of the methods and apparatus by means of which M. Colardeau has succeeded in obtaining radiographs in the 250th part of a second. 1500 w. Génie Moderne—Feb. 15, 1897.

**Interrupter.**—See **INTERRUPTER.**

**Lehigh University.**—Experiments with Röntgen Rays. Alexander Macfarlane. Illustrated description of experiments made in the electrical laboratory of Lehigh University. 1000 w. Elec Wld—March 14, 1896.

**Lodge.**—Röntgen Ray Experiments. Oliver J. Lodge. Facts determined by continued experiments. 1500 w. Elect'n—June 5, 1896.

**Manifolding.**—Manifolding by Cathode Rays. Elihu Thomson. An experiment made to test the effect of Röntgen rays in producing simultaneously a number of impressions of the shadow of the same object. Illustrated description. 400 w. Elec Eng—March 11, 1896.

**Manipulation.**—On the Manipulation of Röntgen-Ray Apparatus. George T. Hanchett. The experimental experience of the writer with a number of tubes under varying conditions. 1200 w. Elec Wld—March 20, 1897.

**Mayer.**—Researches on the Röntgen Rays. Alfred M. Mayer. Experiments described were made in the private laboratory of Prof. Rood in Columbia University. 3300 w. Am Jour of Sci—June, 1896.

See also **Reflection.**

**Metal Flaws.**—The Action of X-Rays, etc (De l'Action des Rayons X, etc). Three papers before the French Academy discussing experimental researches, chiefly relating to the use of X-rays for investigating flaws in metals. 2500 w. Comptes Rendus—July 19, 1897.

**Movements of Hidden Objects.**—Novel Experiments with X-Rays. Edward P. Thompson. Successful experiments directed to the determination of the possibility of applying X-rays to the discovery of movements of hidden objects. 900 w. Steven's In—April, 1896.

**Phosphorescent Zinc Sulphide.**—Increase of the Photographic Yield of the Roentgen Rays by means of phosphorescent Zinc Sulphide. Charles Henry. Describes experiment proving that by coating with phosphorescent zinc sulphide bodies capable of absorbing Röntgen rays, it is possible to render visible on the photographic plate, objects situated behind such bodies, and otherwise invisible. 1100 w. Sci Am Sup—April 11, 1896.

**Physiological Effect.** Deleterious Effect of X-Rays on the Human Body. Editorial account of physiological effects upon H. D. Hawks, who has been giving exhibitions with an unusually powerful X-ray outfit. 450 w. Elec Rev—Aug. 12, 1896.

Physiological Effects of the Röntgen Tube. W. M. Stine. The writer thinks they are the result of stimulation and gives reasons for the opinion. 900 w. Elec Wld—Dec. 19, 1896.

Tesla on the Hurtful Actions of Lenard and Röntgen Tubes. Gives the writer's experience with the Röntgen rays, relating chiefly to their deleterious action on human tissues. 4000 w. Elec Rev—May 5, 1897.

The Harmful Effects of the X-Ray. F. S. Kolle. Discusses ideas advanced by Tesla, and gives the writer's experience and opinions. 1200 w. Elec Eng—May 19, 1897.

The X-Rays and Their Safe Application. J. Mount Bleyer. Read before the Medico-Legal Soc. New York. Notes on precautions necessary in X-ray examinations, and method of treatment when from unforeseen causes an injury has been inflicted. 2000 w. Elec, N. Y.—June 15, 1898.

See also **Surgery.**

**Plant Germinating.**—An Investigation with Röntgen Rays on Germinating Plants. H. J. Webber. Account of experiments. 500 w. Science—June 26, 1896.

See also **ELECTRICITY.**

**Plants.**—Report upon Some Preliminary Experiments with the Röntgen Rays on Plants. G. F. Atkinson. An interesting account of experiments made, showing that while plant tissues absorb the rays quite freely, there are no visible external injuries, and that they produce no easily discernable influence. 3500 w. Science—Jan. 7, 1898.

**Printing.**—A New Process of Printing by the Use of X-Rays. Typo-Radiography Faster Than Any Conceivable Method Now Used. Frederick Strange Kolle. An account of experiments in this field, with description of prenaration of inks, and report of results obtained. 3500 w. Elec Eng, N. Y.—Jan. 19, 1899.

Izambard Process of Printing by X-Rays. Brief account of experimenting with Röntgen rays in the hope of adapting them to commercial use in the printing industry. 1000 w. Elec Eng, N. Y.—Jan. 12, 1899.

Printing by X-Rays (Imprimerie par les Rayons X). L. Le Roux. A general account of the Izambard process for reproducing manuscript or typewriting by use of Röntgen rays. 1200 w. L'Electricien—Dec. 16, 1899.

**Pupin.**—Prof. Röntgen's Discovery in Photography. Michael I. Pupin. Its scientific character and possible application throughout all branches of science, as indicated by Mr. Pupin's re-performance at Columbia College laboratory of Prof. Röntgen's extended experiments. Ill. 2000 w. Eng Mag—March, 1896.

Roentgen Rays. M. I. Pupin. Reviewing the former experiments on electric discharges through rarified gases, and asserting the importance of Roentgen's discovery. 1300 w. Elec—Feb. 5, 1896.

**Reflection.**—On Rood's Demonstration of the Regular or Specular Reflection of the Röntgen Rays by a Platinum Mirror. Alfred M. Mayer. A criticism upon Dr. M. I. Pupin's criticism of Prof. Rood's account of experiments. 600 w. Science—May 8, 1896.

On the Reflection of Röntgen Rays. O. N. Rood. Abstract of paper read before the National Academy of Science. Experiments claiming to demonstrate the regular or specular reflection of the Röntgen rays. 600 w. Elec Wld—May 9, 1896.

On the Reflection of the Röntgen Rays from Platinum. Ogden N. Rood. Describes experiments made by writer. 700 w. Science—March 27, 1896.

On the Regular or Specular Reflection of the Röntgen Rays from Polished Metallic Surfaces. O. N. Rood. Results with different materials and different forms of reflectors. 8200 w. Am Jour of Sci—Sept., 1896.

**Retina.**—The Action of the X-Rays on the Retina (Action des Rayons X sur la Retine). M. Bardet. Showing that a feeble action is experienced when ordinary light is excluded. 1000 w. Comptes Rendus—June 14, 1897.

**Righi.**—On the Production of Electric Phenomena by Means of Roentgen's Rays. Auguste Righi. From the Proceedings of the R. Accademia della Scienze dell' Instituto di Bologna. 1800 w. Elect'n—Feb. 21, 1896.

**Röntgen Experiments.**—Röntgen Rays. W. K. Röntgen. Reports some experiments. 1600 w Sci Am Sup—Dec. 31, 1898.

**Röntgen's Laboratory.**—The New Marvel in Photography. Illustrated article by H. J. W. Dam. A visit to Prof. Röntgen at his laboratory in Würzburg. His own account of his great discovery. Interesting experiments with the cathode rays. Practical uses of the new photography. Ill. 4800 w. McClure's Mag—April, 1896.

**Röntgen's Paper.**—On a New Kind of Rays. W. K. Röntgen. In this paper the discoverer of the X-rays states their properties anl gives definite information by which his experiments may be repeated. 2800 w. Nature—Jan. 23, 1896.

On a New Form of Radiation. Wilhelm Konrad Röntgen. This is an English translation of Prof. Röntgen's second classical paper on the subject. 2000 w. Elect'n—April 24, 1896.

On a New Form of Radiation. Wilhelm Konrad Röntgen. Preliminary communication to the Würzburg Physico-Medical Society. This is Prof. Röntgen's classical paper on the discovery of the X-rays. 3500 w. Elect'n—Jan. 24, 1896.

**Salvioni.**—On the Rays of Röntgen. E. Salvioni. A communication made to the Medico-Chirurgical Academy of Perugia. Results of some studies undertaken by the writer. 800 w. Elec Rev. Lond—Feb. 21. 1896.

Professor Enrico Salvioni's Work on the X-Ray. Salvatore Cortesi. An interview with this eminent scientific man at the University of Perugia, Italy. 2500 w. Elec Rev—April 8, 1896.

**Sheep's Brain.**—Sciagraph of Sheep's Brain. Experiments of John Kammer of Chicago are described. 500 w. W Elec—March 28, 1896.

**Solarization.**—Solarization Effects in Röntgen Ray Photographs. Wm. Lispenard Robb. Experiments made are described, which seem to prove the possibility of photographic plates becoming solarized by Röntgen rays, and showing the necessity of carefully timing exposures. Ill. 1600 w. Am Jour of Sci—Sept., 1897.

**Sound Waves.**—Are Roentgen Ray Phenomena Due to Sound Waves? Thomas A. Edison. An account of experiments with comments, and a reproduction of the article referred to. 1800 w. Elec Eng—April 8, 1896.

**Source.**—Source of X-Rays. A. A. Michelson and S. W. Stratton. Illustrated description of experiments which appear to prove that in a vacuum tube, of a form specified, the X-rays radiate in all directions from the surface first encountered by the cathode rays. 500 w. Science—May 8, 1896.

The Source of the X-Rays. John Trowbridge and John E. Burbank. Describes experiments made with various tubes and states results. Ill. 2000 w. Am Jour of Sci—Feb., 1898.

See also **Tesla; Theory.**

**Static Machine.**—A Large Static Machine for X-Ray Work. Francis H. Williams. Illustrated description of a machine used for examinations in diseases of the chest, also the method. 1600 w. Sci Am—June 17, 1899.

**Stereoscopic.**—See **Surgery.**

**Surgery.**—Apparatus for Determining the Position of Projectiles in the Skull (Appareil Destiné à Determiner la Position des Projectiles dans le Crâne). The method of MM. Remy and Contremoulins, presented to the French Academy by M. Marey consists in the use of two Crookes tubes, to make radiographs from known positions. 1500 w. Comptes Rendus—Nov. 22, 1897.

New System for Locating Bullets. Illustrates and describes a method, aided by radiographic proofs, which has proved most successful. 2400 w. Sci Am Sup—Dec. 25, 1897.

Stereoscopic Roentgen Pictures. Elihu Thomson. The desirability of such pictures, especially in surgical examinations. 500 w. Elec Eng—March 11, 1896.

The New Photography by Cathode Rays. John Trowbridge. Illustrated description in popular style. Gives application of the new photography to surgery, by a method of locating the exact position and depth of a bullet by triangulation. 2400 w. Scrib Mag—April, 1896.

The X-Rays in Medicine and Surgery. Charles L. Norton. The application of X-rays to the diagnosis of disease. Tests that make it seem that a very wide field is open to medical as well as surgical investigations. 550 w. Science—May 15, 1896.

Triangulation by Means of the Cathode Photography. John Trowbridge. Describes an attempt to apply the principles of triangulation to indicate more exactly the position of concealed bodies whose presence is revealed by Röntgen's method. 800 w. Am Jour of Sci—March, 1896.

X-Rays. Apparatus and Methods. Elmer G. Willyoung and H. Lyman Sayen. Discusses apparatus and methods for practical work, with especial reference to the needs of the physician and surgeon. Ill. 7000 w. Jour Fr Inst—March, 1897.

X-Ray Work in Baltimore. C. B. Fairchild. Reports the work in Loyola College, University Hospital and Johns Hopkins Hospital. 2000 w. Elec Eng, N. Y.—Oct. 6, 1898.

X-Rays in the Army. H. Lyman Sayen. The arrangement for X-ray work at Fort McPherson, Ga., and the success in diagnostic work. 1700 w. Elec Wld—Nov. 5, 1898.

See also **Endoscopy; Fluorometer; Physiological Effect.**

**Temperature Effect.**—Influence of Temperature on X-Ray Effects. Thomas A. Edison. Experiments made by writer. 500 w. Elec Eng—April 22, 1896.

**Tesla.**—On Apparatus for Cathography. Nikola Tesla. The writer has found that the most suitable apparatus, and one which secures the quickest action, is a disruptive coil. Directions are given for use. 1400 w. Min & Sci Pr—May 9, 1896.

Tesla on Roentgen Radiations. An account of recent work accomplished. The time is reduced and the distance is four feet. 2000 w. Elec Rev—April 8, 1896.

Tesla on Reflected Roentgen Rays. A communication from Nikola Tesla regarding results obtained by means of his apparatus, giving tests and investigations of the reflective power of conductors. 3000 w. Elec Rev—April 1, 1896.

Tesla's Latest Results in Radiography. Letter from Nikola Tesla. He now produces radiographs at a distance of more than forty feet. 1300 w. Elec Rev—March 18, 1896.

Tesla on Röntgen Rays. Nikola Tesla. Illustration of results in radiography at great distances through considerable thicknesses of substance, with an account of investigations by the writer. 2500 w. Elec Rev—March 11, 1896.

Tesla on the Roentgen Streams. Illustrations and conclusions from recent study of this subject. Points out possibilities of producing nitrogen compounds, explains causes of effects on the skin, and shows the hopelessness of making the blind see by the use of X-rays. 4000 w. Elec Rev—Dec. 2, 1896.

Tesla on the Source of Roentgen Rays and the Practical Construction and Safe Operation of Lenard Tubes. Nikola Tesla. Illustrated account of the writer's investigations and report of results. 3500 w. Elec Rev—Aug. 11, 1897.

Tesla Describes an Interesting Feature of the X-Ray Radiations. Observations made by Nikola Tesla, with bulbs emitting Röntgen radiations, throwing light on their nature and illustrating better properties already known. 900 w. Elec Rev—July 8, 1896.

See also **ELECTRIC INVENTION; ELECTRO-PHYSICS; INDUCTION COIL.**

**Theory.**—A Theory in Reference to the Origin and Character of X-Rays. George Adam. An attempt to account for the rays by the atomic theory. 1000 w. Elec Rev, N. Y.—March 9, 1898.

The Röntgen Rays. Edward J. Houston and A. E. Kennelly. This paper gives a résumé of facts known concerning Röntgen's discovery, and some of the theoretical explanations of the X-rays that have been offered. The discussion following the reading of the paper is of much more than usual interest, having been participated in by many learned scientists, and presenting some facts of personal experience, that have not hitherto been generally known. 14500 w. Jour Fr Inst—April, 1896.

Röntgen Ray Hypotheses. The theories most in favor at the present time. 1200 w. Elec Rev, Lond—Sept. 18, 1896.

On the Present Hypotheses Concerning the Nature of Röntgen's Rays. Oliver Lodge. An examination of hypotheses advanced thus far in the study of these rays, with the conclusion that no satisfactory proof has yet been reached. 3800 w. Elect'n—Feb. 7, 1896.

The Surviving Hypothesis Concerning the X-Rays. Dr. Oliver Lodge. The present aspect in the light of recent experimental progress. Exposition of the meaning of a prediction of Helmholtz, dating back to the early part of 1893. 2800 w. Elect'n—July 17, 1896.

A Theory of the "X-Rays." Albert A. Michelson. The theory of longitudinal waves, and theory of projected particles, are enunciated and their difficulties stated. The author then presents a third theory which he calls the "ether-vortex" theory, by which he seeks to explain the production of the rays by electric impulse at the cathode, in a highly exhausted enclosure. In this theory the X-rays are considered as vortices of an intermolecular medium. 1000 w. Am Jour of Sci—April, 1896.

A Summary of Roentgen Ray Theories. A. Vosmaer and F. L. Ortt. Considers Röntgen rays to be nothing but discharged cathode rays, and tests the hypothesis by seeing how it will explain some of the most striking experiments and facts. Serial. Elec Eng—Sept. 9, 1897.

The Best Known Theories of Röntgen Rays (Die Bekanntesten Theorien über das Wesen der Röntgenstrahlen). Dr. H. Schenkel. A general review of Röntgen ray theories. Serial. 2 parts. 3200 w. Elektrizität—May 26, June 9, 1900.

The New Photography. Richard C. Shettle. An experiment which appears to determine that the cause of the phenomena which Prof. Röntgen was the first to discover, is the direct result of electric stress, and not as was supposed, of invisible light. 900 w. Elec Rev, Lond—March 6, 1896.

A Theory as to the Cause of the Phenomena Produced by the Röntgen Rays. R. C. Shettle. The writer briefly describes his theory of the nature and cause of gravity in order to clearly show his reasons for the theory presented. 1500 w. Elec Eng, Lond—June 5, 1896.

The New Photography. W. M. Stine. A review of the ideas advanced regarding this new discovery, with some views of the writer. 1900 w. W Elec—Feb. 22, 1896.

Theories of the Röntgen Rays. W. M. Stine. The hypotheses of the nature of the rays already advanced, and pointing out fallacies. 1200 w. Elec Wld—March 28, 1896.

Roentgen Rays or Streams. Nikola Tesla. A summary of observations previously made, with arguments to show that these rays consist of streams of matter in some primary condition. 2500 w. Elec Rev—Aug. 12, 1896.

A Speculation Regarding the Causes of Roentgen Rays. Elihu Thomson. Speculations presented in the hope that they may aid in investigation. 2000 w. Elec Wld—June 26, 1897.

What are the X-Rays? John Trowbridge. Believes the rays to be a manifestation of an electrical disturbance in space. Describes experiments and investigations, and shows the importance of the subject to physical Science. Ill. 2300 w. Century Mag—May, 1898.

The X-Ray. John Trowbridge. A general dissertation in which the author is forced to conclude that in this phenomenon we are brought closer to a wave theory in a medium than in a molecular theory of movement of matter. 2300 w. Pop Sci M—April, 1896.

Prof. Röntgen's Epoch-Making Discovery. The closing remarks of a paper in the "Zeitschrift für Elektrotechnik," by Prof. Boltzmann, supporting the idea that the explanation of the rays lies in the longitudinal vibrations in the ether. Also editorial. 1700 w. Elect'n—Jan. 31, 1896.

Electricity a Mode of Motion.—The Röntgen Rays. What Are They? Sydney F. Walker. The writer considers the Röntgen rays to be electrical waves of a very high frequency, and their action due to their conversion into light waves, etc. 1300 w. Elec Eng, Lond—March 13, 1896.

The New "Rays." Sydney F. Walker. A letter to the editor calling attention to the fact that the writer contributed, about three years ago, his views relating to electricity, magnetism, etc., which are confirmed by Röntgen's experiments; with explanation of his reasons for his views. 1500 w. Elec Eng, Lond—Jan. 31, 1896.

See also **Source; Thomson.**

**Thomson.**—The Röntgen Rays. J. J. Thomson. The Rede lecture, given at the University of Cambridge, Eng. Brief reference to the discovery, with discussion of the rays and the effects they produce, etc. 6000 w. Nature—July 30, 1896.

The Röntgen Rays. J. J. Thomson. Abstract of the Rede lecture, given at the University of Cambridge. A general dissertation upon the facts and current theories of the Röntgen rays, and their probable future as a means of physical investigation. 2800 w. Elect'n—Aug. 14, 1896.

The Röntgen Rays. J. J. Thomson. An account of investigations made to determine the nature of these rays. 1500 w. Nature—Feb. 27, 1896.

**Transformations by Metals.**—The Transformation of X-Rays by Metals (Sur la Transformation des Rayons X par les Métaux). A note presented to the French Academy by M. Sagnac, showing feeble reflections and other phenomena effected by certain metals. 1200 w. Comptes Rendus—July 26, 1897.

**Transmission and Photometry.**—Transmission and Photometry of X-Rays. Antonio Röitl. Investigations on X-ray phenomena. 1800 w. Elect'n—Sept. 18, 1896.

**Triangulation.**—See **Surgery.**

**Triphase Currents.**—The Use of Tri-Phase Currents in Radiography (De l'Emploi des Courants Triphasés en Radiographie). M. Delésinier. A communication to the French Academy describing the successful use of the tri-phase currents in connection with the Wehnelt interrupter, for making radiographs. 800 w. Comptes Rendus—Dec. 26, 1899.

**Tubes.**—Adjustable X-Ray Tubes. A. A. C. Swinton. Read before the Röntgen Soc., London. Part first begins the study of the design of the Crookes tube, investigating the action of the focus tube, aiming at improvement in design. Serial. Elec Eng, N. Y.—May 12, 1898.

Adjustable X-Ray Focus Tubes. A. A. C. Swinton. Describes and illustrates two forms of adjustable force tubes. 1200 w. Elec Wld—May 8, 1897.

An Improved Focus Tube. Joseph F. Smith. Illustrated description of a tube that has given excellent results, with sciagraph of hand, showing shot. 500 w. W Elec—July 25, 1896.

Crookes Tubes and Experiments with Röntgen Rays. Thomas Duncan. Suggestions for the making of Crookes tubes for experiments with these rays. and the precautions necessary. 1500 w. Am Elect'n—May, 1896.

How to Keep X-Ray Tubes in Condition While Working. Max Osterberg. Suggestions tending to prolong the life of tubes and to keep them in the best condition. 800 w. Elec Eng—Feb. 10, 1897.

Improved Tubes for Roentgen Rays (Ueber eine Verbessurung an den Roentgenröhren). Discusses the various methods of diminishing the injurious effect of the bombardment upon the walls of the Crookes tube, describing the apparatus of Porter, Fomm and the author, Dr. Arnold Berliner. 1500 w. Elektrotechnische Zeitschrift—Feb. 11, 1897.

Recent Improvements in X-Ray Tubes. H. Lyman Sayen. Discusses "radiant matter" and its properties and briefly describes a tube designed by the writer. 2000 w. Jour Fr Inst—June, 1898.

Remarks upon X-Ray Tubes. C. C. Hutchins. A review of the experiments that have been made in this field. 1500 w. Elec Rev, N. Y.—March 16, 1898.

On Tubes for Producing X-Rays. Augusto Righi. Explains an easy and speedy method of constructing tubes for X-rays with which remarkable effects may be obtained. 600 w. Elect'n—Sept. 18, 1896.

The Shape of Crookes Tubes and Degree of Vacuum for Maximum production of X-Rays. Article communicated to the French Academy of Sciences. Illustration of the tube found superior. 500 w. Elec Eng—June 24, 1896.

Röntgen-Ray Tubes. W. M. Stine. The writer states that no standard form of tube has yet been evolved nor is one needed. He gives minute details for the construction of glass-impact tubes, and shows that by the method of reversal it is possible to completely restore a tube to its original condition without heating or re-exhausting. Also discusses metallic impact or focusing tubes, and their working. 2200 w. Elec Wld—Oct. 3, 1896.

Röntgen Ray Tubes. Elihu Thomson. Criticising some statements made in articles appearing in this paper, and illustrating various forms of tubes. 800 w. Am Elect'n—July, 1896.

See also **Apparatus; Hittorf Tube.**

**U. S. Experiments.**—The Röntgen Rays in America. Cleveland Moffett. A review of work by Arthur W. Wright, William J. Morton, W. L. Robb. M. I. Pupin, Thomas A. Edison, etc. with illustrations. 3300 w. McClure's Mag—April, 1896.

**Velocity of Rays.**—A Method of Measuring the Velocity of Röntgen Rays (Une Methode de Mesure de la Vitesse des Rayons Röntgen). Bernard Brunhes. An adaptation of the property of the X-rays upon potential explosives for measuring the velocity. The ordinary methods are not applicable to rays which cannot be reflected. 1200 w. Comptes Rendus—Jan. 15, 1900.

## ROLL.

See also **ROLLING MILL.**

**Chilled.**—A Method of Casting Chilled Rolls. Cuts and description taken from a pamphlet issued by the Lewis Foundry and Machine Co., of Pittsburg. 2000 w. Ir Trd Rev—Feb. 25, 1897.

Chilled Rolls, and Why They Break. E. D. Nicholson. The analysis of iron for making rolls is considered and the causes of breaking discussed. 4400 w. Ir & Coal Trds Rev—Feb. 17, 1899.

**Roughing.**—The Design of Roughing Rolls. William Hirst. Considers improvements and economy in roll turning, discussing the gothic, the diamond, and the box pass, and the classes of work for which they are adapted. 6200 w. Ir Age—March 16, 1899.

**ROLLER BEARINGS.**

See also **BALL BEARINGS; BEARINGS; ROLLING MILL—Power Consumption.**

Roller and Ball Bearings. J. B. Detwiler. Read before the Mech. Supts.' Assn. Review of progress made in the use of these bearings, noting some of the interesting applications. 2000 w. Can Engr—April, 1900.

Roller Bearings and Their Applications. Thomas W. How. Read before the Manchester Assn. of Engineers. Discusses the advantages, the requirements and details of construction, and results already obtained. Ill. Serial. Prac Engr—Nov. 5, 1897.

Roller Bearings. Detailed description of the exhibit of the Roller Bearings Company, of Delahay Street, Westminster, showing recent improvements, and claiming to have proved that rolling motions for bearings are now being successfully applied to the heaviest loads with satisfactory results. Ill. 1400 w. Engr, Lond—Sept. 3, 1897.

Roller Bearings. W. Bayley Marshall. Abstract of a paper read before the Toronto meeting of the British Assn. for the Advancement of Science. Presents the advantages from the use of roller bearings, the requirements of such bearings, and some of the results obtained. 1300 w. Can Eng—Sept., 1897.

Roller Bearings. W. B. Marshall. Read at meeting of the Fed. Inst. of Min. Engs., London. Shows the difference between rolling and sliding motion, states the requirements of a satisfactory roller bearing, giving some results obtained from their application. 3000 w. Ir & Coal Trds Rev—May 20, 1898.

**American.**—Modern American Roller Bearings and their Reduction of Friction (Ueber die Neuen Amerikanischen Rollenlager und die Damit Erzielte Ersparniss an Reibung). Prof. F. Reuleaux. Paper before the German Railway Society, with many illustrations of ball and roller bearings and their mechanical applications. 7500 w. Glaser's Annalen—Feb. 1, 1898.

**Artillery.**—Roller Bearings for Artillery. E. W. Hubbard. Illustrates and describes a bearing believed to be especially adapted to this service and capable of greatly reducing artillery draft. 700 w. Jour of U S Art—May-June, 1900.

**Automobiles.**—Mr. W. Hugh Woodcock on Roller Bearings. Excerpt from a paper read before the Liverpool Section of the Self-Propelled Traffic Assn. Discusses the requirements of a satisfactory roller bearing, and reports tests. 4000 w. Auto Jour—Jan., 1898.

Roller Bearings and Some Connected Matters. A discussion of the most suitable bearings for a motor vehicle, with abstract of patent specifications recently issued to Edw. P. Cowles. 2700 w. Horseless Age—Aug. 15, 1900.

**Car.**—See also **Centre; Railway Axles; Susemihl.**

**Centre.**—A Roller Centre Bearings. Illustrated description of a centre bearing, designed to afford a slight amount of side motion, recently patented by Edward Cliff. 500 w. R R Car Jour—Feb., 1897.

See also **CAR BEARINGS.**

**Hyatt.**—The Hyatt Roller Bearing. Report of the Committee on Science and the Arts, on the invention of J. W. Hyatt. Illustrates and describes the invention and reports experiments made, giving tabulated comparisons. 1200 w. Jour Fr Inst—Feb., 1899.

**Railway Axles.**—Comparative Test of Roller Bearings. Reports a test recently made by the Union Railroad Company, Providence, R. I., to determine the saving in power, if any, by the use of roller bearings for the car axles as compared with the solid bearings ordinarily in use. The saving was shown to be 18 per cent. of the whole power consumed. 800 w. Am Mach—Oct. 21, 1897.

Roller Bearings. Illustrated description of a roller bearing as applied to car axles. Serial. Ind & East Eng—Sept. 12, 1896.

The Theory of Rolling Surfaces (Théorie du Roulement des Surfaces). R. Dubois. A geometrical study of the action of rolling surfaces with especial regard to the construction of roller bearings and ball bearings for railway axles. 8000 w. Rev de Mécanique—Sept., 1897.

See also **CAR BEARINGS.**

**Sliding Friction.**—Prevention of the Sliding Friction of Ball and Roller Bearings. From "La Nature." Illustrated description of the invention of B. M. G. Philippe for obviating the sliding friction of rollers. 800 w. Sci Am Sup—Oct. 16, 1897.

**Susemihl.**—The Improved Susemihl Roller Side Bearing. Illustrated description of these roller side bearings, in use on the Michigan Central R. R. 900 w. R R Gaz—April 6, 1900.

**Test.**—The Test of Roller Bearings. T. W. R. McCabe and George B. Woodruff. Details of tests made with shafting, both with and without roller bearings. 900 w. Am Mach—Nov. 14, 1895.

**ROLLER BOAT.**

See also **SUBMARINE RAILWAY—English Channel.**

The Roller Boat Problem. Editorial on the causes of failure in the Basin boat, and the mistakes in design of the Knapp boat. 1200 w. Sci Am—Oct. 30, 1897.

**Basin.**—About the "Ernest Basin." The question of the roller ship is discussed, and illustration given. The theory as presented shows the remarkable result produced by rotation, and the question is considered mainly in relation to speed. 1400 w. Trans—Nov. 20, 1896.

Basin Roller Ship (Das Rollende Schiff von Basin). A description and illustrations of this novel vessell, soon to be tried on the English Channel. 1000 w. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1897.

Basin Roller Ship (Der Rollendampfer "Ernest Basin"). Line drawing with dimensions and other data, of the Basin vessel about completed for use on the Channel. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 22, 1897.

M. Basin's Roller Steamship. From "London Graphic." Illustrated description of the boat and results of experiments made on the trip. 1200 w. Sci Am Sup—Nov. 27, 1897.

The Basin Disc Wheel Steamboat. Illustrated description. 1700 w. Eng, Lond—May 15, 1896.

The Basin Roller Ship. Illustrated description of unique craft launched Aug. 19, from the Cail dockyards on the Seine. 800 w. Sci Am—Sept. 12, 1896.

The Roller Boat of Mons. Basin. Emile Gautier. A popular and general account of this invention, with discussion. 7500 w. Jour Soc of Arts—Jan. 22, 1897.

**Knapp.**—Construction and Details of the Knapp Roller Boat. Illustrates and describes the boat, and discusses its operation. 900 w. Sci Am—Oct. 8, 1898.

The Theories Upon which the Knapp Roller Boat was Built. Robert W. Rayson. The idea was to obtain the greatest contact with the water and therefore the greatest resistance, because this tends to lift the boat and decrease the power necessary to acquire speed. 1500 w. Sci Am—Dec. 18, 1897.

**ROLLING MILL.**

See also **IRON MANUFACTURE; IRON WORKS; ROLL; STEEL MANUFACTURE; STEEL WORKS.**

A New Rolling Mill Arrangement (Neue Walzenstrassenordnung). E. Weber. A system of adjacent mills with rolls at different heights, by means of which the bars may be passed continuously from one to the next. 1500 w. Stahl und Eisen—Sept. 1, 1898.

Improvements in Rolling Mills. Condensed from account by E. Weber, in "Stahl und Eisen." Illustrated description of a proposed new arrangement for roll trains. 1700 w. Ir & Coal Trds Rev—Sept. 30, 1898.

Modern Rolling Mills. John S. Hunting. Read before the West of Scotland Iron and Steel Inst. Mentions different types of mills, discusses methods, and suggests considerations necessary in the construction and working of steel mills. 2500 w. Col Guard—March 18, 1898.

Remarks on Iron and Steel Rolling Mills. John T. Brassington. Paper read before the West of Scotland Iron and Steel Institute. A general view of rolling mills used for iron and steel for the purpose of showing the progress that has been made in size and output in the last 20 or 30 years. Serial. Ir & St Trds Jour—April 23, 1898.

Suggestions for the Improvement of Rolling Mills. Louis Katona. Read before the Iron and Steel Inst. Discusses defects of the present system, and the author's suggestions for a solution of the problem. 4000 w. Ir & Coal Trds Rev—Sept. 21, 1900.

**Aix-la-Chapelle.**—The Rolling of Thomas Steel (Le Laminage de l'Acier Thomas). J. Margery. A description of the rolling mills of the basic steel plant at Roth-Erde, near Aix-la-Chapelle. 2500 w. Revue Universelle des Mines—May, 1898.

**Aluminum.**—The New Rolling Mill of the Pittsburg Reduction Co., New Kensington, Pa. Description of a 2-high rolling mill for manufacturing aluminum plates. 1100 w. Eng News—April 9, 1896.

See also **ALUMINUM; ALUMINUM MANUFACTURE; ALUMINUM WORKS.**

**American.**—American Rolling Mills. Samuel T. Wellman. Read before the Inst. of Civ. Engs. Part first traces the development of labor-saving appliances in this industry, and specially describes the work of the Joliet Works of the Illinois Steel Co., with illustration of ingot charging machine. Serial. Ir & St Trds Jour—Nov. 28, 1896.

Four American Rolling Mills. Samuel T. Wellman. Paper read before the Inst. of Civ. Engs., of Great Britain. The author deals more particularly with the machinery and appliances to save labor and time in handling the piece round the rolls, which have been introduced within the past 10 or 11 years. Illustrated description is given of appliances used in the Joliet Works of the Illinois Steel Co., the South Works of the Illinois Steel Co., South Chicago, Ill.; the new rail mill at the Edgar Thomson Steel Works, the plate mill of the Illinois Steel Co., South Chicago. 4000 w. Ir Age—Dec. 10, 1896.

American Rolling Mills (Amerikanische Walzwerksanlagen). P. Eyermann. An illustrated description of some of the mills at Duquesne and Homestead, Pa., and the methods used there. 4000 w. Stahl und Eisen—July 15, 1900.

**American vs. English.**—English and American Rolling Mills. Abstracts of two papers read before the British Inst. of Civ. Engs. I. American and English Methods of Manufacturing Steel Plates. Jeremiah Head. II. Four American Rolling Mills. Samuel T. Wellman. Mr. Head's paper was a comparison of methods. The second paper describes four mills, typical of modern American practice. 1800 w. Engng—May 15, 1896.

**Blooming Mill, American.**—The American Blooming Mill. Ralph Crooker, Jr. Read before the Engineers' Soc. of W. Penna. Reviewing the conditions existing previous to the building of blooming mills, and gives the history of development in this industry in America. 6000 w. Ir Trd Rev—Sept. 23, 1897.

**Chilled Roll.**—See **ROLL.**

**Difficulties.**—Difficulties in Rolling. William Hirst. Discusses some of the difficulties common to the roller's art, pointing out faults or errors that are the usual cause of trouble. Ill. 3700 w. Ir Age—June 30, 1898.

**Engines.**—See **STEAM ENGINE—Rolling Mill.**

**English.**—See **American vs. English.**

**Feed Table.**—Rolling Mill Feed Table. The device consists of endless chains with roller link joints, which are cooled by passing through water under the feed table. Ill. 600 w. Ir Trd Rev—Feb. 13, 1896.

**"Flow."**—See **STEEL MANUFACTURE.**

**Joliet, Ill.**—The Twin Rod Mill at the Joliet Works of the Illinois Steel Company. Illustrated description of the largest rod mill in the world. 2000 w. Ir Age—Aug. 19, 1897.

See also **American; American vs. English.**

**Merchant Steel.**—See **STEEL MANUFACTURE.**

**Micheville.**—Progress in Rolling Mill Construction (Die Fortschritte in den Walzwerkseinrichtungen). Max Meier. A long paper before the Verein Deutscher Eisenhüttenleute, describing the rolling mills at Micheville. Interesting data about electric driving are given. 4500 w. Stahl und Eisen—Nov. 15, 1898.

**New Castle, Pa.**—A Modern Sheet Bar Mill. Describes the bar mill of the National Steel Co.'s Shenango Valley plant, at New Castle, Pa. 1500 w. Ir Trd Rev—March 9, 1899.

**Power Consumption.**—Electrical Tests of Power Consumed by Rolling Mill Machinery. Reported by E. H. Wise, Electrician of the Cambria Iron Co. Tests of lathes, saw, presses, punch for rails, traveling crane, etc. 1400 w. Am Mach—June 25, 1896.

Power Consumption of Rolling Mills. A report of tests of the power consumed on various operations, made at a steel works on the Continent. 700 w. Ir Age—Sept. 13, 1900.

Pressure and Power Required to Roll Sheet Metal. W. P. Richardson and E. K. Wennerlund. Experiments described were made to determine the pressure required to reduce various metals, by cold rolling, and to measure the power absorbed by the rolling mill, and the difference when provided with roller bearings. 1800 w. Engs' Year Book, Univ of Minn—1900.

**Rasselstein, Germany.**—The New Plate Rolling Mills of the Rasselstein Iron Works (Das Neue Platinenwalzwerk der Rasselsteiner Eisenwerks Gesellschaft). A brief account of these new rolling mills in Rhenish Prussia, with plate of plans and sections. 1000 w. 1 plate. Stahl und Eisen—Oct. 1, 1898.

The New Strip Mills of the Rasselstein Ironworks. From "Stahl und Eisen." Illustated detailed description of a mill in Germany presenting features of interest. 700 w. Ir & Coal Trds Rev—Oct. 14, 1898.

**Rod.**—Notes on Rod Rolling and Its Development. N. K. Turnbull. Read before the West of Scotland Iron and Steel Inst. Considers chiefly the rolling of rods under ½ in. in diameter. Reviews the progress in this branch of rolling mill work, the systems used and improvements made. 5500 w. Ir & Coal Trds Rev—Aug. 25, 1899.

See also **Joliet, Ill.**

**Roll-Relieving Device.**—Roll-Relieving Device. An illustrated description of a quick and simple roll-relieving mechanism in use at the Lukens Iron & Steel Co.'s works, invented by Chas. L. Huston. 700 w. Ir Trd Rev—Sept. 20, 1900.

**Roth Erde.**—See **Aix-la-Chapelle.**

**Roughing Roll.**—See **ROLL.**

**Sack Beam.**—The Sack Universal Rolling Mill for Beams (Sacksches Universal-Trägerwalzwerk). A description of an improved form of mill with both vertical and horizontal rolls, by use of which I beams of various sizes may be rolled. 1200 w. 1 plate. Stahl und Eisen—Dec. 1, 1898.

**Sheet Metal.**—See **SHEET METAL.**

**Steam Engine.**—See **STEAM ENGINE—Rolling Mill.**

See also **Power Consumption.**

**Three-High Rolls.**—Three-High Rolls (Ueber Trio Walzen). Fr. Horn. An examination of the correct dimensions and forms of passes in rolls for three-high rolling mills. 1800 w. Stahl und Eisen—Sept. 1, 1900.

**ROLLING STOCK.**

See also **CAR; ELECTRIC CAR; LOCOMOTIVE; RAILWAY EQUIPMENT; TENDER; TRAIN.**

**American Construction.**—A Decade of Car and Locomotive Construction. George L. Fowler. A review of American rolling stock during the past ten years, showing the improvements and changes. 2800 w. Ry Age—June 15, 1900.

**Austria.**—The Development of Locomotives and Cars in Austria. From the "Zeitung des Vereines." Descriptive. 1400 w. R R Gaz—May 12, 1899.

**English Great Central.**—The Rolling Stock of the Great Central Railway. Illustrates and describes details in the design of new cars. 2200 w. Engng—Aug. 25, 1899.

The Rolling Stock of the Great Central Railway, England. The first of a series of illustrations and detailed descriptions of the accommodations for passenger traffic. The present article is merely a brief introduction, with illustrations of elevation and under frame plan. Serial. Engng—July 14, 1899.

**Modern.**—Modern Rolling Stock. Abstract of paper presented by W. McIntosh at the Dec. meeting of the Northwest Ry. Club. Asserts that a track and road-bed that will carry locomotives of 100 tons and cars of 50 tons capacity will soon be necessary. 1200 w. R R Gaz—Feb. 17, 1899.

**Paris Exposition.**—Railway Rolling Stock at the Paris Exposition. Comments on the exhibits and regrets that American practice is not adequately represented. 4200 w. Eng News—July 5, 1900.

**St. Gothard.**—The New Equipment of the St. Gothard Railway (Le Matériel Nouveau du Chemin der Fer du Gothard). M. Lancrenon. A very full account of the heavy new engines and carriages for the St. Gothard railway, with numerous illustrations and a diagram showing the increased traffic. 8000 w. 3 plates. Rev Gen des Chemins de Fer—Dec., 1899.

**Shortage, Great Britain.**—The Shortage of Rolling Stock. From the London "Railway Times." A statement of conditions in Great Britain, especially in reference to coal transportation, and the difficulty in solving the problem. 1400 w. Col Guard—Feb. 3, 1899.

**United States.**—See **American Construction; RAILWAY ACCIDENT—United States.**

**Vienna City Railway.**—The Rolling Stock of the Vienna City Railway (Die Fahrbetriebsmittel der Wiener Stadtbahn). Describing and illustrating the locomotives and cars for the new local railway in the city of Vienna. Two articles. 1 plate. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 17 and 24, 1897.

**Waterloo & City Ry.**—See **UNDERGROUND RAILWAY—London.**

**ROOF.**

See also **BUILDING CONSTRUCTION; ROOFING; ROOF TRUSS.**

**Armory.**—See also **ARMORY.**

**Armory, Brooklyn.**—The Forty-Seventh Regiment Armory Roof, Brooklyn. Illustrated description of the design and erection of a steel roof framework with a transverse span of nearly 200 ft. and a rise of 84 ft. 1200 w. Eng Rec—Dec. 23, 1899.

**Armory, Newark.**—The Newark Armory Drill Hall. Illustrated description of a drill hall, having 163½ ft. 3-hinge roof arches containing several special features. The erection of the roof is also described. 1200 w. Eng Rec—May 26, 1900.

**Chicago Coliseum.**—The Steel Arch Roof for the Chicago Coliseum. Illustrated description of a steel roof of great magnitude. General arrangement, composition and some details are given. 1800 w. Eng News—Nov. 12, 1896.

The Failure of the Chicago "Coliseum" Roof Arches. A statement of facts in regard to the cause of the fall of the twelve steel arches forming the main roof. Ill. 2500 w. Eng News—Sept. 14, 1899.

**Graphic Statics.**—Some Comparisons of Graphic Statics Applied to Roofs. Henry Adams. Explanatory article of elementary work in graphic statics. 2000 w. Nat Build—June, 1900.

**Loads and Strength.**—Loads and Strength of Roofs. From the "Contract Journal." Calling attention to the dead and live loads necessary to be considered in making estimates of the weights of roofs. 2000 w. Can Arch—Oct., 1896.

**Railway Station, Jersey City.**—See **RAILWAY STATION—Jersey City; ROOF TRUSS.**

**Retort-House.**—Retort-House Roofs. A. T. Walmisley. Read before the Incor. Gas Inst. A discussion of various types of roofs. Ill. Also general discussion. 8000 w. Gas Wld—June 16, 1900.

See also **GAS RETORT—House Construction.**

**Saw-Tooth.**—New Saw-Tooth Roof Construction (Neue Sägedachanordnung). E. Förster. An illustrated description of the Nacke machine shops at Koswig, Germany, showing how the overhead shafting and cranes are arranged without interfering with the roof construction. 500 w. Zeitschr d Ver Deutscher Ing—March 17, 1900.

Notes on the Construction of the Weaving-Shed Roof (Beitrag zur Konstruktion der Sägedächer). Th. Landsberg. The trusses are united by jointed connection, to vertical frames forming a portion of the walls, or carried down within them. 1000 w. Zeitschr d Ver Deutscher Ing—Dec. 25, 1897.

See also **WEAVE SHED.**

**Synagogue.**—See **ROOF TRUSS; SYNAGOGUE.**

**ROOFING.**

See also **BUILDING MATERIAL; FIREPROOF CONSTRUCTION; SLATE; TILE.**

**Copper.**—See **Metal; Slate and Copper.**

**Felt and Gravel.**—Felt and Gravel Roofing. Calls attention to some of the weak points and the way of avoiding them. Ill. 700 w. Met Work—Sept. 16, 1899.

**Metal.**—Copper, Lead and Zinc as Materials for Roofing. G. Ewart. Read before the British Arch. Assn. Advantages of sheet metal over slate and tiles are presented, and a comparison of the claims of each of the three metals. 3000 w. Arch, Lond—Nov. 13, 1896.

**Slate.**—Roof Coverings—Slates. Thomas Stirling, Jr. Read before the British Arch. Assn. An extract relating to the Westmoreland and Cumberland slates. 3800 w. Brit Arch—Nov. 13, 1896.

Roofing Slate in Ireland. Information extracted from recent reports of U. S. Consuls at Belfast and Dublin. 2500 w. Stone—April, 1897.

See also **Tiles and Slate.**

**Slate and Copper.**—Slate and Copper Roofing in Fireproof Buildings. William Neubecker. Illustrated description of the best methods to follow in the construction of these roofings. 1200 w. Met Work—Sept. 4, 1897.

**Thatch.**—Thatched Roofs. Henry Rose. Statistics show that this form of roofing is falling into disuse, but it is still common in country districts. Methods of laying it are given, with its advantages and disadvantages, and its esthetic qualities. 2300 w. Builder—Jan. 1, 1898.

**Tile.**—Roof Coverings—Tiles. F. Walker. Read before the British Arch. Assn. On the selection and setting of tiles used for roof coverings. Serial. Brit Arch—Nov. 13, 1896.

Roofing Tiles and Their Manufacture. C. W. Crawford. The manner of holding the tiles to the roof, their advantages and disadvantages, followed by a discussion which includes the paper of Mr. Bleininger with one presented. 7500 w. Brick—March, 1897.

Roofing Tiles in the Fatherland. Albert V. Bleininger. Considers the process of the manufacture of these tiles, and their classification according to patterns. 3500 w. Brick—March, 1897.

Tile Roofing. Max A. Th. Boehncke. An illustrated description of the manufacture and use of the cheapest kind of tile roofs, which have done very good service in Europe for centuries. 1800 w. Brick—April, 1896.

**Tiles and Slate.**—An Australian Opinion on Tiles and Slate. James Nangle. From a paper on "Roof Coverings," recently read before the Eng. Assn. of N. So. Wales, with table showing absorption of water by different varieties of roofing tiles and slates used in Sydney. 1000 w. Builder—Dec. 21, 1895.

**Zinc.**—See **Metal; ZINC—Roofing.**

**ROOF TRUSS.**

See also **BRIDGE DESIGN; BUILDING CONSTRUCTION; FRAMEWORK; ROOF; STRUCTURAL DESIGN; TRUSS.**

The Calculation of Roof Trusses and Their Supports in Iron Structures (Die Berechnung der Binder und Ständer Eiserner Wandfachwerke). L. Geusen. A long mathematical article, with diagrams and tables. Serial. Zeitschr d Ver Deutscher Ing—May 19, 1900.

Trussed Roofs. F. E. Kidder. The writer proposes to describe the different methods of supporting roofs by trusses, the mechanical principles involved in the construction of trusses, the way in which the stresses and size of the pieces are determined and how they should be put together. Ill. Serial. Arch & Build—Dec. 12, 1896.

How to Determine the Stresses in Unsymmetrical Roof Trusses, or in Trusses Unsymmetrically Loaded. F. E. Kidder. An illustrated article showing how to draw the stress diagram. Serial. Arch & Builds' Mag—April, 1900.

**Cantilever.**—The Machinery Hall at the Swiss Exposition at Geneva. Describes the cantilever system of roof trusses. The plan is chiefly remarkable for its economy in construction and its lightness. 850 w. Eng News—Jan. 21, 1897.

**Link Connections.**—The Application of Link Connections to Roof Construction (Die Anwendung von Gelenkträgern bei Dachkonstruktionen). A discussion of the advantages of the link and pin connected system for roof trusses as compared with riveted construction. 1200 w. Schweizer Bauzeit—Feb. 5, 1898.

**Model.**—See **MODEL.**

**Novel Construction.**—Novel Roof Construction. Owen B. Maginnis. Illustrates and describes an unusual form of trussed roof. 800 w. Ill Car & Build—May 13, 1898.

**Pin vs. Riveted.**—Pin and Riveted Roof Trusses. Editorial discussion of the relative merits of the two classes. 900 w. Eng Rec—Nov. 11, 1899.

**Railway Station, Jersey City.**—Moving a Great Steel Arch. Illustrates and describes the work of moving a pair of steel arches weighing 800 tons, in the shed extension of the Pennsylvania Railroad depot in Jersey City. 700 w. Ir Age—July 20, 1899.

See also **RAILWAY STATION—Jersey City.**

**Scissors.**—The Scissors Truss. F. E. Kidder. Illustrated discussion of the principles to be followed in designing them. 1100 w. Eng Rec—Oct. 7, 1899.

**Swiss Exposition.**—See **Cantilever.**

**Synagogue.**—Reconstructing a Trussed Roof. Illustrated description of the methods adopted in remodeling a heavy roof of a St. Louis synagogue. 1000 w. Eng Rec—Jan. 6, 1900.

See also **SYNAGOGUE.**

**Wooden.**—A Large Wooden Roof Truss. Illustrated description of the details of a 67-ft. truss for a large warehouse in Brooklyn. 600 w. Eng Rec—Aug. 18, 1900.

**ROPE.**

See also **HOISTING; MINE HAULAGE; ROPE DRIVING; WIRE ROPE.**

**Power Transmission.**—Ropes for Power Transmission. Discusses the different materials used, the three and four strand ropes, and a new form of square rope. 2000 w. Mach, N. Y.—March, 1899.

See also **POWER TRANSMISSION; ROPE DRIVING.**

**Round vs. Flat.**—Round Ropes vs. Flat Ropes. George W. Westgarth. From a paper read before the British Soc. of Mining Students. Gives an instance showing the superiority of round ropes. 800 w. Eng, Lond—Sept. 18, 1896.

**Sisal.**—See **SISAL.**

**Testing.**—Rope Testing. George A. McCarthy and Ernest G. Matheson. Read before the Applied Science Graduates' Society of McGill Univ. Gives a brief account of the method of manufacturing ordinary ropes, and describes the testing of ropes as carried out in the laboratory. Serial. Can Engr—Feb., 1899.

Rope Tests. Tabulated data obtained in the laboratory of the Mass. Inst. of Tech., with a variety of ropes and splices. 250 w. Tech Quar—June-Sept., 1896.

The Influence of Length on Tests of Hemp Rope (Ueber den Einfluss der Versuchslänge auf die Festigkeit von Hanfseilen). A paper by Prof. Rudeloff showing that the results depend upon the length of the test specimen, and to be comparable the specimens should be of equal length. 15000 w. Mitt aus d Kgl Tech Versuchsanstalt—Part V., 1897.

**Wire.**—See **WIRE ROPE.**

**ROPE DRIVING.**

See also **BELTING; POWER TRANSMISSION; WIRE ROPE DRIVING.**

Rope Driving Practice. W. H. Booth. Hints derived from English practice. Discusses the superiority of cotton for power transmitting ropes. 1500 w. Am Mach—March 12, 1896.

Ropes and Rope Driving. L. H. Kenyon. Read before the Manchester Assn. of Engs. Brief review of the history of rope driving with discussion of methods and the means of securing the best results. Serial. Can Engr—Oct., 1898.

Ropes and Rope Driving. G. H. Kenyon. Part first reviews briefly the history and deals with positive motion, wedging action and construction of grooves. Serial. Mech Wld—Nov. 20, 1896.

Ropes and Rope Driving. G. H. Kenyon. Extracts from a lecture before the Yorkshire Assn. of Engs. (England). Gives the writer's views on the subject of centrifugal tension in ropes, and discusses various difficulties in rope driving. Serial. Mech Wld—Dec. 16, 1898.

Rope Transmission. J. F. De Voll. Read before Assn. No. 2, of Missouri, N. A. S. E. An entirely practical dissertation upon rope driving. 2000 w. Age of St—Oct. 24, 1896.

Rope Transmission. Staunton B. Peck. The paper does not consider wire rope, but discusses briefly the "English System," and more particularly the "American System." Ill. 12500 w. Jour W Soc of Engs—June, 1897.

**Centrifugal Tension.**—Centrifugal Tension in Ropes and Belts. C. N. P. A reply to statements made by G. H. Kenyon, in a recent lecture on "Ropes and Rope Driving," with explanation of the writer's views. Ill. 1800 w. Mech Wld—Jan. 20, 1899.

**Continuous.**—A Problem in Continuous Rope Driving. Spencer Miller. Calls attention to the perplexing problems which occur in driving with ropes, showing that with the continuous-rope plan of driving a large increase of power transmitted is obtained. Ill. 4000 w. Pro Am Soc of Civ Engs—Nov., 1897.

**Dynamo.**—Rope-Driving Arrangements. W. H. Booth. An examination of reasons for a statement made in a paper discussing rope driving as applied to electrical work, with suggestions of a better design. 1800 w. Am Mach—Aug. 6, 1896.

Some Notes on Rope Driving. The use of ropes in dynamo driving, the dangers, matters that require consideration, etc. 3500 w. Elec Rev, Lond—July 10, 1896.

**European.**—European Rope Driving Practice. P. M. E. Notes in European practice in transmitting power by fibrous ropes. 1900 w. Power—Feb., 1897.

**Mines.**—Transmission of Power by Ropes in Mines. G. D. Rice. Illustrated description of the main jack-wheel and connections designed for an installation operating five rope-drives from a tower. 800 w. Eng & Min Jour—Jan. 22, 1898.

See also **HOISTING; MINE HAULAGE.**

**Wire.**—See **WIRE ROPE DRIVING.**

**ROPEWAY.**

See **CABLEWAY.**

**ROSIN.**

See **RESIN.**

**ROTARY BUILDINGS.**

Portable and Rotary Buildings (Edifice Demontable Rotatif). Detailed description of the rotating house which it is proposed to construct for the exposition of 1900. 2500 w. La Rev Tech—April 25, 1897.

**ROTARY CONVERTER.**

See also **ELECTRIC CURRENT CONVERTER; MOTOR GENERATOR; TRANSFORMER.**

Action and Tension Available at the Brushes of a Converter (Fonctionement et Tension Disponible aux Balais d'une Commutatrice). M. Aliamet. A study of the action of rotary converters, and the various methods of transforming currents possible by their use. 1500 w. L'Electricien—Feb. 25, 1899.

A Universal Motor and Dynamo. Description, with working drawings, of a combined direct-current dynamo, alternator and rotary converter. 3200 w. Am Elect'n—May, 1898.

Direct-Current Transformer. C. Thordarson. Read before the Chicago Elec. Assn. Presents the advantages of the continuous current as a method for transmitting electrical energy, and discusses the objections to the direct-current transformer. 1500 w. W Elect'n—May 29, 1897.

Improvements in Continuous Current Transformers. Calls attention to modifications of the original scheme by which the generating plant has been simplified and low-pressure distribution arranged on a three-wire system. The full load efficiency has been increased more than 5 per cent. in less than two years. Ill. 1000 w. Elect'n—Jan. 8, 1897.

Rotary Converters and Their Uses. Louis Bell. Gives an informal description of their properties and uses, showing that the rotary converter furnishes the most efficient and useful method of getting continuous from alternating currents. Discusses when and how it can be advantageously employed. 2500 w. Am Elect'n—Oct., 1897.

Rotary Converters. Ernst Julius Berg. Their action and the conditions under which their use is desirable, and the reaction of these machines on the alternating system, their methods of operation and the limitations imposed by their use. 2300 w. Am Elect'n—Feb., 1897.

Rotary Converters (Ueber Rotirende Umformer). H. S. Meyer. An article on the practical application of these machines, with diagrams. 1700 w. Elektrotech Zeitschr—April 5, 1900.

Rotary Converters. Hans Sigismund Meyer. Translated from "Elektrotechnische Zeitschrift." On the practical applications of these machines. 2500 w. Elec Eng, Lond—May 4, 1900.

Rotary Converters (Les Convertisseurs Rotatifs). A discussion of the construction and action of the rotary converter, with illustrations of various designs. 2500 w. Génie Civil—March 11, 1899.

Rotary Converters. Silvanus P. Thompson. Read before the Inst. of Elec. Engs., England. Describes a rotary converter and considers the machines devoted to the purpose of converting continuous currents into alternating currents of one, two, or three phases, or vice versa. Serial. Elec Eng, Lond—Nov. 11, 1898.

Rotary Field Converters and Rotary Field Transformers (Drehfeld Umformer und Drehfeld Transformer). J. Herrman. A comparison of the apparatus for converting rotary into continuous currents, and also for converting and at the same time transforming pressure. 2000 w. Elektrotech Zeitschr—Jan. 18, 1900.

Some Experiments with Rotary Converters. A. G. Grier and J. C. Hyde. Paper before the Canadian Electrical Association, with diagrams and curves. 1500 w. Canadian Elec News—Sept., 1900.

Some Laws of Rotary Transformers. J. E. Woodbridge and Charles T. Child. Analytical discussion of certain properties dealing with questions in the practical design of such machines. Part first discusses the single-phase rotary. Serial. Elec Wld—Jan. 1, 1898.

Some Notes on Rotary Converters, with Special Reference to the Extension Plant of the Chicago Edison Company. A. C. Eborall. Begins to present claims of the motor-generator as compared with the rotary converter. Serial. Elec Rev, Lond—Nov. 24, 1899.

The Rotary Converter. C. P. Steinmetz. Discussion of the subject, applying principally to polyphase rotary converters. 8000 w. Sib Jour of Engng—June, 1897.

The Converter. C. P. Steinmetz. An article discussing the peculiarities of this machine in the way of armature heating, field reaction, etc. Serial. Elec Wld—Dec. 17, 1898.

The Rotary Converter. E. W. Rice, Jr. Sketches the development of the more important systems of distribution and reviews their present standing, showing the necessity for some practical connecting link, which is found in the converter. 8000 w. Sib Jour of Engng—June, 1899.

**Alioth, Paris.**—Rotary Converters (Les Machines à Courant Alternatif "Commutatrices"). Eug. Miot. Description, with illustration, of a substation in Paris containing rotaries of the "Alioth" type, with details of the machines. 1200 w. L'Electricien—Dec. 3, 1898.

**Armature Reactions.**—Armature Reactions in a Rotary Converter. Robert B. Owens, D. W. Hawksworth and H. W. Doubrava. Experimental study of a machine of the well-known consequent pole type, with the results. Ill. 1800 w. Trans Am Inst of Elec Engs—Aug. and Sept., 1897.

Armature Reaction in a Rotary Converter. Discussion of paper by Robert B. Owens. 4400 w. Trans Am Inst of Elec Engs—Oct., 1897.

**Constant Potential.**—A New Constant-Potential Continuous Current Transformer. F. W. Davis. Brief illustrated description of a simple method of compensating for the voltage drop in the secondary at full load. 1000 w. Elec Rev, Lond—Oct. 19, 1900.

**Design.**—The Design of Rotary Converters. H. F. Parshall and H. M. Hobart. Part first gives tabulated results of investigations, and introductory remarks to the subject of proper lines on which to design rotary converters. Serial. Engng—Sept. 29, 1899.

**Double-Current Generators.**—Electrical Supply and Alternator Design. Alton D. Adams. Advocates the use of double-current generators to meet the requirements of urban and suburban central-station loads. 2000 w. Elec Wld & Engr—Jan. 27, 1900.

See also **DYNAMO—Double Current.**

**Equalizer.**—See **ELECTRIC DISTRIBUTION—Rotary Equalizer.**

**Frequency.**—A Means of Fixing the Frequency of Inverted Rotaries. Describes an ingenious arrangement for preventing rotary converters, deriving their power from a source of direct current and generating alternating current, from fluctuating in speed when their field strength is affected by variations of the power factor of the alternating-current output. 1800 w. Elec Wld & Engr—April 7, 1900.

**Hutin and Leblanc.**—Direct Currents from Alternating. Albert G. Davis. Illustrated description of a device for converting alternating currents into direct, and vice versa. 700 w. Elec Wld—Jan. 9, 1897.

**Hanappe.**—Rotary Transformer (Transformateur Rotatif). Saturnin Hanappe. Description of 5 k. w. direct current transformer. 1400 w. L'Eclairage Electrique—Oct. 17, 1896.

**Investigations.**—Investigations Upon a Converter (Untersuchungen an Einem Umformer). K. Pichelmayer. Giving the results of a study of a rotary converter, when operated under a variety of conditions. 4500 w. Elektrotech Zeitschr—Oct. 5, 1899.

**Iron Losses.**—The Conditions of Iron Losses in Electric Machines (Der Zusätzliche Eisenverlust in Elektrischen Maschinen). G. Dettmar. A description of tests on a rotary converter to determine the losses in the armature core. The results are discussed mathematically, and curves plotted. 4000 w. Elektrotech Zeitschr—April 21, 1898.

**Mine Traction.**—Rotary Converters for Mine Traction. Alton D. Adams. Favoring their use as avoiding disadvantages incident to different classes of generating apparatus, and those that result from a high working pressure. 800 w. W Elect'n—Oct. 20, 1900.

**Phase.**—See **ELECTRIC CURRENT CONVERTER.**

**Starting.**—Starting a Rotary Converter by Means of Direct Current Transmitted Over the Alternating Line. Frederick Bedell. An outline for a laboratory experiment. 800 w. Ill. Sib Jour of Engng—June, 1900.

**Street Railway Work.**—The Rotary Converter in Street Railway Work. Louis Bell. Explains what the rotary converter is, how it operates in practice, and under what circumstances it becomes economically available for railway work. Ill. 5000 w. St Ry Jour—Sept., 1898.

See also **ELECTRIC DISTRIBUTION—Railway; ELECTRIC POWER STATION.**

**Synchronizing Device.**—A New Synchronizing Device for Rotary Converters. F. W. Springer. Illustrated description of the device and its operation. 800 w. Elec Wld & Engr—June 23, 1900.

**Theory.**—The Theory of the Rotary Converter (Theorie der Umformer). Gisbert Kapp. The first installment of a serial treating of the theory of the rotary converter, discussing the general principles upon which the transformation of currents is based. Serial. Elektrotech Zeitschr—Sept. 15, 1898.

The Theory of the Rotary Transformer. Gisbert Kapp, in the "Elektrotechnische Zeitschrift." The first part of a serial discussing the general principles upon which the transformation of currents is based. Serial. Elect'n, Lond—Nov. 18, 1898.

**Woodridge Rotary Field.**—Rotary Transformers. J. E. Woodbridge. Description of a device without moving wire, which will perform the duties of both "static" and "rotary" transformers. 900 w. Elec Wld—March 27, 1897.

### ROTARY CURRENT.

See **ALTERNATING CURRENT—Polyphase.**

### ROTARY ENGINE.

Rotary Pumps and Engines: Their Origin and Later Development. Historical review of the inventions of this class of engines, with illustrations. Serial. Sci Am Sup—April 3, 1897.

The Principles and Development of the Rotary Engine. Elmer S. Farwell. Reviewing the attempts to supersede the reciprocating engine. 2800 w. Eng Mag—May, 1897.

The Rotary Steam Engine. R. H. Thurston. Stating that the prototypes of the most successful of recent forms of rotary engines date back to Hero, of Alexandria, and showing that this engine has usually failed to satisfy in all the essential characteristics of a good steam engine. Ill. 1600 w. Sci Am—April 3, 1897.

**Almond.**—The Almond Engine. Illustrates and describes a novelty in a rotary engine, which, it claims, is free from all the standard objections to engines of this type. 700 w. Am Mach—Nov. 4, 1897.

**Colwell.**—Improvements in Rotary Engines. Illustrated description of an improved engine designed by T. M. Colwell. 1700 w. Sci Am—Sept. 16, 1899.

**Hult.**—Hult's Rotary Engine. Illustrated detailed description of an engine awarded a gold medal at the recent Stockholm Exhibition. 1200 w. Engng—Dec. 24, 1897.

**Two-Piston.**—A Two-Piston Rotary Engine, with Variable Cut-Off. Illustrates and describes the construction and principle of operation of a novel engine. 1800 w. Am Mach—Feb. 2, 1899.

### ROTARY FIELD.

See also **ALTERNATING CURRENT—Polyphase; MAGNETIC FIELD—Rotary.**

**Foucault Currents.**—The Production of Rotating Fields by Foucault Currents (Ueber die Entstehung Rotirender Magnetfelder durch Foucaultströhme). F. Braun. Describing the apparatus used for producing rotating fields and also the methods for examining them. 2500 w. Elektrotech Zeitschr—March 31, 1898.

**Ship Telegraph.**—See **SHIP TELEGRAPH—Rotary Field.**

### ROTARY MOTION.

See also **PHYSICS; SPEED INDICATOR.**

The Determination of Irregularities in the Motion of Rotary Machines by Use of the Tuning Fork (Die Bestimmung des Ungleichförmigkeitsgrades Rotirender Maschinen durch das Stimmgabelverfahren). F. Göpel. The vibrations of the fork give a determinate basis for comparison. Serial. Zeitschr d Ver Deutscher Ing—Oct. 6, 1900.

**Phenomena.**—See **STEAM TURBINE.**

### ROUND HOUSE.

See also **LOCOMOTIVE HOUSE; RAILWAY SHOP; RAILWAY TERMINAL; RAILWAY YARD; TURNTABLE.**

Construction, Equipment and Ventilation of Round Houses. Committee report with illustrations. 2500 w. Cent Ry Club—May, 1900.

Round House Construction. A discussion, containing communications from Thomas Appleton, W. H. Marshall, and others. 2500 w. Cent Ry Club—Sept., 1900.

**Chicago.**—New Round House, 27th Street, Chicago, Illinois Central Ry. Plan of yards, boiler room and shops, with description. 900 w. Ry & Engng Rev—Dec. 31, 1898.

**Chicago & Northwestern.**—A Remarkable Round House—Chicago & Northwestern Railway. An illustrated description of a well equipped round house at Clinton, Ia. 900 w. Ry Master Mech—Sept., 1900.

**Running Shed.**—See **RAILWAY SHOP.**

**Russian.**—Types of Russian Round Houses. Illustrations of different types of enginehouses reproduced from the "Aperçu des Chemins de Fer Russes," with brief description. 800 w. Ry Age —Aug. 11, 1899.

### ROWING.

**Experiments.**—Some Interesting Rowing Experiments. E. Cuthbert Atkinson, in "Natural Science." Describes a recording indicator for rowing experiments, the diagram and the method of treating it, giving some account of results obtained from 27 experiments. 3300 w. Sci Am Sup—Sept. 3, 1898.

### RUBBER.

See also **GUTTA PERCHA; INSULATION; RUBBER MANUFACTURE.**

Wealth Based Upon Elastic Gum. Hawthorne Hill. The rubber industry is described in a general popular style, giving many points of commercial interest. 2400 w. Sci Am Sup—Nov. 7, 1896.

**Africa, West.**—The Rubber Trees of British West Africa. Hawthorne Hill. A new source of rubber promising to be of great value to commerce. 900 w. Ind Rub Wld—Jan. 10, 1896.

**Brazil.**—Where Rubber is Plenty, but Gatherers Scarce. From a recent report of the British consul. W. A. Churchill. Gives information relating to rubber-trees, method in use for curing rubber, and rubber-gathering in Brazil. 1200 w. Ind Rub Wld—Sept. 1, 1898.

**British Reports.**—India Rubber in British Official Reports. A comprehensive array of India-rubber statistics. 1800 w. Ind Rub Wld—Oct. 10, 1896.

**Burma.**—Decline in the Rubber Yield of Burma. Hawthorne Hill. A statement of the conditions existing in Burma, with the conclusion that other sources must be sought for an increase of the rubber supply. 1200 w. Ind Rub Wld—Dec. 1, 1898.

**Cultivation.**—Some Recent Developments in Rubber Cultivation. Francis Child Nicholas. Discusses the interest in rubber planting in the British West Indies; the writer's views in regard to forestry cultivation and husbandry cultivation. 2000 w. Ind Rub Wld—Sept. 1, 1898.

The Outlook for Rubber Cultivation. Gustav Mann. An interesting article in which the writer gives his opinion that all rubber plants had better be grown in the countries in which they are indigenous. This paper is followed by several short articles on related subjects. 1500 w. Ind Rub Wld—Feb. 10, 1897.

**Decay.**—The Decay of Vulcanised Rubber. H. L. Terry. Discusses the cause of the decay, suggesting that it is the action of either the free or the combined sulphur in the copper. 2700 w. Elect'n, Lond—May 26, 1899.

**Drying.**—The Drying of Washed India-Rubber. A discussion of the rubber-drying process. 1600 w. Engng—Feb. 25, 1898.

**1895-96.**—Official Statistics of India-Rubber and Gutta-Percha. Statistics for the export and import trade of the year ending June 30, 1896. Tables. Ind Rub Wld—Jan. 10, 1897.

**1897.**—The Crude India-Rubber Trade of 1897. Statistics for the year are given with comments. 1200 w. Ind Rub Wld—Feb. 10, 1898.

**Electrical Engineering.**—The India-Rubber and Gutta-Percha Industries as Applied to Electrical Engineering. J. Wright. An account of how India-rubber is obtained and its preparation for commercial uses, dealing only with such processes as are involved in its preparation for electrical purposes. Ill. 3600 w. Ind & East Eng—Jan., 1898.

See also **Decay; Substitutes; GUTTA-PERCHA; INSULATION.**

**European Industry.**—The India-Rubber Industry in Europe. Information of interest from various points. 2200 w. Ind Rub Wld—May 10, 1897.

The India-Rubber Industry in Europe. Interesting notes from various sources. 1600 w. Ind Rub Wld—Aug. 10, 1896.

The India-Rubber Industry in Europe. Statistics relating to the quantity and value of crude India-rubber imported by Russia and the export of manufactures. Also information concerning the trade conditions of this product in Germany. 900 w. Ind Rub Wld—Dec. 10, 1896.

**Hard.**—Development of the Hard Rubber Industry. Gives the history of the hard rubber industry in the United States, with interesting notes relating to accidents which led to important inventions. 3600 w. Ind Rub Wld—April 1, 1898.

**Heat Action.**—The Action of Heat on India-Rubber. Editorial discussion of practical points relating to this subject, about which little is known and much that is misleading has been published. 2500 w. Engng—Oct. 13, 1899.

**Madagascar.**—The Rubber Situation in Madagascar. Brief description of the growth of rubber yielding plants, with account of the practice of the native rubber gatherers, and the prediction that the industry is destined to become more important. 1300 w. Ind Rub Wld—May 10, 1896.

**Plantations.**—India-Rubber Planations. Gives possible explanations of the shortness of supply other than the scarcity of material, discusses the proposed cultivation of the Pará tree out of its natural home, not regarding it with favor, but thinks it possible that replanting of denuded territory with the indigenous tree might, in time, prove remunerative. 2000 w. Engng—Aug. 26, 1898.

**Plants.**—Investigations upon the Milk of Rubber Plants (Recherches sur les Laits de Caoutchouc). A posthumous paper from the documents of M. Aimé Girard, giving analyses of the milk of a variety of rubber plants, showing the proportions of caoutchouc, and the general properties of each. 3000 w. Bull de la Société d'Encour—July, 1898.

Sources of Commercial India-Rubber. Dr. D. Morris. A series of lectures confined to an investigation of the rubber plants now existing in various parts of the tropics, their geographical distribution, the conditions under which they grow, and the prospects they afford of being able to meet the increasing demand for rubber. Ill. Serial. Jour Soc of Arts—July 29, 1898.

**Prices.**—The Higher Prices for Rubber Goods Explained. Circular prepared by order of the Mechanical Rubber Mfrs. Assn., giving in detail the prices of rubber and showing the advance since 1896. 2700 w. Ind Rub Wld—March 10, 1898.

The Latest Action Regarding Prices. Information concerning the advance in prices of mechanical goods due to the high price of crude rubber. 1500 w. Ind Rub Wld—Aug. 1, 1898.

**Reclaiming Old.**—The Reclaiming of Old Rubber. Hawthorne Hill. An account of the progress made in reclaiming rubber from worn-out goods in a condition fit for use again, with information concerning the product. 3700 w. Sci Am Sup—June 25, 1898.

**Soudan.**—A Study of Rubber Production in the Soudan (Etude sur le Caoutchouc au Soudan). M. Hamet. An abstract of the report of the French scientific commission, showing the adaptability of the Landolphia Hendolotti for cultivation in the Soudan. 3000 w. Bull de la Soc d'Encour—Feb. 28, 1900.

**Stress-Strain.**—Singular Stress-Strain Relations of India-Rubber. R. H. Thurston. From "Science." Calling attention to the rapid increase in resistance just before rupture. 900 w. Sib Jour of Engng—Feb., 1898.

**Substitutes.**—Substitutes for India-Rubber. H. L. Terry. A general discussion of the value of these substitutes as compared with India-rubber. 2000 w. Elect'n, Lond—Dec. 29, 1899.

The Manufacture of Rubber Substitutes. Explains the term, and briefly considers the best known substitutes. 1100 w. Ind Rub Wld—April 10, 1897.

Substitutes for India-Rubber. H. L. Terry. Discusses this subject, pointing out the danger with which users of India-rubber for electrical purposes are threatened. 2000 w. Elect'n—Aug. 6, 1897.

**Testing.**—The Testing of India-Rubber Goods. Discusses the drawbacks to chemical analysis, and gives specific cases where physical tests were made to give a fair criterion of the quality without unfitting the articles for sale. 2000 w. Engng—July 23, 1897.

**Tires.**—See **TIRE.**

**Vulcanised.**—See **Decay; INSULATION; RUBBER MANUFACTURE.**

**RUBBER MANUFACTURE.**

See also **RUBBER.**

Methods of Preparing Rubber. R. H. Biffen. Considers some of the better-known varieties of rubber and the methods of preparation, and the need of research in this field. Reports the writer's recent success in preparing pure rubber by a physical process. 3000 w. Jour Soc of Arts—Dec. 23, 1898.

**Chaffee Inventions.**—Edwin Marcus Chaffee as a Rubber Inventor. Biographical account, with description of inventions. 2000 w. Ind Rub Wld—Nov. 10, 1896.

**Explosions.**—Explosions in Indian-Rubber Works. Editorial discussion of the processes in which carbon bisulphide is used and their danger, and the responsibility of the government. 1700 w. Engng—Sept. 1, 1899.

**Improvement.**—The Harmless Cheapening of Rubber Goods. Edward F. Bragg. Advocates the cheapening of production through improved processes, or machinery. 800 w. Ind Rub Wld—Feb. 10, 1896.

**"Masticator."**—The Invention and Development of the Masticator. A machine used for breaking down or milling crude rubber is described by the inventor, Thomas Hancock. 2000 w. Ind Rub Wld—July 10, 1896.

**Mechanical Goods.**—Mechanical Rubber Goods. C. Wadsworth, Jr. Illustrated description of plant and some of the products of the Manhattan Rubber Mfg. Co., whose factory is located at Passaic, N. J. 1800 w. Engr, N. Y.—April 16, 1898.

**New Brunswick, N. J.**—History of the Rubber Industry in New Brunswick, New Jersey. T. Robinson Warren. Historical account of this industry and the benefit it has proved to the town. 2500 w. Ind Rub Wld—Aug. 10, 1896.

**New Durham, N. J.**—The Works of the Peerless Rubber Manufacturing Company, New Durham, N. J. Illustrated description of the process as practiced by this company. 3000 w. Am Eng & R R Jour—Oct., 1897.

**New York.**—New York as a Rubber Manufacturing Center. Hawthorne Hill. Reviews the considerations which encourage the location of the manufacturing industries in this city. 1800 w. Ind Rub Wld—Sept., 1, 1898.

**South America.**—Rubber Manufacture by South American Natives. Information of practices among the natives, seeming to have originated among themselves, but which involve principles of importance in the development of rubber. Ill. 2000 w. Ind Rub Wld—March 10, 1898.

**Trenton.**—The India-Rubber Business in Trenton. W. H. Dunbar. A résumé of the rubber industry in this city. 1700 w. Ind Rub Wld—Oct. 10, 1896.

**Vulcanisation.**—Improvements in Vulcanization (Modifications Apportées à la Vulcanisation au Soufre). Report by Ach. Livache, upon a new process, due to MM. Bapst and Hamet. They use a bath of molten sulphur, kept hot by a steam jacket, so that the temperature is easily regulated and no inflammable vapors produced near a flame, as is the case when the bath is heated by a fire. Ill. 2000 w. Bull de la Société d'Encour—Dec., 1898.

**RUBBER TIRE.**

See **TIRE—Pneumatic; Rubber.**

**RUBBER TUBING.**

**Gas Action.**—The Action of Illuminating Gas on Rubber Tubing. H. Grosheintz, in the "Bulletin of the Industrial Society of Mulhouse." An account of experiments carried out by the author. 900 w. Am Gas Lgt Jour—Aug. 10, 1896.

**RUBBER WORKS.**

See **RUBBER; RUBBER MANUFACTURE.**

**RUBY.**

See also **DIAMOND; PRECIOUS STONE; SAPPHIRE.**

**Burma.**—The Burma Ruby Mines. An account of the work at these mines, which are now working on a paying basis. 1000 w. Eng & Min Jour—Aug. 18, 1900.

The Ruby Mines of Burma. T. Trafford Wynne. Extract from a paper recently read before the Institution of Mining and Metallurgy in London, giving account of climate, labor, formation, exploitation, and methods of mining. 2000 w. Eng & Min Jour—June 12, 1897.

**North Carolina.**—On a New Mode of Occurrence of Ruby in North Carolina. J. W. Judd and W. E. Hidden. Describes discoveries in the State of North Carolina. Ill. 3800 w. Am Jour of Sci—Nov., 1899.

**Siam.**—See **SAPPHIRE.**

**RUDDER.**

See also **MARINE ENGINEERING; NAVAL ARCHITECTURE; STEERING; STEERING GEAR.**

**Action.**—See **STEERING.**

**Balanced.**—See **STEERING.**

**RUHMKORFF COIL.**

See **INDUCTION COIL; RADIOGRAPHY; ROENTGEN RAY.**

**RUSSIA.**

See also **IRON INDUSTRY; MINERAL REGION; SIBERIA.**

Engineering in Russia and the Use of Naphtha for Fuel in Russia. Alexis Gatzook and Stephen Goulishambaroff. Information concerning the mechanical industries, fuel, etc. Ill. 3000 w. Power—Dec., 1898.

Foreign Capital in Russian Industrial Undertakings. An article from the "Financial Chronicle," reviewing the part taken by foreign investors in the development of Russia. 1100 w. Ir Age—Sept. 27, 1900.

Russia as a World Power. Charles A. Conant. Considers the economic development of Russia is destined to soon make her the great competitor of the Anglo-Saxon race for the commercial and military supremacy of the world. 4800 w. N Am Rev—Feb., 1899.

Russian Industry and Trade. Calling attention to the economic and industrial development which is taking place in this country. 1800 w. Engng—Feb. 4, 1898.

The Giant of the East. Discusses the great progress made by Russia of late years, not only in political and diplomatic affairs, but in the paths of industry and trade. 1500 w. Bradstreet's—July 30, 1898.

Trade with Russia. Editorial review of Mr. Mitchell's opinions concerning the industrial resources and prospects of the Russian Empire. 1000 w. Mach, Lond—Feb. 15, 1898.

What We Saw in Russia. A. S. A report of the industrial conditions, with review of the history of the people. 3800 w. Loc Engng—Dec., 1898.

**American Trade.**—American Trade in Russia. Suggests some American articles that would find a market in Russia, gives information of how the competition of Germans in Russia is organised and other matters concerning trade. 1200 w. Ir Age—April 28, 1898.

**Engineering.**—Notes on Russian Engineering. Charles Hyde. Abstract of a paper read before the Engs. Soc. of W. Penna. The points touched are both detailed and interesting. 3700 w. Am Eng & R R Jour—Feb., 1896.

**RUSTING.**

See also **METAL CORROSION.**

Cases of "Mysterious" Rusting. N. Monroe Hopkins. Describes machines suddenly coated with rust and investigates the causes. 1200 w. Sci Am—Nov. 11, 1899.

## S

**SAFE.**

**Electrical Burglar.**—Burglarising Safes by Electric Heat. Is It Feasible? Discusses recent articles that have appeared setting forth this new danger threatening safes, and quotes the authority of expert electricians in proof that there is no need of great anxiety on the subject. 3400 w. Elec Eng—March 31, 1897.

Burglarising Safes by Electricity. L. L. Summers. An account of experiments made, with charts giving some of the results, showing that any arguments based upon the assumption that a metal wall cannot be penetrated by currents obtained from electric light plant, or storage battery, are fallacious. 1000 w. Elec Engng—June 15, 1897.

The Modern Burglar. Carl E. Kammeyer. Illustrated description of work on safes by burglars with electricity, with description of protective device. 900 w. Elec Rev—March 17, 1897.

**Electrically Operated.**—An Electrically Operated Burglar-Proof Safe. Illustrated description of the construction and operation of a safe for the protection of the costly tabernacle for the sacrament in St. Augustine's Church, Brooklyn, N. Y. 600 w. Elec Wld—Jan. 15, 1898.

**Electrical Protection.**—Electrical Protection of Safes and Vaults. Clyde J. Coleman. Read before the Chicago Elec. Assn. Reviews various means for protection that are in use or have been suggested, and the considerations to be met in providing an effective system. 1800 w. Sci Am Sup—Aug. 19, 1899.

**SAFETY FUSE.**

See **BLASTING; ELECTRIC FUSE; EXPLOSIVE.**

**SAFETY LAMP.**

See also **COAL MINE EXPLOSION; FIREDAMP.**

Electric and Other Safety Lamps. Brief illustrated description of various types. 1200 w. Ir & Coal Trds Rev—June 5, 1896.

Firedamp Indicating Lamp. M. G. Chesneau. From a communication to the Second International Congress of Applied Chemistry. Particulars of this appliance based on the results of active practice, as more than 400 are in service. Ill. 3500 w. Col Guard—May 27, 1898.

Safety Lamps—Past and Present. Reviews the appliances used for lighting mines, illustrating many of the safety lamps. Serial. Ir & Coal Trds Rev—June 29, 1900.

Some Notes on the Safety Lamp Problem. H. W. Halbaum. The object of the paper is to show that in some respects the incandescent lamp is inferior to the best form of Davy, as it introduces new sources of danger. Serial. Col Guard—April 29, 1898.

Some Notes on the Safety Lamp Problem. H. W. Halbaum. Discusses whether the incandescent lamp should entirely supersede the older type of safety lamp; and whether the use of safety lamps should be made compulsory in all mines. Serial. Col Guard—March 25, 1898.

**Electric.**—Accumulator-Maintained Miner's Lamp. M. G. Nicolai to the Liége section of the Assn. des Ingénieurs de Liége. Extract. Description and report of trials. 1300 w. Col Guard—Jan. 7, 1898.

Notes on Underground Lighting by Electricity. John Daw. Read before the Inst. of Min. and Met. Brief description of a portable electric lamp. 1400 w. Min Jour—Jan. 23, 1897.

The Portable Electric Miner's Lamp. Sydney F. Walker. Discusses whether the electric current shall be furnished by a primary or a secondary battery. 2500 w. Col Guard—Sept. 29, 1899.

The Storage of Electrical Energy and How It Affects Sparking. Sydney F. Walker. The writer's explanation of points brought out in a controversy with Mr. Halbaum on the subject of the comparative safety of the portable electric mining lamp. 2500 w. Col Guard—Dec. 15, 1899.

See also **Sussmann; Thermo-Electric Magnetism; ELECTRIC EQUIPMENT—Coal Mine Precautions; FIREDAMP—Electric Ignition.**

**Electric vs. Ordinary.**—The Safety of the Electric Miners' Lamp as Compared with the Ordinary Miners' Lamp. Sydney F. Walker. Maintains that the general adoption of electric portable lamps would lead to decreased accidents and lower working costs. 2200 w. Col Guard—Sept. 15, 1899.

**Experiments.**—Experiments with Safety Lamps. Bergrath Meyer, in "Oesterreischische Zeitschrift für Berg und Hüttenwesen." Investigations as to the cause of an explosion led to the interesting experiments described. 1000 w. Col Guard—Feb. 2, 1900.

**Guichot.**—Guichot Self-Lighting Safety Lamps. M. Chesneau. From a report to the French firedamp commission. Experiments made to test two re-lighting safety lamps; an oil lamp with match lighter, and petroleum-spirit lamp with fulminating lighter. Ill. 1100 w. Col Guard—May 21, 1897.

**History.**—The First Safety Lamps. William Clifford. Sequel to an article that appeared in this paper in Jan., 1897. The Davy lamp and some of the improvements which have been attempted upon it. 3500 w. Mines & Min—Dec., 1897.

**Interior Igniters.**—Testing Interior Igniters for Safety Lamps. Bergassessor Balzer, in "Oesterreichische Zeitschrift für Berg Hütten und Salinenwesen." Illustrates and describes experiments made to ascertain to what extent the lamps are liable to flare when lighted by percussion igniters in a fiery atmosphere, and so produce explosions. 1800 w. Col Guard—Feb. 16, 1900.

**Invention.**—The First Safety Lamp. William Clifford. History of its invention and the controversy between Davy and Stephenson. Reviews events which incited scientists and philanthropists to seek a safe light for fiery mines, and traces the evolution of the Davy lamps. Read before the W. Penna. Cent. Min. Inst. 4000 w. Col Eng—Jan., 1897.

**Laune.**—Laune Re-Lighting Safety Lamp. From a report by M. G. Chesneau, to the French Firedamp Commission, published in the "Annales des Mines." Illustrated description, with report of trials, and the advantages and disadvantages. 1200 w. Col Guard—Nov. 19, 1897.

**Lock.**—A New Safety Lamp Lock. M. H. Baugniet. From a communication to the Société des Ingenieurs des Mines du Hainaut. Briefly describes and illustrates three systems, investigated because of an explosion, caused by opening a lamp. Favors the Bomal lock, which depends upon a lead rivet. 2200 w. Col Guard—Nov. 17, 1899.

**Marsaut.**—Re-Lighting Marsaut Lamp Fed With Benzine. From a communication by M. Lafitte to the Société de L'Industrie Minérale. Vertical section and details, illustrating this lamp fitted with Seippel re-lighter and adapted for burning benzine. 2000 w. Col Guard—July 28, 1899.

**Sussman.**—Improved Form of Sussman Lamp for Belgian Collieries. From a communication of M. A. Abrassart, to the Société des Ingenieure Sortis de l'Ecole des Mines du Hainaut. Illustrates and describes the improvements, and states the advantages and disadvantages. 2400 w. Col Guard—March 30, 1899.

Improved Sussman Lamp at the Strepy-Bracquegnies Collieries. Joseph Goffin. From a communication to Société des Ingenieurs des Mines du Hainaut. An illustrated description of the improved lamp. 1100 w. Col Guard—Nov. 10, 1899.

The Sussman Mine Lamp (Note sur la Lampe de Mines du Système Sussman). Ad. Abrassart.

Illustrated description of the ingenious dry accumulator of Sussman and its application to various systems of mine lamps, also of the mechanism used in charging large numbers of these lamps at once. 4000 w. Rev Universelle des Mines—Sept., 1898.

**Testing.**—Miners' Lamps and the New Method of Testing Them. Brief illustrated description of method recently used in Austria. 700 w. Mach, Lond—Sept. 15, 1896.

Report on the Investigation of Mining Lamps (Bericht über die auf Berggewerkschaftlichen Versuchsstationen bisher Ausgeführten Lampenuntersuchungen). H. Fähndrich. A report of tests of various mining lamps with respect to their capacity for igniting mine gases. 5000 w. Glückauf—Sept. 15, 1900.

**Testing, Westphalia.**—The Testing Station for Safety Lamps at Bismarck, Westphalia (Die Versuchsstation für Sicherheitslampen auf der Berggewerkschaftlichen Versuchsstrecke bei Bismarck i. W.). H. Fähndrich. An illustrated description of the apparatus and methods of testing. 2 plates. 2600 w. Glückauf—May 26, 1900.

**Thermo-Electric Magnetism.**—Thermo-Electric Magnetism and Mining Safety-Lamps. Describes a singular case of thermo-electric magnetism in a safety-lamp, and the investigations of the cause. 2500 w. Col Guard—Sept. 24, 1897.

### SAFETY VALVE.

See also **BOILER; BOILER EXPLOSION; STEAM ENGINEERING.**

Safety Valves. H. Highet. An examination of various types. Ill. Serial. Prac Engr—Oct. 6, 1899.

Safety Valves. Illustrates and describes various types. 2800 w. Am Elect'n—Aug., 1899.

Safety Valves. H. H. Kelley. The Danger of neglecting safety valves, and the principle involved in the safety-valve lever. 3000 w. Engr, U S A—Aug. 15, 1899.

**Approximate Formulae.**—See **HYDRAULICS.**

**Génard.**—Safety Valves (Soupapes de Sureté). Illustrated description of the Génard safety valve, an improvement on the "pop" type. 3000 w. La Revue Technique—Jan. 10, 1897.

**Lever.**—The Lever Safety Valve. C. A. Collett. Presents methods of finding the proper area for a lever safety valve orifice, as given by different authorities, and gives the writer's opinion that lever safety valves should be consigned to the scrap heap, and pop valves substituted. 2200 w. Am Elect'n—Aug., 1897.

The Lever Safety Valve. C. A. Collett. The object of the article is to ascertain, as far as possible, to what extent the rules laid down by authors harmonize, and to enable the engineer to decide whether his safety valve is of ample capacity to relieve the boiler of an over-production of steam. 1700 w. Mech Wld—Sept. 17, 1897.

**Low-Pressure Boilers.**—Safety-Valves on Low Pressure Boilers. Criticises the practice of placing of safety-valves of insufficient area of opening. 1800 w. Bos Jour of Com—Feb. 27, 1897.

**Practice.**—Safety-Valve Practice. F. F. Hemenway. Discusses the requirements of safety-valves and the means of deciding on the area. 1800 w. Am Mach—March 11, 1897.

Safety Valve Practice. W. H. Booth. Calling attention to the importance of pressure, and referring to some notes made sixteen years ago. 1100 w. Am Mach—July 15, 1897.

### SAILING VESSEL.

See also **MERCHANT MARINE; SCHOONER; SHIP; SHIPBUILDING.**

**Great Britain.**—The Future of the Sailing Ship. Editorial on the economical causes of the collapse of this industry in Great Britain. 1700 w. Engr, Lond—March 25, 1898.

**Spars and Rigging.**—The Strength of Spars and Rigging of Sailing Vessels. Remarks the interesting mechanical problems dealing with the strength and efficiency of these structures, and discusses the applied forces in the present article. Serial. Engr, Lond—Jan. 5, 1900.

**Steel.**—The Arthur Sewall, an American Shipentine Built of American Steel. Illustrated detailed description with principal dimensions. 1500 w. Marine Engng—May, 1899.

**Steel vs. Wood.**—Steel vs. Wood as a Material for Sailing Ships, with Data of American Ships in Service. William A. Fairburn. Gives brief descriptions of vessels of both types, and claims the great superiority of steel over wooden vessels. Ill. Marine Engng—Feb., 1899.

**Types.**—Types of Sailing Craft. Discusses how they are dressed in different parts of the world, and considers the schooner rig destined to be the sea-going ship of the future. 2400 w. Marine Rev—Aug. 30, 1900.

**United States.**—The New Era of the American Sailing Vessel. Waldon Fawcett. An illustrated account of large steel sailing vessels and five and six masted wooden schooners recently built at Bath, Me. 2000 w. Sci Am—Sept. 22, 1900.

### SALMON FISHERIES.

**Columbia River.**—The Columbia River Salmon Fisheries. Illustrated description. 1600 w. Sci Am—Sept. 19, 1896.

### SALT.

**Alps.**—The Salt Mines of the Alps at the End of the 19th Century (Die Salzberge der Alpen am Ende des Neunzehnten Jahrhunderts). A general review of the history of the Alpine salt industry, with an account of the geological conditions, the present output, and future prospects. Two articles. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 5, 12, 1898.

The Transformation of the Alpine Salt Works (Ueber die Umgestaltung des Alpinen Salzbergbaues). A. Aigner. A review of the improved methods which have been introduced since 1863, and the economy which has resulted. 2500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Sept. 16, 1899.

**Avery Island.**—See **Louisiana.**

**Briquettes.**—The Manufacture of Salt Briquettes at the Royal Salt Works at Salzkammergut (Ueber Sudsalzbriquettirung bei den k. k. Salinen des Salzkammergutes). Max v. Arbesser. With illustrations of the hydraulic presses, and detailed description of the process. 6000 w. Zeitschr d Oesterr Ing u Arch Ver —Oct. 28, 1898.

The Müller Salt Press (Ueber die Müller'sche Salzbriquettes-Presse). An illustrated description of the apparatus used in Austria for compressing salt into "briquettes" for commercial convenience. Two articles and 1 plate. 6000 w. Oesterr Zeitschr f Berg u Hüttenwesen—March 13, 20, 1897.

**China.**—Chinese Salt and Gas Mines. An interesting account of the manner of working these mines, which have been uninterruptedly worked for over twenty centuries. 1500 w. Engr, Lond—Aug. 12, 1898.

The Great Salt Wells at Tsz-Lin-Ching. E. H. Parker. Description of these interesting wells in China, and the principle on which they are worked. 3600 w. U S Cons Repts—Nov., 1897.

The Salt Wells of Szchuan, China. W. M. Upcraft. Illustrated description of the peculiar methods of an important industry. 700 w. Eng & Min Jour—May 5, 1900.

**Electric Mining.**—See **Galicia; Salzburg.**

**Electrolysis.**—See **ELECTRO-CHEMICAL WORKS; ELECTRO-CHEMISTRY—Salt.**

**Galicia.**—Soóvár (Sóovár). G. Harmancsok. A geological and historical account of the Soóvár salt mines in Galicia, in which electric power has recently been introduced. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 12, 1898.

**Heilbronn.**—Rock Salt Mining at Heilbronn (Mittheilungen über den Steinsalz-Bergbau in Heilbronn). Alexander Iwan. A general description of the geological conditions, and of the mechanical methods employed. Two articles. 5000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—March 18, 25, 1899.

**Louisiana.**—Louisiana Salt Resources. A. F. Lucas. An account of the discovery and working of deposits of rock salt of great purity in a series of islands on the Gulf Coast. 3300 w. Am Mfr & Ir Wld—Dec. 23, 1898.

Rock-Salt in Louisiana. A. F. Lucas. An account of localities known, with particulars concerning the development of the deposits, giving illustrations and details not heretofore published. 4200 w. Trans Am Inst of Min Engs—Sept., 1899.

Salt Mines of Avery's Island, Louisiana. Henry Romeyn. A description of the works and the interesting geological formation. 2500 w. Mines & Min—May, 1900.

The Avery Salt Mine and the Joseph Jefferson Salt Deposit, Louisiana. Illustrated description of the mine, with brief history and account of the system of mining. 1700 w. Eng & Min Jour —Nov. 14, 1896.

**Müller Press.**—See **Briquettes.**

**Ohio Valley.**—Salt Making. R. G. Collier. An interesting account of this industry in the Ohio Valley. 3700 w. Tradesman—June 15, 1896.

**Salzburg.**—The Extension of the Wolfdietrich Tunnel (Die Erweiterung des Wolfdietrichstollens). Describing the work upon a deep tunnel in the Salzburg salt mines. Electric machinery driven by hydraulic power was used, including the Siemens' rock drill. 6000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Nov. 13, 1897.

See also **Briquettes.**

**Strassfurt, Germany.**—The Strassfurt Region Salt Deposits in Germany. H. B. Nitze. Describes these deposits with special reference to the potassium and magnesium salts. 2600 w. Mines & Min—June, 1899.

**SALT LAKE.**

Great Salt Lake and Its Waters. Don Maguire. A history of the early exploration that led to its discovery, and an account of an expedition upon it in 1891. 6500 w. Mines & Min—Aug., 1900.

**SALTPETER.**

See also **ELECTRO-CHEMISTRY; SODA.**

**Chile.**—Chilian Nitrate of Soda Deposits. Gives an historical account of the discovery, how long known, the methods of mining, value, etc. Serial. Engng—Oct. 30, 1896.

The Occurrence and Manufacture of Chili Saltpetre. A lecture by Dr. Weitz, in Berlin. Illustrated description of the deposits and the production. 3000 w. Ir & Coal Trds Rev—Dec. 29, 1899.

**United States.**—Our Saltpeter Caves in Time of War. Horace C. Hovey. Describes what was once a vital industry of the United States, though now abandoned, and the importance of these deposits in time of war. 2000 w. Sci Am—May 8, 1897.

**SALT WELL.**

See **SALT.**

**SALT WORKS.**

See also **ELECTRO-CHEMICAL WORKS; ELECTRO-CHEMISTRY.**

**France.**—The Marchéville-Daguin Salt Works and Soda Works (Saline et Soudiere de la Société Marcheville-Daguin et Cie). Ch. Dantin. An illustrated description of these works and their method of operation, in which an electric plant plays an important part. 5000 w. Génie Civil—July 28, 1900.

**SALVAGE.**

See **WRECKING.**

**SALVATION ARMY BUILDING.**

**New York.**—Architectural Aberrations.—The Salvation Army Building in New York. Severe criticism of the structure. 1200 w. Arch Rec—July, Sept., 1896.

**SAMPLING.**

See also **ASSAYING; METALLURGY; MINE VALUATION; PROSPECTING.**

Notes on Mine Sampling. George J. Bancroft. Describes the methods in use, and the most satisfactory. Also the method of estimating the value of the mine. Ill. 2000 w. Min & Sci Pr —June 17, 1899.

Sampling and Measurement of Ore Bodies in Mine Examinations. Edmund B. Kirby. A thoroughly practical article. Serial. Aust Min Stand —Dec. 28, 1896.

Testing the Ores. The method usually employed of sampling the ores at the mines is briefly described. 450 w. Min & Sci Pr—Feb. 22, 1896.

The Theory and Practice of Ore-Sampling. D. W. Brunton. The subject is discussed from both a practical and theoretical standpoint. Tabular statements and diagrams are presented and formulae derived. 4000 w. Trans Am Inst of Min Engs—Feb., 1896.

**Comstock Lode.**—Comstock Ore Sampling. John D. McGillivray. An enumeration of defects in practical sampling and an exposition of the unsatisfactoy method employed on the Comstock lode. 3200 w. Min & Sci Pr—Feb. 29, 1896.

**Copper.**—See **COPPER SAMPLING.**

**Iron Ore.**—See **IRON ORE—Sampling.**

**Placer.**—See **GOLD PLACER—Testing and Sampling.**

**Silver-Lead Bullion.**—Experiments in the Sampling of Silver-Lead Bullion. G. M. Roberts. Report of interesting experiments made in sampling the silver-lead bullion obtained from the water-jacket smelting-furnace at the Proprietary Mines, Broken Hill, N. S. W., for the purpose of ascertaining the relative accuracy of the methods then in use. 3000 w. Trans Am Inst of Min Engs—Aug., 1898.

**Surface.**—Some Notes on Mine Surface Sampling. S. H. Pearce. A discussion of methods used and the difficulties met. Ill. 6400 w. Jour Chem & Met Soc of S Africa—Aug., 1899.

**SAND.**

**Floating.**—See **FLOATING SAND; RIVER—Solid Matter.**

**Furnace.**—See **Refractory.**

**Hydraulic Plant.**—A Hydraulic Sand Plant. Illustrates and describes a method of dredging, transporting and washing sand by water. 1000 w. Eng Rec—Jan. 21, 1899.

See also **DREDGE; DREDGING.**

**Molding.**—See **MOLDING SAND.**

**Mortar.**—Sand for Mortar. Ira O. Baker. The importance of the quality on the strength and durability of the mortar is shown, and the requirements of a good building sand are discussed. 2500 w. Br Build—June, 1899.

See also **MORTAR.**

**Refractory.**—Fusibility of Bottom Sand. Charles Ferry. The results of chemical and physical examinations of refractory sands intended for furnace hearth bottoms. The author advocates chemical tests. 2200 w. Ir Age—Dec. 19, 1895.

See also **CUPOLA—Lining; FURNACE LINING.**

**Shifting.**—The Control and Fixation of Shifting Sands. John Gifford. Proper forestry cultivation will convert shifting sands into fixed soil and enable large areas to be reclaimed. Many valuable and interesting instances are given. 4000 w. Eng Mag—Jan., 1898.

See also **SAND STORM.**

**Tests.**—See also **MORTAR—Sand Tests.**

**Tests, Berlin Laboratory.**—Normal Sand (Normal-Sande). M. Gary. A report upon the results of the tests at the Berlin Royal Testing Laboratory upon various kinds of building sand, with reproductions of micro-photographs of sand from a number of localities. 2 plates. 7500 w. Mitt aus den Kgl Tech Versuchsanstalt—Part 3, 1896.

**SAND BLAST.**

See also **CASTING—Cleaning; PAINTING.**

**Architectural Work.**—The Sand-Blast in Architectural Work. B. F. Fells. Illustrates and describes how to build and use a sand blast, and sand-sifting apparatus. 900 w. Am Arch—Sept. 9, 1899.

**Iron Cleaning.**—See **Viaduct Cleaning.**

**Mining.**—Sand Blast Apparatus for Mining Purposes. Describes the construction and operation of the apparatus. 900 w. Eng & Min Jour—May 14, 1898.

**Smoke Stains.**—The Sand-Blast Process as Applied to the Cleaning of the Walls of Pardee Hall, Lafayette College. J. C. Heckman. Illustrates and describes the application of the sand blast to the cleaning of stone walls from smoke stains after a fire. 1100 w. Compressed Air—Aug., 1898.

**Viaduct Cleaning.**—Cleaning a Viaduct by the Sand Blast. Illustrated description of the test work under the direction of E. P. North, made on the 155th St. viaduct, New York. 1800 w. Eng Rec —Sept. 25, 1897.

Cleaning Structural Iron by the Sand-Blast Preparatory to Painting. An account of experimental work being conducted by the Department of Public Works, on the 155th St. viaduct in New York City, which has been attacked by rust. 1500 w. Eng News—Sept. 23, 1897.

Opinions on the Sand-Blast for Cleaning Structural Iron. Reports that the consensus of replies from about twenty prominent engineers is that the use of the sand-blast for this purpose is wise and judicious. Based on work on the 155th St. Viaduct in New York. 800 w. Eng News—Jan. 13, 1898.

The Sand-Blast for Structural Steel. Describes the work being done on the 155th St.

viaduct, its effect upon the iron, and the treatment as a test of the best protective paint. 1700 w. Am Mach—Sept. 30, 1897.

**SAND HOUSE.**

See **SAND TOWER.**

**SAND SIFTING.**

See also **SAND BLAST.**

New Patterns of Sand-Sifting Machinery. George D. Rice. Drawings and descriptions of several new styles, not patented. 800 w. Mach, N. Y.—July, 1897.

Sand-Sifting Machine. John L. Klindworth. Illustrated description. 250 w. Am Mach—July, 1896.

**SANDSTONE.**

See also **BUILDING MATERIAL; STONE.**

The General Character and Properties of Sandstones. T. C. Hopkins. Descriptive of varities of sandstone and their uses. 2500 w. Stone—July, 1896.

**Mansfield, Indiana.**—The Mansfield, Indiana, Sandstone. T. C. Hopkins. Description, with account of tests and results. Its durability, etc. Serial. Stone—Sept., 1896.

The Mansfield, Indiana, Sandstone. T. C. Hopkins. Illustrated description of this building stone, the location, varieties, colors, etc. Serial. Stone—Aug., 1896.

**Minnesota.**—Minnesota Sandstones. N. H. Winchell. Extract from Geol. and Nat. Hist. Survey of Minnesota. Descriptive. 2000 w. Stone—Dec., 1896.

**Strength.**—The Relation Between Extension and Stress in Sandstone (Zur Frage der Proportionalität zwischen Dehnungen und Spannungen bei Sandstein). C. Bach. Investigations into the strength of sandstone, with especial reference to the stresses in revolving grindstones. 2000 w. Zeitschr d Ver Deutscher Ing—Sept. 1, 1900.

**United States.**—The Sandstone Industry in 1894. Gives the composition of various sandstones, and the United States production by states. 800 w. Stone—Nov., 1895.

**SAND STORM.**

See also **SAND—Shifting.**

**Cape Cod.**—Saving a Town and Cape. George Ethelbert Walsh. Efforts to reduce the danger and prevalence of sand storms at Cape Cod, and to protect Provincetown. 1300 w. Sci Am—Aug. 21, 1897.

**SAND TOWER.**

See also **RAILWAY STATION—Sand, Coal and Water.**

**Argentine, Kan.**—Further Details of Sand House at Argentine. Kansas. Illustrated description. 150 w. Ry Mas Mech—April, 1896.

**Chicago and Northwestern Ry.**—Sand Tower, Chicago & Northwestern Railway. Brief description, with drawings. 700 w. Ry Rev—Aug. 22, 1896.

**SANITARY CONSTRUCTION.**

See **BUILDING CONSTRUCTION—Sanitary; SANITARY ENGINEERING; SANITATION.**

**SANITARY ENGINEERING.**

See also **DRAINAGE; PLUMBING; REFUSE DISPOSAL; SANITATION; SEWAGE DISPOSAL; SEWER; SEWERAGE.**

Inaugural Address by Sir William Henry Preece. Full address discussing the principles of sanitary engineering. 8000 w. Jour San Inst—Oct., 1899.

Practical Sanitary Science. William H. Maxwell. Information of interest connected with ventilation, calculation of areas, water and water supply, plumbing work, removal of refuse, etc. First part treats of ventilation. Serial. San Rec—July 3, 1896.

Progress in Sanitary Engineering. Andrew Noble. Address as President of the Section of Engineering and Architecture of the Congress of the Sanitary Institute, at Newcastle-on-Tyne. General discussion dealing with various branches. 5000 w. San—Dec., 1896.

Progress in Sanitary Engineering. Andrew Noble. Address delivered before the Section of Engineering and Architecture, of the Congress of the Sanitary Inst., at Newcastle-on-Tyne. General review of progress. 4500 w. Arch, Lond—Sept. 11, 1896.

The Civil Engineer as a Guardian of the Public Health. J. B. Johnson. The paper aims to show that it is the duty of civil engineers to provide clean streets, pure water, and the quick removal of refuse and waste, and to lead in forming public sentiment to secure these results. 4500 w. Jour Assn of Engng Soc's—Dec., 1898.

**Architecture.**—Engineering and Architecture. James Lemon. Discusses those branches which particularly affect public health, as pure water, sewerage, pure air, healthy dwellings, etc. 4500 w. Jour San Inst—Oct., 1899.

**British.**—Sanitary Engineering. Editorial review of the year's work in this field. 1500 w. Engr, Lond—Jan. 7, 1898.

Sanitary Engineering. The annual editorial survey deals principally with the question of the treatment of sewage. 1800 w. Engr, Lond—Jan., 1899.

See also **WATER SUPPLY.**

**European.**—European Sanitary Engineering. James H. Fuertes. Describes the arrangement and operation of the refuse-disposal plant at Cambridge, Eng. Ill. Serial. Eng Rec—March 20, 1897.

**House Building.**—See **BUILDING CONSTRUCTION—Sanitary; SANITATION—Domestic.**

**Massachusetts.**—Notable Sanitary Experiments in Massachusetts. W. T. Sedgwick. The work accomplished by the State Board of Health of Massachusetts, chiefly in the direction of water supply and sewerage. 6500 w. Forum—Feb., 1896.

The Work of the Massachusetts State Board of Health for 1895. A review of the year's work, which contains valuable information for hydraulic and sanitary engineers. 1600 w. Eng Rec—Nov. 14, 1896.

**State Boards of Health.**—Sanitary Engineering and State Boards of Health. Jacob A. Harman. Review of work done by State boards of health, with discussion. 6500 w. Ill Soc of Engs & Surv—11th An Rept, 1896.

**Water Supply Control.**—The Control and Supervision of Public Water Supplies by Sanitary Authorities. C. Porter. Abstract of a paper read at the Congress of the Sanitary Institute at Newcastle-on-Tyne. Considers some of the principal powers and duties of sanitary authorities. 2500 w. San—Nov., 1896.

**SANITATION.**

See also **WATER SUPPLY—Protection.**

See also **DISINFECTION; DRAINAGE; PLUMBING; REFUSE DISPOSAL; SANITARY ENGINEERING; SEWAGE DISPOSAL; SEWERAGE.**

Modern Sanitation. W. Henman. Address before the Engng. & Arch't. Section of the Sanitary Institute Congress at Birmingham, England. General remarks on the importance and progress, with consideration of plumbing, ventilation, and related subjects. 3500 w. Builder—Oct. 1, 1898.

Some Phases of Public Sanitation. E. C. Gardner. Calls attention to practices in cities and towns that cause illness and discomfort. 5000 w. Am Archt—July 28, 1900.

**Bandora, Bombay.**—See **WATER SUPPLY.**

**Baths.**—Baths. G. Mendizabal. Read before the American Public Health Assn. Uses, abuses, benefits and dangers of baths. Promiscuous bathing in a common bath-tub is dangerous unless the greatest cleanliness in the care of bath-tub, towels, brushes, etc., is observed. 1800 w. San Plumb—Sept. 15, 1896.

More About the Public Rain Baths. Moreau Morris. Read at the Conference of Charities, New York. Historical sketch of the attempts that have been made to establish free public baths in New York City, of which the public rain baths are the latest phase. 5600 w. San—July, 1896.

See also **BATH.**

**Bombay.**—The Renovation of Bombay. Information from the report of the Special City Improvement Trust of Bombay showing energetic efforts to overcome the plague and to render the city healthful. 2000 w. Engr, Lond—Aug. 25, 1899.

**Bristol, Eng.**—Twenty Years' Sanitation in an Urban District. James Young. A résumé of the advancement in all matters pertaining to the public health of the district of St. George, Bristol, England, showing an interesting record of progress and development. 1800 w. San Rec—Nov. 26, 1897.

**Canal Impurities.**—Canals and Their Impurities. H. Ward. Read before the Staffordshire Sanitary

Inspectors' Assn. The subject is treated with reference to the sanitation of canal waters. Serial. San Rec—Sept. 4, 1896.

**Cleveland, Ohio.**—Report on the Sanitary Needs of Cleveland, O. An interesting and instructive document. 1200 w. Eng Rec—Feb. 15, 1896.

**Congress.**—Congress of the Royal Institute of Public Health. Report of the presidential and other addresses dealing with subsoils, nuisances, sewage disposal, sanitation, and kindred topics. 5000 w. Builder—Aug. 27, 1898.

Presidential Address before the Congress of the Sanitary Institute at Leeds, Eng. Dr. Robert Farquharson. He discusses the progress of hygiene, defects of civilization, increase of new diseases, value of light, housing and health questions. 4400 w. Arch, Lond—Sept. 17, 1897.

The Sanitary Institute Congress, Birmingham. Abstracts of a series of papers read at the recent Congress on ventilation, drainage, water, sewage, etc. 5000 w. Builder—Oct. 8, 1898.

**Country Districts.**—Some Sanitary Defects in Rural Districts with Suggestions for their Remedy. George H. Smith. Considers briefly the principal defects, such as water supply, drainage, etc., with their remedies. Discussion. 5000 w. Jour of San Inst—Jan., 1899.

See also **SEWAGE DISPOSAL; SEWERAGE.**

**Country Houses.**—Sanitation of Country Houses, Villages, and Small Areas. Edward Tidman. Considers the general principles to be adopted, describing the essential points of the drainage, outfall, etc. 2500 w. San Rec—June 10, 1898.

See also **DRAINAGE; SEWAGE DISPOSAL.**

**Disinfecting Boat.**—The Disinfecting Boat of the New York State Board of Health. Illustrated description of the vessel and its disinfecting appliances, bath, sulphur furnace, and disinfecting oven. 800 w. Sci Am—Oct. 3, 1896.

**Disinfection.**—See also **DISINFECTION.**

**Domestic.**—Domestic Sanitation. W. Watkins. Read before the Sanitary Inspectors' Assn., during the Conference at Lincoln, England. Considers various appliances in household use, and the surroundings that affect the soil and healthfulness of the home. 3300 w. Builder—Aug. 12, 1899.

House Sanitation. Esther A. Pownal. Read at meeting of New Hope Farmers' Inst., Doylestown, Penn. Discusses the heating, lighting and ventilating of a house. 2800 w. San—July, 1898.

Making Human Abodes Germproof. Frederick Baumann. Suggestions for the protection of foundations and sewer and water pipes. 1400 w. Dom Engng—Aug., 1898.

Some Sanitary Points in House Building. R. H. Ellis. Suggestions for choosing a site, character of the ground, precautions to prevent dampness in walls, and for smoky chimneys are dealt with in part first. Serial. Ill Car & Build—Oct. 2, 1896.

The Hygiene of Dwelling Houses (Zur Hygiene des Wohnhauses). O. Richter. A general discussion of the structural features of dwelling houses, affecting their sanitary condition; including ventilation, drainage, etc., etc. 5000 w. Oesterr f d Oeffent Baudienst—July, 1899.

The Sanitation of Dwellings in England. Barrister F. Fletcher. The present article deals with the site, the drainage, and the heating, lighting and ventilation. 3300 w. Arch Rec—April, June, 1899.

The Sanitation of Domestic Buildings. Frank Latham. Part first is introductory and shows the danger of neglecting defective house drains, citing cases of serious illness and death from this cause. Serial. San Rec—Jan. 7, 1898.

**Electrolytic.**—See **Woolf Electrolytic.**

**France.**—France's New Sanitary Law as Applied to Contractors and Builders. Comments on the hygienic precautions being enforced to prevent contagion, especially during the preparatory work for the coming exposition in Paris. 1400 w. Stone—May, 1899.

**Halifax, Nova Scotia.**—Halifax Sanitary Regulations. Rules and regulations for the guidance of architects, plumbers, householders, and others using the water supply, to secure the sanitary condition of buildings. 2400 w. Can Arch—Nov. 1895.

**Havana.**—The Engineering and Sanitary Renovation of Havana under U. S. Military Government. Abstract of report by Gen. Ludlow of the extensive and excellent work, with editorial comment. 6000 w. Eng News—Oct. 12, 1899.

The Importance of Cleaning Havana. Editorial statement of the results in the past of its unsanitary condition. 1600 w. Eng Rec—Jan. 21, 1899.

The Renovation of Havana. An account of the work done in cleaning the city during the first six months of American occupation. 3100 w. Eng Rec—Oct. 7, 1899.

The Sanitary Condition and Requirements of Havana, Cuba. E. Sherman Gould. Describes the natural conditions due to site, soil, climate, etc., and the artificial conditions created by the inhabitants, the work since the American occupation, and the permanent work needed. 2500 w. Eng News—Aug. 3, 1899.

The Sanitary Regeneration of Havana. George M. Sternberg. Describes the sanitary condition of this city, and discusses the possibility of regeneration, considering that if placed in a satisfactory sanitary condition as regards its dwellings, sewers, and pavements, it would be practically immune from yellow fever. 4400 w. Century Mag—Aug., 1898.

The Sanitation of Havana. Extracts from the report of General Francis V. Greene giving information on the unsanitary condition of the Cuban capital. 2400 w. Eng Rec—Jan. 7, 1899.

The Sanitation and Public Works of Havana. Extracts from General Greene's review and from G. E. Hill's presentation of Col. Waring's views, with comments. 2200 w. Eng News—Jan. 12, 1899.

See also **Woolf Electrolytic; SEWERAGE.**

**Hermite Electrolytic.**—See **Woolf Electrolytic.**

**History.**—A Half Century of Sanitation. William Paul Gerhard. Read at meeting of the Brooklyn Engs' Club. Considers the progress during the second half of the nineteenth century in public sanitation and applied sanitary science. Serial. Am Arch—Feb. 25, 1899.

The Outcome of Sanitation. Louis C. Parkes. A record of the progress during the reign of Queen Victoria. 6500 w. Jour of San Inst—April, 1898.

**Hong Kong.**—See **SEWERAGE.**

**Honolulu.**—Sanitary Methods During the Bubonic Plague in Honolulu. Describes the measures taken by the Board of Health, particularly in the Chinese quarters. 1200 w. Eng Rec—Feb. 17, 1900.

**Hydro-Geology and Hygiene.**—Hydro-Geology and Hygiene: Law and Legislature. Abstract of paper read by C. E. De Rance before the British Assn. of Water Works Engineers. The relations between hydro-geology and hygiene are set forth and their study is urged as related to sanitary legislation. 4000 w. Jour of Gas Lgt—Aug. 11, 1896.

**Indian Cities.**—The Reconstruction of Plague-Stricken Cities in India. A. J. Hughes. Presents the great importance of these problems, the difficulties, and an explanation of the character of the enterprises now in progress for dealing with this subject. 6300 w. Engr, Lond—Nov. 11, 1898.

**Inspection and Surveys.**—Modern Drainage Inspection and Sanitary Surveys. Gerard J. G. Jensen. Part first gives a brief illustrated description of some of the most reliable apparatus for making tests for hidden defects with the mode of application. Serial. San Rec—Nov. 18, 1898.

**Longevity.**—What Sanitation Has Done for Life. Extracts from address of Prof. Brewer, of Yale Univ., showing that life has been prolonged, especially in cities. 1000 w. Safety V—Nov., 1896.

**Manila.**—Sanitation in Manila. C. W. Iredale. Illustrated description of the conditions and the plumbing work found there. 2000 w. Dom Eng—Jan., 1900.

**New York.**—The City's Health-Sanitary Construction. Charles F. Wingate. Describing the changes which have taken place in New York City in recent years, showing the progress and the needed reforms. 4000 w. Munic Af—June, 1898.

**Ozone.**—See **OZONE.**

**Paint.**—See **PAINTING—Sanitary.**

**Paris.**—Paris From a Sanitary Engineering Standpoint (Die Stadt Paris vom Gesundheitstechnischen Standpunkte). Hermann Beraneck. A general account, with some details of the sewage, water supply, street cleaning, etc., and two plans. 4000 w. Zeitschr d Oest Ing u Arch Verein—April 27, 1900.

See also **SEWAGE DISPOSAL; SEWAGE FARM; SEWER; SEWERAGE.**

**Porto Rico.**—Sanitary Work in Porto Rico. L. P. Davison. Describes the conditions existing and the work in progress. 1800 w. Sci Am Sup—Aug. 26, 1899.

See also **SAN JUAN.**

**Railway.**—Railroad Sanitation. Abstract of discussion at the New England Railroad Club in Boston. Calls attention to some things that need correction. 2900 w. R R Gaz—Dec. 29, 1899.

**Russia.**—Sanitation in Russia. Notes and observations on sanitary conditions in Russia. Serial. Am Arch—May 20, 1899.

**Santiago, Cuba.**—Sanitary Conquest of Santiago. From "Chicago Sunday Tribune." An account of the work that has been necessary to make the city a safe dwelling place. 3000 w. Dom Engng—Feb., 1900.

See also **SANTIAGO.**

**School, Boston.**—Report of Sanitary Condition of Boston Schools. Report to the Mayor of Boston, made by a special committee of experts. 1600 w. Eng Rec—March 28, 1896.

Sanitary Schools. Abstract of a report upon Boston schools, by a committee of experts. The article is well illustrated with engravings of model and defective plumbing and drainage, ventilation and heating work. 1900 w. Dom Engng—June, 1896.

**School, Germany.**—German Maxims on School Sanitation. Reported by William Paul Gerhard. The result of several conferences held by a number of prominent German physicians, architects, sanitary engineers and school teachers. 1800 w. Arch & Build—Feb. 6, 1897.

**School, Pennsylvania.**—Hygienic Demands for School Buildings. A. M. Sloan. Read at meeting of the State Health Authorities at Harrisburg. Discusses the need of intelligent consideration of the conditions, gives general rules, and requirements in the ventilation and heating. 4000 w. San—April, 1897.

**Shelters for Homeless.**—The Sanitary Supervision of Shelters for the Homeless. F. J. Waldo. Abstract of a paper read before the Sanitary Inst., showing the necessity of bringing those places under the control of the local authorities. 1200 w. San Rec—Feb. 19, 1897.

**Ship.**—The Relation of Naval Architecture to Proper Sanitation. J. R. Tyron. An important and able discussion of effective and defective sanitation of ships, reprinted from the annual report to the United States Navy. The question of naval construction as bearing upon sanitation, is exhaustively reviewed. 13000 w. San—Feb., 1896.

The Sanitary Arrangements of the Modern Steamship (Die Gesundheitlichen Einrichtungen der Modernen Dampfschiffe). C. Busley. A very complete series of articles describing the arrangements for ventilating, draining, lighting, water supply, etc., of modern vessels. 3 articles. 2500 w. Zeitschr, d Ver Deutscher Ing—Jan. 2, 9, 16, 1897.

See also **PLUMBING—Yacht.**

**Small Towns.**—The Sanitation of Small Towns (Abfuhr der Abfallstoffe, etc., in Mittleren und Kleineren Städten). A discussion of this important subject by Baumeister Schmick, of Frankfurt a. M. 6000 w. Gesundheits Ingenieur—July 31, 1897.

See also **SEWER; SEWERAGE—Boston Suburbs; Brixworth, Eng.**

**Sociology.**—Sanitation and Sociology. Marion Talbot. The ground is taken that improvement in health and prolongation of life should not be the sole aims and results of sanitation, but that it falls short of its possibilities unless a notable improvement in the habits and morals of the poorer class of society is evident. 2800 w. Am Jour of Soc—July, 1896.

**Suburban.**—Suburban Sanitation. G. B. Thornton. Read at meeting of Tennessee Medical Soc., at Chattanooga. Need for better suburban sanitation and plans discussed. Reprinted from "Commercial Appeal," Memphis. 2500 w. San—Sept., 1896.

See also **Country Districts; SEWAGE DISPOSAL—Country; SEWERAGE—Boston Suburbs.**

**Theatre.**—Theatre Sanitation. William Paul Gerhard. Read at meeting of the Am. Pub. Health Assn., at Ottawa, Can. A paper on the hygiene of theatres, considering drainage, plumbing, water supply, ventilation and general sanitation. 5500 w. San—Dec., 1898.

**Washington.**—History and Progress of Sanitation of the City of Washington, and the Efforts of the Medical Profession in Relation Thereto. Samuel C. Busey. Address at meeting of the Washington Academy of Sciences. A résumé of the history of sanitation in this city, covering a period of 107 years. 4500 w. San—March, 1899.

**West Indies.**—Sanitary Conditions of Some West Indian Cities. F. C. S. Part first describes the conditions at Port au Prince, Hayti. 1800 w. San Plumb—Jan. 1, 1899.

See **Havana; Porto Rico; Santiago.**

**Woolf Electrolytic.**—Electricity for Sanitation at Havana. Illustrated description of a plant employing the Woolf electrical process for the production of hypochlorites from sea water. 1100. Elec Wld & Engr—Oct. 7, 1899.

What Electrolyzed Sea Water Has Accomplished. W. L. Hedenberg. Explains the methods invented by Albert E. Woolf and M. Hermite, giving reports of applications of the process and the results. 1500 w. Elec, N. Y.—May 18, 1898.

**SAN JUAN.**

**Porto Rico.**—Engineering Features of San Juan. Porto Rico. H. M. W. A letter containing a statement of the general character of the engineering works in progress. Ill. 3000 w. Eng News—March 30, 1899.

**SANTIAGO DE CUBA.**

Engineering Notes at Santiago de Cuba. H. M. W. Describes the topography, and gives information concerning the sanitary condition, water supply, streets, harbor, etc. 8500 w. Eng News—June 8, 1899.

**SAPPHIRE.**

See also **PRECIOUS STONES.**

**Siam.**—The Sapphire and Ruby Mines of Southeastern Siam. From the London "Times." Historical account of discovery of the mines, with interesting information, description, etc. 3000 w. Min Jour—May 30, 1896.

**SAW.**

**Band.**—The Making of a Band Saw. Illustrated description. 2000 w. Ir Age—July 30, 1896.

See also **BAND SAWING; WOOD-WORKING MACHINERY.**

**Hand.**—The Care of Hand Saws. Julien A. Hall. Hints for keeping a saw in order. 1600 w. Ry Mas Mech—Sept., 1897.

**SAWMILL ENGINES.**

Steam Engines and Boilers for Sawmills. J. L. Crathorne. Describes briefly the most suitable types. 2406 w. Builder—Sept. 16, 1899.

**SCAFFOLDING.**

See also **BUILDING CONSTRUCTION.**

History of Early Scaffolding. W. J. Eden Crane. Reviews what is known of methods used in early times for the raising of high structures. Ill. 2000 w. Ill Car & Build—Feb. 18, 1898.

**Congressional Library.**—The Great Scaffolds of the Congressional Library, Washington, D. C. Brief with cuts showing the method adopted for giving illustrated description of this beautiful building, access to the interior surface of the dome. 900 w. Sci Am—Nov. 14, 1896.

**Schneider Pavilion.**—See **PARIS EXPOSITION.**

**SCALES.**

See **WEIGHING.**

**SCHISEOPHONE.**

The Detection of Flaws by the Schiseophone (Le Schiséophone). This is a modification of the microphone by means of which flaws in metal are detected by the modification produced in the sound of tapping as heard in the microphone. 1000 w. Le Génie Moderne—May 1, 1897.

**SCHOOL.**

See also **COLLEGE; EDUCATION; LABORATORY.**

**Aix-la-Chapelle Technical.**—The New Buildings for the Royal Technical High School at Aix-la-Chapelle (Der Neubau an der Königlichen Technischer Hochschule zu Aachen). Elevation and plans of new buildings for the departments of mining and electrotechnics; costing $120,000. 1200 w. 1 plate. Glückauf—Sept. 18, 1897.

**American and German.**—The American School House. Edmund M. Wheelright. Part first compares the planning of German and American schools, and discusses sizes of rooms, light, ventilation, etc. Ill. Serial. Br Build—Nov., 1897.

**Berlin Technical.**—See **EDUCATION.**

**English Board.**—The Planning and Construction of Board Schools. T. J. Bailey. An account of the building work of the London School Board, discussing sites, buildings, warming and ventilation, etc. Discussion. Ill. 1200 w. Jour Roy Inst of Brit Archts—June 3, 1899.

The Planning of Board Schools. Charles Henry Wyatt. A paper read before the Manchester Soc. of Arch. Views based on practical acquaintance with school life. 4500 w. Arch, Lond—Dec. 6, 1895.

**Girls.**—The Planning of High and Endowed Schools for Girls. F. J. Osborne Smith. Read at meeting of the Architectural Association, London. Considers the types of plans which experience has proved to be best suited for the work. Also the fittings for cloak rooms, lavatories, etc. 5500 w. Arch, Lond—Dec. 10, 1897.

**Heating.**—See **HEATING; HEATING AND VENTILATION.**

**Liverpool Technical.**—See **MUSEUM.**

**Model.**—The Model School-House. R. L. Jones. Calling attention to the essentials of a model school building and the wisdom of providing the same. 3000 w. So Arch—May, 1896.

**New York.**—Some Features of New York School-Houses. Illustrated description of a double stairway in a single well, movable partitions, children's toilet rooms, and other features of buildings erected in 1899. 800 w. Eng Rec—June 16, 1900.

The School Buildings of New York. John Beverley Robinson. A finely illustrated article on the school buildings of New York, showing the great improvements made, and the evidences of careful thought. 5000 w. Arch Rec—Jan., March, 1898.

**Paris.**—The New Commercial High School at Paris (La Nouvelle Ecole Supérieure de Commerce à Paris). Description, with illustrations and plans, of this building, intended to accomodate 300 students. 2000 w. Génie Civil—Dec. 10, 1898.

**Sunday.**—See **SUNDAY SCHOOL.**

**Technical.**—See **Aix-la-Chapelle; COLLEGE; EDUCATION; ENGINEERING BUILDING; LABORATORY; UNIVERSITY.**

**Ventilation.**—See **HEATING AND VENTILATION; VENTILATION.**

**Vermont.**—Site, Construction and Furnishing of School-Houses. Excellent recommendations and regulations for "lighting, heating, ventilating and other sanitary arrangements" of school-houses, issued by the State Board of Health of Vermont. 1200 w. San—June, 1897.

**West Orange, N. J.**—A School Building and Town Hall of Moderate Cost. Illustrated description of the Washington school building, situated in West Orange, N. J., planned to be used for a town hall and primary school house. 900 w. Eng Rec—July 17, 1897.

**Zürich.**—New Secondary School House in Zürich (Das Neue Sekundar Schulhaus in Zurich). A description, with plate of an excellently arranged school house in probably the best educational centre in Europe. 800 w. Schw Bauz—Dec. 12, 1896.

Primary School House in Zurich (Das Primarschulhaus an der Klingenstrasse in Zürich—Kreis III.). A. Geiser. A short description, with illustration, and plans. 500 w. Schweiz Bauzeitung—April 28, 1900.

**SCHOOL SHIP.**

See **TRAINING SHIP.**

**SCHOONER.**

See also **MERCHANT MARINE; SAILING VESSEL; SHIPBUILDING.**

**Clyde-Built.**—A Notable Clyde-Built Schooner. Illustrated general description. 900 w. Eng, Lond—April 24, 1896.

**"Honolulu."**—Four-Masted Steel Schooner "Honolulu." Illustrated description. 800 w. Am Ship—June 25, 1896.

**"Polly," Calais, Me.**—A Famous Old Schooner. From the Boston "Evening Transcript." Reviews the history of the "Polly," of Calais, Me." in service ninety-six years. 1400 w. Marine Rev—July 12, 1900.

**"Pretoria."**—A Five-Thousand Ton Wooden Schooner. Illustration of what is believed to be the largest wooden sailing vessel ever built, the "Pretoria," of Bay City, Mich. 600 w. Marine Engng—Oct., 1900.

**SCIENCE.**

See also **CHEMISTRY; ELECTRO-PHYSICS; MECHANICS; PHYSICS.**

**Engineering.**—Science and Engineering. W. H. Preece. Opening address of the president to the Engineering Conference, Institution of Civil Engineers, England. 2400 w. Jour Soc of Arts—June 23, 1899.

The Relation of Physics and Astronomy to the Development of the Mechanic Arts. Cleveland Abbe. An address to the Franklin Institute on the inauguration of a new branch entitled "The Section on Astronomy and Physics," showing the close relation of the sciences to the mechanic arts. 14000 w. Jour Fr Inst—Aug., 1899.

The Scientist and the Engineer. Editorial comment and several recent addresses showing the importance of a mutual understanding. 1500 w. Eng Rec—Aug. 12, 1899.

See also **ENGINEERING—Science.**

**Recent Progress.**—Recent Science. Prince Krapotkin. Parts first and second deal with the progress made in liquefying air and gases; parts third and fourth, with motive power and transmission. 9800 w. Nineteenth Cent—Aug., 1898.

**University of Pennsylvania.**—Science at the University of Pennsylvania. Lewis R. Harley. Historical and general description of this institution, with illustrations, exterior and interior views, and more detailed description of departments in which chief contributions to science have been made. 7000 w. Pop Sci M—Aug., 1896.

**SCIENTIFIC SOCIETY.**

See also **ENGINEERING SOCIETY.**

**American Association.**—Early Years of the American Association. William Henry Hale. This brief early history of the association is illustrated by portraits of eminent men who have presided over its councils. 1800 w. Pop Sci M—Aug., 1896.

**British Association.**—The British Association. Abstracts of the papers read in the Mechanical Science section at the Bradford meeting. 6000 w. Engng—Sept. 14, 1900.

The British Association. A condensed report of the Bristol meeting, with an abstract of Sir William Crookes' remarkable presidential address. 2500 w. Eng, Lond—Sept. 9, 1898.

**Franklin Institute.**—See **ELECTRICITY.**

**Technical.**—The Work of Technical Societies. Editorial review of the origin, spread, and general results of these societies. 2700 w. Engng—Nov. 8, 1895.

See also **ENGINEERING SOCIETY.**

**SCOOP WHEEL.**

See **WATER RAISING.**

**SCORIFICATION.**

See also **ASSAYING.**

Experiments Regarding the Influence of Silica on the Loss of Silver in Scorification. Lester Strauss. An account of experiments made and conclusions reached. 1600 w. Trans Am Inst of Min Engs—Aug., 1900.

**SCREEN.**

See **SCREENING; WATER WORKS.**

**SCREENING.**

See also **COAL PREPARATION; METALLURGY; MINING; ORE; ORE CRUSHER.**

**Graphic Records.**—Graphic Records of the Screening of Crushed Materials. Courtenay De Kalb. Results of studies of the behavior of ores or rocks when subjected to crushing under different conditions. 2000 w. Am Inst of Min Engs—Oct., 1898.

**Sardinia.**—Progress in Ore Preparation Processes in Sardinia (Fortschritte der Erzaufbereitung in Sardinien). Erminio Ferraris. Description of swinging screens used in sorting ores. 1600 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—May 5, 1900.

**Vibromotor.**—The Vibromotor Automatically Balanced Screening Machinery. Illustrates and describes an apparatus for utilising the vibrations set up in a reciprocating or gyratory piece of machinery. 800 w. Col Guard—May 11, 1900.

**SCREW.**

See also **PROPELLER; SCREW THREAD.**

**British Association Report.**—Report of the Screw Gauge Committee of the British Association. Exhaustive, with a tabulated statement of screws recommended, and appendix with diagrams, and descriptions of shadow photographs of screws. Also appendix on gauges for verifying accuracy of screws, and another giving working dimensions in millimeters, and in thousandths of inches. 3000 w. Eng, Lond—Sept. 25, 1896.

**Europe.**—Screws, Nuts and Bolts in Foreign Countries. Consular reports from various parts of Europe, giving information relative to the manufacture and trade in these products. Calls attention to the fact that Withworth's standard thread is so generally used as to make it useless to attempt to introduce any other system. 9000 w. U S Cons Repts—Vol. XV., 1898.

**Fastenings.**—Screw-Threaded Fastenings. G. D. Rice. Gives various forms of devices for keeping nuts and set screws from working loose. Ill. 800 w. Dom Engng—March, 1898.

**Manufacture.**—Screws and Screw-Making. L. A. Murray. The history of screw-making is briefly given, its requirements stated, with description of the method of manufacture. 3000 w. Sib Jour of Engng—Nov., 1896.

See also **SCREW CUTTING; SCREW DIE; SCREW MACHINE.**

**Nut.**—See **SCREW THREAD—Metric.**

**Rig.**—Rig for Making Little Screws on a Speed Lathe. Illustrated description. 800 w. Am Mach—Aug. 30, 1900.

**Square Threaded.**—Cutting Square Threaded Screws. Boyd Harriman. A thorough, practical, illustrated discussion of the different methods of making the so-called square threaded screws. 2400 w. Mach—Jan., 1896.

**Testing.**—See also **DIE—Manufacture.**

**Wood.**—Experiments and Study upon the Holding Power of Wood Screws. Norris M. Works. Reports a series of experimental tests and the conclusions. 2000 w. Trans Assn of Civ Engs of Cornell Univ—1898.

The Holding Power of Screws in Wood. Walter J. Graves. Describes tests and investigations made, giving general conclusions. 3000 w. Trans Assn of Civ Engs of Cornell Univ—1900.

Holding Power of Wood Screws. W. M. Macphail. Read before the Canadian Soc. of Civ. Engs. Gives a record of tests made to determine the relation between the strength developed and the size of the screw when driven in different sized holes in different woods, both parallel to and across the grain. Ill. 1800 w. Engng—Oct. 6, 1899.

**SCREW CUTTING.**

See also **SCREW—Manufacture; SCREW DIE: SCREW MACHINE.**

Accurate Screw Machine Work-Screw Cutting. J. O. Surface. Explanation of some methods and tools by which difficulties in this work may be overcome. Ill. 1500 w. Am Mach—Feb. 3, 1898.

"Catching the Thread" in Screw-Cutting After Running the Carriage Back by Hand. Explains the principles of a device used by the R. K. Le Blond Machine Co., of Cincinnati. Ill. 800 w. Mach, N. Y.—May, 1899.

**Metric on American Lathes.**—See **SCREW THREAD—Metric.**

**SCREW DIE.**

**Hartness.**—A Screw Die for the Turret Lathe. James Hartness. Description of a screw-cutting die, possessing novel features, and mention of other means now employed for the same purpose. Ill. 1300 w. Trans Am Soc of Mech Engs—Dec., 1897.

The Hartness System of Screw Dies. An illustrated description of die head, including a brief account of the method of making the chasers. 1700 w. Am Mach—Jan. 6, 1898.

**SCREW MACHINE.**

See also **LATHE—Turret; SCREW; SCREW CUTTING.**

A Lag-Screw Cutting Machine. An illustrated description of an interesting machine designed for cutting screw-threads upon lag-screws. 1200 w. Am Mach—Jan. 25, 1900.

**Acme.**—Multiple Spindle Automatic Screw Machine. Illustrates and describes the Acme machine and the work produced. 2000 w. Am Mach—Jan. 18, 1900.

**Automatic.**—An Automatic Screw Machine. Illustrates and describes the appearance and construction of a recently perfected machine. 1700 w. Am Mach—June 8, 1899.

Automatic Screw Machine. Illustrates and describes a fine English machine for producing all kinds of pins, collars, studs, washers, bushings, or turned work, and specially suited for the production of projectiles. 2000 w. Engng—Nov. 10, 1899.

**Spencer.**—The Spencer Automatic Screw Machine. Illustrated description of a machine designed for making all kinds of screws and studs, and also for cross-drilling pins and other parts for cycle and electric work. 2000 w. Engng—Sept. 30, 1898.

The Spencer Double-Turret Automatic Screw Machine. Illustrated description. 1500 w. Am Mach—April 22, 1897.

**SCREW PROPELLER.**

See **PROPELLER.**

**SCREW THREAD.**

See also **SCREW.**

Screw Pitches in Foreign Countries. Data upon the pitches of screws used abroad and the gearing for cutting them. 1600 w. Mach, N. Y.—Feb., 1900.

**Bicycle Construction.**—On Screw Threads Used in Cycle Construction, and for Screws Subject to Vibration. O. P. Clements. Read before the British Assn. Discusses the shape of the threads. 1200 w. Engr, Lond—Sept. 21, 1900.

See also **BICYCLE MANUFACTURE.**

**Computation.**—Notes on the Computation of Screw Threads (Beiträge zur Schraubenberechnung). H. Camerer. With diagrams showing the various stresses and formulas for computation, including the influence of torsion. 2000 w. Zeitschr d Ver Deutscher Ing—Aug. 11, 1900.

**Gauges.**—Instruments for Gauging Screw Threads (Sur les Instruments Vérificateurs des Filetages). M. Marré. Describing a system of gauges intended for use on the metric screw thread system known as the "Système Français" (S. F.). with table for the system. 6000 w. Bull de la Société d'Encour—Jan., 1898.

**Metric.**—Metric Screw Threads. Henry Harrison Suplee. Statements showing that it is not necessary to equip American lathes with metric lead screws, and describing the change gears which enable metric screws to be cut with English lead screws. 600 w. Mach, N. Y.—Feb., 1900.

Metric Screw Threads (Metrisches Gewinde). A general review of the subject, with especial reference to the recent convention at Zürich. A very complete and valuable bibliography is also given. 3500 w. Zeitschr d Ver Deutscher Ing—Dec. 3, 1898.

Rules for the Construction of Machine Screw Threads (Régles pour la Construction des Vis Mécaniques). E. Sauvage. Discussing the new metric screw thread system adopted by the Sociét d'Encouragement pour l'Industrie Nationale, and also the standard wire gauge of the same society. With graphical scale of screw proportions and a comparison with English and American threads. 4000 w. Rev de Mécanique—May, 1897.

The Metric System and Standard Screw Threads. Editorial discussion of a recommendation recently made by a committee of the House of Commons, that a law be passed making the adoption of the metric system in England compulsory within two years from its enactment. The benefits of the metric system are admitted, but the difficulties to be met in making such a change are formidable. 2800 w. Engng—Jan. 17, 1895.

The Present Status of a Standard Metric Screw Thread System (Referat über den Gegenwärtigen Stand der Frage Betreffend die Einführung eines Metrischen Gewindesystems). A discussion, by the German Railway Society, of the metric screw-thread system proposed by the international commission at Berne. 3500 w. Glaser's Annalen—Nov. 1, 1898.

See also **Standardization; Zürich Congress.**

**Metric, Nut.**—Report on the Width of Nut for the New Metric Screw System (Bericht über die Frage der Schlüsselweiten zum Neuen Metrischen Gewinde-System). An appendix to the report of the Zürich conference of 1898, discussing especially the width between opposite flat faces of nuts and bolt heads. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 27, 1899.

**Standardization.**—The Unification of Screw Threads (Unification des Filetages). The full report of the International Congress at Zürich for the unification of metric screw-thread systems, with the text of the discussions, and a bibliography of the subject. 10000 w. Bull de la Soc d'Encour—March, 1899.

The S. J. Standard Metric Thread in Continental Europe. Henry Hess. Reviews the efforts to secure uniformity in screw threads, and the "Système Internationale" adopted in Continental Europe, giving considerations to be weighed by the American manufacturer who desires to sell in foreign markets. Ill. 1200 w. Am Mach—May 3, 1900.

The Standardization of Screw Threads. A summary of information presented in a paper by Signor A. Galassini, and supplemented by facts from other sources. Serial. Engng—Jan. 19, 1900.

The Unification of Screw Threads Abroad (L'Unification des Filetages à l'Etranger). A report of a preliminary meeting held at Zürich to provide for an international convention for the discussion of a general unification of screw threads. 7500 w. Bull de la Soc d'Encour—Feb., 1898.

See also **Metric; Zürich Congress; PIPE THREAD.**

**Zürich Congress.**—Zürich International Congress for Standardizing Threads (Congrès International pour l'Unification des Filetages à Zürich). Ed. Sauvage. Short account of the more important conclusions reached by the congress. The system is practically that of the French Société d'Encouragement for metric threads. 900 w. Bull de la Soc d'Encour—Oct., 1898.

See also **Metric; Standardization.**

**SCULPTURE.**

See **MUNICIPAL ART.**

**SEA FIGHT.**

See **ARMORED SHIPS; GUN FIRE; NAVAL BATTLE; WARSHIP.**

**SEA MILL.**

See also **TIDE POWER; WAVE POWER.**

**Cephalonia.**—The Sea Mills of Cephalonia. F. W. Crosby and W. O. Crosby. Excellent description and attempted explanation of a very singular phenomenon which has been observed many years hitherto without satisfactory explanation. 7500 w. Tech Quar—March, 1896.

**SEA POWER.**

See also **NAVY; WARSHIP.**

Sea Power at the End of the Nineteenth Century. W. Laird Clowes. A full discussion of the various factors included in sea power, showing above all things the supreme importance of speed. 5000 w. Eng Mag—July, 1898.

The Essential Elements of Modern Sea Power. Vice-Admiral P. H. Colomb, R. N. A review of the naval programme of England by one of the foremost authorities upon the subject, making important comparisons between England, France and Russia. 4500 w. Eng Mag—Sept., 1898.

The Relations of the United States to their New Dependencies. Capt. A. T. Mahan. An essay upon the best method of realizing the fruits of recent over-sea victories. Colonial systems are contrasted and the beneficence of Anglo-Saxon rule defined. Strong sea-power is urged and the most cogent arguments adduced in favor of the retention of these colonial possessions. 2300 w. Eng Mag—Jan., 1899.

The Study of Sea-Power. Translated from "Marine Rundschau." A scientific and historical study. Serial. Jour of U S Art—May-June, 1900.

**SEARCHLIGHT.**

Projectors. W. H. Pretty. Part first discusses reflectors and lamps. A study of the optical arrangements suited for the purpose of transmitting the light given out by the electrical lamp. Serial. Elect'n—Feb. 19, 1897.

**Coast Defense.**—Electrical Searchlights in Sea-Coast Defense. John T. Thompson. The benefits to the defense from the use of these lights with general information. 1200 w. Elec Engng—March, 1896.

The Electric Light for Coast Defense. M. A. Boyd. Synopsis of a lecture as given in an English journal, giving views held abroad on this subject after practical tests. 900 w. W Elec—March 13, 1897.

**Dynamotor Operation.**—Method of Operating Searchlights More Efficiently by Use of Dynamotors. Alton D. Adams. On the changed conditions which render it desirable to operate searchlights independent of the voltage of the system from which the power is drawn, and how it is accomplished. Ill. 1800 w. Marine Engng—Oct., 1899.

**General Electric.**—Latest Types of General Electric Searchlights. Illustrated description. 900 w. Elec Eng—Feb. 24, 1897.

**Platinum-Hydrocarbon.**—A Portable Searchlight Apparatus (Projecteur Lumineux Portatif). A small sphere of platinum in the focus of a parabolic reflector is raised to white incandescence by the blast of a hydrocarbon vapor. The apparatus is especially applicable to military, mining, and engineering work. 1000 w. La Rev Tech—Jan. 10, 1898.

**SEA SIGNAL.**

See **ELECTRIC SIGNAL; FOG SIGNAL; NAVIGATION; SHIP TELEGRAPH; TELEPHOTOS—Boughton.**

**SEA TRAFFIC.**

See **MERCHANT MARINE; TRANSPORTATION—Ocean.**

**SECOHMMETER.**

See **ELECTRIC INSTRUMENT; INDUCTANCE.**

**SECONDARY BATTERY.**

See **ACCUMULATOR.**

**SECRETIVENESS.**

See also **WORKS MANAGEMENT.**

The Policy of Secretiveness in Industrial Works. A. E. Outerbridge. A comparison of European and American practice in regard to exclusiveness in access to workships, showing the gradual assimilation of the practice on both sides of the Atlantic. 3000 w. Eng Mag—March, 1900.

**SEE-SAW.**

**Giant.**—A Giant See-Saw, for the Tennessee Centennial Exposition, Nashville, Tenn. Gilbert P. Coleman. An illustrated description of an engineering novelty which the promoters aim to make as prominent as the Ferris wheel at Chicago. 700 w. Eng News—July 8, 1897.

See also **GEAR—See-Saw.**

**SEGER CONE.**

See **PYROMETRY—Seger Cone.**

**SELECTOR SYSTEM.**

**Drake.**—See **ELECTRIC SIGNAL—Drake Selector System.**

**SELF-INDUCTION.**

See **INDUCTANCE.**

**SEMI-STEEL.**

See **IRON—Gun; STEEL—Semi.**

**SEPIOLITE.**

Sepiolite. R. Helmhacker. Description of formation, locating deposits, and qualities of this mineral. 2000 w. Eng & Min Jour—July 25, 1896.

**SERPOLLET MOTOR.**

See **CAR—Steam Motor; STEAM TRAMWAY; STEAM VEHICLE; STREET RAILWAY—Paris.**

**SETTLEMENT HOUSE.**

**Cleveland, O.**—The Goodrich House, Cleveland, O. Illustrated description of a carefully planned building for social settlement work. 1000 w. Eng Rec—Sept. 24, 1898.

**SEWAGE.**

See also **DRAINAGE; PLUMBING; SEWAGE DISPOSAL; SEWAGE FARM; SEWER; SEWERAGE.**

**Analysis.**—Ammoniacal Nitrogen in Sewage and Effluents. W. J. Dibdin. A discussion of the analytical results of certain bacterial methods of treatment. Gives results of analyses obtained by the process known as the septic tank, and the Sutton system. 1200 w. San Rec—Jan. 7, 1898.

The Composition of Drainage Water (Sur la Composition des Eaux de Drainage). Showing the proportion of nitrogenous constituents and giving a discussion of the fertilizing value. 2500 w. Comptes Rendus—July 26, 1897.

**Bacteria.**—Methods for the Quantitative Determination of Bacteria in Sewage and Waters. George W. Fuller and William R. Copeland. Abstract of paper in Massachusetts State Board of Health Report for 1895, describing methods used at the experimental station at Lawrence. 4000 w. Eng Rec—Dec. 26, 1896.

**Boston.**—Handling Boston's Sewage. Henry G. Young. Extracts from a lecture before the Massachusetts Assn. No. 1, N. A. S. E. The growth of the system in Boston and the steam plant necessary to handle it. 1800 w. Bos Jour of Com—March 27, 1897.

See also Reservoir; SEWER; SEWERAGE.

**Compressed Air Apparatus.**—See Lift; BUILDING EXHIBIT.

**Des Moines, Ia.**—See SEWER—Flow.

**Flow.**—See Regulator; SEWER.

**Liernur Exhaust System.**—See SEWERAGE.

**Lift, Adams.**—Adams Patent Sewage Lift. Illustrated description of invention to meet the difficulty of lower levels. 900 w. Ind Engng—Aug. 21, 1897.

Sewage Elevator (Elevateur Hydro-Pneumatique). Illustrated description of the Adams system of elevating and discharging sewage by automatic siphons operated by compressed air. 2500 w. La Rev Tech—Feb. 10, 1897.

Some Applications of an English Sewage Lift. Describes and explains the use of the Adams sewage lift. Ill. 800 w. Eng Rec—Feb. 6, 1897.

The Adams Sewage Lift. Detailed illustrated description of plant having 20,000 gals. daily capacity at Great Grimsby, Eng. 1500 w. Engng—Nov. 8, 1895.

**Lift, Salem, N. J.**—An Automatic Sewage Lift, Salem, N. J. An illustrated description of plant operated by water from street mains. 700 w. Eng Rec—Nov. 5, 1898.

**Oyster Beds.**—Oysters and Sewage. Describes conditions causing enteric fever in Brightlingsea, England. 600 w. Eng Rec—May 28, 1898.

See also SEWERAGE—Baltimore.

**Poisons.**—Sewage and Zymotic Poisons. James Hargreaves. Read before the Liverpool Polytechnic Society. Poisons are divided into three classes—elemental, organic, or quasi-organic, and organised, self-propagating or parasitic poisons,—this class being that for which sewage supplies the elements for propagation, and which therefore includes the zymotic poisons with which the author deals. Methods by which these poisons are propagated and diffused, and means for their prevention are described. 3200 w. San Rec—Feb. 21, 1896.

**Pump.**—See also PUMP; PUMPING ENGINE; PUMPING STATION.

**Pumping Station, Concord, Mass.**—Municipal Lighting and Sewerage Plant, Concord, Mass. Illustrated detailed description of a small plant as nearly as possible automatic in its operation. 1300 w. Elec Wld & Engr—Jan. 13, 1900.

See also Storage Well.

**Regulator, Boston, Mass.**—A Constant Flow Sewer Regulator. Illustrated description of apparatus used to maintain a constant flow from a branch sewer into an interceptor, no matter what the height of water in the latter. 850 w. Eng Rec—June 24, 1899.

**Regulator, Cambridge, Mass.**—Sewage Regulator at Cambridge, Mass. Illustrated description of an apparatus used to regulate the flow of sewage into a main interceptor, and a device for automatically registering the state of the regulator. 600 w. Eng Rec—April 29, 1899.

**Reservoir, Moon Island, Boston.**—The Moon Island Sewage Reservoir, Boston. Illustrated description of the new basins built to hold sewage until the tide was at the proper stage for its discharge into the sea. 1800 w. Eng Rec—Nov. 4, 1899.

**Sludge.**—See SEWAGE DISPOSAL.

**Storage Well, Concord, Mass.**—Difficulties Encountered in Building the Storage Well for the Sewerage System of Concord, Massachusetts. Leonard Metcalf. Illustrated account of the essential features of the construction and some of the difficulties, the cost, etc. Discussion. 6000 w. Jour Assn of Engng Socs—May, 1900.

The Concord Sewage Pumping and Electric Station. Illustrated description of the construction of the foundations of a sewage well and pumping station under extremely difficult conditions, with notes on the power plant. 3900 w. Eng Rec—Oct. 6, 1900.

The Sewerage of Concord, Mass. Illustrated description of work involving a circular vaulted reservoir of peculiar construction, constructed with much difficulty. 1000 w. Eng Rec—Aug. 19, 1899.

See also Pumping Station.

**SEWAGE DISPOSAL.**

See also FACTORY WASTE; RIVER POLLUTION; SEWAGE; SEWAGE FARM; SEWERAGE; WATER PURIFICATION.

Modern Methods of Sewage Disposal. William Henry Preece. Extract from address before the Sanitary Inst. of Great Britain, at the Southampton meeting. Considers briefly the mechanical, chemical, and biological systems. 1800 w. Eng News—Sept. 14, 1899.

Modern Processes of Municipal Sewage Treatment (Die Behandlung Städtischer Spüljauche mit Besonderer Berücksichtigung Neuerer Verfahren). A paper read before the German Sanitary Association by Dr. Dunbar, discussing the more recent chemical methods of treating sewage, with reference also to the bacterial and sedimentation processes. 4500 w. Gesundheits Ingenieur—Dec. 15, 1898.

Purification of Sewage. E. G. Barrow. Read before the Can. Assn. of Stationary Engineers. Refers especially to the general requisites for a proper land-filtration plant, with mention of sewage farming and chemical precipitation. 2300 w. Can Engr—Sept., 1898.

Recent Developments in Sewage Purification. Gilbert Thomson. An address at the opening of the Sanitary Association of Scotland. Discusses the three chief methods in use at the present time—on land, by precipitation, and by bacteriological methods. 1600 w. Arch, Lond—Sept. 3, 1897.

Recently Improved Methods of Sewage Disposal. Details of plants inspected and the results. 3300 w. San—June, 1900.

Sewage Disposal. Benjamin F. La Rue. From "Home Study Magazine." Introductory remarks with brief notes of the methods of natural disposal, clarification and application to the soil. 2500 w. Sci Am Sup—June 11, 1898.

Sewage Disposal by Bacteria Beds and the Septic Tank. Paper by George Thudichum on the condition governing the use of these systems. 3300 w. Eng Rec—Dec. 31, 1898.

Sewage Disposal. H. deB. Parsons. Gives a brief general description of properly designed disposal works, with information bearing on the subject of purification of water, etc. 2800 w. Stevens Ind—Jan., 1899.

Sewage Disposal. W. M. Watson. An examination of some of the systems for cleansing sewage and their inefficiency; claiming that no chemical process, without some secondary treatment, is capable of producing a sufficiently pure effluent. Ill. 2000 w. Can Eng—March, 1897.

Sewage Disposal and Water Purification. Charles Francis. Urging action to prevent cities discharging their sewage into streams or water courses, and commending the methods of broad irrigation and intermittent downward filtration. 3500 w. Munic Engng—Dec., 1897.

Sewage Disposal and Water Purification. John N. McClintock. Read before the Am. Soc. of Munic. Imp. Describes the system of purification by double filtration, or by combining the settling or septic tank with single or double filtration, commending it as certain to give pure water and prevent pollution. 4500 w. Munic Engng—Sept., 1900.

Sewage, Its Purification and Disposal. Four papers bearing on this subject, by H. Kenwood and W. Butler, S. Rideal, W. D. Scott-Moncrieff, and W. E. Adeney, with discussion. 22300 w. Jour of San Inst—Jan., 1899.

Sewage Purification. E. A. Hermann. Read before the Am. Soc. of Munic. Imp. A discussion of the various systems. 3400 w. Munic Engng—Sept., 1900.

The Disposal of Sewage and Refuse. Abstract of a lecture delivered by C. S. Cannell, before the educational department of the Norwich Co-operative Society. The declaration that the people of England are wasting a grand opportunity, is followed by suggestions of methods whereby the sewage now floated out to sea, may be utilised on land as a fertilising agent. 1200 w. San Rec—March 20, 1896.

The Necessity of Effective Means of Sewage Disposal. Elmer L. Andrews. Considers nature's manner of disposal of wastes, the danger of allowing water to become polluted by sewage, and the means of solving the problem. 2000 w. Munic Engng—Feb., 1899.

The Problem of Sewage Disposal. Charles Francis. Read at the convention of the American Waterworks Assn. The two systems considered worthy of discussion are the broad irrigation or sewage farming system, and intermittent downward filtration. 3700 w. Fire & Water—July 31, 1897.

The Proper Disposal of Sewage. C. E. Grumsky. Read before the Convention of Health Officers in San Francisco. Discussing how sewage should be disposed of and collected. Filtration is considered the solution. 3700 w. San—April, 1898.

The Purification of City Sewage (Die Klärung Städtischer Abwässer). Abstract of a paper by Herr Brix, of Hamburg, reviewing the various sedimentation and precipitation processes, and emphasizing the importance of adapting the method to the local conditions. 1800 w. Gesundheits Ingenieur—Jan. 15, 1898.

**A B C Process.**—See **Kingston-on-Thames.**

**Acton, Eng.**—Purification of Sewage in England. John W. Alvord. Read before the Illinois Soc. of Engs. and Surveyors. Describes a chemical system in use in the borough of Acton, a suburb of London, its operation and efficiency. 2000 w. Munic Engng—May, 1898.

Sewage Treatment at Acton, England. James H. Fuertes. Illustrated description of a plant for a town of 7000 people, where ferozone is used as a coagulant and polarite as a filtering material. 600 w. Eng Rec—May 5, 1900.

The Purification of Sewage by the Ferozone Polarite System. John W. Alvord. Description of the original works at Acton, Eng., where this chemical system is in use, with account of the operation and efficiency. Discussion. 7500 w. Ill. Soc of Engs & Surv—1898.

**Aldershot, Eng.**—Sewage Disposal at Aldershot. A statement of the results obtained with the double bacteria-bed system. 1000 w. Eng Rec—Nov. 25, 1899.

**Alliance, O.**—Sewage Disposal at Alliance, O. Describes the operation of a plant using chemical treatment and gives the resulting purification attained. 1800 w. Eng Rec—Jan. 13, 1900.

**Altoona, Pa.**—The Sewage-Disposal Plant at Altoona, Pa. Harvey Linton. Describes the location and conditions at Altoona, with the work in preparing for filtration. Tabulated statements of all bids received are given, with a general map and profile view of the sewer, and the eastern sewage carrier, in the filter bed, etc. 5500 w. Pro Engs' Club of Phila—July-Sept., 1897.

The Sewage Filter Beds of Altoona, Pa. Information regarding the intermittent filtration adopted, and the construction of the filter beds. Ill. 2300 w. Eng News—July 22, 1897.

**Ames Works.**—Results Obtained with the Ames Sewage Disposal Works. A statement of the leading facts found by chemical and bacteriological examinations of the raw and purified sewage at a plant using some storage and then intermittent filtration. 1800 w. Eng Rec—Feb. 24, 1900.

**Asylum, London, Ont.**—A Short History of Sewage Disposal at the Asylum for the Insane, London, Ontario. R. M. Bucke. Read before the Ontario Assn. of Executive Health Officers at Ottawa. Describes an intermittent downward filtration plant, stating its advantages. 1400 w. Can Eng—Oct., 1898.

**Asylum, Verona, N. J.**—Septic Tank and Sewage Filter Beds for the Essex Co. Lunatic Asylum, Verona, N. J. Describes the largest septic tank for the treatment of sewage thus far built in the United States. 750 w. Eng News—Sept. 7, 1899.

**Bacillite, Hanley.**—Bacillite Sewage Disposal at Hanley, England. Describes a unique system of chemical treatment. 800 w. Eng Rec—March 25. 1899.

**Bacterial.**—An Experiment in Sewage Trtatment. The suggestion of W. J. Dibdin, and the trial made. The cultivation of sewage-devouring bacteria. 1100 w. San Rec—Dec. 11, 1896.

Bacterial Purification of Sewage. Samuel Rideal. This first of a series of lectures reviews the use of cesspools, the effects of dilution, chemical precipitation, etc. 5300 w. Jour Soc of Arts—July 7, 1899.

Reduction of Nitrates by Bacteria and Consequent Loss of Nitrogen. Ellen H. Richards and George William Rolfe. Interesting experiments which lead to the conclusion that bacteria are active agents in the disappearance of nitrogen in nitrogen-compounds dissolved in water. 3600 w. Tech Quar—March, 1896.

The Biological Purification of Sewage. W. J. Dibdin. Gives the history of the process, the work of the Barking filter, the Sutton filter, the septic tank system, and discusses the future developments. 1800 w. Prac Eng—Sept. 10, 1897.

The Ultimate Purification of Sewage. George Thudichum. Read before the Soc. of Engs. Describes some of the more important features of biological filtration, with a comparison between filtration and irrigation, and results of various experiments. Serial. San Rec—Dec. 18, 1896.

Bacterial Sewage Disposal During the Past Year. George Thudichum. A paper read before the Assn. of Mun. and Co. Engs., reviewing the details in which improvements have been made; with an abstract of the discussion. 6800 w. Eng Rec—Aug. 11, 1900.

The Essential Conditions of Bacterial Sewage Purification. A paper read before the British Assn. by W. J. Dibdin and George Thudichum. Gives the history of bacterial processes, and discusses air supply, temperature, light, reaction, time of contact, nature of bed material, and depth of bed. 3500 w. Eng Rec—Oct. 8, 1898.

Sewage Disposal Through the Action of Bacteria. W. M. Watson. Information gathered from leading bacteriologists, chemists and engineers, and from the writer's experience. 2300 w. Can Eng—April, 1898.

The Purification of Sewage by Bacteria. Samuel Rideal. Explains the theory of the bacterial processes and gives an outline of the different methods. Discussion follows. 9500 w. Jour Soc of Arts—Dec. 17, 1897.

The Purification of Sewage by Bacteria. Arthur J. Martin. Address delivered to the Belfast Natural Hist. & Phil. Soc. Part first is largely introductory, showing the nature and properties of sewage. Ill. Serial. San Rec—Feb. 10, 1899.

Experience with Bacteria Beds. A report to the Sanitary Institute on the water capacity, size of filtering material, and the influences on organic nitrogen. 2300 w. Eng Rec—Oct. 21, 1899.

Recently Improved Methods of Sewage Disposal. J. B. Johnson. A paper before the Science Club of the Univ. of Wisconsin, criticising chemical methods and describing the bacterial reduction method. 5500 w. Bull Univ Wis—No. 40, June, 1900.

The Bacterial Treatment of Crude Sewage. Editorial on the methods used at various places and experiments made. 2200 w. Engng—Oct. 13, 1899.

The Bacteriological Treatment of Sewage. H. T. Scoble. Read at meeting of the Surveyor's Inst., London. Reviews and discusses the various processes now in use. General discussion. 1400 w. San—April, 1900.

The Bacterial Treatment of Sewage in England. William Easby, Jr. Considers the operation of the bacterial systems and the results obtained by them. Illustrations and discussion. 12800 w. Pro Engs' Club of Phila—July, 1900.

The Utilization of Bacteria and Bacteriological Methods in Sanitary Engineering. A. C. Abbott. Calls attention to various devices favoring the application of this process in the purification of water-supply and the disposal of waste. 6800 w. Pro of Engs' Club of Phila—May, 1900.

The Bacterial Treatment of Sewage. Frank Clowes. Discusses these processes and the experience obtained from experiments, giving illustrations of some species of bacteria found in sewage. 3000 w. Nature—June 7, 1900.

The Bacterial Treatment of Sewage. A discussion of this subject, the methods of application, and points of importance. 2800 w. Engr, Lond—May 25, 1900.

See also **Aldershot; Champaign; Lawrence; Liberty; Manchester; Portadown; Scott-Moncrieff; Sutton; WATERWORKS—New England Association.**

**Bacterial, Crossness.**—See **Crossness, Eng.**

**Bacterial, East Cleveland.**—Bacterial Sewage Disposal at East Cleveland. Illustrated description of a plant for treating 150,000 gals. of sewage daily by the Waring system of preliminary filtration, aeration and final filtration. 1600 w. Eng Rec—Feb. 10, 1900.

**Bacterial, Exeter.**—Bacterial Processes of Sewage Purification. Rudolph Hering. A review of the latest developments in sewage purification by bacterial processes, with descriptions and illustrations of the works at Exeter, Sutton and Yeovil. 4500 w. Eng Mag—Sept., 1898.

Bacterial Treatment of Sewage. Editorial discussion of the systems at Exeter and Sutton, Eng., and the views presented by Messrs. Thudichum and Latham. 2000 w. Engng—Dec. 9, 1898.

Some Recent Experiments in Sewage Treatment at Exeter. Donald Cameron. Abstract of a paper read before the British Inst. of Public Health at Glasgow. The system described is based upon the idea of forwarding to fullest extent the work of natural agents. 2500 w. Engng—Aug. 21, 1896.

The Exeter Septic Tank System. Reviews the explanation given by the designer, Donald Cameron, of the principles of the system and a statement of the results attained with the first permanent plant. 3500 w. Eng Rec—March 25, 1899.

The Purification of Sewage. Editorial on the experiments being tried at Exeter, Eng., with information concerning recent systems. 2500 w. Engng—Jan. 21, 1898.

The Septic Tank System of Sewage Treatment. Donald Cameron. Portion of a paper read before the Devon and Exeter Architectural Society. Explains the system and its advantages. 1900 w. Builder—July 10, 1897.

The Septic Tank System of Sewage Treatment at Exeter, England. Albert S. Crane. Brief description of the plant and the method of operating. Also information from English engineering papers. 2400 w. Eng News—Jan. 13, 1898.

The Septic Tank Process of Sewage Treatment at Exeter and Yeovil, England. Letter to the editor describing the process so successfully carried out, with brief history of the place. Ill. 3500 w. Eng News—Oct. 26, 1899.

**Bacterial, Hampton.**—Bacteriological Sewage Works at Hampton-on-Thames. An illustrated description of the works and system, with an account of the difficulties encountered. 1200 w. Engr, Lond—Oct. 20, 1899.

**Bacterial, Manchester.**—English Experiments on the Bacterial Treatment of Sewage, with an Account of the Work Done at Manchester, England, During the Past Year. Leonard P. Kinnicutt. Reviews briefly the experimental study of this subject, giving the history of sewage treatment at Manchester, where what is known as the double contact system has been carefully studied. Ill. 13000 w. Jour Assn of Engng Socs—Feb., 1900.

**Bacterial, Owestry, Eng.**—Bacterial Sewage Treatment, Owestry, England. A statement of the results attained with contact-bed methods of treatment. 1000 w. Eng Rec—March 10, 1900.

**Bacterial, Southwold.**—The International System of Bacterial Sewage Treatment. Explains works at Southwold and Reigate, England, in which sewage is distributed by revolving arms over filters containing polarite. At Southwold there is also a preliminary filtration through anaerobic beds. 1800 w. Eng Rec—April 7, 1900.

**Bacterio-Chemical.**—Recent Advances in the Bacterio-Chemical Study of Sewage and Polluted Waters. W. E. Adeney. Read before the Inst. of Civ. Engs., of Ireland. Discusses how these matters can be treated so as to prevent after putrefaction being set up in them. 3000 w. Engng—Aug. 26, 1898.

**Barker Filter.**—See **Bacterial.**

**Berlin, Germany.**—See **SEWAGE FARM; SEWERAGE.**

**Berlin, Ont.**—See **SEWAGE FARM.**

**Brandenburg, Prussia.**—The Filtering Beds of Brandenburg, Prussia (Die Rieselfeldanlage der Stadt Brandenburg a. H.). E. Bernhard. A brief description of the large field of over 250 acres to which the sewage from Brandenburg is led for filtration. 400 w. 1 plate. Gesundheits Ing—March 31, 1900.

**Bristol, Conn.**—The Bristol, Conn., Sewage-Disposal Works. Brief description with plan. The system comprises both intermittent filtration and broad irrigation. 400 w. Eng Rec—June 13, 1896.

**Brockton, Mass.**—Experiments with Stale and Partially Septic Sewage on the Brockton Filter Beds. Outlines the difficulties met with in disposing of sludge, and describes experiments made at Brockton, Mass. Editorial comment. 3300 w. Eng News—Feb. 2, 1899.

Sewage Disposal at Brockton, Mass. Describes important practical studies on the effect of sedimentation of sewage before filtration. 2000 w. Eng Rec—July 8, 1899.

The Operation of the Brockton Sewage Filter Beds in 1895. Information on the subject of sewage filtration derived from observations of the results attained in the filter beds at Brockton, during the past year. The disposition of the sewage, without offensive odors, is as yet not satisfactorily effected at Brockton. 2300 w. Eng News—Feb. 27, 1896.

Operation of the Sewage Filter Beds of Brockton, Mass., in 1896. Information abstracted from report of F. Herbert Snow, city engineer. 2300 w. Eng News—May 20, 1897.

The Operation of the Sewage Filter Beds at Brockton, Mass., in 1899. Information from the annual report of the city engineer. 1200 w. Eng News—March 29, 1900.

**Brooklyn.**—See **Powers Chemical.**

**Cambridge, Eng.**—Cambridge Sewerage Works. James H. Fuertes. Illustrated description of an English disposal system where lime is added to sewage and the latter filtered a few minutes later. 1000 w. Eng Rec—Sept. 3, 1898.

**Canada.**—Recent Methods of Sewage Disposal. C. G. Horetzky. Read before the Assn. of Executive Health Officers of Ontario, and before the Am. Public Health Assn. Considers the most recent methods in operation in the United States, with remarks on their adaptability to cities in Canada. 3300 w. Can Eng—Oct., 1898.

See also **Irrigation; SEWAGE FARM—Montreal.**

**Central Falls, R. I.**—Sewage Purification by Intermittent Filtration at Central Falls, R. I. Description with plan. 1000 w. Eng News—Sept. 1, 1898.

The Sewage Disposal Plant at Central Falls, R. I. W. F. Keene. Illustrated description. 1000 w. Eng Rec—April 24, 1897.

**Champaign, Ill.**—The Champaign Septic Tank. Describes the construction of two tanks at Champaign, Ill., and gives a statement of their working. 1000 w. Eng Rec—Feb. 11, 1899.

The Septic Tank of the Champaign Sewerage System. Arthur N. Talbot. Explains the process and the conditions under which the tank named is operated. Also editorial on "The Proper Size for Septic Sewage Tanks." 4500 w. Eng News—Aug. 17, 1899.

**Chemical.**—Purification of Sewage (Klärversuche). A discussion of the Permanganate and Ferozone-Polarite Systems of purifying sewage water. 4000 w. 1 plate. Gesundheits Ingenieur—Jan. 15, 1897.

Sewage Analysis and the Chemical Treatment of Sewage. Leonard P. Kinnicutt. Considers what sewage is and how an idea of its character is obtained, and the amount of purification accomplished by different methods of treatment. Gives special information concerning the chemical treatment. 5000 w. Eng News—May 11, 1899.

The Treatment of Sewage by Chemicals in Perfect Solution. Herbert Henry Law. Read at the Newcastle Congress of the Sanitary Inst. Brief statement of difficulties, and short description of proposed treatment at Oldham. 1000 w. San Plumb—Dec. 1, 1896.

See also **Acton; Alliance; Hamilton; Lincoln; London; Newport; New Rochelle; Powers.**

**Chichester, Eng.**—Sewage Disposal at Chichester, England. James H. Fuertes. Illustrates and describes works to store, clarify by chemical treatment, and filter the sewage of a sea-coast town of 4000 population. 900 w. Eng Rec—Feb. 10, 1900.

**China.**—Sewage and Garbage Disposal in China. Reports by John Fowler and J. W. Ragsdale, U. S. Consuls at Chefoo and Tientsin. 1000 w. Eng Rec—Aug. 11, 1900.

See also **SEWERAGE—Hong Kong.**

**Chorley, Eng.**—Sewage Disposal at Chorley, England. Illustrated description of a plant using ferozone precipitation and polarite filters. 1000 w. Eng Rec—Nov. 26, 1898.

The Chorley Sewage Works. Illustrates and describes an intermittent system of purification. 1700 w. Can Engr—Dec., 1898.

**Clinton, Mass.**—The Clinton, Mass., Sewage Disposal System. Illustrated description of a pumping plant, reservoirs, and filter beds built by the Metropolitan Water Board to prevent the pollution of the Nashua River. 1800 w. Eng Rec—Jan. 14, 1899.

The Clinton, Mass., Sewage Disposal System. Illustrated description of works noteworthy for the air pipes used to clean sewage basins and for concrete distributers for spreading sewage uniformly over filter beds. 500 w. Eng Rec—March 8, 1900.

**Coal Filtration.**—More About Filtration of Sewage Through Coal. Information from a paper by A. Bostock Hill, given in response to an inquiry. Gives details of the construction of the filter tried at Wolverhampton, Eng. 1400 w. Munic Engng—May, 1898.

Sewage Filtration Through Coal. A review of experiments at Lichfield and Wolverhampton yielding new information on the value of coal for treating effluents of chemical and septic tanks. 1800 w. Eng Rec—Feb. 3, 1900.

Sewage Disposal by Artificial Filtration. G. Reid. Read at meeting of Assn. of Municipal and County Engineers, England. Describes the Garfield Coal Filter and reports favorably regarding its efficiency. 2500 w. Builder—July 3. 1897.

**Coke Beds, Crossness.**—See **Crossness, Eng.**

**Coke Breeze.**—On the Use of Coke Breeze in Sewage Purification. John W. Alvord. Detailed review of the development of coarse grain filters, and experiments relating to them. Discussion and correspondence. 6000 w. Jour W Soc of Engs—June, 1898.

**Cologne.**—The Purification of Sewage at Cologne (Klärung der Kanalwässer der Stadt Köln). Report of Prof. Fraenkel upon the best method of purification. Sedimentation is recommended in two pools alternately emptied and cleaned. 3500 w. Gesundheits Ingenieur—Nov. 15, 1897.

**Congleton, Eng.**—The Utilization of Town Sewage. Alderman Maskery. A paper read in relation to the Peat system of town refuse utilization as adopted at Congleton. 2500 w. San Rec—March 19, 1897.

**Connecticut Commission.**—The Report of the Connecticut Sewage Disposal Commission. Abstract of a valuable report on the disposal of sewage under conditions existing in the State named. 2300 w. Eng News—Feb. 16, 1899.

**Country.**—Rural Drainage. Briefly discusses the methods which are utilized with more or less success for the disposal of sewage; gives early use of sewers, etc. From "The Builder." 4000 w. Dom Engng—Jan., 1897.

Rural Drainage. The first part is preliminary and discusses definitions, statutes, etc. Serial. Builder—July 4, 1896.

Sewage Purification in Rural Districts. J. Aldersey Davenport. Advocates the use of intermittent downward filters. 1000 w. San Rec—Nov. 19, 1897.

The Best Method of Sewage Disposal on Farms and in Small Communities. B. C. Brett, in the "Medical Age." Suggestions easily carried out at small cost, and, with proper attention, insuring health and cleanliness. 2200 w. Sci Am Sup—June 26, 1897.

See also **SANITATION.**

**Country Club House.**—A Small Septic and Nitrification Sewage Treatment Plant Near Chicago. Alvord & Shields. An interesting account of the construction and working of a plant for a large golf and polo club house near Chicago. 2000 w. Eng News—Sept. 7, 1899.

**Country House.**—Country Houses and the Disposal of Their Sewage. Address by George E. Waring before the Metropolitan Club, New York. Principles governing the work at the present time. A plain, practical treatment of the subject. 3500 w. Dom Engng—July, 1896.

Disposal of Wastes from Country Homes. H. C. Patterson. Illustrates and describes inexpensive plans and methods. 400 w. Dom Engng—Oct., 1899.

Drainage as Applied to Country Houses. W. J. Wells. Read before the Inst. of Sanitary Engs. Part first presents the difficulties to be overcome in rural drainage and deals briefly with cesspools. 1600 w. San Rec—Jan. 22, 1897.

Sewage Disposal for Country Houses. Explaining how their work of purification may be carried on by means of artificial filtration and land-irrigation. 1800 w. San Rec—Feb. 10, 1899.

See also **DRAINAGE; SANITATION.**

**Crossness, Eng.**—The Bacterial Treatment of Crude Sewage at Crossness. Conclusions concerning the experimental intermittent treatment of London crude sewage in the coke beds, as taken from the report of the London County Council. 4800 w. Engr, Lond—Oct. 20, 1899.

The Use of Coke in the Treatment of Sewage. Review of the report of Frank Clowes on the bacterial treatment of sewage, giving an account of experiments carried out on the crude sewage of London in the coke beds at Crossness. 5000 w. Jour Gas Lgt—Oct. 24, 1899.

Recent Crossness Experiments with Bacterial Sewage Treatment. Gives results of passing sewage intermittently through beds filled to depths of 4, 6, and 13 feet with coke of the size of English walnuts. 3000 w. Eng Rec—Oct. 28, 1899.

Report on Sewage Sludge Deposits on the Experimental Coke Beds, London, England. Information from reports of Frank Clowes and A. C. Houston on the character of the deposits, the bacteria, and other matters of interest. 1100 w. Eng News—March 8, 1900.

**Damages, New York.**—Damages Due to Sewage Disposal. Reviews a recent decision by the State Supreme Court of New York. 1500 w. Eng Rec—June 4, 1898.

Damages Due to Sewage Disposal in New York. A statement, largely quoted from a recent decision of the State court of final resort, outlining the remedies open to a property owner injured by the disposal of sewage from public sewers. 1200 w. Eng Rec—June 16, 1900.

**Deery.**—See **Waring and Deery.**

**Denny and Duniface.**—Denny and Duniface Sewage Filtration Works. Drawings and photographs of these sewage filtration works, with description. The whole of the sewage is treated by intermittent downward filtration. 700 w. Eng, Lond—March 12, 1897.

**Dilution.**—The Dilution Process of Sewage Disposal. Rudolph Hering. An examination of the conditions under which sewage may be made harmless as a waste discharge by dilution in public water courses and other bodies of water. 3500 w. Eng Mag—July, 1898.

Purification of Sewage by Mixing with Pure Water. W. M. Watson. Thinks it perhaps possible that a rapid flowing river might purify its contents, but considers it improbable that it will purify raw sewage. 1300 w. Can Eng—Oct., 1898.

See also **Storm Water.**

**Dublin.**—See **Oxygen System.**

**Ealing, Eng.**—The Sewerage of Ealing, England. James H. Fuertes. Describes a system of treatment involving the use of lime, clay and sulphate of alumina, with the cremation of the sludge. 700 w. Eng Rec—April 21, 1900.

**East Molesey, Eng.**—East Molesey Drainage and Sewage Disposal Works. Illustrated detailed description. Separate system adopted. Storm water excluded. Two-page inset. These works constitute a model plant in many respects. 2000 w. Engng—Dec. 20, 1895.

The East Molesey Sewage Works. General description of plant and methods with editorial remarks. 2500 w. Mach, Lond—March 15, 1896.

**Effluent Treatment.**—Treatment of the Effluent from Sewage Precipitation Works. Kenneth Allen. Presents the frequent necessity of subsequent purification, giving the methods used in numerous foreign cities, and data furnished by recent investigators. 3400 w. Munic Engng—Sept., 1897.

**Electricity.**—The Application of Electricity in the Sewage Problem. Abstract of a paper by John W. Langley giving the results of his experiments and investigations. 1000 w. Elec—Nov. 20, 1895.

See also **SANITATION—Woolf Electrolytic.**

**England.**—Recent Progress in Sewage Purification in England. Abstract of paper read by Gilbert J. Fowler before the Am. Soc. of Munic. Imp. Gives outline of experiments on biological methods of sewage treatment and conclusions. 900 w. Munic Engng—Oct., 1900.

The Sewage Problem. Editorial discussion of how to deal with sewage in England. The self-purifying process in operation in Sutton (Surrey) District Council is favorably reported. 1800 w. Prac Eng—Sept. 10, 1897.

**Essex Fells, Boston.**—The Essex Fells Sewage Filter. Illustrated description of a simple and effective method of purifying a daily flow of about 20,000 gallons, by distributing it over the surface of natural beds of gravel in which drains are laid to carry the inoffensive effluent into an adjacent brook. 700 w. Eng Rec—July 3, 1897.

**Europe.**—The Present European Practice in Regard to Sewage Disposal. Allen Hazen. A general review of the subject. 8000 w. Jour Assn of Eng Soc—Dec., 1896.

**Exeter, Eng.**—See **Bacterial, Exeter.**

**Factory Wastes.**—See **FACTORY WASTE.**

**Farm.**—See **Irrigation; SEWAGE FARM.**

**Ferozone Polarite.**—See **Acton; Chemical; Lincoln; WATER PURIFICATION.**

**Fertilizer.**—The Conversion of Discharges into Poudrette (Die Verwandlung der Faeces in Poudrette). A paper read by Dr. Vogel before the German Association for Sanitary Promotion, describing the chemical treatment by which night soil is converted into an inoffensive fertilizer. 3500 w. Gesundheits Ingenieur—March 15, 1897.

**Filter Beds.**—See **Altoona; Brandenburg; Brockton; Canada; Irrigation; Paris, Tex.; Pawtucket; SEWAGE FARM.**

**Filtration.**—The Purification of Sewage by Filtration. Henry Law. Read at the Sanitary Inst. Congress. The filtration of sewage when the insoluble solid matters have been removed by previous precipitation is considered. 1800 w. San Rec—Nov. 20, 1896.

**Friern Barnet, Eng.**—Sewage Disposal at Friern Barnet, England. James H. Fuertes. Illustrated description of a plant with many ingenious mechanical devices, which was built by Baldwin Latham in 1887. Chemical treatment and filtration are employed. Serial. Eng Rec—Oct. 15, 1898.

**Garbage.**—See **REFUSE DISPOSAL.**

**Garfield Filter.**—See **Coal Filtration.**

**Glasgow.**—Sewage Disposal at Glasgow. James H. Fuertes. Illustrated description of works for treating 12,000,000 gals. daily by chemical precipitation and filtration through sand and coke. 2000 w. Eng Rec—May 20, 1899.

**Great Grimsby, Eng.**—See **SEWAGE—Lift, Adams.**

**Hamilton, Ont.**—Report on the Precipitation System of Sewage Disposal in Operation at Hamilton, Ont. W. M. Watson. Details and account of expenses, showing that the system is very costly. 2500 w. Can Engr—June, 1898.

Sewage Disposal Works, Hamilton. Illustrated description of this efficient system. 1500 w. Can Eng—Jan., 1897.

Sewage Disposal by Chemical Precipitation at Hamilton, Ont. E. G. Barrow. Brief illustrated account of the works now being constructed. 900 w. Eng News—Jan. 28, 1897.

**Hanley, Eng.**—See **Bacillite.**

**History.**—Progress in Sewage Purification. W. Kaye Parry. Paper before the Royal Institute of Public Health arraigning recent claims to novelty and pointing out early investigations and successes in sewage disposal by clarification and filtration. 2000 w. Builder—Sept. 3, 1898.

**Hospital, Evansville.**—A Hospital Sewage Disposal System. Illustrated description of the combined chemical treatment and filtration system installed at the Southern Hospital for the Insane, Evansville, Ind. 700 w. Eng Rec—March 11, 1899.

Precipitation and Filtration of Sewage. G. C. Mason. Brief account of the sewerage system at the Southern Indian Hospital for Insane, Evansville, Ind. 900 w. Dom Engng—Feb., 1899.

**Huddersfield, Eng.**—Sewage Purification. An exceedingly well prepared article dealing broadly with the subject and presenting illustrations of the important English sewage filtration works at Huddersfield and Melton Mowbray. 3000 w. Ind & Ir—May 1, 1896.

**Independence, Mo.**—The Septic Tank System at Independence. Illustrated description of a number of septic tank and filter plants for different sections of Independence, Mo. 1000 w. Eng Rec—June 16, 1900.

**Indiana Law.**—The Indiana Sewage Disposal Law. Analysis of the decision of the Supreme Court of Indiana, permitting the pollution of streams by the sewage from towns, but forbidding it in the case of sewage of industrial establishments. 2600 w. Eng Rec—Aug. 4, 1900.

**Iowa State College.**—The Iowa State College Sewage Disposal Plant. Illustrated description of works on the intermittent filtration system, in which a partial septic action is obtained by preliminary storage of the sewage. 2500 w. Eng Rec—Feb. 17, 1900.

**Irrigation.**—Sewage Irrigation. George W. Rafter. Contains many details and gives a discussion of sewage purification in the United States, with descriptions of the works at various localities. Ill. 36500 w. U S Dept of the Interior—1897.

Sewage Irrigation for Profit. Walter C. Parmley. Discussion of the general irrigation question, and pointing out the conditions whereby even sewage may become a producer of wealth. 4000 w. Ill Soc of Engs & Surv—11th An Rept, 1896.

Sewage Irrigation in Europe and America. H. Alfred Roechling. Read at the Congress of the Sanitary Inst., Newcastle. The term "sewage irrigation" as used includes all forms of applying sewage to land. Part first is a general consideration of the subject. Serial. San Rec—Dec. 4, 1896.

See **Brandenburg; Canada; Filter Beds; Los Angeles; Nottingham; Paris; Plainfield; SEWAGE FARM.**

**Irrigation, Canada.**—Purification of Sewage by Irrigation. W. M. Watson. Discusses methods and their degree of success, describing the sewage farm of St. Laurent College, near Montreal and also the sewage works of the Georgian Bay district. 1700 w. Can Eng—Oct., 1898.

**Kingston-on-Thames.**—Sewage Disposal, Kingston-on-the-Thames, England. James H. Fuertes. Illustrated description of a plant treating the sewage of a population of 43,000 by the A B C process, which, in its latest form, is described in detail. 1100 w. Eng Rec—April 8, 1899.

**Land Use.**—The Proper Use of Land in Connection with Sewage Purification. W. J. Dibdin. Consideration of means of attaining the best results. 1400 w. San Rec—April 1, 1898.

**Lawrence, Mass., Experiments.**—Sewage Treatment. Douglas Galton. Paper read before the Sanitary Institute. Gives an account of the Massachusetts experiments, and the conclusions to which they point, the object being to open a discussion of the subject by members of the institute. Serial. Ind & Ir—Dec. 20, 1895.

Massachusetts Experiments on the Purification of Fresh, Stale, and Septic Sewage. H. W. Clark. A brief review of the work at the Lawrence experiment station, and results of investigations recently made. 5800 w. Eng News—Aug. 4, 1898.

Experiments on Sewage Purification at the Lawrence Experiment Station During 1898. From the report of the Massachusetts State Board of Health, outlining the work. 2000 w. Eng News—Dec. 21, 1899.

Recent Lawrence Experiments in Sewage Disposal. A review of the investigations of the Massachusetts Board of Health in 1898, with septic tank and bacteria bed methods of disposal. 3200 w. Eng Rec—Dec. 23, 1899.

See also **SEWAGE—Bacteria.**

**Leeds, Eng.**—The Leeds Sewage Disposal Experiments. From a progress report of the Sewage Committee, describing the different systems tested and giving the results obtained. 1700 w. Eng Rec—Sept. 22, 1900.

Sewage Disposal Experiments at Leeds. A review of experiments with various bacterial processes, chemical treatment and land filtration. 1000 w. Eng Rec—Nov. 4, 1899.

The Treatment of Leeds Sewage. Abstract of a report of the Leeds Sewage Committee on experiments with various systems. 1200 w. Engr, Lond—Sept. 7, 1900.

**Leicester, Mass.**—Sewage Disposal by Intermittent Filtration at Leicester, Mass. Information concerning this plant, which seems to be giving satisfaction, and of the character of the sewage. 1400 w. Eng News—April 5, 1900.

**Leyton, Eng.**—See **REFUSE DISPOSAL.**

**Liberty, N. Y.**—Septic Sewage Disposal at Liberty, N. Y. Illustrated description of a plant to dispose of the sewage of a resort where land for filtration was unobtainable. 1200 w. Eng Rec—Aug. 18, 1900.

**Lichfield, Eng.**—See **Coal Filtration.**

**Lincoln, Eng.**—Sewage Disposal at Lincoln, England. James H. Fuertes. Illustrated explanation of the works for chemical treatment with ferozone, filtration of the sewage thus dosed through polarite beds, and the use of the effluent for irrigation. 1100 w. Eng Rec—Dec. 23, 1899.

**Litchfield, Conn.**—Sewage Disposal on Land at Litchfield, Conn. Information of a satisfactory system. 500 w. Eng News—Oct. 28, 1897.

**London.**—London Sewage Disposal. James H. Fuertes. Description of methods and results at two large chemical-treatment plants. Serial. Eng Rec—Aug. 27, 1898.

The Purification of the Thames, England. Gives the results which have followed the chemical clarification of London sewage. 2000 w. Eng Rec—June 17, 1899.

See also **Crossness; RIVER POLLUTION—Thames; SEWERAGE; WATER PURIFICATION—Thames.**

**Los Angeles, Calif.**—Operation of the Los Angeles Outfall Sewer and Sewerage Irrigation. Burr Bassell. A brief description of the sewer with account of its operation, and of the sewerage irrigation and its results. Discussion follows. Ill. 7800 w. Jour Assn of Engng Soc—Aug., 1897.

**Madison, Wis.**—Chemical Precipitation and Rapid Filtration of Sewage at Madison, Wis. Outlines the history of sewage disposal in this city and gives an illustrated description of the new plant in operation since June, with objections raised and alleged defects. 4400 w. Eng News—Dec. 28, 1899.

The Unsuccessful Sewage Purification Plant at Madison, Wis. Extracts from the report of F. E. Turneaure, with explanatory notes. 3300 w. Eng News—Oct. 11, 1900.

**Manchester, Eng.**—Manchester Sewage Disposal. Descriptions of important extensions of the sewerage system of Manchester, by a scheme of effluent disposal, and a further scheme of sludge disposal, in addition to the original scheme of main drainage now being carried out. 4500 w. Engr, Lond—Sept. 25, 1896.

Manchester Sewage Disposal Scheme. Discusses the modified scheme now adopted. 2000 w. Engr, Lond—Dec. 4, 1896.

The Manchester Sewage Disposal Experiments. Illustrated description of the bacteria beds, septic tank system and Roscoe filters used in 1898 and 1899, and their method of operation. Serial. Eng Rec—June 23, 1900.

Manchester Sewage. Editorial on the changes in disposal made necessary by the construction of the ship canal, and the experiments made. 3000 w. Engng—Dec. 1, 1899.

Manchester Sewage. Report of investigations made by three experts is outlined and some points discussed. 3000 w. Engr, Lond—Nov. 24, 1899.

Sewage Disposal at Manchester, England. James H. Fuertes. Illustrated description of the chemical treatment works in use in 1899, and a brief description of the experiments to find some more satisfactory system. 1400 w. Eng Rec—Dec. 2, 1899.

See also **Bacterial.**

**Marion, Ia.**—A Sewage Distributing Tank and Automatic Dosing Apparatus for Marion, Ia. F. A. Barbour. Illustrates and describes the apparatus and gives an outline of the proposed plan of treatment. 2000 w. Eng News—July 13, 1899.

**Massachusetts and Rhode Island.**—See **WATER SUPPLY.**

**Massachusetts Experiments.**—See **Lawrence.**

**Melton Mowbray, Eng.**—See **Huddersfield, Eng.**

**Mendota, Ill.**—Sewage Disposal at Mendota, Ill. Illustrated description of the first system of intermittent filtration in the State, with a summary of the chemical analyses of sewage and effluent. 900 w. Eng Rec—May 26, 1900.

**Mixing with Water.**—See **Dilution Process.**

**Montreal.**—See **Irrigation, Canada; SEWAGE FARM.**

**Natick, Mass.**—The Natick, Mass., Sewage Reservoirs. Very complete illustrated detailed description. 1800 w. Eng Rec—April 25, 1896.

The Sewage Disposal Works of Natick, Mass. Illustrated detailed description. 900 w. Eng News—June 4, 1896.

**Natural Agencies.**—Sewage Sludge Disposal by Natural Agencies. G. Sims Woodhead. Read at the Engineering Conference of the Inst. of Civ. Engs., England. Brief notes on the treatment of solid matter in sewage. 1100 w. Engr, Lond—June 16, 1899.

**New Jersey Law.**—See **RIVER POLLUTION; SEWERAGE.**

**Newport, Isle of Wight.**—Sewage Disposal at Newport, Isle of Wight. Illustrates a chemical treatment plant and an inverted syphon. 700 w. Eng Rec—April 16, 1898.

**New Rochelle, N. Y.**—Chemical Treatment of Sewage at New Rochelle, N. Y. Describes the operation of a small plant. 700 w. Eng Rec—April 23, 1898.

Sewage Precipitation Works of New Rochelle, N. Y. H. de B. Parsons. Illustrated description. 1200 w. Stevens Ind—April, 1899.

**Nottingham, Eng.**—The Sewerage of Nottingham, Eng. James H. Fuertes. Describes and illustrates a 900-acre sewage farm. Serial. Eng Rec—July 16, 1898.

**Oldham.**—See **Chemical.**

**Overbrook, N. J.**—The Septic Tank at Overbrook, N. J. Describes a small system and gives the results attained in its use. 1200 w. Eng Rec—Dec. 16, 1899.

**Oxygen System.**—The Oxygen System of Sewage Purification. W. H. Watson. Explains the System of the Sewage Purification Co., of Dublin, Ireland. 700 w. Can Eng—April, 1898.

**Paris.**—Diversion and Purification of the Sewage of Paris. An account of this scheme and its practical realization, which marks the progress of sanitary science in France. 2800 w. Engr, Lond—Nov. 24, 1899.

Progress Made in the Purification of the Sewage of Paris. J. F. Flagg. Descriptive account of improvements being made for the purification of all the sewage of Paris before admitting it into the Seine. 5000 w. Eng Rec—Dec. 5, 1896.

The General Distribution of the Sewage of Paris (L'Emissaire Général des Esaux d'Egout de la Ville de Paris). E. Fourrey. The second paper is devoted to the sewage pumping machinery and the purification beds. 2500 w. Revue Technique—Oct. 10, 1899.

The Present Condition of Sewage Disposal at Paris. An outline of the progress since 1895, in the works executed for diverting the sewage of Paris from the River Seine. 1000 w. Eng News—Aug. 17, 1899.

See also **SANITATION; SEWAGE FARM; SEWER; SEWERAGE.**

**Paris, Texas.**—Sewage Filter Beds at Paris, Tex. Information regarding the first sewage purification plant in the south. Ill. 1100 w. Eng News—Aug. 12, 1897.

**Pawtucket, R. I.**—Purification at Pawtucket, R. I. George A. Carpenter. Illustrated detailed description giving plan of sewage, filter beds, and settling tanks, etc. 1700 w. Eng News—Jan. 2, 1896.

The Operation of the Pawtucket, R. I., Sewage Filter Beds. Information of the successful operation of sand filters. 700 w. Eng Rec—March 6, 1897.

**Peat System.**—See **Congleton, Eng.**

**Permanganate.**—See **Chemical.**

**Plainfield, N. J.**—Notes on the Operation of the Sewage Filter Beds of Plainfield, N. J. An account of the operation of this intermittent filtration system which has been in use three years. Ill. 1000 w. Eng News—March 16, 1899.

The Sewerage and Sewage Disposal Systems of Plainfield, N. J. Andrew J. Gavett. Illustrated detailed description. Irrigation system. Contract prices for different parts of the work. 7000 w. Eng News—Sept. 10, 1896.

**Portadown, Ireland.**—The Septic Tank at Portadown, Ireland. Description of plant treating 22,000 gallons of sewage daily by the Exeter bacterial system. 1200 w. Eng Rec—Oct. 1, 1898.

**Powers Chemical, Brooklyn.**—Chemical Sewage Treatment, Brooklyn, N. Y. Illustrated description of works for treating about 5,000,000 gals. of sewage daily by the Powers patented process. 800 w. Eng Rec—March 25, 1899.

**Pullman, Ill.**—See **SEWAGE FARM.**

**Reading, Pa.**—Improved Methods for the Purification of Sewage and Water, as shown in the Operation of the Municipal Plant at Reading, Pa. John Jerome Deery. Part first gives an illustrated detailed description of the sewerage system. Serial. Jour Fr Inst—Sept., 1899.

Rapid Double Filtration and Aeration of Sewage at Reading, Pa. Illustrated description of purification plant where the sewage is first screened through coke, then filtered twice, being aerated by dropping from the first filter bed to the second. 5500 w. Eng News—Jan. 27, 1898.

**Refuse.**—See **REFUSE DISPOSAL.**

**Reigate, Eng.**—See **Bacterial, Southwold.**

**Richmond, Eng.**—The Richmond Drainage and Sewage Works. A popular description of the plant and process of treatment. 2500 w. Mach, Lond—Feb. 15, 1896.

**River Pollution.**—See **FACTORY WASTE; RIVER POLLUTION.**

**Rockingham Co., N. H.**—A Small Sewage Disposal Plant. General description of plant, with plans at the Rockingham County farm, New Hampshire. 450 w. Eng Rec—May 9, 1896.

**Roscoe Filter.**—See **Manchester, Eng.**

**Rural Districts.**—See **Country; SANITATION—Country.**

**Salford, Eng.**—Sewage Disposal at Salford. General description with sketch plan. 2300 w. Eng, Lond—Jan. 17, 1896.

**Scott-Moncrieff.**—The Biolysis of Sewage. Describes the theory of the Scott-Moncrieff cultivation tanks and the new apparatus to replace filters in purifying the effluent. 1500 w. Eng Rec—Nov. 26, 1898.

The Scott-Moncrieff System of Sewage Disposal. Detailed description of the process and of the steps by which its present condition has been reached. Ill. 2500 w. Engr, Lond—Jan. 26, 1900.

**Sedimentation.**—The Sedimentation Process in Sewage Disposal. Arthur N. Talbot. Describes this method, recommending it where an inexpensive method is essential, and as a preliminary process. Discussion follows. 3500 w. An Rept of Ill Soc of Engs & Surv—1897.

**Septic Tank.**—See **Bacterial; Champaign; Liberty.**

**Sheffield, Eng.**—Sewage Disposal at Sheffield, England. Gives the results of investigations with various methods of disposal, and the final recommendations for new works. 2100 w. Eng Rec—June 9, 1900.

**Sludge.**—Sewage Sludges. Reviews the work of Dr. W. E. Adeney in demonstrating that sludge can be prevented from having offensive "after-putrefaction." 2000 w. Eng Rec—Feb. 4, 1899.

The Problem of Sewage Sludge Disposal. W. L. Hedenberg. Discusses the four general methods of sludge disposal, and their advantages and objections. 3000 w. Munic Engng—Jan., 1900.

See also **Worcester, Mass.**

**Soil Pollution.**—Soil Pollution from Careless Disposal of Sewage. F. A. Lyman, in the "Medical Age." Showing the danger arising from this source and the great importance of securing pure air and pure water. 1300 w. San Rec—July 8, 1898.

**Southampton, Eng.**—See **SEWERAGE.**

**South Framingham, Mass.**—Underdrainage Purification Plant, Sewerage System of South Framingham, Mass. Illustrated description. 1100 w. Eng News—Feb. 13, 1896.

See also **SEWAGE FARM.**

**Southwold, Eng.**—See **Bacterial, Southwold.**

**Spandau, Prussia.**—Plans for the Sewage Purification Plant at Spandau (Entwurf sur Kanalwasser-Reinigungs-Anlage für Spandau). Describing the pumping, settling and purifying plant intended to permit the discharge of the sewage of the city into the Havel; the oxide of iron process is the method adopted. 4500 w. Gesundheits-Ingenieur—Sept. 15, 1897.

**Spencer, Mass.**—Sewage Purification by Intermittent Filtration at Spencer, Mass. Information of this plant with details of the sewage-screening chamber. 1500 w. Eng News—March 24, 1898.

**State Supervision.**—See **WATER SUPPLY.**

**Storm Water.**—The Provision for Storm Water in Sewage Purification Work. A. J. Martin. Condensed from a paper read before the Sanitary Inst. at Southampton. A discussion of the difficulties and statement of conclusions. 2800 w. Eng News—Nov. 16, 1899.

See also **SEWER.**

**Sutton, Eng.**—Sutton Sewage Disposal Works. The bacterial process has been for some time in operation and an account is given of the results obtained and the manner of obtaining them. Ill. 2800 w. Engr, Lond—Oct. 13, 1899.

See **Bacterial, Exeter; England; SEWERAGE.**

**Sutton Filter.**—See **Bacterial.**

**Taunton, Mass.**—See **SEWERAGE.**

**Tidal Waters.**—Sewage Disposal in Connection with Tidal Waters. H. Bertram Nichols. Particulars relating to what has been done in some of the principal English seaside towns, the methods of treatment adopted, and the points of discharge. Discussion. 5000 w. Jour of San Inst—Jan., 1899.

The Disposal of Sewage in Tidal Estuaries. G. Sims Woodhead. Points out the different conditions in some large tidal rivers, and discusses what is necessary in order that purification may take place. Also discussion. 8500 w. Jour of San Inst—April, 1898.

**Toronto.**—A Novel Method of Sewage Disposal. Especially Designed for the City of Toronto. C. G. Horetzky. Details of the method adopted with cost of construction and annual maintenance. 2500 w. Can Engr—Jan., 1899.

**Trade Wastes.**—See **FACTORY WASTE.**

**Ultimate Purification.**—See **Bacterial.**

**United States.**—See **Canada.**

**United States Law.**—A Federal Decision on Sewage Disposal Nuisances. Reviews the case of a resident of one state against a city in another, and gives the court's summary of the principles of law governing nuisances to private parties from public sewerage and drainage systems. 1700 w. Eng Rec—July 29, 1899.

**Walsall, Eng.**—See **SEWERAGE.**

**Waring and Deery.**—Some Methods of Sewage Disposals. W. M. Watson. Describes the methods employed in the sewage purification systems of the late George E. Waring and Jerome Deery. 2500 w. Can Engr—March, 1899.

**Waring Filtration.**—See **Bacterial, East Cleveland.**

**Waterloo, Ont.**—Sewage Filter Beds at Waterloo, Ont. Illustrated detailed description of a plant well adapted to the use of a small town. 900 w. Eng News—April 2, 1896.

**Weston Factory, Waverly Park, N. J.**—See **PLUMBING.**

**Winsford.**—Sewage Filtration at Winsford. Describes a system of filtration which has been in use for nearly twenty years with marked success, and the conditions which have made the cost of operation small. 8300 w. Engr, Lond—June 17, 1898.

**Wolverhampton, Eng.**—See **Coal Filtration.**

**Woolf Electrolytic.** See **SANITATION.**

**Woonsocket, R. I.**—Sewage Disposal at Woonsocket, R. I. Illustrated description of the covered settling basins and filtration system recently built. 1500 w. Eng Rec—Feb. 18, 1899.

**Worcester, Mass.**—Recent Changes in Sewage Disposal, Worcester, Mass. Illustrated review of the history of the plant, explaining the peculiar difficulties in treating the 17,100,000 gals. of sewage from the city, and describing the sludge-pressing and filtration works recently added to the original chemical treatment works. 3500 w. Eng Rec—March 17, 1900.

The Worcester Sludge Process. Illustrated description of the largest sewage filter press plant in the United States. 1400 w. Eng Rec—April 21, 1900.

**Yeovil, Eng.**—See **Bacterial, Exeter.**

**SEWAGE FARM.**

See also **SEWAGE DISPOSAL—Irrigation; SEWERAGE.**

Raising Crops on Sewage Filter Beds. Experience at Pullman, Ill., at Berlin, Ont., and at South Framingham, Mass. 1500 w. Eng News—June 11, 1896.

Sewage and Sewage Farms. J. H. Garrett. The faults of the system as at present practiced in many places, and their remedies. 2000 w. San Rec—Aug. 28, 1896.

**Berlin.**—A Visit to a New Sewage Farm at Berlin. Allen Hazen. Photographs taken during the visit are given and described. All the sewage is treated by applying it to land. 1500 w. Eng News—Sept. 16, 1897.

Notes on the Berlin Sewage Farms. James H. Fuertes. Illustrated article on details of these farms not before made public. 600 w. Eng Rec—June 10, 1899.

The Irrigation Fields of Berlin and Their Discharge Water (Die Rieselfelder der Stadt Berlin und ihre Abwasser). A discussion with professional opinions upon the nature of the drainage from the sewage irrigated farms near Berlin, with chemical analyses. 4000 w. Gesundheits-Ingenieur—June 15, 1898.

See also **SEWERAGE.**

**Blankenberghe, Belgium.**—See **SEWERAGE.**

**Brockton, Mass.**—See **SEWAGE DISPOSAL.**

**Colliery Villages.**—See **SEWERAGE.**

**Edinburgh.**—See **SEWERAGE.**

**Milk.**—The Healthfulness of Milk from Dairies on English Sewage Farms. Interesting information given in a recent report of Frederick W. Andrews, to the Secretary of State for War. 1000 w. Eng News—Aug. 16, 1900.

**Montreal.**—New Sewage Farm for the St. Denis Ward of Montreal. Illustrated description of a farm of 20.05 acres, which it is expected will care for the sewage of 12,000 people. 800 w. Eng News—Jan. 25, 1900.

Purification of Sewage by Means of the Soil. George Janin. Discusses the experiments and conclusions regarding the purification by the soil and agricultural utilization of sewage, the operation and rules, giving report of the sewage farm of St. Laurent College. Ill. 5400 w. Can Soc of Civ Engs—Adv. Brief—April 12, 1900.

See also **SEWAGE DISPOSAL—Canada; Irrigation.**

**Paris.**—Irrigation with Paris Sewage. A notice of the unusually high rate of irrigation per acre which must be adopted for a portion of the sewage farms in order to comply with the law. 900 w. Eng Rec—Aug. 5, 1899.

The Aqueduct and Sewage Farm at Achères (L'Aqueduct et le Parc Agricole d'Achères). A very complete and fully illustrated account of this great sewerage work at Paris. 70000 w. 10 plates. Ann des Ponts et Chaussées—Part II.—1897.

The Sewage Farm of Achères, Paris. An article prepared from data contained in a very full description by the engineers in charge, published in the "Annales des Ponts et Chaussées." 3500 w. Eng News—March 17, 1898.

See also **SEWAGE DISPOSAL; SEWERAGE.**

**St. Laurent, Montreal.**—See **Montreal.**

**Salt Lake City.**—See **SEWERAGE.**

**Stretford, Eng.**—The Management of Sewage Farms. A statement, by H. Royle, of the methods employed in Stretford to prevent land sickness and yield good effluents. 1900 w. Eng Rec—Aug. 4, 1900.

**SEWAGE LIFT.**

See **SEWAGE—Lift.**

**SEWAGE PUMP.**

See **PUMP; PUMPING ENGINE; PUMPING STATION; SEWAGE.**

**SEWER.**

See also **DRAIN; DRAINAGE; PLUMBING; SEWAGE; SEWAGE DISPOSAL; SEWAGE FARM; SEWERAGE.**

**Assessments.**—Assessments for Sewers and Water Mains. Charles Carroll Brown. Proposes a method of assessment which is in a measure proportional to the amount of use made of the system. 800 w. Munic Engng—Oct., 1898.

Liability for Cost of Main Sewers. Review of a decision by Lord Pearson, of the Scottish Courts, upholding the corporation as against a disputing property owner. 1000 w. Arch, Lond—Sept. 2, 1898.

See also **SEWERAGE.**

**Boston.**—See **Concrete—Expanded Metal; Design; High-Level Gravity; Storm Water; SEWERAGE.**

**Brantford, Ont.**—See **SEWERAGE—Separate System.**

**Brick.**—Heavy Sewer Work. Describes the construction of brick sewers in the twenty-third and twenty-fourth wards of New York City. 1100 w. Eng Rec—Aug. 28, 1897.

**Brick, Single-Ring.**—The Construction of a Seven Foot Single Ring, Brick Sewer. C. M. Rickard. The cause for the construction of this unusual sewer was limited appropriation. The nature of the soil through which it was run and the method of executing the work are described. 1400 w. 10th An Rept of Ill Soc of Eng & Surv—1895.

**Bridge, London, Ont.**—Carrying a Steel Pipe Sewer Across a Bridge at London, Ontario. Describes the carrying of a 36-in. main across the river Thames, at an elevation of 24-ft. above low water, at London, Ontario. Ill. 600 w. Eng News—July 14, 1898.

**Brussels.**—See **Storm Water.**

**Cambridge, Mass.**—Experience in Sewer Construction. L. M. Hastings. Notes experiences gained in the city of Cambridge, Mass., bearing on the difficulty of excavating and maintaining trenches, and expensive bracing and other work affecting the character and cost of the system. Ill. Discussion. 4500 w. Jour Assn of Engng Socs—March, 1899.

**Catch Basin.**—See **Cleaning.**

**Cement and Clay.**—European Methods of Testing Sewer Pipes of Cement and Clay. A review of the preliminary report of M. Gary to the International Association for Testing Materials. Data concerning Continental practice are given. 1000 w. Eng News—Sept. 8, 1898.

**Chicago.**—Intercepting Sewers in 12th St. and 22d St., Chicago. Illustrated description of the first two sewers of the intercepting system which is to carry the sewage to the Chicago River. 2000 w. Eng News—Feb. 24, 1898.

The Intercepting Sewers of Chicago. Describes the work done to keep sewage from Lake Michigan, and illustrates a novel form of shield used on one of the tunnels. 3000 w. Eng Rec—Aug. 12, 1899.

The New Intercepting Sewerage System of Chicago. Illustrates details of this work, which is described in outline, for turning sewage from Lake Michigan toward the drainage canal. 1600 w. Eng Rec—April 9, 1898.

The New Intercepting Sewer for Chicago. Describes this important work and gives an abstract of the specifications for the main conduits on Lawrence ave., and 39th street. Ill. 6500 w. Eng News—April 21, 1898.

The New Sewer System of Chicago. A brief account of the extensive work in progress and its cost, with a statement of the conditions which led to the undertaking. Ill. 2000 w. Engr, Lond—July 22, 1898.

See also **RAINFALL.**

**Cincinnati, O.**—See **Repairs.**

**Cleaning.**—Cleaning Catch-Basins, Yonkers, N. Y. Illustrated description of a simple apparatus resulting in a decrease in the cost of cleaning. 500 w. Eng Rec—Dec. 17, 1898.

Cleaning Catch-Basins and Sewers. A. Prescott Folwell. Explains the methods and cost of such work in many American cities. 2500 w. Eng Rec—June 16, 1900.

Cleaning Sewers. Elmer D. Fletcher. A discussion of the merits of various methods. 1300 w. Eng Rec—April 7, 1900.

Sewer Catch-Basin and Cleaning Apparatus at Wilmington, Del. T. Chalkley Hatton. A brief description of a catch-basin and apparatus invented by the writer, which has proved satisfactory and economical. Ill. 700 w. Eng News—March 30, 1899.

See also **Maintenance; SEWERAGE—Walsall.**

**Cleveland.**—Walworth Run Sewer, Cleveland, O. A circular sewer of concrete and brick on an oak grillage was built under difficult conditions by methods described. 1000 w. Eng Rec—Dec. 18, 1897.

**Columbus, O.**—An Interesting Sewer Inspection. Describes the conditions of an interesting sewer in Columbus, Ohio, after six years' service. 600 w. Eng Rec—June 16, 1900.

**Concrete.**—See also **Storm.**

**Concrete-Expanded Metal.**—A Composite Sewer. Illustrates sewers of concrete and expanded metal used in Boston. 300 w. Eng Rec—April 2, 1898.

**Concrete-Steel.**—A French Achievement. Describes a sewage force-main 4793 ft. long built of concrete and steel bars. 800 w. Eng Rec—Oct. 22, 1898.

**Concrete, Washington.**—The North Carolina Avenue Concrete Sewer, Washington, D. C. Alexander Crawford Chenowith. Six illustrations of different stages of the work with description. 600 w. Stone—Oct., 1898.

**Concrete, Wilmington.**—Concrete Monolithic Sewers of Wilmington, Del. T. Chalkley Hatton. Illustrated description. 1500 w. Eng Rec—March 6, 1897.

**Damages.**—See **Storm Water Damages.**

**Deep Trenching.**—Deep Sewer Trenching. Illustrated description of the methods adopted in building a sewer in sand, with its invert 35 to 40 ft. below the street level. 1300 w. Eng Rec—Sept. 1, 1900.

**Denver, Colo.**—Note on the Sewers and Pavements of Denver, Colo. A description of comparatively recent work. 700 w. Eng News—Nov. 10, 1898.

See also **Storm Water.**

**Design.**—See also **Storm Water; SEWERAGE—Tables and Diagrams.**

**Design, Boston.**—New Units in the Design of Sewers. A discussion of the methods used in determining the unusually large amount of sewage per capita, 300 gals., on which the design of the south Metropolitan sewers of Massachusetts were based. 1100 w. Eng Rec—March 25, 1899.

**Dijon, France.**—The Main Sewers of Dijon, France (Les Grands Collecteurs de la Ville de Dijon). Charles Mocquery. A full and well illustrated description of the Dijon sewer system. 25000 w. 6 plates. Ann d Ponts et Chaussées—1st quarter —1900.

**Dislocation, Lynn.**—The Dislocation of a Brick Sewer in Soft Ground, at Lynn, Mass. Description, with engraving, and proposed remedy. 400 w. Eng News—Feb. 13, 1896.

**Electric Navigation.**—Electric Navigation in a Sewer. Explains the numerous ways in which electricity was employed in the construction of a masonry sewer at Worcester, Mass. 1300 w. Eng Rec—Oct. 30, 1897.

**Excavating Machinery.**—Sewer Excavating Machinery. Illustrated detailed description. 500 w. Eng Rec—Jan. 11, 1896.

**Flow.**—A Table for Computing Flow in Sewers. A very useful table with description of method of applying it. 600 w. Eng News—Jan. 16, 1896.

Gaugings of the Dry Weather Flow of Sewage at Des Moines, Ia. J. A. Moore and W. J. Thomas. A compilation of data from records of various sewer flow gaugings in American cities. Illustrated description of apparatus for gauging flow, and a diagram of hourly pumpage and sewer-flow at Des Moines, June 30 to July 16, 1895. 3800 w. Eng News—Feb. 27, 1896.

Sewer Discharge and Velocity. Albert Wolheim. Formulae, diagrams, and two tables, one giving proportional values of velocity and discharge of circular sewers at different depths of flow and when flowing full. 300 w. Pav & Mun Engng—April, 1896.

The Methods and the Results of Experiments for the Determination of the Velocity of the Flow of Water, under Direction of the Bureau of Surveys, City of Philadelphia. Charles Jacobsen. Describes experiments illustrating the work being done under the direction of the Bureau of Surveys, to determine the size of sewers, the velocity of the flow of water, and the relative percentage of the amount of rainfall which would reach the sewer. Discussion follows. Ill. 6000 w. Pro Engs' Club of Phila—July, Sept., 1897.

See also **Flush Tanks; Manhole for Gauging; SEWAGE—Regulator.**

**Flow, Joints.**—The Effect of Imperfect Joints upon the Flow in Pipe Sewers. Prepared from a thesis by G. D. Holmes. Experiments made with six-inch vitrified tile pipe, showing generally an increase of velocity with the smooth interior. 2500 w. Trans of Assn of Civ Engs of Cornell Univ—June, 1897.

**Flushing.**—Flushing in Pipe Sewers. H. N. Ogden. Considers the subject carefully and the hydraulic problem involved, giving much needed information on the use of flush-tanks. 4400 w. Pro of Am Soc of Civ Engs—March, 1896.

Flushing Pipe Sewers. H. N. Ogden, Jr. Abstract of a paper read at meeting of Am. Soc. of Civ. Engs. Reports experiments made on sewers of Ithaca, N. Y., and conclusions drawn from available information, with summary of discussion. 1600 w. Eng News—May 12, 1896.

Sewer Flushing. Review of new method, by J. H. Fuertes, for determining the flushing power of discharges of different volumes in sewers of different grades. 1000 w. Eng Rec—Nov. 26, 1898.

Systems of Sewer Flushing and Suggestions on Flush-Tank Design and Construction. Andrew Rosewater. An analysis of the relative merits of the various methods of flushing sewers, with suggestions as to the construction, operation and care of the flushing devices in general use. 2300 w. Eng News—May 6, 1897.

The Effect of Flushing Devices for Small Sewers. Illustrated description of valuable experiments in Washington. 2500 w. Eng Rec—Nov. 12, 1898.

**Flushing Apparatus.**—A Portable Sewer-Flushing Apparatus. Illustrated description of apparatus used in New Haven, Conn., whereby work that used to require from eight to ten days is now performed in two or three hours. 900 w. Eng Rec—Feb. 8, 1896.

**Flushing Tunnel.**—The Milwaukee River Flushing Tunnel. Lawrence Fitch. Describes the successful plan brought forth by Mr. Benzenberg for overcoming the unhealthful condition of this stream. 1100 w. Yale Sci M—Feb., 1897.

**Flush Tanks.**—Effect of Size, Grade and Length of Sewers upon the Efficiency of Automatic Flush Tanks. A practical discussion of the subject, reviewing current practice with automatic flush-tanks, and seemingly proving that at distances of 2000 ft. the flow in a sewer is very little if at all accelerated by the use of automatic flush-tanks. 900 w. 10th An Rept of Ill Soc of Eng & Surv—1895.

**Gas.**—Sewer Air; Mistaken Ideas Regarding It. Leonard P. Kinnicutt. Discusses the chemical composition and what is known of the micro-organisms, and claims there is little danger from the amount that ever enters dwellings. 3200 w. Munic Engng—Aug., 1899.

Sewer Gas and Its Disposal. Paul Plimton. Discusses the methods that have been suggested and the need of attention to this subject. 1100 w. San Plumb—Feb. 1, 1897.

Sewer Gas: Its Danger to Health. Dr. Joseph Priestley. Explains the source of sewer gas and its dangers. 1800 w. San Rec—Jan. 8, 1897.

See also **Ventilation; VENTILATION—Air Ducts.**

**Gas, Newport, Ky.**—Deadly Sewer Gas. Report of William Attlesey on the disaster in Newport, Ky., which caused destruction of life and property. 1800 w. Dom Engng—Oct., 1897.

**High-Level Gravity, Boston.**—Studies for a High-Level Gravity Sewer for Boston and Vicinity. From a report of the Metropolitan Sewerage Commission recommending a plan for a high-level gravity sewer for the Charles and Neponset River valleys, and figures in the quantity of sewerage, the effect upon the waters of the harbors, etc. Ill. 2300 w. Eng News—March 16, 1899.

**Infiltration.**—Infiltration of Ground Water into Pipe Sewer Systems. Prepared from a thesis by F. S. Senior. An attempt to throw some light in an experimental way, upon the question of what is a fair amount of infiltration to be expected from the joints of sewer pipe laid in water, before the cement has well set. 3500 w. Trans of Assn of Civ Engs of Cornell Univ—June, 1897.

See also **Water Bearing Soils.**

**Intercepting.**—See **Chicago; SEWERAGE—Delhi; Salt Lake City.**

**Intercepting and Relief.**—Intercepting and Relief Sewers. Charles Carroll Brown. The object of the writer is to show that the principles of intercepting and relief sewers can often be applied with advantage to the sewer system of small cities. 1500 w. Munic Engng—Aug., 1896.

**Intersections, Baltimore.**—Sewer Intersections at Baltimore, Md. Charles P. Kahler. Description with explanatory diagrams of the chamber or conical section as employed in Baltimore. Also accompanied photographs reproduced in half-tone. 350 w. Eng News—April 9, 1896.

**Invert Block.**—A New Form of Sewer Invert Block. Arthur N. Talbot. Read before the Illinois Soc. of Engs. and Survs. A comparison of circular and egg-shaped sewers, with description of a new form of invert block for use with circular sewers. 900 w. Munic Engng—March, 1899.

A New Sewer Invert Block. Illustrated description of the block designed by A. N. Talbot to concentrate the minimum flow in a sewer in a channel of small radius. 900 w. Eng Rec—Jan. 6, 1900.

**Iron Pipe.**—See **Pipe.**

**Joints.**—Joining of Sewers and Drain Pipes. R. S. Rounthwaite. General defectiveness of this class of work. Methods employed are described and criticised. 2200 w. Ind & Ir—Sept. 11, 1896.

Sewer Pipe Joints in England. John A. Turner.

Illustrated description of various types. 2000 w. Brick—July, 1898.

The Packing of Terra Cotta Pipes (Ueber das Dichten von Steingutröhren). Describing improved methods of making tight bell joints with terra cotta drain pipe with especial reference to the use of asphalt. 4000 w. Gesundheits Ingenieur—Aug. 31, 1897.

**Joints Obstruction.**—See **Flow, Joints.**

**Legal Damages.**—See **Storm Water Damages.**

**Los Angeles.**—See **SEWAGE DISPOSAL.**

**Lynn, Mass.**—See **Dislocation.**

**Macon, Ga.**—See **Tile Alignment.**

**Maintenance.**—Sewer Maintenance. W. C. Parmley. Discusses what is an adequate and efficient system of sewerage, and its maintenance, after being put in operation. 5500 w. Jour Assn of Engng Socs—June, 1900.

Sewer Construction and Maintenance. Report of a discussion in which the views of a number of New England engineers were given. 3500 w. Eng Rec—June 24, 1899.

See also **Cleaning; SEWERAGE—Separate System.**

**Maintenance, Providence.**—Maintenance of Sewers at Providence, R. I. Allen Aldrich. Results from an experience of 26 years. Ill. 4800 w. Eng News—March 30, 1899.

The Maintenance of Catch-Basins and Sewers in Providence. An article based on the quarter century of experience in such work of the present head of the sewer maintenance force in that city. 2600 w. Eng Rec—March 25, 1899.

**Maintenance, Winchester, Mass.**—Maintenance of Sewers. Elmer D. Fletcher. Letter giving methods of cleaning by floats, employed at Winchester, Mass. 700 w. Eng Rec—Jan. 27, 1900.

**Manhole for Gauging.**—Manhole for Gauging. Illustrated description of a special manhole with triangular weir for catching sewage at Liberty, N. Y. 400 w. Eng Rec—Oct. 20, 1900.

**Medford, Mass.**—Municipal Practice in Sewer Construction. Medford, Mass. T. Howard Barnes. Historical account of the work and the important details of the system. 2000 w. Eng Rec—Oct. 30, 1897.

**Melbourne.**—See **SEWERAGE; TUNNEL—Shield.**

**Municipal Construction.**—See **Medford, Mass.**

**Newton, Mass.**—See **SEWERAGE.**

**New York, Canal St.**—See **ELECTRIC CONDUIT TRAMWAY—New York.**

**Outlet, Burlington, Iowa.**—The New Sewer Outfall at Burlington, Ia. Illustrates and describes a structure designed to take the place of an outlet three times destroyed by storms. 1000 w. Munic Engng—Oct., 1900.

**Outlet, Ithaca, N. Y.**—The Sewer Outfall at Ithaca, N. Y. An interesting example of cheap and easily constructed work, designed by Mr. Rudolph Hering. Ill. 400 w. Eng Rec—Feb. 8, 1896.

**Outlet, Niagara, Ont.**—Sewer Outlets at Niagara Falls, Ont. Charles H. Mitchell. The novel features are illustrated and described. 1400 w. Eng News—May 13, 1897.

**Outlet, Paris.**—See **Paris; SEWAGE DISPOSAL—Paris; SEWAGE FARM—Paris; SEWERAGE—Paris.**

**Outlet, Springfield, Mass.**—Sewer Outlets in Springfield, Mass. Brief illustrated description of the construction of three sewer outlets in the Connecticut river. 500 w. Eng Rec—Sept. 11, 1897.

**Oval.**—Formulas for Computing Quantities of Brickwork in Egg-Shaped Sewers. Philip P. Farley. Formulas given were developed for the writer's own use. 400 w. Eng News—April 19, 1900.

**Overflow, Cleveland.**—A Large Overflow Chamber. Illustrated description of an overflow on a sewer 14¾ ft. in diameter, at Cleveland, O. 1200 w. Eng Rec—Dec. 16, 1899.

**Overflow, Denver.**—A Storm Water Overflow, Denver. Illustrates and describes a spillway in connection with the Delganey Street Sewer Extension, and explains its operation. 600 w. Eng Rec—Sept. 9, 1899.

**Paris.**—The Achères Aqueduct, Paris. Describes siphon and masonry conduit on the main outfall sewer of Paris. Ill. Serial. Eng Rec—April 9, 1898.

The Mechanical Plant of the Great Clichy Collecting Sewer (Les Installations Mécanique du Grand Collecteur de Clichy). R. Legouës. Describing the various mechanical devices used in the construction of this great Paris sewer; including shields, hydraulic cylinders, conveyors, pumps, motors, etc., etc. 7500 w. Revue de Mécanique—May, 1898.

The Sewers of Paris—An Inverted Siphon under the Seine. The sewer is lined with sheet iron and consists of a shaft at one bank connecting with a tunnel under the river, which rises gradually into the sewer on the other bank. 700 w. Sci Am Sup—Jan. 25, 1896.

Visiting the Sewers of Paris. From "Le Génie Civil." Illustrated description by an eye-witness, with map of itinerary followed in visits to the sewers. 1100 w. Sci Am Sup—Sept. 5, 1896.

See also **SEWAGE DISPOSAL; SEWAGE FARM; SEWERAGE; TUNNEL—Shield.**

**Peoria, Ill.**—West Bluff Sewer System. Peoria, Ill. A. D. Thompson. Illustrated detailed description of the design and construction, cost, etc. 4800 w. Eng News—Jan. 28, 1897.

**Philadelphia.**—See **SUBWAY.**

**Pipe.**—Iron Pipe for Sewers. Charles Carroll Brown. A criticism on the action taken in an Illinois city, with some of the objections to iron pipe. 800 w. Munic Engng—May, 1898.

Notes on the Construction of Pipe Sewers. H. E. Riggs. On methods of construction, mode of handling certain perplexing problems and pipe laying. 4300 w. Technic—1897.

Sewer Pipe: Its Manufacture. Anton Vogt. Part first considers the setting of the pipes in the kiln. Serial. Brick—May 1, 1899.

Sewer Pipe; Its Manufacture. A complete account of the process, including water smoking, heating up, vitrifying, salting and cooling. 4300 w. Brick—June 1, 1899.

See also **Steel; Tile Alignment.**

**Pipe, Earth Pressure.**—The Strength of Sewer Pipe and the Actual Earth Pressure in Trenches. Frank A. Barbour. Experiments are described which were undertaken to determine where and under what circumstances it is necessary to use other than standard pipe, and whether failures are due to poor pipe or poor construction. Tabulated results are given, also discussion. Ill. 17500 w. Jour Assn of Engng Socs—Dec., 1897.

**Pipe, England.**—Sewer Pipe Manufactured in England. J. A. Turner. An account of the material used and an illustrated description of the more recent methods. 3800 w. Brick—Oct., 1898.

**Pipe Joints.**—See **Joints; Flow, Joints.**

**Pipe Tests.**—Sewer Pipe Tests. Charles E. Greene. Describes tests made and gives results and conclusions. 1600 w. Technic—1897.

**Providence.**—See **Maintenance.**

**Providence, R. I., Tunnel.**—The Providence Sewer Tunnel. Illustrated description. 600 w. Eng Rec—July 25, 1896.

**Rain Water.**—See **Storm Water; DRAINAGE; RAINFALL.**

**Reading, Pa.**—Submerged Pipe Line for the Pennsylvania Sanitary Sewerage Company at Reading, Penna. William H. Deehant. Illustrated description followed by discussion. 4000 w. Pro Eng's Club of Phila—July, Oct., 1896.

**Regulator.**—See **SEWAGE.**

**Repairs, Cincinnati.**—Sewer Repairs, Cincinnati, O. Describes the method of reconstructing the invert of a 9½ ft. sewer without stopping the flow of sewage. 1000 w. Eng Rec—April 15, 1899.

**Roots.**—Injuries to Sewers by Roots. Description of the construction of pipe sewers in Washington to prevent this trouble. 2500 w. Eng Rec—Aug. 20, 1898.

**St. Louis.**—Repairs to a Large St. Louis Sewer. Illustrates and describes the method of replacing the timber bottom of a sewer from 15 to 26 feet wide, by a concrete and brick invert. 500 w. Eng Rec—March 17, 1900.

**Separate.**—See **SEWERAGE.**

**Shield Driving.**—See **TUNNEL.**

**Siphon.**—System of Siphon and Refuse Holder for Street Gullies. Illustrated description of a French water trap system whereby odors and gases from sewers are prevented from gaining access to the air in streets. 1300 w. San Rec—Feb. 21, 1896.

See also **Paris; Woonsocket; SEWERAGE—Newton.**

**Small Cities.**—Sewers for Small Cities. Alfred E. Phillips. Considers some general propositions applicable to all cases, that should be given weight in planning a system, with hints as to the best method of carrying out the work. 4300 w. Wis Eng—Jan., 1897.

See also **SANITATION.**

**Steel.**—A Steel Street Sewer. Illustrates a 48 and a 66-inch riveted steel sewer in Jersey City. 500 w. Eng Rec—April 2, 1898.

See also **Pipe; WATER PIPE.**

**Steel Tunnel.**—See **TUNNEL—Steel Cylindrical.**

**Storm-Water.**—A Graphical Method for Determining the Capacity of Storm-Water Sewers. Clinton S. Burns. Shows how a graphical diagram may be constructed to afford an easy means of obtaining results from the new formulae proposed by W. Santo Crimp and Charles E. Bruges. 1700 w. Engng Jour—May, 1897.

A Large Storm-Water Sewer. Illustrated description of special intersections and crossings of main sewers in Boston. 600 w. Eng Rec—March 10, 1900.

Notes on Storm-Water Sewers. Explains the determination of their sizes and gives a diagram for estimating the rainfall for which they should be proportioned. 2200 w. Eng Rec—Oct. 1, 1898.

See also **DRAINAGE; RAINFALL; SEWAGE DISPOSAL; SEWERAGE—Taunton, Mass.**

**Storm-Water, Brussels.**—A Concrete Storm-Sewer in Brussels, Belgium. Interesting, instructive, illustrated description of large concrete works designed to carry the storm flow of a stream that flows through an important part of the city, and attains a great volume after each heavy rainfall. 500 w. Eng News—March 26, 1896.

**Storm-Water Damages.**—Damages for Inadequate Sewerage Works. Review of decisions of Supreme Courts of New York and Delaware concerning a city's responsibility for sewers too small to remove heavy rainfalls. 1100 w. Eng Rec—Sept. 3, 1898.

**Storm-Water, Denver.**—A 94-in. Sewer and Storm Overflow at Denver, Colo. Illustrated detailed description. 1800 w. Eng News—Dec. 26, 1895.

**Subway.**—See **SUBWAY—Philadelphia.**

**Surveying.**—Laying Out Sewer Work. W. K. Hatt. Some notes descriptive of the field work in laying out sewer lines for construction, the operations of giving line and grade. 1700 w. Pro of Purdue Soc of Civ Engs—1897.

**Terra Cotta Joints.**—See **Joints.**

**Tile Alignment.**—Alignment of Tile Sewer Pipe in Macon, Ga. Illustrated description of devices and methods successfully employed. 300 w. Eng Rec—March 14, 1896.

**Tunnel.**—See **Flushing Tunnel; Providence; Waterbury; SEWERAGE—Melbourne; TUNNEL.**

**Under Tramway.**—See **ELECTRIC CONDUIT TRAMWAY—New York.**

**Ventilation.**—A New Method of Ventilating Sewers. Charles Cameron. Read at a meeting of the Royal Inst. of Archts. of Ireland, May 25, 1899. Describes a sewer diffuser ventilator, which has given satisfaction in Dublin. 1300 w. Builder—June 17, 1899.

Sewer Ventilation.. A. Prescott Folwell. A description of the various methods employed, the results attained with each, and the present practice, as learned from recent investigations. 3900 w. Eng Rec—March 3, 1900.

Sewer Ventilation. J. W. Hughes. Read before the American Public Health Assn. at Philadelphia. Opposing what is known as the intercepting trap, with reasons. 1300 w. Metal Work —Nov. 6, 1897.

Sewer Ventilation. J. W. Hughes. Opposes the use of the intercepting trap, giving reasons. 1400 w. Dom Engng—Jan., 1898.

Sewer Ventilation. Report of the Sanitary Committee of Cardiff. A tabulated statement of replies received from various towns as to certain points in connection with the subject. 1800 w. Plumb & Dec—April 1, 1897.

Sewer Ventilation and Its Bearing upon Public Health. Edward Walford. From report submitted to Health Committee. Gives the results of investigations at different points. Thinks when sewers are well constructed and thoroughly flushed, the ventilation is a matter of minor importance. Serial. San Rec—July 23, 1897.

Some New Theories on Sewer Ventilation. J. Morgan, in "The Surveyor." Briefly reviews existing systems and describes the method approved by the author. 1200 w. San Plumb—Sept. 1, 1899.

The Construction and Ventilation of Sewers. W. Gruggen. Considers the requirements of a properly designed sewer. 2000 w. San Rec—Dec. 16, 1898.

The Effective Prevention and Dissemination of Noxious Gases in Sewers. Frank Latham. On the proper means of sewer ventilation, so as to remove the gaseous effluvia in a manner that will least tend to vitiate the air. Serial. San Rec—July 15, 1898.

See also **Gas; DRAINAGE—House; DRAIN—Ventilation.**

**Ventilation, Diphtheria.**—The Ventilation of Sewers and Drains as a source of Diphtheria. James Aitken. Extracts from experts showing that when sanitary improvements have caused a decrease of ordinary diseases, they have frequently been accompanied by an increase of diphtheria. Ill. 1400 w. San Rec—Oct. 28, 1898.

**Vienna.**—The Collecting Sewer on the Right Bank of the Danube Canal at Vienna (Der Sammelcanal am Rechten Ufer des Donau Canales in Wien). An account of the inspection of this important work by the Austrian Society of Engineers, with photographs illustrating work in progress. 3000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Jan. 28, 1898.

**Water Bearing Soils.**—Sewer Construction in Water Bearing Soils. Andrew W. Gates. A practical essay on methods of procedure in cases where pressure of water in the soil gives trouble. Short discussion by members. 2900 w. 10th An Rept of Ill Soc of Eng & Surv.—1895.

See also **Infiltration.**

**Waterbury, Conn.**—The Round Hill Street-Sewer Tunnel in Waterbury, Conn. Detailed description of the construction of a sewer tunnel, necessarily built very deep. Ill. 1500 w. Eng Rec—Aug. 28, 1897.

**Wilmington, Del.**—Shipley Run Sewer, Wilmington, Del. T. Chalkley Hatton. Illustrated description. 1500 w. Eng Rec—Oct. 10, 1896.

See also **Concrete.**

**Winchester, Mass.**—Winchester, Mass., Sewer Details. Illustrated detailed description, also comprising the methods employed by the sewer committee in using help resident in the town, and the method of proceeding whereby applicants obtain house connections. 1100 w. Eng Rec—April 25, 1896.

**Woonsocket, R. I.**—Sewer Work at Woonsocket, R. I. Illustrated description of inverted siphons, weir, manholes and tunneling operations. 600 w. Eng Rec—March 31, 1900.

**Worcester, Mass.**—See **Electric Navigation; SEWERAGE.**

**SEWERAGE.**

See also **DRAINAGE; PLUMBING; SEWAGE; SEWAGE DISPOSAL; SEWAGE FARM; SEWER.**

The Principles of Drainage and Sewerage. A discussion of the principles that should govern the construction, with some consideration of cost. 2800 w. Dom Engng—Aug. 15, 1900.

**Assessment.**—Apportioning the Expenses of Joint Sewerage Works. A review of a method like that of clearing house settlements, making each part-owner of the works pay in proportion to the amount of sewage and ground water contributed, and its advantage in location. 1000 w. Eng Rec —May 26, 1900.

See also **SEWER.**

**Baltimore, Md.**—Baltimore Sewerage. A review of the final recommendations of a commission appointed to consider the sewerage and sewage disposal of Baltimore, where the oyster interests seriously interfere with usual practice. 1100 w. Eng Rec—Aug. 26, 1899.

Baltimore Sewerage Plans. A sewerage commission has recommended the construction of sewers costing about $10,500,000. Describes the conditions existing and the system adopted. 2000 w. Eng Rec—Dec. 18, 1897.

The Sewerage of Baltimore. Kenneth Allen. Read before the Am. Soc. of Munic. Imp. Describes the present situation and outlines the proposed system. 2200 w. Munic Engng—Jan., 1899.

See also SEWER—Intersections.

**Berlin.**—Operation of the Berlin Sewerage System and Sewage Farms for the Year 1898-99. Allen Hazen. Abstract from "Verwaltungs-Bericht des Magistrats zu Berlin." 700 w. Eng News—May 24, 1900.

The Municipal Sewage Works of Berlin (Die Städtischen Kanalisationswerke Berlins). Abstracts from the official report for the fiscal year 1898-99 on the sewer system and filtration beds, giving various statistics. 1600 w. Gesundheits Ingenieur—July 15, 1900.

The Sewers and Sewage Farms of Berlin. Review of a report made by the French government engineer, F. Launay, with illustrated description. 4400 w. Eng News—Aug. 27, 1896.

See SEWAGE FARM.

**Blankenberghe, Belgium.**—Notes on the Sewerage of Blankenberghe. Illustrated description of a system which consists in carrying all matters into sewers and using the sewage for fertilizing the land. Serial. Engr, Lond—Jan. 1, 1897.

**Boston.**—See also SEWAGE; SEWER.

**Boston Suburbs.**—The New Massachusetts Metropolitan Sewerage Project. Explains the main features of a $4,600,000 undertaking for the district south and west of Boston. 500 w. Eng Rec—March 18, 1899.

**Brixworth, Eng.**—Village Sewerage Schemes. Rev. Dr. Cox. Experiments in the rural district of Brixworth, Eng., giving attempts and failures. 2500 w. Jour San Inst—April, 1899.

**Calcutta.**—Calcutta Drainage Scheme. A brief outline of the history of the drainage, with sketch. 1400 w. Ind Engng—Jan. 23, 1897.

**Colliery Villages.**—Sewerage and Sewage Disposal of Colliery Villages. John Edward Parker. Read at the congress of the Sanitary Inst., Newcastle-on-Tyne. Insanitary condition of many colliery villages. What has already been done, and what remains yet to be done for their improvement. Serial. Ind & Ir—Sept. 11, 1896.

**Concord, Mass.**—See SEWAGE—Concord, Mass.

**Country.**—See Brixworth; SEWAGE DISPOSAL.

**Delhi, India.**—Drainage Works, Delhi. B. Parkes. Part first gives a synopsis of various projects framed for the sewerage of Delhi, and plan showing route of intercepting sewer and city ditch. Serial. Ind Engng—Dec. 12, 1896.

**Depew, N. Y.**—The Sewerage System of Depew, N. Y. Illustrated description of details of sewers and chemical treatment works for sewage disposal. 1200 w. Eng Rec—July 9, 1898.

**Edinburgh.**—The Sewerage of Edinburgh, Scotland. James H. Fuertes. Illustrates and describes the novel details of the works and of the method of irrigating with the sewage. 1000 w. Eng Rec—Jan. 13, 1900.

**English Communities.**—See WATER SUPPLY.

**Estimates.**—See Tables and Diagrams: SEWER—Design.

**Faesz, Hungary.**—See WATERWORKS.

**Flemington, N. J.**—The Sewerage Works at Flemington, N. J. Illustrated description of the construction and cost of sewers for a village of 2200 people, with broad irrigation fields for disposal. 2000 w. Eng Rec—Sept. 29, 1900.

**Flow.**—See SEWER.

**Frankfort, Germany.**—The Sewerage of Frankfort-on-the-Main. J. H. Fuertes. Illustrates and describes details of the sewers, which are particularly well constructed. 1200 w. Eng Rec—April 14, 1900.

**Flushing.**—See SEWER.

**Hanau, Germany.**—The Sewerage of Hanau, Germany. James H. Fuertes. Illustrated details of design and construction. Serial. Eng Rec—Jan. 8, 1898.

**Havana.**—Sewerage of Havana. Part first gives a statement of the present conditions. Serial. Fire & Water—Feb. 25, 1899.

See also SANITATION.

**Hong Kong.**—Sanitary Conditions in Hong Kong. Abstract of paper by Robert G. Alford, before the Inst. of Civ. Engrs., describing the difficulties of sewerage in a community made up mainly of Chinese. 2500 w. Eng Rec—Oct. 20, 1900.

**House Drainage.**—The Principle of Delivering all Drainage into the Sewer (De l'Application du "Tout-à-l'Egout"). A discussion of the importance of doing away with cesspools and wells and the delivery of everything to the sewer, accompanied by an ample flow of water for flushing and dilution. 2500 w. Génie Civil—Oct. 9, 1897.

See also DRAINAGE; PLUMBING.

**Indianapolis.**—The Sewerage System of Indianapolis. Charles Carroll Brown. An excellent, comprehensive detailed illustrated description of an interesting example of sewer work. 7000 w. Jour Assn of Eng Soc—March, 1896.

**Karachi, India.**—The Shone Sewerage System at Karachi. Facts taken from a paper by James Strachan presented to the Institution of Civil Engs. Describes features of interest and gives the results of efficiency tests. 2000 w. Eng Rec—May 27, 1899.

Karachi Municipal Drainage Scheme. J. Strachan. Plan showing the position of various works connected with this scheme, with report of the work of the sewerage farm. Serial. Ind Engng—April 3, 1897.

**Kunhardt Estate.**—See WATER SUPPLY.

**Liernur System, Amsterdam.**—The Liernur System in Amsterdam (Das Liernur System in Amsterdam). An illustrated account of the working of the Liernur pneumatic sewerage system in Amsterdam, where it has been in successful operation since 1870. 1000 w. Glaser's Annalen—March 1, 1898.

**Liernur System, Trouville.**—The Liernur Exhaust System (Le Système Aspirateur Liernur). Describing the details of the installation of the Liernur pneumatic system of sewage removal at Trouville-sur-Mer. 2500 w. La Rev Tech—July 25, 1897.

**London.**—The Main Drainage of London. Extracts from the report of the Main Drainage Committee of the London County Council, with comments. 4500 w. Engr, Lond—Nov. 10, 1899.

The Penalties of Bigness. An editorial review of certain troublesome problems which have resulted from the growth of London particularly; refers to water and sewerage projects. 1200 w. Eng Rec—Nov. 25, 1899.

The Sewerage of London, England. History of the works and a statement of their size and effect on the Thames. 3500 w. Eng Rec—June 3, 1899.

See also RIVER POLLUTION—Thames; SEWAGE DISPOSAL; WATER PURIFICATION—Thames.

**London, Ont.**—The Sewerage of London, Ont. Abstract of a paper by W. T. Ashbridge before the Canadian Soc. of Civ. Engs., on methods followed in constructing sewers under difficult conditions. 1400 w. Eng Rec—April 22, 1899.

**Low Level.**—See Sydney; DRAINAGE; PUMP; SEWAGE—Pumping Station.

**Melbourne, Australia.**—New Sewerage of the City of Melbourne. Report of the Consul-General to the State Dept. Describes the conditions to be met and the work as planned. 3400 w. San—March, 1897.

The Sewerage of Melbourne. Interesting historical and descriptive account. 3500 w. Eng Rec—May 23, 1896.

See also TUNNEL—Shield, Melbourne.

**Mexico.**—The Sanitation of Mexico (Assainissement de Mexico). An illustrated description of the new system of sewerage now being installed in the City of Mexico. 1800 w. La Rev Tech—Sept. 10, 1900.

See also DRAINAGE.

**New Jersey Commission.**—The New Jersey State Sewerage Commission. Explains the power of a commission which has been given practically absolute control over the sewerage and sewage disposal systems of New Jersey. 900 w. Eng Rec—April 7, 1900.

See also RIVER POLLUTION.

**New Orleans.**—See DRAINAGE; PUMPING STATION.

**Newton, Mass.**—Maintenance of the System of Separate Sewers at Newton, Mass. Stephen Childs. Describes the system, the underdrains, flushing, ventilation, etc. Discussion. Ill. 7800 w. Jour Assn of Engng Socs—March, 1899.

Sewers Laid Under Aqueducts at Newton, Mass. Henry D. Woods. Brief illustrated description of the work and statement of cost. 1100 w. Jour Assn of Engng Socs—May, 1899.

The Sewerage and Subsoil Drainage System of Newton, Mass. G. M. Warren. Illustrated detailed description with diagram of average cost per foot of pipe sewage, map, profile, etc., with two-page inset. 4000 w. Eng News—Jan. 2, 1896.

Worcester Street Drain Syphon at Newton, Mass. H. D. Woods. Illustrated description of work made necessary by the depression of the four tracks of the Boston & Albany Railroad. 800 w. Eng Rec—Jan. 2, 1897.

**Norwich, Eng.**—Norwich Sewerage Works. Illustrates and describes a system that has been obliged to conquer many difficulties. 1500 w. Engr, Lond—July 22, 1898.

**Ottawa.**—The Main Drainage of Ottawa. Illustrated description of the details of a system of difficult river crossings. 1800 w. Eng Rec—Nov. 25, 1899.

**Paris.**—The General Distribution of the Sewage of Paris (L'Emissaire Générale des Eaux d'Egout de la Ville de Paris). E. Fourrey. A very complete account of the system by which all the sewage of Paris is delivered to the irrigation area below the city. Interesting data about re-inforced concrete construction are given. 4000 w. La Rev Tech—Sept. 25, 1899.

The Paris Sewage System (Die Entwässerung von Paris). A discussion of the Paris sewers in comparison with those of Berlin, especially with regard to the sewage farms. Two plates. 8000 w. Oesterr Monatschr f d Oeffent Baudienst—May, 1897.

The Present Condition of the Sanitation of Paris (Etat Actuel de l'Assainissement de Paris). With map and profile showing the extent and nature of the sewerage improvements executed from 1895 to 1899. 2000 w. Génie Civil—July 22, 1899.

The Sanitation of the Seine (L'Assainissement de la Seine). G. Bechmann. A very full review of the sewage works nearly completed; which take all the sewerage of Paris, formerly discharged into the Seine, and deliver it to the sewage farms of Achères. Details of the important aqueduct and siphon work are given. A valuable paper. 7500 w. Bull de la Soc d'Encour—Feb., 1898.

The Sewerage of Paris, France. James H. Fuertes. Illustrated explanation of features previously undescribed. Serial. Eng Rec—June 11, 1898.

The Sewers of Paris, and the Purification and Utilization of the Sewage (Die Kanalisirung von Paris, und die Reinigung und Benutzung des Kanalwassers). Especially describing the recent work in connection with the sewage utilization at Gennevilliers, Clichy and Achères. 4500 w. Glaser's Annalen—May 15, 1897.

See also **SEWAGE DISPOSAL; SEWAGE FARM; SEWER; TUNNEL—Shield, Paris.**

**Plumbing.**—Perfect Sewerage and Perfect Health. G. M. Sinclair. Read before the Nat. Assn. of Master Plumbers. Shows that good sewerage lessens the death rate, discusses sewerage systems and the disposal of sewage. 1800 w. Met Work—March 18, 1899.

Perfect Sewerage and Perfect Health. Papers by W. R. Morrison, and by Graham M. Sinclair. Considers the essentials of a perfect system. 2800 w. San Plumb—May 1, 1899.

Perfect Sewerage in Relation to Public Health. James J. Wade. Read before the Nat. Assn. of Master Plumbers, at New Orleans. Showing the dependence of public health upon perfect sewerage and plumbing. 2200 w. Dom Engng—April, 1899.

Perfect Sewerage in Relation to Public Health. Louis F. Meyer. The work of the plumber in the prevention of disease, and in promoting sanitation. Serial. San Plumb—April 15, 1899.

See also **DRAINAGE; PLUMBING; SANITATION.**

**Poona, India.**—The Drainage of Poona. A statement of the existing conditions, and the need of promptly rectifying the sanitary defects. 2500 w. Ind & East Engr—Nov., 1899.

**Portishead, Eng.**—Portishead Sewerage Scheme. Detailed description of a system recently completed. The sewage is discharged into the Severn a third of a mile from the shore under conditions so favorable as to make it unobjectionable. 2800 w. San Rec—April 28, 1899.

**Pumping Engines.**—See **PUMP; PUMPING ENGINE; PUMPING STATION; SEWAGE.**

**Rainfall and Run-Off.**—See **RAINFALL—Run-Off; SEWER—Storm Water.**

**Rural Districts.**—See **Brixworth; SANITATION—Country; SEWAGE DISPOSAL—Country.**

**Salt Lake City.**—Outfall Sewer and Sewage Farm at Salt Lake City, Utah. Illustrated description of the gravity intercepting sewer and the sewage farm, which were undertaken to prevent the pollution of the Jordan River. 1500 w. Eng News—March 18, 1897.

**Separate System.**—Maintenance of a Separate System of Sewers. T. Harry Jones. Paper relates to sewers in Brantford, Ont. These sewers were built and are now maintained by the city with day labor. Full account of the system is given, and also details of practice in flushing. 600 w. Eng News—April 23, 1896.

Separate Sewage Systems (Ueber Trennungssysteme). A discussion by Chief Engineer Metzger, of Bromberg, of the status of the separate system in Germany, with sections of double-channel sewers. 7500 w. Gesundheits Ingenieur—Aug. 15, 1897.

See also **SEWAGE DISPOSAL—East Molesey, Eng.**

**Separate vs. Combined.**—A Comparison of the Combined and Separate Systems of Sewerage. C. P. Collins. A general discussion of systems in use, with explanation of the combined and separate systems, favoring the latter. 2500 w. Munic Engng—Oct., 1898.

Some Considerations on the Designs of Town Sewerage Schemes. Frank Wood. Discusses the basis on which sewerage schemes are designed, with a note on the combined versus the separate systems. 4500 w. Engr, Lond—Nov. 12, 1897.

The Advantages of the Separate Sewage System. W. M. Watson. Presents the superiority of the separate system to the combined system. 1400 w. Can Eng—Nov., 1897.

**Shone System.**—See **Karachi, India.**

**Southampton, Eng.**—The New Sewerage and Sewage Disposal Works of the Borough of Southampton. W. B. G. Bennet. A description of the new works, with map. Also discussion. 6800 w. Jour San Inst—April, 1900.

**Sutton, Eng.**—Chemical Sanitation and Public Health. William Brown. Illustrated description of low-level drainage system at Sutton in Surrey, Eng., and remarks upon antiseptic sanitation in connection with this kind of drainage. 2000 w. San. Rec—Sept. 4, 1896.

See also **SEWAGE DISPOSAL.**

**Sydney, Australia.**—Sydney and Suburbs Low-Level Sewerage. A. E. Cutler. Read before the Engng. Assn. of N. S. W. Describes the work as carried out, and the operation of the mechanism employed. Serial. Min Stand—Sept. 20, 1900.

**Tables and Diagrams.**—Tables and Diagrams for Facilitating the Computation of Estimates for Sewerage Work. S. M. Swaab. A set of tables and diagrams whose object is to facilitate computation of estimates for sewerage work, with inset of diagrams. 700 w. Eng News—May 14, 1896.

**Tampico, Mexico.**—See **WATERWORKS.**

**Taunton, Mass.**—The Sewerage of Taunton, Mass. Describes place and manner of final sewage disposal, the general character of the system, its alignment, capacity, and relation to the removal of storm water, and details of construction. 8400 w. Eng Rec—Nov. 23, 1895.

**Victoria, B. C.**—The Sewerage of Victoria, B. C. E. Mohun. Read before the Canadian Soc. of Civ. Engs. An interesting and instructive general description. 4400 w. Can Eng—Aug., 1896.

**Vienna.**—Sewerage and Street Cleaning of Vienna. Max Judd. From report to State Department. An interesting description of means and methods. 2000 w. San—Jan., 1896.

**Village.**—See **Brixworth; Colliery Village; SEWAGE DISPOSAL—Country.**

**Walsall, Eng.**—The Sewerage of Walsall, England. Illustrated description of works including some sewers running under a head, and a disposal system with chemical treatment supplemented by land filtration. The results of the treatment are stated, and an unusual dredge for cleaning sewers is illustrated. 2500 w. Eng Rec—Nov. 18, 1899.

**Western Springs, Ill.**—See **WATERWORKS.**

**Wimbledon, Eng.**—The Sewerage of Wimbledon, England. James H. Fuertes. Illustrates a system where none of the sewage, not even storm-water overflow, is allowed to flow directly into water courses. Serial. Eng Rec—Feb. 12, 1898.

**Worcester, Mass.**—The Sewerage Problem of the City of Worcester, Mass. An explanation of the topography of the city and the existing conditions, with an illustrated description of the plant now in operation, on the chemical precipitation system. 1600 w. Sci Am Sup—April 7, 1900.

See also **SEWER—Electric Navigation.**

**SEWER CONSTRUCTION.**

See **SEWER; TUNNEL—Shield.**

**SEWER GAS.**

See **SEWER—Gas.**

**SEWER PIPE.**

See **PIPE; SEWER—Pipe.**

**SEWER VENTILATION.**

See **SEWER—Ventilation.**

**SEWING MACHINE.**

Our Sewing Machines. From the "N. Y. Sun." Interesting information of this industry, its extent, export trade, and changes wrought by the invention. 2800 w. Sci Am Sup—Aug. 7, 1897.

Sewing Machinery. F. W. Brady. Gives the early history, account of first patent, the principles of the chain-stitch and lock-stitch machines and other information. Ill. 2000 w. Mach, N. Y.—March, 1898.

The Sewing Machine. History from the date of allowance of Elias Howe's application for U. S. letters patent, in 1846, to the present time. Illustrations of the earlier machines. 3000 w. Sci Am—July 25, 1896.

**SHAFT.**

See also **FORGING; MINE SHAFT; POWER TRANSMISSION; SHAFT SINKING; STEEL INGOT.**

Crank and Other Shafts Used in the Mercantile Marine. G. W. Manuel. Read at the International Congress of Naval Architects and Marine Engineers. Discusses the cause of some of the failures, giving results of experience. Ill. 2800 w. Ir & St Trds Jour—July 17, 1897.

**Corrosion and Failure.**—Corrosion and Failure of Propeller Shafts. A. Scott Younger. Read before the Inst. of Naval Archts. An endeavor to account for the extreme corrosion which is found to occur at the ends of the brass liners on tail-end shafts, with a review of some of the methods that have been suggested to overcome this difficulty. Ill. 3500 w. Engr, Lond—April 20, 1900.

See also **Fractures; Tail End.**

**Crank.**—See **CRANK SHAFT.**

**Defects.**—Defects in Propeller Shafts. M. W. Aisbitt. Abstract of paper read at meeting of Inst. of Marine Engineers, Cardiff. Presents certain defects and discusses means of remedying them. Also discussion. 6000 w. Steamship—Feb., 1898.

**Design.**—A Diagram for Determining Diameters of Solid Round Shafts Subject to Bending and Twisting, and Arrangement of Drawing-Room Bluebook. Henry Hess. Diagram, with directions for use, and example. 1000 w. Am Mach—Dec. 10, 1896.

A New Formula and Diagram for Combined Stresses in Shafts. A. L. Hopkins. Explains the deduction of a formula which the writer thinks should be not only convenient for general use and permit of a graphic representation, but which would also give results agreeing closely with those obtained by the use of the Rankine and Grashof formulae. 2000 w. Am Mach—Dec. 31, 1896.

Another Diagram for the Design of Shafts. C. L. Griffin. Diagram with explanation of its use. 500 w. Am Mach—April 6, 1899.

Diagrams for the Design of Shafts. G. Eugene Barrett. Diagrams with an explanation of their use. 600 w. Am Mach—Jan. 12, 1899.

Graphical Aids to the Design of Shafts Subject to Bending and Twisting. Robert A. Bruce. Diagram with explanation of its construction and use. 4000 w. Prac Engr—Aug. 17, 1900.

Strength of Shafts. Charles L. Griffin. A diagram for easily determining the diameter of shafts subject to simple bending or twisting, or to both combined. 200 w. Am Mach—Feb. 20, 1896.

See also **Proportions; Tables.**

**Electricity Compared.**—See **POWER TRANSMISSION—Electricity vs. Shafting.**

**Engine.**—The Evolution of the Modern Engine Shaft. H. F. J. Porter. Gives the history of the development and processes for making steel shafts. Ill. 5000 w. Power—Aug., 1898.

**Flywheel Effects.**—Flywheel Effects on Shafting. W. H. Booth. Discusses this subject and the difference between American and English practice. 1200 w. Am Mach—Nov. 30, 1899.

**Fractures.**—On Mysterious Fractures of Steel Shafts. R. Schanzer. Read before the Inst. of Nav. Archts. Describes a particular brittle structure observed in a suddenly fractured shaft that was presented for examination. Ill. 4700 w. Engng—April 27, 1900.

Remarks on the Increasing Frequency of Failure of Propeller Shafts. Frank Caws. Read before the Northeast Coast Inst. of Engs. and Shipbuilders. Alludes to the possibility of adopting larger and hollow shafting, and shows that rules for the diameter of a steamer's shafting should not be based only on the power of the engines, but also on the power of the ship's displacement at the light draught. 2700 w. Ind & Ir—March 30, 1899.

The Causes of Mysterious Fractures in the Steel Used by Marine Engineers as Revealed by the Microscope. A. E. Seaton. Paper read at the 37th session of the Inst. of Naval Architects upon the results of an investigation of a broken shaft, concluding that the practice of boring out a shaft is a good one. Microscopic sections are shown and the report of an expert presented. 2000 w. Ir & St. Trds Jour—March 28, 1896.

The Breaking of Propeller Shafts (La Rupture des Arbres de Couche). A discussion of the accidents at sea by reason of shaft breakages, with reference to a large number of recent instances; suggesting methods of repair at sea. 1800 w. La Rev Tech—May 25, 1898.

See also **Corrosion and Failure; Defects; Tail End; METALLOGRAPHY.**

**Hollow and Solid.**—Solid and Hollow Shafts and Their Weight Relation. Henry Hese. Formula for solid shafts and diagrammatic method of finding hollow shafts after the solid shaft has been calculated. 600 w. Am Mach—Sept. 3, 1896.

**Hollow-Bored.**—Hollow-Bored Shafts as Made by the Cast Steel Works of Fried. Krupp, Germany. George H. Bryant. Illustrated description of the processes used, a statement of the advantages of hollow shafts, and information concerning material, etc. 3500 w. Wis Engr—May, 1899.

**Installing.**—See **Torpedo Boat.**

**Keyways.**—Do Compressed Shafts Become Curved when Keyways are Cut in Them (Werden Comprimirte Wellen durch das Einarbeiten von Nuten Krumm)? C. Bach. Gives the results of careful tests showing the amount by which cold-rolled shafts spring when cut for keyways, with illustrations of the apparatus used. 1000 w. Zeitschr d Ver Deutscher Ing—Nov. 12, 1898.

**Manufacture.**—Notes on the Manufacture of Shafting for Screw Steamers with Some Causes of Defects and Failures. Edward Catmore Chaston. Abstract of a paper read before the Northeast Coast Inst. of Engs. and Shipbuilders, with editorial comment. The writer aims to show that about half of the defects and failures are due to preventable causes. 4800 w. Engs Gaz—April, 1899.

Notes on the Manufacture of Shafting for Screw Steamers, with Some Causes of Defects and Failures. E. C. Chaston. Abstract of paper read before the N. E. Coast Inst. of Engs. and Shipbuilders. Aims to prove that about half the defects and failures are due to preventable causes. Serial. Mech Wld—April 21, 1899.

The Manufacture of Propeller Shafts. D. B. Morison. Considers the material, workmanship, corrosion, and wearing down of stern bush as the chief factors governing the life of a propeller shaft. Ill. 2500 w. Engng—Sept. 1, 1899.

**Metallography.**—See **Fracture; METALLOGRAPHY.**

**Mine.**—See **MINE SHAFT; SHAFT SINKING.**

**Multiple Eccentric.**—Repairing Multiple Eccentric Shafts. Walter J. May. Brief illustrated description of method. 700 w. Prac Engr—Oct. 19, 1900.

**Power Transmission.**—See **POWER TRANSMISSION.**

**Proportions.**—Relative Proportions of Solid Shafts, Hubs, Sleeves, and Hollow Shafts. Henry Hess. Gives diagram of solid and hollow shaft, hub and sleeve relations, with directions for use. 2000 w. Am Mach—Nov. 18, 1897.

**Repairing.**—How the Shaft of the Transport "Fasilka" was Repaired. Illustrated description of the repair of a shaft fractured in two places inside the stern tube, forcing itself through the tube. 1000 w. Engr, Lond—June 29, 1900.

Repairing a Broken Thrust Shaft at Sea. An interesting and instructive narrative. Repairs accomplished under very difficult conditions. 1200 w. Steamship—March, 1896.

See also **Multiple Eccentric.**

**Strength.**—See **Design; MATERIALS' STRENGTH—Main Shafts and Crosshead Pins.**

**Tables.**—Shafting Tables. Tables calculated by Hans Birkholz, with explanation. 1000 w. Power—Feb., 1897.

**Tail-End.**—Tail-End Shafts. Report on the causes of trouble, prepared at the special request of the British Committee of the Bureau Veritas by John Gravell. 1600 w. Mech Wld—Oct. 8, 1897.

See also **Corrosion and Failure.**

**Torpedo Boat.**—A Novel Method of Installing Propeller Shafting. Harrie Webster. Describes the placing of the propeller shafting of the torpedo boat "Shubrick," with success and slight comparative cost, after the vessel was launched. 700 w. Jour Am Soc of Nav Engs—May, 1900.

**Vertical.**—See **POWER TRANSMISSION—Vertical Shafting.**

**SHAFTING.**

See **POWER TRANSMISSION; SHAFT.**

**SHAFT SINKING.**

See also **MINE SHAFT; MINE VENTILATION; MINING.**

New Arrangement for Putting Down Mine Shafts. From a communication by Friedrich Gerber to "Glückauf." A contrivance designed to secure the greatest possible continuity in sinking shafts, and bring up the stuff excavated, with any water encountered. 1700 w. Col Guard—May 15, 1896.

Notes on Shaft Sinking. W. Teague. Read before the Inst. of Min. & Met., England. Favors round shafts and states their advantages; briefly considers ventilation, size, and inclined shafts. 1200 w. Col Guard—Feb. 25, 1898.

Shaft Sinking. G. E. J. McMurtrie. From the "Proceedings" of the South Wales Inst. of Engs. A paper for which a prize has been awarded in competition for the Lewis prizes. Part first considers form of shafts, explosives, drills, methods of dealing with water, winding and disposal of the débris, etc. Serial. Ir & Coal Trds Rev—April 8, 1898.

Simultaneously Sinking, Lining, and Fitting a Shaft with Guides. M. Bouteille. From a communication to the Société de l'Industrie Minérale. Illustrated detailed description of interesting work. 4200 w. Col Guard—April 27, 1900.

**Air Shaft.**—Deepening an Air Shaft Under Difficulties. Illustrates and describes the most interesting portion of the work for rectifying the air shaft of the Perron pit at the Bois d'Avroy Colliery, in the Province of Liége. 500 w. Col Guard—June 2, 1899.

**Belgian Coal Mine.**—Boring a Pair of Winding Shafts at the Bois-du-Luc Collieries. A. Demeure. From a communication to the "Annales des Mines de Belgique." Illustrated detailed description. 3300 w. Col Guard—Dec. 22, 1899.

Sinking a Shaft at the Bois-du-Luc Collieries. Adolphe Demeure. Translated from the "Annales des Mines de Belgique." Illustrated description of an undertaking where certain improvements were introduced to facilitate operations. 3000 w. Ir & Coal Trds Rev—Nov. 17, 1899.

The Sinking of Shafts in Coal Measures (Approfondissement d'un Puits dans le Terrain Houiller). J. Linet. A description of a method of deepening the shafts of collieries and simultaneously lining them with monolithic walls of concrete. 4000 w. 3 plates. Rev Univ des Mines—Oct., 1899.

Simultaneously Deepening and Lining a Belgian Colliery Shaft. Julien Linet. From a communication to the Assn. des Engs. Sortis de l'Ecole de Liége. Illustrates and describes the work, stating the conditions. 2400 w. Col Guard—Nov. 24, 1899.

The Sinking of Shafts No. 5, 6 and 7, at the Bascoup Colliery, Belgium (Enfoncements des Puits No. 5, 6 et 7, du Charbonnage de Bascoup). E. Briart. Especially devoted to the methods used in sinking through watery strata of sand, and layers of clay, by the use of metallic tubing. 3500 w. 1 plate. Rev Univ des Mines—March, 1899.

Sinking Shafts Through Quicksand at Bascoup Colliery, Belgium. Edward Briart. From a communication to the Société des Ingenieurs des Mines du Hainaut. Describes and illustrates the methods adopted. Notwithstanding serious difficulties, the work was satisfactorily carried out. 3000 w. Col Guard—April 21, 1899.

See also **Iron Tubbing.**

**Bohemian Coal Mine.**—Sinking a New Shaft at the Colliery of the West Bohemian Company, Near Pilsen. K. Anton Weithofer. Description of general arrangements, sinking, masonry and ventilating of the "Bayer" shaft. 2200 w. Col Guard—May 1, 1896.

**Bridge Pier.**—See **Foundations.**

**Brown Coal Mine.**—See **Loderburg, Germany.**

**Coal Mine.**—See **Belgian; Bohemian; Deep Mines; Freezing Process; French; Maypole; Petrzkowitz; Ruhr District; Sollenau; South Wilkesbarre; Walling Simultaneously; Westphalian.**

**Compressed Air.**—The Application of Compressed Air for Sinking the Sterkrade Shaft at the Gutehoffnungs Works (Die Verwendung Komprimierter Luft beim Absinken des Schachtes Sterkrade der Aktiengesellschaft Gutehoffnungshütte). With plan and section of the shaft cylinder and air-lock, and a detailed description of the work of sinking the shaft through 16 meters of quicksand. 1800 w. 1 plate. Glückauf—March 5, 1898.

**Congelation.**—See **Freezing Process.**

**Deep Mines.**—Sinking and Equipping Deep Winding Shafts. E. Tomson. From a communication to the jubilee meeting of the Liége Engineers' Assn. Gives results of the writer's studies for laying out of Preussen No. 1 for depth of working from 400 m. to 800 m., and Preussen No. 2, for 450 m. to 1000 m. Ill. 3900 w. Col Guard—June 10, 1898.

**Electric Plant.**—Electrically Driven Machinery Used in Sinking a Shaft at the Rheinelbe and Alma Mine, Germany (Elektrisch Angetriebene Maschinen beim Abteufen des Schachtes Rheinelbe II., der Zeche Vereinigte Rheinelbe und Alma). Illustrated description of the electric plant for driving the shaft-sinking machinery and pumps. 2000 w. 2 plates. Glückauf—April 7, 1900.

**Foundations.**—Improvements in Sinking Shafts (Neueres über Schachtabteufungen). P. Simons. A description of the method employed at Berne for sinking pits for the foundation piers of the Kornhaus Bridge, the Stadt-Theater, and other structures. 1200 w. Schweiser Bauzeit—Feb. 17, 1900.

See also **BRIDGE PIER; CAISSON; FOUNDATION.**

**Franklin, N. J.**—Sinking Parker Shaft at Zinc Mines, Franklin Furnace, New Jersey. J. A. Van Mater. An account of the means used to control the inflow of water in the shaft, plans of timbering, placing holes for blasting, and method of firing by electric dynamo. Ill. 5000 w. Mines & Min—June, 1900.

**Freezing Process.**—A New Mode of Sinking Shafts. From the "Federated Institute." Describes the freezing process of shaft sinking: the advantage of the direct freezing method. 2300 w. Aust Min Stand—Sept. 17, 1896.

A New Freezing Process for Sinking Shafts. Brief description of a process invented by Louis Koch. Gaseous carbonic acid, ammonia, or a mixture of dioxide of sulphur, is circulated in specially constructed tubes whereby a degree of cold of from 40 to 60 degrees Cent. is generated and communicated to the ground. Ill. 700 w. Col Guard—Sept. 17, 1897.

Shaft Sinking by Congelation. Messrs. Saclier and Waymel. Abstract of a paper prepared by the Inst. of Civ. Engs., from the "Bulletin de la Société de l'Industrie Minérale." Itemized cost statements are given. The paper contains much of value. 3000 w. Col Guard—Dec. 13, 1895.

Sinking with Congelation, at Anzin. M. Saclier and M. Waymel. From a communication to the Société de l'Industrie Minérale. Part first gives a description of the preparatory works and the congelation. Ill. Serial. Col Guard—July 23, 1897.

Notes on Sinking Two Shafts by Poetsch's Freezing Process, at Ounaing, near Valenciennes, France. H. F. Olds. A paper read before the first students' meeting of the Inst. of Mining and Metallurgy. Descriptive of two shafts sunk by congelation by the Anzin Mining Co. 1000 w. Min Jour—May 9, 1896.

Sinking by the Poetsch Process at a Brux Lignite Mine. C. Petrlik. From a communication to the "Allgemeine Bauzeitung," of Vienna. Describing a very difficult piece of work, caused by a thick bed of quicksand. Ill. 2500 w. Col Guard—Nov. 12, 1897.

Sinking Shafts by Means of the Poetsch Freezing Process (Die Abteufung von Schächten mittels des Poetsch'schen Gefrierverfahrens). F. H. and Walter Poetsch. A long description of practical experience with this method of solidifying quicksand and other loose materials, so that shafts can be sunk through them. Four articles. 9000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—April 14, 21, 28, May 5, 1900.

Sinking Deep Shafts by the Freezing Process. Abstract of a paper in the "Revue Universelle des Mines." States the conditions to be observed. Ill. 1200 w. Eng & Min Jour—March 18, 1899.

Sinking Deep Shafts with the Aid of Congelation. M. Saclier. From a communication to the Société de l'Industrie Minérale. On the precautions necessary, especially in sinking to great depths. 1300 w. Col Guard—Feb. 3, 1899.

Sinking Shafts by Freezing Process (Fonçage des Puits de Mine par Congélation). Describes the natural process, the Poetsch system as used in France, also the systems of Gobert and Koch, and the cold air method of Lindmarck, used in Sweden. 3000 w. 1 plate. La Rev Tech—March 25, 1897.

The Gobert Freezing Process of Shaft Sinking. A. Gobert. Read at meeting of the Federated Inst. of Mining Engs., London. Description of the direct freezing process. 2500 w. Col Guard—June 12, 1896.

See also **MINING—Congelation.**

**French Coal Mine.**—Simultaneous Sinking and Tubbing of a New French Pit. Léon Thiriart. Translated from "La Revue Universelle des Mines, de la Metallurgie," etc. A very complete description with construction details fully illustrated. 3600 w. Col Guard—Feb. 7, 1896.

Sinking and Lining a Shaft at a French Colliery. Aime Gardon. From a communication to the Société de l'Industrie Minérale. Description with illustrations. 4800 w. Col Guard—Nov. 6, 1896.

See also **Walling Simultaneously.**

**Hoisting Device.**—Hoisting Device for the Sinking of the Emscher I Shaft (Fördereinrichtung beim Abteufen des Schachtes Emscher I). An auxiliary shaft, enclosed within the main shaft contained a special hoisting plant which enabled the sinking to proceed without the interruption of regular work. 800 w. 1 plate. Glückauf—March 11, 1899.

See also **HOISTING.**

**Holten, Holland.**—Sinking the Hugo Shaft Near Holten, Oberbergrath Selbach, in "Zeitschrift für Berg-Hütten- und Salinenwesen." An account of a difficult piece of work followed by disaster, which ruined the labor of three years and incurred a loss of some £37,000. Ill. 1400 w. Col Guard—May 5, 1899.

**Honigmann's Method.**—Honigmann's Method of Boring Mine Shafts. W. Schulz. Abstract of paper in "Glückauf." A sinking tower is let down into a tubbed shaft, and the water pumped out, and mixed with loam or clay, is allowed to flow back into the shaft, the loam addition consolidating the shaft sides. 2000 w. Col Guard—May 1, 1896.

**Iron Tubbing.**—Substitution of Cast-Iron Tubbing for Wood in a Belgium Pit. L. Verniory. From a communication to the Assn. des Ingenieurs Sortis de l'Ecole de Liége. Describes the modern tubbing constructed in 1848, the trouble with leakage and the replacing by iron tubbing, the water being kept back during the operation by means of a concreted plate-curve constructed under the water level. Serial. Col Guard—Sept. 3, 1897.

**Kind-Chaudron.**—The Deepening of No. II. Shaft at the Victor Mine at Rauxel (Das Abteufen des Schachtes II. der Zeche Victor bei Rauxel). An account of a difficult piece of shaft sinking through sand and watery strata; the Kind-Chaudron method being employed, with a closed tabular section through the quicksand. The total depth is about 800 feet. 4000 w. 2 plates. Glückauf—Jan. 14, 1899.

An Improvement in the Kind-Chaudron Shaft-Sinking Apparatus (Ueber Neuerungen beim Kind-Chaudronschen Abteufverfahren). With illustrations of an improved steel boring tool, and a suspended bucket dredge, as employed in sinking shafts in Belgium. 800 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 24, 1900.

**Loderburg, Germany.**—Shaft Sinking at the Royal Brown Coal Pit near Loderburg, Germany. From "Zeitschrift für Berg-Hütten-und Salinenwesen." Describes the sinking of a shaft under peculiar difficulties, owing to the presence of a layer of fine-grained quicksand. 1200 w. Col Guard—Nov. 13, 1896.

**McCulloch's Frame.**—McCulloch's Frame for Sinking Round Shafts. Illustrated description of a device enabling them to be sunk with economy and speed. 800 w. Engr, Lond—Oct. 29, 1897.

**Maypole, Eng.**—An Account of the Maypole Colliery Sinking, Wigan. A. H. Leech. Abstract of a paper read before the British Assn. of Mining Students. Explains the conditions prevailing in this locality, and describes the sinking, which was a very difficult work. Ill. 8000 w. Ir & Coal Trds Rev—Jan. 13, 1899.

Pumping Difficulties in the Maypole Colliery Sinking. J. Keen. Abstract of paper read before the Manchester Geol. Soc. Describes difficult work and the appliances used. Ill. 3700 w. Ir & Coal Trds Rev—Sept. 15, 1899.

Shaft Sinking near Wigan. C. M. Percy. Describes a very difficult piece of mining work. The sinking of pit-shafts through almost inexhaustible water feeders, extending to a substantial depth. 1300 w. Col Guard—Sept. 10, 1897.

Sinking the Maypole Shafts Near Wigan. James Keen. Abstract of a lecture delivered at the Wigan Mining School. An interesting description of the work as far as it has progressed. 4000 w. Col Guard—May 20, 1898.

**Nova Scotia Gold Mine.**—Rapid Sinking in a Nova Scotia Gold Mine. A. A. Hayward. Read before the Mining Society of Nova Scotia. Facts from the experience of the writer aiming to show that the best possible results are not being obtained in that community by the methods used. 3500 w. Can Min Rev—May, 1898.

**Petrzkowitz, Prussia.**—Deepening and Strengthening the Oskar Shaft No. 1, at Petrzkowitz, Prussia (Abteufen und Ausmauerung des Oskar-Schachtes Nr. I. bei Petrzkowitz in Preussen). Describing the operation of sinking a shaft over 650 feet including lining with masonry. Valuable data are given as to time and cost in various strata. 5000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—July 30, 1898.

Sinking and Lining a Shaft at a Prussian Colliery. Jaroslav Jicinsky, "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Describes the sinking of the ney Oskar shaft, at Petrzkowitz, 197 m. in depth. 1200 w. Col Guard—Aug. 12, 1898.

**Platform.**—Improved Platform for Lining a Sinking Shaft. Plan and vertical section with description and statement of advantages. 1000 w. Col Guard—March 9, 1900.

**Poetsch Freezing Process.**—See **Freezing Process.**

**Quicksand.**—See also **Belgian Coal Mine; Compressed Air; Freezing Process; Kind-Chaudron Process; Sollenau; Watered Strata.**

**Rapid.**—See **Nova Scotia Gold Mine; Wales.**

**Ruhr District, Germany.**—The Sinking of Shaft II. of the Osterfeld Mine (Das Abteufen des Schachtes II. der Zeche Osterfeld im Deckgebirge). A description of the method adopted in one of the coal mines in the Ruhr district near Oberhausen, in sinking a shaft through sand, gravel, and marl. 1000 w. Glückauf—Feb. 17, 1900.

**Sollenau, Austria.**—Sinking a Shaft Through a 6.7-Meter Layer of Quicksand at a Depth of 155.5 Meters at Sollenau, Lower Austria (Durchteufung des 6.7-m Mächtigen Schwimmsandes am Sollenauer Schachte Nr. 1, bei 155.5 m. Teufe). K. Hoftich. An illustrated description of the work, in which a combination of methods was used, with costs. 1 plate. 2500 w. Oest Zeitschr f Berg u Hüttenwesen—June 9, 1900.

Sinking Through Quicksand at an Austrian Colliery. K. Hoftich, in "Oesterreichische Zeitschrift für Berg-und Hüttenwesen." Illustrates and describes the method adopted, which employed a wrought-iron caisson made of 2-5 in. plate, driven into the quicksand. 1800 w. Col Guard—June 22, 1900.

**South Wilkesbarre, Pa.**—Methods of Opening and Working Coal Mines. Deals with boring and sinking, with illustrations showing the plan of surface arrangements of the South Wilkesbarre Colliery. 2000 w. Ir & Coal Trds Rev—June 5, 1896.

**Sutcliffe's Machine.**—On a New Method of Sinking Pits by Machinery. Richard Sutcliffe. Read before the Manchester, Eng., Geol. Soc. Illustrates and describes Sutcliffe's pit-sinking machine, and gives an account of its operation. 5200 w. Ir & Coal Trds Rev—Sept. 28, 1900.

**Tomson Water Raising Apparatus.**—See **WATER RAISING—Mines.**

**Wales.**—Coal Pit Sinking in South Wales. Extract from address of Henry W. Martin before the South Wales Inst. of Engs. Describes method of rapid sinking, with illustrations. 2000 w. Ir & St Trds Jour—Oct. 8, 1896.

**Walling Simultaneously.**—The Simultaneous Sinking and Walling of Shafts (Fonçage et Muraillement Simultanés d'un Puits). Describing the method employed by M. Matheron at the Bouble mines. The masonry was built in sections as the shaft was sunk. 1200 w. Génie Civil—Aug. 18, 1900.

See also **French Coal Mine.**

**Water Raising.**—See also **AIR LIFT; PUMP; PUMPING ENGINE; WATER RAISING.**

**Watered Strata.**—A New Method of Shaft Sinking. G. C. McFarlane. Illustrates and describes a method of sinking when it is necessary to go through water bearing strata. 800 w. Eng & Min Jour—April 7, 1900.

Boring a Pair of Shafts Through Heavily-Watered Measures. M. L. Petit. From a communication to the Société des Ingénièurs des Mines du Hainaut. Illustrates and describes a difficult piece of mining work. The shafts were passed through heavily-watered measures and quicksands. 4800 w. Col Guard—March 23, 1900.

Sinking Through Heavily Watered Strata. Richard Robinson. Read before the British Soc. of Min. Students. Directions, with illustrations. 1700 w. Ir & Coal Trds Rev—Jan. 19, 1900.

**Westphalian Coal Mine.**—Sinking a Shaft at the Victor Colliery, Westphalia. From an article founded on papers by Herr Pieler and Herr Hennenbruch, in "Glückauf." Illustrates and describes a difficult work. 5700 w. Col Guard—Feb. 17, 1899.

**Wigan, Eng.**—See **Maypole, Eng.**

**Zinc Mine.**—See **Franklin, N. J.**

### SHALE.

See also **STONE.**

The Origin, Properties, and Uses of Shale. H. Ries. Discusses principally the properties. 2000 w. Stone—April, 1900.

### SHALE OIL.

See also **BITUMINOUS ROCK.**

The Shale Oil Industry. The article describes the oil shale, methods of extracting the oil and its accompanying products. It employs two and one-half million pounds capital. 2400 w. Eng, Lond—Nov. 15, 1895.

**Brazil.**—The Oil-Bearing Shales of the Coast of Brazil. John C. Branner. Describes the material and the width of the belt at various places, the exposures, etc. Ill. 3800 w. Trans Am Inst of Min Engs—Aug., 1900.

**France.**—The Bituminous Schist Industry in France (L'Industrie des Schistes Bitumineux en France). A comparison of the French and Scotch industries, calling attention to the superior output of mineral oil, paraffine, etc., obtained by the Scotch process of distillation. 1800 w. Moniteur Industriel—Dec. 30, 1899.

**New South Wales.**—Kerosene Shale in New South Wales—The Genowlan Mine. General description with production and analysis. 1700 w. Aust Min Stand—March 12, 1896.

The Bituminous Shales of New South Wales. Deals with the so-called bituminous shale, which contains volatile, hydro-carbon in large quantities, variously known as torbanite, boghead mineral, joadja mineral, petroleum oil, cannel coal, and shale, and is now only procurable in New South Wales. Ill. 2000 w. Aust Min Stand—Oct. 1, 1896.

**Scotland.**—The Shale Oil Industry in Scotland (L'Industrie des Huiles de Schiste, Méthodes Ecossaises). A description of the Young-Beilby furnaces for distilling oil and paraffin from shale. 5000 w. La Rev Tech—Dec. 25, 1896.

### SHAPER.

See also **LATHE; MACHINE TOOL.**

A Shaping Machine with Novel Features. Illustrated description. 700 w. Am Mach—Feb. 1, 1900.

**Stockbridge.**—The Stockbridge Shaper. Illustrated description of a new shaper having points of novelty and interest. 500 w. Am Mach—Feb. 22, 1900.

### SHARPENING MACHINE.

See also **GRINDER; GRINDING; GRINDSTONE.**

**Rock Drills.**—See **ROCK DRILL—Sharpening Machine.**

### SHEARING.

See also **MACHINE TOOL; METAL WORKING; PRESS—Sub; PUNCHING.**

**Power.**—A Power Shear With a Peculiar Movement. Illustrated description. 600 w. Am Mach—July 6, 1899.

### SHEARS.

See also **CRANE; DERRICK.**

**Bordeaux.**—Shears of 80 Tons Capacity at the Port of Bordeaux (Bigue de 80 Tonnes du Port de Bordeaux). Detailed description with plate of illustration; the inclination and hoisting are effected by direct-acting hydraulic cylinders, with an auxiliary tackle for light loads. 1500 w. 1 plate. La Rev Tech—Sept. 25, 1897.

### SHEATHING.

See also **PAINT—Anti-Fouling; SHIP—Fouling.**

Sheathing of Ships. Concerning the discussion of the naval board of construction as to whether the new vessels of the U. S. navy shall or shall not be sheathed. 3000 w. Marine Rev—March 22, 1900.

**"Chesapeake."**—Notes on Sheathing the U. S. S. "Chesapeake." Lloyd Bankson. Describes the process of sheathing this steel vessel with wood. 3 plates. 1200 w. Soc of Nav Archts & Marine Engs—No. 7, Nov., 1899.

Notes on Sheathing U. S. Naval Academy Practice Ship "Chesapeake." Lloyd Bankson. Read at New York meeting of the Soc. of Nav. Archts. and Marine Engs. Illustrates and describes the process of sheathing. 2000 w. Marine Engng—March, 1900.

**Copper Alloys.**—The Endurance of the Ordinary Copper Alloys in Sea Water. Herr Diegel. Abstract translation of an article in "Marine-Rundschau." An account of experiments made on sheathing the vessels, describing tests and giving results. 8500 w. Jour Am Soc of Nav Engs—May, 1899.

See also **COPPER ALLOY—Sea Water Action.**

**Electroplating.**—See **ELECTROPLATING—Ships.**

**Propeller.**—See **PROPELLER—Sheathed.**

**Roper System.**—On the Direct Attachment of Copper Sheathing Plates to the Hulls of Vessels. Leopold Roper. Read at session of the Inst. of Naval Archts., England. Describes Roper's system of coppering steel ships, which the writer claims approaches nearer to the ideal than any other known system. 2500 w. Ind & Ir—April 15, 1898.

**U. S. Cruisers.**—Faulty Features of Our Proposed Sheathed and Coppered Cruisers. Compares the proposed type with ships of a similar size and class among the navies of the world, with the conclusion that if built, these vessels will be the least efficient of the seven compared. Also editorial. 2700 w. Sci Am—Aug. 19, 1899.

**Warships.**—Sheathing Warships. G. E. Walsh. Considers the advisability of using copper sheathing, discussing the objections, and giving the experience of other nations. 1200 w. N Am Rev—Jan., 1899.

### SHEAVE WHEEL.

See also **POWER TRANSMISSION; PULLEY; ROPE DRIVING.**

Sheave Wheel with Wrought Iron Arms. W. H. Osborn. Illustrated description of the molding and casting of sheave wheels with wrought iron arms and of diameters ten feet and upwards. 700 w. Ir Trd Rev—March 19, 1896.

### SHEET METAL.

See also **METAL WORKING; STAMPING.**

A Job in Drawing and Forming Sheet Metal. Joseph V. Woodsworth. Illustrated detailed description of the work. 600 w. Am Mach—July 12, 1900.

Note on the Manufacture of Sheet Iron (Note sur la Fabrication des Toles). Hubert Bya. This paper is limited to the discussion of sheets more than 2¼ millimetres thick. The processes are fully described and numerous figures are given. The article is an interesting and valuable review of the present state of sheet metal manufacture on the continent of Europe. One plate. 8000 w. Rev Universelle des Mines—Sept., 1898.

**SHELL.**

See **PROJECTILE.**

**SHIELD.**

Devices for Attacking Trenches. Illustrated description of a steel shield made to be used on a rifle or to build up defence. 1600 w. Engr, Lond—Jan. 12, 1900.

**Tunnel.**—See **TUNNEL—Shield.**

**SHIP.**

See also **MERCHANT MARINE; NAVAL ARCHITECTURE; SAILING VESSEL; SHIPBUILDING; SHIP PROPULSION; SHIP RESISTANCE;** and under specific types of vessels.

Ships. Dimensional data, etc., of ships of the United States and other countries. 13500 w. Jour Am Soc of Nav Engs—Nov., 1895.

**Ancient.**—Some Ships of the Ancients. George Henry Preble. Interesting information of remarkable vessels, including the Ark, the "Alexandria," or "Alexandrian," and others. 5200 w. Sci Am Sup—July 17, 1897.

The Mysterious Wreck of Nemi. Rudolpho Lanciani. Describes the discovery and the attempts at lifting the wreck of a large ancient vessel. Such portions as have been recovered show a knowledge of the art of naval architecture, dating back to the classic period of Roman history, very much in advance of what has been commonly supposed. 4000 w. N Am Rev—Feb., 1896.

See also **SHIPBUILDING—History; YACHT—Roman.**

**Cable-Laying.**—See **CABLE SHIP.**

**Electroplating.**—See **ELECTROPLATING—Ships.**

**Fouling.**—The Fouling of Ships. W. H. Atherton. On the nature, effect, and prevention of fouling. Also an appendix and discussion. 8000 w. Trans of N E Coast Inst of Engs & Shipbuilders—June, 1900.

The Fouling of Ships. W. H. Atherton. Abstract of paper read before the Northeast Coast Inst. of Engs. & Shipbuilders. Deals with the nature of fouling, the effect, and prevention. 3900 w. Engs' Gas—April, 1900.

See also **Marine Growths; PAINT—Anti-Fouling; SHEATHING.**

**Iron.**—The Earliest Iron-Built Ships. Historical review of the earliest efforts at iron-ship construction in Great Britain. 2200 w. Engr, Lond—Jan. 22, 1898.

**"Kenilworth."**—The Four-Masted Ship 'Kenilworth." Illustrated description of a fine American iron ship. 1200 w. Am Shipbuilder—June 23, 1898.

**Loading.**—An Essay upon Methods of Loading (Essai sur des Procédés d'Arrimage). Devoted to the proper method of loading vessels with rails, and arranging cargo so as to avoid shifting; including the loading of wooden and iron ships and also iron steamers. Serial. La Rev Tech—March 10, 1898.

Loading of Vessels Engaged in "Klondike" Trade on the Pacific Coast. James S. Tyler. An account of the arrangements made to meet the sudden increase in passenger and freight traffic. 2000 w. Marine Engng—Dec., 1897.

**Load Line.**—See **MERCHANT MARINE.**

**Marine Growths.**—Marine Growths—An Effective Argument for the Building of Dry Docks. H. Webster. Explains the causes which make necessary the docking and cleaning of ships, and the complications of the problem to be solved by the shipbuilder. 8000 w. Marine Engng—Aug., 1899.

See also **Fouling.**

**Pitching.**—Stresses Due to the Pitching of Ships. A. Kriloff. Paper read before the institution of Naval Architects. A new theory of the pitching motion of ships on waves and of the stresses produced by this motion. The treatment is mathematical, employing the calculus, and the text is illustrated by diagrams. 3000 w. Engng—April 17, 1896.

See also **NAVAL ARCHITECTURE.**

**Propulsion.**—See **SHIP PROPULSION.**

**Repair Ship.**—See **REPAIR SHIP.**

**Resistance.**—See **SHIP RESISTANCE.**

**Roller.**—See **ROLLER BOAT.**

**Rolling.**—The Non Uniform Rolling of Ships. R. E. Froude. Paper before the Inst. of Naval Archs., criticising a paper read by M. Emile Bertin at a meeting of the Inst. in 1894. Serial. Engng—April 24, 1896.

The Rolling of Ships on Waves. G. Russo. Read before the Inst. of Nav. Archts. The author's experimental method is described and results given. The apparatus used is illustrated and the principles explained. Serial. Engng—April 6, 1900.

**Safety.**—See **FOG SIGNAL; LIFE-SAVING APPLIANCES; NAVIGATION.**

**Sanitation.**—See **PLUMBING—Yacht; SANITATION—Ship.**

**Sheathing.**—See **SHEATHING.**

**Side-Lights.**—See **SIDE-LIGHTS.**

**Speed Trial.**—See **SHIP PROPULSION;** and under specific types and names of vessels.

**Stability.**—Some Geometry in Connection with the Stability of Ships. J. Bruhn. Read before the Inst. of Naval Architects. Geometrical principles are regarded in this paper as at the very root and foundation of the question of stability in ships, and the discussion, after a brief review of the methods hitherto used, proceeds on geometrical lines to the construction of a set of cross-curves of stability for inclinations of from 90 to 180 degrees, when the corresponding curves from 0 to 90 degrees inclination are known. 4300 w. Engng—April 10, 1896.

The Stability of Steamships and Sailing Vessels Under Light Burden (Sur la Stabilité des Vapeurs et des Navires à Voiles à l'Etat Léger). A discussion of the effect of the absence of cargo upon stability, and also the effect of the distribution of the load. Serial. Revue Technique—Aug. 10, 1899.

See also **NAVAL ARCHITECTURE.**

**Stresses.**—See Pitching Stresses; **NAVAL ARCHITECTURE; SHIPBUILDING.**

**Tonnage.**—See **SHIPBUILDING.**

**Water Ballast.**—See **BALLAST.**

**SHIP BOAT.**

See **BOAT; LIFEBOAT.**

**SHIPBUILDER.**

**Thames.**—Thames Pioneer Shipbuilders and Marine Engineers. Biographical notes of some of the originators of these establishments, with photographs. 6500 w. Engr, Lond—Jan. 27, 1899.

**Webb Home.**—A Shipbuilder's Dual Monument. Illustrated description and information concerning the academy and home for shipbuilders, built and endowed by William H. Webb. 2300 w. Harper's Weekly—July 10, 1897.

**SHIPBUILDING.**

See also **MARINE ENGINEERING; NAVAL ARCHITECTURE; SCHOONER; SHIP; SHIPYARD; STEAMSHIP; WARSHIP.**

Building a Ship. Philip Hichborn, in Boston "Sunday Herald." A summary of progress from the earliest times, with details of modern practice in the construction of both wooden and steel vessels. 5200 w. Marine Rev—Aug. 17, 1899.

Recent Advances in Shipbuilding. Review of progress in this industry. Ill. 1700 w. Ir & Coal Trds Rev—Jan. 29, 1897.

**Aluminum.**—See **ALUMINUM — Shipbuilding; LAUNCH; YACHT—Defender.**

**American.**—See United States.

**Ancient.**—See History; **SHIP.**

**Boom Statistics.**—The Shipbuilding Boom. Editorial on statistics given in "Lloyd's Returns," with explanation of why there is a seeming disparity between Lloyd's and the published statistics given in a previous issue of this paper. 1500 w. Engng—Jan. 20, 1899.

**British.**—British Shipping and Ship-Building. The large business in ship-building in British yards during the past year and the promise of increase the coming year, and matters of special interest in connection with the mercantile marine. 2800 w. U S Con Repts, No. 402—April 17, 1899.

Progress of Warships and Machinery Building in England. Notes on the progress of work now in hand in English ship yards and marine engine works. 3400 w. Engr, Lond—June 29, 1900.

Shipbuilding as a Productive Industry in Great Britain. James McKechnie. With a discussion of the economic relation of the shipbuilding industry to other branches of trade, followed by illustrated descriptions of the leading British shipyards, and their latest productions. 4500 w. Eng Mag—Dec., 1897.

Shipbuilding as a Productive Industry in Great Britain. James McKechnie. Showing the reciprocal influence of private enterprise and naval dominion with especial reference to the growth of ship-building on the Clyde and at Barrow subsequent to the Naval Defense Act. 4000 w. Eng Mag—Jan., 1898.

Shipbuilding as a Productive Industry in Great Britain. James McKechnie. Treating chiefly of the increase of steam and decrease sail tonnage during the past ten years, with especial reference to the various shipbuilding districts of Great Britain. 3500 w. Eng Mag—Feb., 1898.

Shipbuilding as a Productive Industry in Great Britain. James McKechnie. In this paper Mr. McKechnie discusses the economic features of the situation, and shows that in the rising competition the ratio of output to wages is the deciding factor. 3500 w. Eng Mag—March, 1898.

See also **North England; Steel; United States vs. British.**

**British, 1895.**—Marine Engineering and Shipbuilding in the year 1895 in the United Kingdom. Review of the industry for the past year and a glance at the present status. 8000 w. Eng's Gas—Jan., 1895.

Summary of Shipbuilding Returns of United Kingdom in 1895, Arranged in Order of Tonnage, Built by Each Firm. A useful table for reference. Seventy establishments are listed. 300 w. Marine Eng—Jan. 1, 1896.

Shipbuilding and Marine Engineering in 1895. A summary of the industry for the year and a review of the present status of the trade, from which the outlook is considered hopeful. 3600 w. Engng—Dec. 27, 1895.

The Year's Shipbuilding. An interesting retrospect of this industry during 1895, incidentally touching upon the advantages and disadvantages of water-tube boilers—questions that have been hotly debated during the last twelve months. 3500 w. Ind & Ir—Dec. 27, 1895.

**British, 1896.**—Shipbuilding and Marine Engineering in 1896. Review of the year in the United Kingdom. 3200 w. Engng—Dec. 25, 1896.

Shipbuilding and Marine Engineering in 1896. Review of the year, dealing with separate districts. Part 1st reports the Tyne, Wear, Tees, Hartlepool, Blythe and Whitby, Humber, Barrow-in-Furness, Mersey, Thames and other districts. Serial. Engng—Jan. 1, 1897.

**British, 1897.**—Shipbuilding and Marine Engineering in 1897. Reviews the shipbuilding industry of Great Britain and explains the marked decrease in tonnage, etc., with additional information of interest. Serial. Engng—Dec. 24, 1897.

Shipbuilding in 1897. Calls attention to the discrepancies found in published reports of various papers, and of Lloyd's Register, showing that it is useless to try to be very precise in reporting statistics. Gives general information of the amount of work done in British shipyards. Serial. Engr, Lond—Feb. 18, 1898.

**British, 1897-8.**—I. Shipbuilding and Marine Engineering in 1897. II. Shipbuilding prospects for 1898. Brief review of progress during the last year in Great Britain is given, with editorial on the prospect for the present year. 6000 w. Ind & Ir—Jan. 14, 1898.

**British, 1898.**—Marine Engineering and Shipbuilding in the Year 1898 in the United Kingdom. A review of work in the different districts. 11500 w. Engr's Gas—Jan., 1899

**British, 1899.**—Shipbuilding and Marine Engineering in 1899. A review of this industry in the United Kingdom, giving interesting information. 3600 w. Engng—Dec. 29, 1899.

Shipbuilding and Marine Engineering in 1899. The first of a series of articles considering the work of the several districts and firms. Serial. Engng—Jan. 5, 1900.

**British Naval Work.**—Naval Work in English Shipyards and Engine Factories in 1899. Review of the construction of warships and their equipment. 2700 w. Engr, Lond—Dec. 29, 1899.

**British vs. Foreign.**—Shipbuilding—British and Foreign. Review of returns in Lloyd's register, showing a more satisfactory condition in the English shipbuilding industry. 1300 w. Mach, Lond—July 15, 1896.

**British vs. German.**—English and German Shipbuilding (Englischer und Deutscher Schiffbau). A paper by Prof. Oswald Flamm, discussing the growth of British shipbuilding from a German standpoint. 6000 w. Stahl und Eisen—Sept. 1, 1897.

Shipbuilding in England and Germany. Translation of a German newspaper clipping, giving reports for 1898 and 1899. 700 w. U S Cons Repts, No. 671—March 7, 1900.

See also **British; Germany.**

**Cambering Keels.**—Cambering of Steamship's Keels. An account of an English high court decision in a case of special interest to naval architects. 2500 w. Marine Rev—June 28, 1900.

See also **NAVAL ARCHITECTURE—Keel Cambered.**

**Cargo Steamers.**—The Distribution of Materials in the Upper Works of Large Steamers. Samuel J. P. Thearle. Read before the North-East Coast Inst. of Engs. and Shipbuilders. Changes made necessary by the growing tendency to build very many large cargo steamers, and to place extensive superstructure upon them are discussed. Ill. 3800 w. Trans N E Coast Inst Engs & Shipbuilders—Feb. 2, 1900; and Engr, Lond—Feb. 9, 1900.

See also **Mercantile.**

**Chicago.**—System of Work in a Great Lake Shipyard. W. I. Babcock. Describes the practice of the Chicago Ship-Building Company as applied to the ordinary lake bulk freight vessel of large size. 20 plates. 4700 w. Soc of Nav Archts & Marine Engs, No. 8.—Nov., 1899.

**Clyde.**—Ship Building on the Clyde. Francis S. North. A brief review of the changes brought about in this region, with description of the plant of the Fairfield Company. 1900 w. Yale Sci M—Nov., 1896.

See also **SHIPYARD—Fairfield.**

**Clydebank.**—Ships and Their Makers. An illustrated account of the Clydebank shipyard and the vessels built there. 8000 w. Commerce—Feb. 7, 1900.

**Countersinking.**—Countersinking in the Shipyard. Robert H. Muir. Read before the North-East Inst. of Engs. & Shipbuilders. A detail which has received less attention in the ship-yard than almost any other. The object of the paper is to draw out information, and to arrive, if possible, at some agreement upon a correct angle of countersink for different sizes of rivets and thickness of plates used in ship-yard work. 1300 w. Eng's Gas—Feb., 1896.

**Delaware River.**—See **WARSHIP—Delaware River Yards.**

**Education.**—See **MARINE ENGINEERING—Glasgow University; SHIPBUILDER—Webb Home.**

**1895.**—List of Vessels Launched in 1895. Purports to be a complete list of new vessels set afloat from all yards in the world during 1895, with names of owners, material of construction (steel, wood, etc.) class names of the vessels, and nominal horse-power. 15000 w. Marine Eng—Jan. 1, 1896.

**1898.**—The World's Shipbuilding in 1898. A clipping from a British journal showing the shipbuilding for the year just closed, with interesting comments. 1300 w. U S Cons Repts, No. 350—Feb. 14, 1899.

**1899.**—Shipbuilding and Marine Engineering in 1899. Benjamin Taylor. A comprehensive review of the work of the past year, showing the remarkable mechanical achievements in one of the greatest of engineering industries. 4500 w. Eng Mag—March, 1900.

**Fairfield Company.**—See **SHIPBUILDING—Clyde.**

**Ferro-Manganese.**—See **Steel.**

**Fittings.**—See **SHIP FITTINGS.**

**Framing.**—Some Considerations in Connection with the Transverse Framing of Ships. H. E. J. Camps. Read before the N. E. Coast Inst. of Engs. and Shipbuilders, at West Hartlepool. The type of vessel chosen for discussion is a three-deck ship, and the writer considers what she would have been if built on each of the several systems of framing. Ill. Serial. Ind & Ir—Jan. 21, 1898.

**France.**—Maritime Construction and National Defense (Les Constructions Maritimes et la Défense Nationale). Calling attention to the weak points in the maritime defense of France and urging the encouragement of French establishments for the construction of marine work. 1200 w. Moniteur Industriel—April 30, 1898.

**Freeboard.**—Some Considerations on Freeboard and on the Relation between Scantlings and Freeboard. Archibald Hogg. Read before the North East Coast Institution of Engineers and Shipbuilders. An investigation of the freeboard question, giving tables. 2300 w. Engs' Gaz—March, 1899.

**Future.**—The Future of Ship Building. Charles H. Cramp. From "Harper's Weekly." A review of the past history of this industry in America, and facts concerning Germany and Great Britain. 2000 w. Marine Rev—April 26, 1900.

**Germany.**—German Shipbuilding (Deutsche Werften). A review of shipbuilding going on at present in the leading German yards, with illustrations of the new North German Lloyd Steamer "Kaiser Friedrich." 3000 w. Zeitschr d Vereines Deutscher Ingenieure—Jan. 30, 1897.

German Shipping and Shipbuilding. Discusses the progress made, the development of the merchant marine. the sailing fleet, shipbuilding, etc. 2500 w. Engng—March 18, 1898.

German Shipbuilding and Its Allied Industries (Der Deutsche Schiffbau und seine Hülfsindustrien). Prof. Oswald Flamm. A general account of the progress of German shipbuilding, with good illustrations showing the effects of collisions. 2800 w. Stahl und Eisen—May 1, 1900.

Industry as a Promoter of Marine Technology (Die Industrie als Förderin der Marine Technik). An address by Herr Von Janke showing the relation between general industrial progress and the development of shipbuilding, with especial reference to the marine progress of Germany. 10000 w. Stahl und Eisen—May 1, 1898.

Recent Progress in the Building of Merchant and War Ships in Germany (Neuste Erfolge des Deutschen Handels- und Kriegsschiffbaues). With description of recent German vessels and illustrations of launches of the "Kaiser Friedrich," and "Victoria Luise." 4000 w. Stahl und Eisen—Dec. 15, 1897.

Shipbuilding in Germany. An article showing Germany to be second to England in ocean transportation. 900 w. U S Cons Repts, No. 638—Jan. 26, 1900.

Shipbuilding in Germany. C. Ferd. Laeisz. Read at meeting of the Inst. of Naval Architects. Brief survey of the development of the industry. 2100 w. Eng, Lond—June 12, 1896.

Shipbuilding in Germany. George Crouse Cook. Illustrates and describes Howaldswerke at Kiel and the work. 1200 w. Marine Rev—June 14, 1900.

Shipbuilding in Germany. George Crouse Cook. Illustrated description of Kaiserliche Werft, a German navy yard credited with the construction of many modern vessels of war. 1800 w. Marine Rev—Aug. 23, 1900.

Shipbuilding in Germany (Les Construction Navales en Allemagne). Raoul Dubreuil. An article giving the German naval program, and showing the wonderful development of shipbuilding in Germany in recent years, with tables of statistics. 2000 w. Revue Technique—July 10, 1900.

The Development of German Shipbuilding. Rudolph Haack. The first of an important series of papers dealing with the enormous growth of shipbuilding in Germany since the consolidation of the empire in 1871. 3500 w. Eng Mag—Aug., 1899.

The Development of German Shipbuilding. Rudolph Haack. Herr Haack's second paper deals chiefly with the growth of the shipyards on the North Sea Coast, with many handsome illustrations. 3500 w. Eng Mag—Sept., 1899.

The Development of German Shipbuilding. Rudolf Haack. Herr Haack's third paper deals with the shipyards on the shores of the Baltic, and gives many fine illustrations of yards and their products. 4500 w. Eng Mag—Oct., 1899.

The Development of German Shipbuilding. The climax of Herr Haack's admirable series of papers, summing up the economic and sociological elements of Germany's wonderful industrial growth as exemplified to the fullest extent in her shipbuilding. 4000 w. Eng Mag—Nov., 1899.

See also **British vs. German**; **Steel**; **SHIPYARD—Vulcan**; **WARSHIP**.

**Great Britain.**—See **British**.

**Great Lakes.**—New Competitive Conditions in Steel Shipbuilding. Waldon Fawcett. Considers the changes that will come with the opening of the St. Lawrence canals, thus giving a water way for moderately deep draft vessels between the Great Lakes and the coast. 2200 w. Ir Age—Jan. 18, 1900.

See also **Chicago**.

**Great Lakes—Atlantic Waterways.**—From Lakes to Seaboard. A view of conditions presented to ship builders of the Great Lakes and the Atlantic coast by the opening of Canada's St. Lawrence River canals, and the proposed New York State canal improvements. Ill. 1700 w. Marine Rev—Feb. 8, 1900.

**History.**—Shipbuilding, Ancient and Modern. M. W. Aisbitt. Abstract of paper read at meeting of the Bristol Channel Center of the Inst. of Marine Engs. Considers the proportions of the Ark, other ancient vessels, modern wooden vessels, advent of iron and steel, a steamer's requirements. 2500 w. Steamship—May, 1897.

See also **SHIP—Ancient**.

**Innovations.**—The Practical Results of Some Innovations in Modern Shipbuilding. Henry B. Wortley. Read before the Inst. of Nav. Archts. Gives results of recent departures from ordinary practice, such as a rudder hung so that no stern frame has been required; the substitution of two pillars in the main hold in the place of numerous stanchions; a 8-ft. frame spacing; and the disuse of cement on the ship's bottom inside the ballast tanks. 4700 w. Engng—April 13, 1900.

**Iron.**—See **Steel and Iron**.

**Keel Repairing.**—See **BATTLESHIP—"Massachusetts" Repairs**.

**Lengthening.**—See also **Reconstruction**; **"Spree"**; **STEAMSHIP—Kaiserin Maria Theresia**.

**Lengthening "Indiana."**—Unique Engineering Feat. Illustrates and describes the rapid work in cutting the steamship "Indiana" in two and pulling the sections apart 40 feet. 1000 w. Naut Gas—June 14, 1900.

**Lengthening "New York."**—Lengthening a Hudson River Steamboat. Illustrated description of the addition of 30 feet to the steamboat "New York." 1800 w. Sci Am—Nov. 27, 1897.

**Lengthening "Scot."**—Lengthening the Cape Mail Steamer "Scot." Describes the lengthening of a steamer by an addition of 50 ft. The vessel is cut in two and the addition to length is made amidships. Illustrated by diagrams showing the method. Eng, Lond—Feb. 28, 1896.

**Lines.**—Comparison and Construction of Ships' Lines. Archibald Hogg. Read before the Northeast Coast Inst. of Engineers and Shipbuilders, at Newcastle-on-Tyne. Illustrates a method of comparison and construction of the under-water part of a ship's hull. 2800 w. Ind & Ir—Nov. 19, 1897.

**Maine.**—See **SHIPYARD—Bath, Me.**; **STEAMSHIP—Bath, Me.**

**Mechanical Engineering.**—The Connection Between Mechanical Engineering and Modern Shipbuilding. William H. White. Presidential address before the Inst. of Mech. Engs. Aims to indicate the directions in which shipbuilding and the working of ships have been influenced by mechanical engineering. Serial. Engng—April 28, 1899.

**Mercantile.**—Recent Developments in Mercantile Ship Construction. Part first calls attention to certain tendencies and developments now in progress in regard to the details of ship construction. 1500 w. Eng, Lond—April 23, 1897.

The Mercantile Ship-Building of the World. Compiled from the carefully prepared statistical tables of the committee of Lloyd's Register of British and Foreign Shipping. 1600 w. Eng's Gas—Sept., 1896.

See also **Cargo Steamers**.

**Merrimac.**—About Merrimac Ship Building. Horace C. Hovey. Facts of interest concerning the history and progress of ship building. Ill. 1400 w. Sci Am—March 13, 1897.

**"Milwaukee" Repairs.**—See **WRECKING—"Milwaukee."**

**Navy Yards.**—Shipbuilding in Navy Yards. Francis T. Bowles. Discusses the advantages and disadvantages. 2800 w. Naut Gaz—April 12, 1900.

See also **NAVY YARD; SHIPYARD; WARSHIP.**

**Newport News, Va.**—See **SHIPYARD.**

**Nickel-Steel and Aluminum.**—Improved Materials of Construction and Their Influence on Design. John Howard Biles. Read at the Inst. of Civil Engs. Engineering Conference. The materials discussed are nickel-steel and aluminum as applied to ship design. 3000 w. Ind & Ir—July 16, 1897.

**North England.**—The North of England Shipbuilding Industry. Henry F. Swan. Extracts from a presidential address delivered before the Northeast Coast Inst. of Engs. Review of the past and present of the industry. The tendency to increase the size of vessels and the increase of steam pressures are particularly noticed. 3500 w. Col Guard—Oct. 23, 1896.

**Pitching Stresses.**—See **NAVAL ARCHITECTURE; SHIP.**

**Plating.**—Hepburn and Stewart's Patent System of Plating. General illustrated description of a new system, for which many advantages are claimed. 350 w. Eng's Gaz—Dec., 1895.

**Rapid Construction.**—Speed of Construction, a Vital Factor of Naval Strength. Frank B. King. Urging simplification of hull, machinery, fittings and armament, and other changes allowing economy of time. The application of the "unit principle," and changes tending to rapid building. 4800 w. Jour Am of Nav Engs—Feb., 1898.

**Reconstruction.**—Interesting Ship Repair Work. An account of the lengthening of the hull and the reconstruction of the stern of an Italian passenger and cargo vessel, by the Wallsend Slipway and Engineering Co. 800 w. Engng—Sept. 7, 1900.

See **Lengthening; "Spree."**

**Repairs.**—See also **Lengthening; Reconstruction; BATTLESHIP — "Massachusetts" Repairs; WRECKING.**

**Riveting.**—See **Countersinking; RIVETED JOINT —Tests; RIVETING.**

**"Spree."**—A Problem in Shipbuilding. From "Illustrirte Zeitung." Illustrations and brief description of the details of the work in lengthening the North German Lloyd Steamer "Spree," and transforming it from a single to a twin-screw steamer. 1200 w. Sci Am Sup—Jan. 7, 1899.

**Steamship.**—How a Ship is Made. Max Hahn. Considers the construction of a modern ocean steamer. 1800 w. Chau—April, 1898.

The Advancement in Steamship Construction. Editorial discussing whether the large proportions and great speed of the Atlantic liners will pay, and the importance of the ship-building industry, its advances and improvements. 2000 w. Am Ship—Oct. 14, 1897.

See also **STEAMSHIP.**

**Steam Yacht.**—See **STEAM YACHT—American Builders.**

**Steel.**—Our Steel Industry. Charles H. Cramp. The wonderful development and the relation to shipbuilding. 4500 w. Marine Rev—Feb. 1, 1900.

Steel Considered as a Material for Ship Construction and Machinery. C. A. McAllister The importance of selecting and testing material. The unfitness of steel made by the Bessemer process for marine construction. The writer's preference for open-hearth steel, and general discussion of requirements, etc. 1600 w. Marine Engng—Sept., 1897.

The Steel Foundations of the Shipbuilding Industry. A review of the transformations which have taken place in the use of steel as a marine structural material, with especial reference to the use of ferro-manganese. 2500 w. Eng Mag—Nov., 1898.

The Steel Foundations of the Shipbuilding Industry. James Riley. A history of the use of steel in shipbuilding. The article describes fully the troubles encountered by the British Admiralty in the earlier attempts to build steel ships, the growth of the steel-making industry and the improvement and standardising of the product. The machinery of the steel mill and its evolution are described. The recognition of the possibilities of steel by the marine engineer led to the greatest triumphs of his profession. 4500 w. Eng Mag—Dec., 1898.

**Steel and Iron.**—On Some Features of the Repairs and Construction of Iron and Steel Ships. M. W. Aisbitt. Read at meeting of the North-East Coast Inst. of Engs. and Shipbuilders, at Newcastle-on-Tyne. Notes from one long engaged in the work. Discusses stanchions, web frames, double-bottoms, etc. Ill. 2500 w. Steamship—Dec., 1898.

The Morbid Anatomy of Iron and Steel Ships. S. J. P. Thearle. Lecture delivered to the Glasgow Univ. Engng. Soc. An examination of the diseases to which these ships are liable, and the advances being made in overcoming them. Serial. Engr, Lond—Dec. 9, 1898.

**Thames.**—Thames Shipbuilding and Marine Engineering. A summary of the work, with tabular statement of the prinicpal ships built by each firm. 3800 w. Engr, Lond—Dec. 30, 1898.

Marine Engineering and Shipbuilding on the Thames. A brief account of the work now in hand. 4200 w. Engr, Lond—Sept. 29, 1899.

Shipbuilding and Marine Engineering on the Thames in the Victorian Era. Part first, as an introduction to the subject to be considered, reviews events preceding the present reign, the invasion of the Dutch, as recorded by Samuel Pepys, the threatened invasion of the Spaniards, etc. Ill. Serial. Engr, Lond—Sept. 3, 1897.

See also **SHIPBUILDER; SHIPYARD.**

**Theory and Practice.**—Shipbuilding in Theory and Practice. The first of a series of articles in which it is the writer's intention to give a clear and explicit description of the calculations employed and the methods adopted in the science of shipbuilding. Serial. Mech Wld—Sept. 3, 1897.

**Timber Supply.**—Shipbuilding. A discussion, at some length, of the timber supply for shipbuilding, by Mr. G. C. Mackrow. Ill. 4200 w. Ill Car & Build—Nov. 27, 1896.

**Tonnage.**—Tonnage and Its Measurement. Refers to Mr. Ramage's paper on "Minimum Net Register and its Effect on Design," and to Mr. W. Hök's paper on "The Trunk-Deck Steamer Oscar II," and the exposure of tonnage cheating. 2500 w. Engr, Lond—April 15, 1898.

**United Kingdom.**—See **British.**

**United States.**—American Shipbuilding. Illustrated historical sketch. 2000 w. Sci Am—July 25, 1896.

New Vessels Being Constructed in United States Ship-Yards. A list with particulars of the vessels now under construction in the United States ship-yards, including both merchant and government work. Serial. Naut Gaz—Jan. 12, 1899.

Progress and Promise in American Ship-Building. Lewis Nixon. Antagonising the policy of freedom in the ship-building industry, and showing the dependence of the steam marine on governmental aid. Ill. 4200 w. Eng Mag—Jan., 1896.

Shipbuilding and Shipping Conditions of the United States—Past, Present and Future. George R. McDermott. Reviews the conditions of the mercantile marine and the coasting service, discussing also the future of the foreign trade, and the industry of shipbuilding. 2700 w. Marine Engng—June, 1899.

Shipbuilding in America. Editorial discussion of the competition that is inevitable in this industry and the prospects of success for the United States. 2200 w. Engng—Dec. 30, 1898.

Ship Building Industry in America. Gives tabulated report of vessels under construction, and other information showing a prosperous condition. 1800 w. Marine Rev—Feb. 8, 1900.

Shipping and Shipbuilding in the United States. James W. Ross. Historical review of the rise and fall of this industry, and the present outlook. 4000 w. Sci Am Sup—April 28, 1900.

The Prospective Expansion of American Shipbuilding. G. R. Dunell. An examination of the coming American competition, showing that the command of the steel trade is the key to the control of the shipbuilding industry. 4500 w. Eng Mag—April, 1899.

See also **Steel.**

**United States, 1899.**—The Record of the Year in Steel Shipbuilding. Waldon Fawcett. Showing the development and advancement in the United States in 1899. 2500 w. Ir Age—Dec. 14, 1899.

**U. S. Importation Laws.**—U. S. Laws Regulating the Importation of Materials for the Construction and Repair of Vessels. Gives opinions and rulings in recent cases, and which are accepted as the law at the present time. 2500 w. Marine Engng—Oct., 1900.

**United States Rivers.**—Ship Building on Inland Rivers. Waldon Fawcett. Review of the work, showing a very promising outlook. Ill. 2200 w. Am Mfr & Ir Wld—June 7, 1900.

**United States vs. British.**—American Rivalry in the Ship Building Industry. Considers the conditions and causes that contribute to success in this field. 2200 w. Ir & Coal Trds Rev—Jan. 20, 1899.

An American Menace to British Shipbuilding. Editorial on an article by Andrew Carnegie in the "Iron Trade Review," of Cleveland, urging the United States to regain the supremacy in shipbuilding. 1100 w. Ir & Coal Trds Rev—March 18, 1898.

**Wages.**—Wages Paid Mechanics in the Private Shipyards of Foreign Nations. Information of importance from a standpoint of competition in vessel construction. 2200 w. Marine Engng—May, 1900.

**Warship.**—See also **WARSHIP.**

**Water-Tight Door.**—See also **BULKHEAD DOOR; SHIP FITTINGS; WATER TIGHT DOOR.**

**Watertight Work.**—Methods of Securing Watertight Work. H. G. Smith. A discussion of the best methods of construction for bulkheads double-bottoms, etc., in order that watertight work may be assured, with especial reference to the vessels of the U. S. Navy. 7500 w. 9 plates. Trans Soc N A & M E—1898.

**Z-Beams.**—See **BEAM—Z.**

### SHIP CANAL.

See **CANAL; GREAT LAKES; STEEL INDUSTRY—Great Lakes Export; WATERWAY.**

### SHIP FITTINGS.

Novelties in Ship Fittings. R. M. Watt. Illustrates and describes a safety electric watertight door, asbestos sheathing, metal folding berth, and metal skylight. 5000 w. Soc of Nav Archts & Marine Engs, No. 11—Nov., 1899.

### SHIPPING.

See **MERCHANT MARINE.**

### SHIP PROPULSION.

See also **MARINE ENGINE; MARINE ENGINEERING; PROPELLER; SHIP RESISTANCE.**

Discussion of the Mechanical Theory of Steamship Propulsion. Robert Mansel. The paper is a continuation of an article published in this journal on Oct. 14, 1898. Gives formula and graphical illustrations. 2500 w. Engr, Lond—Feb. 10, 1899.

Modern Steamship Propulsion. W. H. Atherton and A. L. Mellanby. Part first discusses the resistance and power of steamships. Serial. Prac Engr—Jan. 13, 1899.

Modern Steamship Propulsion. W. H. Atherton and A. L. Mellanby. A mathematical discussion of the speed of ships, with diagrams. 1800 w. Pract Eng—Sept. 7, 1900.

Propulsive Power. James N. Warrington. A comparison of the results of speed trials of several new ships, with explanation and tabulated calculations. 1200 w. Jour Am Soc of Nav Engs—Feb., 1898.

**"Argonaut" Trials.**—Trials and Experiments Made in H. M. S. "Argonaut." Sir John Durston. Read before the Inst. of Naval Archts. An account of the results of the contract trials and experiments made while these were being carried out. Ill. 8200 w. Jour Am Soc of Nav Engs—May, 1899.

**Combined Sail and Steam.**—Remarks on Sail and Steam Power Combined. H. C. Vogt. A paper designed to show that a special construction of sails is necessary to work efficiently along with steam power, and that sails and steam power, properly constructed, act to the best advantage when used together. 1500 w. Steamship—Nov., 1896.

**Danish Trials.**—Some Steam Trials of Danish Ships. A. Rasmussen. Read before the British Inst. of Nav. Engs. Report of trials made to determine the elements of propulsion of ships and torpedo boats under various circumstances. 1600 w. Engng—March 24, 1899.

**Danube Navigation Co.'s Tests.**—See **TOWAGE.**

**Economics.**—The Economics of Propulsion in the Modern Steamship. R. L. Weighton. Lecture delivered at the Marine Engineers' Institute, South Shields, on the 9th of Dec., 1895. Serial. Prac Eng—March 27, 1896.

**Electric.**—Direct Application of Electricity to the Propulsion of Ships. William F. Durand. A reply to certain of the statements made by Nikola Tesla in the June, 1900, issue of "The Century Magazine." 2800 w. Marine Engng—July, 1900.

See also **ELECTRIC BOAT; TORPEDO BOAT.**

**High Speed.**—A Vessel for High Speed. H. C. Vogt. An investigation of how to obtain high speed on the seas, based on a study of marine animals and their rapidity in swimming. Ill. 2300 w. Steamship—June, 1898.

**Model Tanks.**—See **NAVAL ARCHITECTURE.**

**Power Calculation.**—Calculation of Horse-Power for Marine Propulsion. Thomas English. Read before the Inst. of Mech. Engs. A method whereby, with the ordinary appliances of a ship-yard, results can be closely approximated, that could be obtained otherwise only by the use of the refined apparatus of a model tank. Illustrated with diagrams. Discussion. 2000 w. Jour Am Soc of Nav Engs—May, 1896.

Calculation of Horse-Power for Marine Propulsion. Thomas English. The calculation proceeds from the basis of the resistance of a given vessel at the speed desired. Froude's method of ascertaining resistance is approved and adopted. An apparatus whereby the delicate dynamometrical apparatus ordinarily used with a model tank may be dispensed with. The mode of using it is also described. 1300 w. Ind & Ir—Feb. 14, 1896.

**Screw.**—Improvements in Screw Propulsion. I. McKim Chase. Considers methods of utilising the discharged water from a screw propeller to aid propulsion. 1000 w. Marine Rev—July 5, 1900.

Improvements in Screw Propulsion. I. McKim Chase. Considers how to increase the efficiency of screw propellers. Ill. 1300 w. Marine Rev—June 21, 1900.

See also **PROPELLER.**

**Secor Direct.**—The New Marine Power. Describes the Secor Direct Propulsion system, and the works of the company on New York Bay. 1500 w. Sea—Dec. 17, 1896.

**Slip.**—Slip and Its Relation to the Problem of Screw Propulsion. Edmund Leavenworth. Part first explains what slip is and the causes of variability. Serial. Marine Engng—Jan., 1899.

**Small Craft.**—Determination of the Power, Diameter and Pitch of Screws to Propel Small Boats. Facts on these points furnished by a high authority on the subject. The data concerning screws gives the results of recent experimental work. 2000 w. Am Elect'n—July, 1898.

Steam Power of Small Yachts. William Burlingham. Rules for calculating the displacement, horse-power, speed and the necessary points about the propeller for small boats of medium speed. 2000 w. Mach, N. Y.—April, 1899.

**"Sovereign" Trials.**—Efficiency of the Twin-Screw Steam Yacht "Sovereign." John D. Hackstaff. Warren H. Miller, Waldo G. Lunger. Graduating thesis discussing the application of Rankine's Theory of the Mathematical Action of Screw Propellers in determining the efficiency of this yacht and of distribution and dissipation of the power given out by her engines. Serial. Stevens Ind—April, 1899.

Analysis of the Speed-Trial of the Twin-Screw Steam Yacht "Sovereign" by D. W. Taylor's Method of Trial Analysis. Robert S. Haight. Graduation thesis. Compares results by Taylor's method with those obtained by following Rankine's theory of the screw propeller. 1800 w. Stevens Ind—April, 1900.

**Speed Trials.**—Analysis of Speed Trials of Ships. William George Walker. Read before the British Assn., Toronto. Illustrates the method of analysis. 800 w. Engr, Lond—Oct. 29, 1897.

Description of a Full Speed Sea Trial. From the "London Globe." Descriptive. 1500 w. Marine Rev—June 21, 1900.

See also **"Argonaut"; Danish; "Sovereign"**; and under specific types and names of vessels.

**Theory.**—Discussion of Some Theories of Steamship Propulsion. Robert Mansel. Discusses the theories of M. Dupuy de Lome, Rankine and others, showing discrepancies. 2700 w. Engr, Lond—Oct. 14, 1898.

The Mechanical Theory of Steamship Propulsion. Robert Mansel. Briefly reviews published mathematical theories. 1800 w. Engr, Lond—Aug. 18, 1899.

On the Mechanical Theory of Steamship Propulsion. Robert Mansel. An account of investigations, giving results and discussing the subject generally. 3000 w. Engr, Lond—March 9, 1900.

On the Mechanical Theory of Steamship Propulsion. Robert Mansel. A mathematical discussion. 2500 w. Engr, Lond—Aug. 24, 1900.

**Torpedo Boats.**—See **TORPEDO BOAT—Speed.**

**Triple Screw.**—See **WARSHIP.**

**Wave.**—See **WAVE PROPULSION.**

**Yacht.**—See **Small Craft; "Sovereign" Trials.**

**"Yosemite" Trials.**—See **STEAM YACHT.**

**SHIP RESISTANCE.**

See also **NAVAL ARCHITECTURE; WATER FLOW.**

On Resistance to the Motion of Solids in a Fluid. B. Schieldrop. Read before the Inst. of Naval Archts., England. The object of the paper is to point out a method by which it is hoped experimentally to secure information about the actual magnitude and character of the process to which the various parts of the skin of the solid are submitted. 6400 w. Engng—May 6, 1898.

Resistance of Ships. Joseph R. Oldham. Read at meeting of Civ. Engs.' Club, of Cleveland, O. Part first is a study of the friction of solid bodies. Serial. Am Ship—Feb. 4, 1897.

Resistance of Ships and Other Floating Bodies at Deep and Shallow Drafts of Water. Joseph R. Oldham. Convictions and opinions held by eminent scientists and engineers on the resistance offered by water to ships floating therein are examined, with general remarks. 5000 w. Jour Assn of Engng Soc—Feb., 1897.

Resistance of Ships. William A. Fairburn. Replies to questions asked concerning conclusions reached in an article published Nov. 9, 1899, in this paper. 2500 w. Marine Rev—Jan. 11, 1900.

Skin Resistance. H. S. Hele-Shaw. Read at the International Congress of Naval Architects and Marine Engineers. Gives experiments on the nature of surface resistance in pipes and on ships. Apparatus used is described and results given. 4000 w. Engng—July 16, 1897.

Surface Resistance of Water. H. S. Hele-Shaw. Read before the Inst. of Naval Arch'ts, London. Investigations of the nature of surface resistance of water and of stream line motion under certain experimental conditions. Ill. Serial. Engng—April 8, 1898.

Horse-Power Absorbed by Skin Friction and Wave-Making in Ships of Different Forms and Proportions Deduced from Progressive Trials. James Hamilton. Read before the Inst. of Naval Archts., England. Statement of results deduced from trials of actual vessels showing the principles governing wave-making resistance. 2000 w. Engng—May 13, 1898.

The Computation of the Resistance of Ships (Berechnung des Schiffswiderstandes). Prof. Th. Maryniak. A development of a formula for computing the resistance of ships from the principles of hydrodynamics, with numerous applied examples. 1200 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 4, 1896.

**Bow Wave.**—A Study of the Energy of the Bow Wave. Marston Niles. The paper presents the writer's reasons for believing that prevailing opinions, with their mathematical basis, are in almost every respect erroneous, and the conclusions therefore incorrect. Considers the transverse bow wave. 16500 w. Jour Am Soc of Nav Engs—Aug., 1899.

**Danube Navigation Co.'s Tests.**—See **TOWAGE.**

**Italian Tests.**—On the Influence of Depth of Water on the Resistance of Ships. Giuseppe Rota. Read before the Inst. of Naval Archts. An account of experimental tests carried out in the tank of the Royal Dockyard of Spezia, Italy, giving curves of resistance. 1400 w. Engng—April 20, 1900.

**Model Experiments.**—The Determination of the Resistance of Vessels by Experiments with Models (Die Bestimmung des Schiffswiderstandes auf Grund der Versuche mit Modellen). A paper by Herr Schromm, discussing the influence exerted by the shape and dimensions of the tank or channel upon the resistance to motion. 3000 w. Zeitschr d Oesterr Ing u Arch Ver—June 10, 1898.

See also **NAVAL ARCHITECTURE—Model Tank.**

**Transverse Waves.**—The Resistance of Transverse Waves to the Progress of Vessels (De la Résistance à l'Avancement des Bateaux et des Ondes Transversales). M. F. Chandy. A mathematical discussion in connection with models for use in tank trials, showing the influence of the dimensions of the tank upon the results. 3500 w. Soc Ing Civ de France—Feb., 1899.

See also **Bow Wave.**

**SHIP SIGNAL.**

See **ELECTRIC SIGNAL; FOG SIGNAL; NAVIGATION; SHIP TELEGRAPH; TELEPHOTOS—Boughton; WRECK—La Bourgogne.**

**SHIP TELEGRAPH.**

See also **ELECTRIC EQUIPMENT; ELECTRIC INDICATOR; ELECTRIC SIGNAL; MARINE ENGINE—Speed Controlling Device.**

The Application of Electricity for Transmitting Orders (Ueber die Anwendung der Elektricität für Kommandozwecke). Dr. A. Raps. With numerous illustrations of indicators for transmitting orders from the bridge of a ship to the engine room. 4500 w. Elektrotech Zeitschr—Sept. 7, 1899.

**Boiler Room.**—Electric Boiler Telegraph (Elektrischer Kesseltelegraph). An illustrated description of a Siemens-Halske apparatus for sending various signals to and from the boiler room of a ship. 800 w. Elektrizität—April 14, 1900.

**Fiske's Helm Indicator.**—Fiske's Helm Indicator and Steering Telegraph. Illustrated description of these two instruments, which have attained very great success in an extended series of trials in the war vessels of the United States. 1400 w. Engng—Dec. 4, 1896.

**Mechan.**—Mechan & Sons' Triple Automatic Reply Ships' Telegraph. Illustrated description. 500 w. Steamship—Jan., 1896.

**Rotary Field.**—Rotary Field Electric Indicator (Drehfeld Fernzeiger). Describing an electric dial indicator for use on vessels between bridge and engine room. 4000 w. Elektrotech Zeitschr—Aug. 12, 1897.

Rotary Field Signal Command Apparatus (Drehfeld-Fernzeiger als Signal- und Kommando Apparat). Describing an improved form of dial signal apparatus for communication of orders from the bridge to the engine room of a vessel. The indications are transmitted by the rotation of a magnetic field. 4500 w. Glaser's Annalen Feb. 1, 1898.

The New Electric Telegraph Signal Apparatus of the Allgemeine Elektricitäts Gesellschaft on the Rotary Field Indicator System (Die Neuen Elektrischen Kommandoapparate der Allgemeinen Elektricitäts Gesellschaft nach dem "Drehfeld-fernzeiger-System"). F. Querengässer. A paper before the Verband Deutscher Elektrotechniker, giving an illustrated description of an apparatus for transmitting signals and orders of various kinds on shipboard. 1400 w. Elektrotech Zeitschr—July 19, 1900.

**SHIPWRECK.**

See **WRECK.**

**SHIPYARD.**

See also **NAVY YARD; SHIP; SHIPBUILDING.**

**Appliances.**—See **Keyham; Union Iron Works; United States; CRANE; DERRICK; SHEARS.**

**Barrow, Eng.**—The Naval Construction Company's Works at Barrow. Illustrated description of a shipbuilding establishment whose annual payment of wages is over $1,600,000. Serial. Engng—Aug. 7, 1896.

**Bath, Me.**—Bath Iron Works, Ltd. A sketch of its history and an illustrated description of the plant. 3300 w. Marine Rev—July 19, 1900.

See also **STEAMSHIP.**

**Commercial Value.**—The Commercial Value of the Shipyard. Lewis Nixon. Discusses the relation of the shipyard to the arts of peace, showing its effectiveness to be indispensable to national prosperity. Presents the effect in England, and the importance of the subject in America. 5000 w. N Am Rev—Nov., 1897.

**Cramp's, Philadelphia.**—Where the New "Maine" is Building. Illustrated description of important improvements at the Philadelphia works of Wm. Cramp & Sons Co. 2800 w. Marine Rev—Feb. 8, 1900.

**Detroit.**—The Detroit Dry Dock Company's Plant. Brief but interesting illustrated description of a typical lake shipbuilding establishment. 1000 w. Sea—March 26, 1896.

**Fairfield, Clyde.**—Recent Extensions at Fairfield Shipyard. Notes on recent improvements and new features. 2400 w. Engr, Lond—Aug. 17, 1900.

See also **SHIPBUILDING—Clyde.**

**Germany.**—See **SHIPBUILDING.**

**Harlan & Hollingsworth.**—Model American Shipyard. Illustrates and describes the plant of the Harlan & Hollingsworth Co., of Wilmington, Del., its equipment and operation. 3300 w. Marine Rev—July 13, 1899.

**Harland & Wolff.**—See **HARBOR—Belfast.**

**Keyham, Eng.**—The Mechanical Appliances Employed in the Construction of the Keyham Dockyard Extension Works. Whately Eliot. Read before the Inst. of Mechanical Engs. Describes briefly, and illustrates, the machinery which is being employed in excavation, dealing with materials, building operations and workshops. 3200 w. Engng—July 28, 1899.

**Kiel.**—See **SHIPBUILDING—Germany.**

**Lorain, O.**—Most Modern of Lake Shipyards. Illustrates and describes some of the details of the plant at Lorain, Ohio. 1100 w. Ir Trd Rev—Feb. 24, 1898.

The Lorain Shipyard of the Cleveland Shipbuilding Co. With general plan showing the arrangement of the slips and buildings, also plan, section, and details of the 500 ft. dry dock. 1800 w. Eng News—Sept. 8, 1898.

See also **DRY DOCK—Lorain, O.**

**Military Value.**—The Military Value of the Shipyard. Lewis Nixon. Résumé of the history of the U. S. naval reconstruction and survey of the existing situation, with comparison or contrast with the policy of Great Britain. 6000 w. N Am Rev—June, 1897.

**Morris Heights, N. Y.**—See **LAUNCH—Naphtha.**

**Nagasaki, Japan.**—The Nagasaki Dockyard. Information concerning the dockyard and slips of the Mitsu Bishi Co., of Japan, and of Hitachi Maru iron steamship now building. 1100 w. Engr, Lond—April 22, 1898.

**Newport News, Va.**—A Great Shipyard. Full illustrated description of the many departments of the Newport News yard, with brief account of the founder, and of its rapid development. 12000 w. Marine Rev—March 30, 1899.

Full Share of Prosperity. Summary of the year's work at the Newport News shipyard, with illustrations. 800 w. Marine Rev—Feb. 8, 1900.

**Palmer's, Jarrow-on-Tyne.**—See **IRON WORKS.**

**Russia.**—Some Notes in Russia. Deals with Russian dockyards. Part first discusses the New Admiralty Yard, St. Petersburg. Ill. Serial. Engr, Lond—Feb. 24, 1899.

**Stettin.**—See **Vulcan.**

**Thames.**—Shipbuilding on the Thames. Describes, in a general way, the notable shipyards on the Thames, beginning in the first part with the yards of Messrs. Yarrow and Co. Serial. Ir & St Trds Jour—Nov. 23, 1895.

The Thames Iron Works and Shipbuilding Company. A very complete illustrated and detailed description of one of the largest and most important shipbuilding and marine engineering works in the world. 11000 w. Engr, Lond—Dec. 13, 1895.

See also **SHIPBUILDER; SHIPBUILDING.**

**Union Iron Works.**—Overhead Cranes, Staging, and Riveter-Carrying Appliances in the Shipyard. James Dickie. Detailed description of these appliances. 6 plates. 1600 w. Soc of Nav Archts & Marine Engs—No. 9, Nov., 1899.

Overhead Cranes, Staging and Riveter-Carrying Appliances in the Shipyard. James Dickie. Illustrated detailed description of the wooden framework in the shipyard of the Union Iron Works in San Francisco. 1500 w. Marine Engng—May, 1900.

Shipbuilding Plant of the Union Iron Works at San Francisco. An illustrated description of the works where the "Oregon" was built. 2300 w. Marine Engng—Jan., 1900.

The Union Iron Works. J. Richards. Illustrates and describes the equipment of these works at San Francisco, giving interesting information. 2000 w. Mach, N. Y.—Sept., 1899.

**United States.**—Newest Practice in American Shipyard Appliances. Waldon Fawcett. On the recent development in the equipment of shipyards, calling attention to innovations adopted in various yards and reforms in methods. 2500 w. Ir Age—Feb. 22, 1900.

The Shipbuilding Yards of the United States. Waldon Fawcett. A continuation of a former paper. Reviews the location, growth, equipment, and output of the principal yards of the coast and the lakes. Very fully illustrated. 4000 w. Eng Mag—Aug., 1900.

The Shipbuilding Yards of the United States. Waldon Fawcett. A summary of conditions and progress, with statistics of work in hand and in prospect, and fully illustrated descriptions of all the larger yards of the country and of their equipment. Part I. 5000 w. Ill. Eng Mag—July, 1900.

**Vulcan, Stettin.**—The Stettiner Maschinenbau Actien-Gesellschaft "Vulcan." Interesting information concerning the Vulcan Works at Bredow, near Stettin, Germany, the great progress, especially during the last ten years, giving diagrammatic profiles of work done. The success of the twin-screw Atlantic liner "Kaiser Wilhelm der Grosse," and comparison with other vessels. Serial. Engng—July 7, 1899.

**Wallsend, Eng.**—The Equipment of Shipbuilding Sheds. Illustrates and describes improvements at the works of Messrs. Swan & Hunter, Wallsend, Newcastle-on-Tyne. 900 w. Engr, Lond—Aug. 4, 1899.

**West Bay City, Mich.**—A Great Lake Shipyard. Illustrated description of Messrs. F. W. Wheeler & Co.'s extensive works at West Bay City. One of the finest vessel building plants in America. 900 w. Sea—May 14, 1896.

**Weymouth, Mass.**—A New England Shipbuilding Industry. Illustrates and describes the plant of the Fore River Engine Co., at Weymouth, Mass. 2000 w. Marine Rev—Nov. 2, 1899.

**Wolff & Zwicker, Portland, Ore.**—Shipbuilding Plant of Wolff & Zwicker, at Portland, Ore., on Pacific Coast. Brief illustrated description. 800 w. Marine Engng—Oct., 1899.

### SHOE-BLACKING MACHINE.

Automatic Shoe-Blacking Machine. Illustrated description of an electrical machine for the above purpose. 600 w. W Elec—Nov. 30, 1895.

### SHOP.

See **MACHINE SHOP; RAILWAY SHOP;** etc.

### SHORE IMPROVEMENT.

See also **HARBOR; SHORE PROTECTION.**

**Blackpool, Eng.**—Shore Improvements at Blackpool. Illustrated description of the construction of a new promenade, sea wall, etc. 1000 w. Engng—Jan. 19, 1900.

### SHORE PROTECTION.

See also **DRAINAGE; HARBOR; JETTY.**

Sea-Coast Protection. W. H. Wheeler. Describes the causes of coast destruction and the remedies adopted in various lands. Serial. Engr, Lond—April 7, 1899.

Sea Defences. Richard F. Grantham. Read before the Society of Engineers, England. A study of the principles upon which works for the protection of property from the sea should be constructed. Serial. Ind & Ir—Nov. 5, 1897.

The Proper Profile for Resisting Wave Action. Robert Fletcher. Abstract of a paper filed in the library of this society. A continuation of previous study of the subject by the writer. 2800 w. Am Soc of Civ Engs—Nov., 1896.

**Detritus.**—Sea-Beaches and Sandbanks. Vaughan Cornish. Abstract of a paper read before the Royal Geographical Society. Research upon the processes which distribute the detritus which enters the sea at its margin, and upon the behavior of the material distributed. Ill. 2000 w. Nature—May 12, 1898.

**Dymchurch Wall, Eng.**—The Dymchurch Wall and Reclamation of Romney Marsh. Edward Case. Read before the British Assn. Historical account, with description of the method of building up a foreshore. 1700 w. Engr, Lond—Oct. 20, 1899.

**Earthen Dike.**—The Construction of Earthen Dikes (Construction des Digues en Terre). A. Dumas. A description of the so-called English method, in which a central puddle-wall of clay is used to insure resistance to leakage. 2000 w. Génie Civil—Dec. 2, 1899.

**England.**—Sea-Coast Destruction and Littoral Drift. W. H. Wheeler. States the conditions that have caused the present state of the cliffs and coasts, and the conditions under which the material is drifted along the shore, illustrating by a study of the coast of the southwest of England. 3400 w. Nature—Aug. 23, 1900.

**Groynes.**—Groynes and Sea-Coast Defenses. A. T. Walmisley. Read before the Inst. of Municipal and Civil Engs. Maintenance of cliff faces, the retention of a fore-shore, and such works of protection as are necessary to secure the advantages of a seaport. 2500 w. Ind & Ir—April 30, 1897.

Foreshore Protection, with Special Reference to the Case System of Groyning. R. G. Allanson-Winn. Read before the Soc. of Engs. Describes certain methods which have recently found favor in shore protection, giving examples of works carried out under different conditions. Serial. Ind & Ir—June 23, 1899.

Sea Encroachment and Case Groynes. Illustrates and describes the groyne invented and patented by Edward Case. The object is to utilize the destructive forces of the sea for constructive purposes. 2000 w. Engng—Jan. 27, 1899.

**Holland.**—Holland's War With the Sea. J. H. Gore. A discussion of the conditions under which this annex to the continent was made, the technical processes employed by the people to keep back the waters, and its effect upon the character of the people. A very interesting paper. 8000 w. Trans Assn of Civ Engs of Cornell Univ—June, 1896.

The Protection of Shores against Encroachments of the Sea. E. L. Corthell. Devoted especially to the dikes and shore protection works of Holland, and showing how with skillful guidance the sea may be made to build up the shore instead of eating it away. 3000 w. Eng Mag—Dec., 1897.

See also **North Sea.**

**Norfolk, Eng.**—Land Reclamation in Norfolk. Describes the system adopted, which makes the sea itself the maker of the land. 1500 w. Engng—June 1, 1900.

**North Sea.**—Sea Walls on the North Sea Coast (Strandmauern an der Nordseeküste). With illustrations showing the different kinds of sea walls and methods of construction on the coasts of Denmark, Holland, Belgium and Germany. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 25, 1898.

See also **Holland.**

**Po Delta.**—See **RIVER REGULATION—Po Embankment.**

**Rivers.**—See **RIVER REGULATION—Bank Protection.**

### SHOT-GUN.

See also **RIFLE.**

**France.**—The Shot-Gun, Its Origin, Evolution and Present Status (Le Fusil de Chasse, son Origine, ses Transformations, sa Situation Actuelle). Report by M. E. Polonceau to the Société d'Encouragement pour l'Industrie Nationale, upon the work of M. Nouvelle. Interesting data of the development of fire-arms, with statistics of the present French import and export trade in guns. 1800 w. Bull de la Soc d'Encour—Dec., 1896.

### SHOVEL.

**Steam.**—See **STEAM SHOVEL.**

### SIAM.

Public Improvements in Siam. Concerning the electric light and the streets of Bangkok. 1100 w. U S Cons Repts, No. 636—Jan. 24, 1900.

Trade Opportunities in Siam. Information concerning this country of southeastern Asia, and the opportunities for American exporters and manufacturers. 2000 w. U S Cons Repts—March 15, 1898.

**Foreign Trade.**—Foreign Trade of Siam. The most extended report yet made upon Siamese commerce, prepared with special reference to the opportunity open to exporters of the United States. 4000 w. U S Cons Repts—May, 1896.

### SIBERIA.

See also **CHINA; GOLD REGION; JAPAN; MINERAL REGION; RAILWAY; RUSSIA.**

Russian Opening for Anglo-Saxon Enterprise in Asia. A. H. Ford. Personal observations of the startling railway developments of Eastern Asia, the markets for machinery and engineering construction there afforded, and the rising competition of Japan. 4500 w. Eng Mag—June, 1900.

The Natural Resources and Gold Bearing Strata of Siberia (La Sibérie, ses Resources Naturelles et ses Gisements Aurifères). A review of the recent work by M. R. De Batz, with much interesting and valuable information concerning this important country. 1800 w. Génie Civil—Jan. 29, 1898.

The Opening of Siberia. Information cencerning this extensive and richly endowed region, its mineral riches, industries, and the opening for foreign trade. 2800 w. Bd of Trd Jour—June, 1898.

### SIDE-LIGHT.

**Ship.**—Sir E. J. Reed on the Question of Ship's Side-Lights. Defence of an order of the Marine Department of the Board of Trade, issued Jan., 1898, prescribing an angle of four degrees as the largest at which any part of a ship's side-light should pass the screen and cross the line of the ship's advance. The severe criticisms to which this order has been subjected are answered. 1700 w. Steamship—Feb., 1896.

### SIDEWALK.

See also **MUNICIPAL IMPROVEMENT; PAVEMENT; STREET; STREET IMPROVEMENT.**

**Cement.**—Cement Sidewalks. W. K. Eldridge. Letter discussing reasons for failure of cement walks. 1800 w. Eng Rec—June 2, 1900.

Letters to the Editor Concerning Cement Walks. A discussion of the causes of failure in such walks and suggested remedies. 2700 w. Eng Rec—May 12, 1900.

Some Theories Regarding Cement Walks. Daniel B. Luten. Illustrated description of different classes of failure in walks and methods of avoiding them. 3300 w. Eng Rec—April 14, 1900.

Specifications for Cement Walks. Suggestions submitted, covering in a general way the proper methods and materials to be used in the building of cement walks. 800 w. Br Build—Dec., 1896.

Specifications for Cement Sidewalk Construction. A. J. McPherson, in "Journal of the Engineering Society of the School of Practical Science of Toronto." Abstract of specification. 800 w. Eng News—June 24, 1897.

Popular Village Sidewalks. Describes the system in operation in Mexico, N. Y., which has furnished a generous amount of concrete sidewalk pavement, thus greatly improving the town and facilitating pedestrian movement. 500 w. Eng Rec—Sept. 24, 1898.

See also **PAVEMENT.**

**Concrete.**—See **Cement; PAVEMENT.**

### SIGNAL.

**Balloons.**—Long Distance Signals from Free or Captive Balloons (Les Signaux à Grandes Distances à Bord des Aérostats Captifs ou Libres). M. Dibos. A system of flash signals based upon the use of phosphine generated from calcic phosphide. The details are carefully worked out and illustrated. 2600 w. La Rev Tech—Nov. 10, 1898.

See also **SPACE TELEGRAPHY.**

**Electric.**—See **ELECTRIC SIGNAL; SHIP TELEGRAPH; TELEPHOTOS—Boughton.**

**Railway.**—See **BLOCK SIGNAL; GRADE CROSSING; INTERLOCKING; RAILWAY SIGNAL.**

**Sea.**—See **FOG SIGNAL; NAVIGATION; SHIP TELEGRAPH; TELEPHOTOS — Boughton; WRECK—"La Bourgogne."**

**Trains.**—See **TRAIN INTERCOMMUNICATION.**

**Weather Bureau.**—Electric Signal Apparatus at Atlantic City, N. J. Illustrated description of the principal features of the electric signaling system recently installed by the weather bureau. 1000 w. W Elect'n—Jan. 14, 1899.

### SILICON.

**Electrolytic.**—Metalloid (Metalloide). A description of a process, patented in Germany, for the electrolytic production of silicon from a mixture of carborundum and silica. 1000 w. Zeitschr f Elektrochemie—April 19, 1900.

**Iron.**—The Effect of Silicon on Iron. M. Moissan. A paper communicated to the Académie des Sciences, Paris, giving the results of his experiments in making silicide in an electric furnace. 600 w. Ir & St Trds Jour—Feb. 1, 1896.

See also **CAST IRON—Silicon and Carbon; IRON—Silicon and Chromium; IRON ALLOY; IRON MANUFACTURE.**

**Iron Silicides.**—On the Silicides of Iron. G. De

Chalmot. Experimental results obtained in the electric furnace. 400 w. Jour Am Chem Soc—Dec., 1895.

The Commercial Manufacture of Iron Silicides. G. De Chalmot. Abstract of a paper in the "Am. Jour. of Chemistry." Deals with silicides containing 25 to 50 per cent. of silicon. 1200 w. Eng & Min Jour—Feb. 18, 1899.

**Permeability of Iron.**—See **MAGNETISM—Silicon Effect.**

**SILICON CARBIDE.**

Carbide of Silicon: Its Purpose and Use in Steel. F. J. Tone. Explains the action of silicon on foaming or boiling steel, its advantage over ferro-silicon, and the range of its application. 1800 w. Ir Age—June 22, 1899.

**Cupola Practice.**—See **CUPOLA—Silicon Carbide.**

**SILVER.**

See also **GOLD; PRECIOUS METALS.**

Silver. R. N. Osbiston. Read before the Inverell (N. S. W.) Assn. of Mines. The first part is introductory to a description of processes used to extract silver at the Inverell mines. Serial. Aust Min Stand—Aug. 23, 1900.

**1896.**—See **GOLD.**

**Melting Point.**—See **MELTING POINT—Silver and Gold.**

**Proof.**—See **GOLD.**

**SILVER GEOLOGY.**

See also **GEOLOGY; GOLD GEOLOGY; MINERAL REGION; MINERAL VEIN; SILVER REGION.**

The Enrichment of Gold and Silver Veins. Walter Harvey Weed. A synopsis of the writer's theory and an explanation of its application to deposits of the precious metals. Ill. 8000 w. Trans Am Inst of Min Engs—June, 1900.

**SILVER METALLURGY.**

See also **GOLD METALLURGY; LEAD METALLURGY; METALLURGY; SILVER MILL; SMELTING.**

**Bartlett Process.**—See **ZINC.**

**Bolivia.**—Reduction Works of the Compania Huanchaca de Bolivia. K. F. L. Description of a large silver reduction plant in the interior of Bolivia. 2400 w. Eng & Min Jour—Dec. 28, 1895.

See also **SILVER MINE.**

**Broken Hill, Australia.**—Metallurgical Methods in Use at Broken Hill. G. H. Blakemore. History of the methods in vogue in this Australian mine, dealing with smelting, lixiviation and chloridizing, amalgamation and concentration. Serial. Aust Min Stand—March 31, 1898.

The Treatment of Broken Hill Sulphide Ores by Wet-Extraction Processes, and the Electrolytic Deposition of Zinc. Edgar A. Ashcroft. Abstract of paper read before the British Inst. of Mining & Metallurgy. An account of some novel metallurgical work in Australia which, though a commercial failure, is of interest. 7000 w. Elect'n, Lond—Aug. 19, 1898.

The Broken Hill Sulphide Problem. Remarks based on information obtained from William Dewar, on the system adopted at Broken Hill, giving a brief account of a plant designed by one of the larger companies. 1700 w. Eng & Min Jour—June 4, 1898.

Treatment of Broken Hill Sulphide Ores. F. J. Greenaway. The importance of the treatment and the operations, with their advantages and disadvantages. 1700 w. Aust Min Stand—Sept., 1896.

See also **SAMPLING—Silver-Lead Bullion; SILVER MINE.**

**Cupellation.**—Silver Losses in Cupellation. L. D. Godshall. Treats of the losses sustained by silver, under certain specified conditions, during the process of cupellation, and the conditions which govern these losses. 1400 w. and table of results. Trans Am Inst of Min Engs—Sept., 1896.

See also **Volatilization.**

**Electrolytic.**—See **ELECTRO-METALLURGY.**

**Lixiviation.**—The Lixiviation of Silver Ores. John H. Clemes. A paper read before the Inst. of Civ. Engs. The process employed at the Yedras mines in Mexico is described. 1500 w. Ind & Ir—March 20, 1896.

**Losses.**—See **Cupellation; Volatilization; DUST—Collection; SMELTING.**

**Mexico.**—Silver Smelting in Mexico. Otto H. Hahn. Condensed extract from paper before the London Inst. of Min. & Met. A criticism of the method in operation at Smelter No. 3, of M. Guggenheim's Sons at Monterey, Mexico. Serial. Min & Sci Pr—July 28, 1900.

**Patio Process.**—The Patio Process in Guanajuato, Mexico. Roberto Fernandez. An explanation of this process for the treatment of silver ores, and the class of ores to which it is best adapted. 1700 w. Trans Am Inst of Min Engs—Feb., 1899.

**Sonora, Mexico.**—The Reduction Works for Silver Ores, at Aduana, Sonora, Mexico. Miltiades Th. Armas. A brief geographical description, the kinds of ores and metals applied. Serial. Jour Fr Inst—Oct., 1898.

**South America.**—The Treatment of Dry Silver Ores in South America. A. A. Watson. Describes the methods used in Chili, Peru, and Bolivia. 2000 w. B C Min Rec—Nov., 1899.

**Sulphides.**—Reduction of Sulphides. The new process for the treatment of the sulphides of Broken Hill and Mount Reid in Australia. 3000 w. Aust Min Stand—May 11, 1899.

Silver-Lead-Zinc Sulphide Ores. J. T. Greenbury. Describes operations which represent very nearly what has been accomplished on a practical scale in connection with the treatment of the Broken Hill sulphide ores. 3000 w. Aust Min Stand—Jan. 20, 1897.

The Treatment of Complex Lead, Zinc, Silver, Sulphide Ores. O. J. Steinhart. A brief account of past work, with special reference to its most recent developments. Serial. Ind & Ir—March 24, 1898.

See also **Broken Hill; LEAD METALLURGY; METALLURGY; SMELTING.**

**Volatilization.**—The Volatilization of Silver in Chloridizing-Roasting. L. D. Godshall. A reply to the criticism of the late Mr. Stetefeldt. 2000 w. Eng & Min Jour—May 16, 1896.

The Volatilization of Silver in Chloridizing-Roasting. L. D. Godshall. A reply to the criticisms of Mr. Stetefeldt upon a former paper. 2700 w. Trans Am Inst of Min Engs—April, 1896.

See also **Cupellation.**

**Washing Roasted Ores.**—The Effect of Washing with Water upon the Silver Chloride in Roasted Ore. Discussion of the paper of Mr. Willard S. Morse, by L. D. Godshall. 2800 w. Trans Am Inst of Min Engs—Feb., 1896.

**Zinc-Bearing Ores.**—See **GOLD METALLURGY.**

**SILVER MILL.**

See also **GOLD MILLING; SILVER METALLURGY.**

**New Mexico.**—Milling in the Cooney Mining Districts, New Mexico. Carl Anderson. A tabulated statement itemized by months, and nine heads of expenses, etc., of results obtained by improved methods in silver milling. The author corrects a previous description by Mr. L. W. Tatum. 500 w. Eng & Min Jour—Feb. 15, 1896.

**Pulp Handling.**—Improved Method of Handling Pulp in Silver Mills. L. W. Tatum. Description of a method of testing a plant showing how the capacity was increased, the losses reduced and the expenses cut down by intelligent arrangement. 1000 w. Eng & Min Jour—Dec. 14, 1895.

**SILVER MINE.**

See also **GOLD MINE; MINERAL REGION; SILVER REGION.**

**Bolivia.**—The Oruro Silver Mines in Bolivia. Jorge Basadre. Description of the method of ore treatment. The mine ore is divided into the 130-oz. per ton grade, which is shipped to Europe, and the 60-oz. grade, which is tested at their mill by the chlorination process, at a cost of $14.81 per ton. 1000 w. Eng & Min Jour—Nov. 9, 1895.

**British Columbia.**—Silver Mining in Kootenay, B. C. Editorial review of silver mining in British Columbia, with illustrations. 4800 w. Can Min Rev—Sept., 1896.

Silver Mining in British Columbia. E. D. Ingall. Deals specially with the more newly-discovered silver veins of the West Kootenay district. 2500 w. Min Jour—Aug. 29, 1896.

The North Star Silver Mine. An account of valuable property in British Columbia. Ill. 1300 w. Can Min Rev—July, 1897.

See also **MINERAL REGION; SILVER REGION.**

**Broken Hill.**—Meeting of Broken Hill Proprietary Company, Limited, New South Wales. Address of chairman, Mr. E. Neale Wigg, showing what has been done during the past half year, and the plans for the future. 4400 w. Aust Min Stand—Aug. 5, 1897.

Some Mining and Metallurgical Developments at Broken Hill. T. J. Greenway. An illustrated account of the mining developments in New South Wales, describing the treatment of the ores. 1800 w. Eng & Min Jour—Aug. 27, 1898.

The Ore-Deposits of the Australian Broken Hill Consols Mine, Broken Hill, New South Wales. George Smith. The lode has a thickness of 18 inches with well defined walls and has been worked 1300 ft. A section of the deposits is given in connection with the description. 3400 w. Trans Am Inst of Min Engs—Feb., 1896.

The Silver Sulphides of Broken Hill. The story of the discovery and development of this region in Australia, the sulphides and their treatment, works, processes, etc., as given in special edition devoted largely to this subject. Ill. 12400 w. Aust Min Stand—Jan. 20, 1897.

The Broken Hill Silver Mines in Australia. An account of the silver production region of New South Wales. Some statements taken from the Melbourne "Argus," the figures being supplemented and corrected by the companies. 2000 w. Eng & Min Jour—July 11, 1896.

The Silver-Lead Mines of New South Wales. Illustrated historical account of the Broken Hill Mine. 2500 w. Aust Min Stand—Sept., 1896.

The Underground Workings of Broken Hill Block 10 Silver Mine. Illustrated description from the report of the general manager. 1900 w. Aust Min Stand—Dec. 14, 1895.

See also **SILVER METALLURGY.**

**Butte, Montana.**—See **COPPER MINE.**

**Colorado.**—See also Leadville; **GOLD MINE; GOLD REGION; MINERAL REGION; SILVER REGION.**

**Comstock Lode.**—The Comstock Lode. L. P. Gratacap. An account of this great deposit and the scheme under way for unwatering the fissure after almost twenty years of idleness. 1500 w. Sci Am Sup—Oct. 28, 1899.

The Deep Levels of the Comstock Lode. Urging the pumping out and resuming the work at depth. 2000 w. Min & Sci Pr—Feb. 5, 1898.

The Situation in the Comstock Deep Levels. Dan de Quille. Comment on the false impressions that seem to prevail regarding this mine, and an outline of the work soon to be undertaken, with the hopeful outlook. 3000 w. Min & Sci Pr—July 10, 1897.

See also **Nevada; GOLD REGION—Cripple Creek vs. Comstock; MINE DRAINAGE—Sutro Tunnel.**

**Fuel.**—See **FUEL—Peru Mines.**

**Hungary.**—See **GOLD MINE.**

**Joachimsthal, Bohemia.**—The Silver Mines at Joachimstahl, Bohemia. R. Helmhaeker. Historical sketch with account of the present state of mining. 3000 w. Eng & Min Jour—Dec. 5, 1896.

**Leadville, Colo.**—Leadville, Colorado, Mines in 1899. Comments on the general conditions of mining during the year. 1800 w. Eng & Min Jour—Jan. 13, 1900.

See also **MINERAL REGION.**

**Mexico.**—Mines at Velardena, Mexico. Ernest E. Payne. A history and illustrated description of some little known, but productive, mines, which have been worked for centuries. 1400 w. Mines & Min—Sept., 1900.

The Mines and Plant of the El Carmen Mining Company, Villadoma, Mexico. Harrison Souder. A description of the silver mines, sampling ore, ventilation of the workings, water supply, and the company railroad. The article is well illustrated. 5000 w. Pro of Engs' Club of Phila—Jan., 1896.

The Mines of Guanajuato, Mexico. Clara Spalding Brown. Illustrated account of the mines and their working. 2000 w. Min Rept—Oct. 11, 1900.

The Operation of a Mexican Mine (Einrichtungen einer Mexicanischen Erzgrube). Descriptive account of a visit to a typical Mexican mine in the Sierra Madre. 3500 w. Glückauf—Sept. 11, 1897.

The Tajos Mine, Mexico. Frank B. Fowler. Describes these mines as an evidence of American energy and talent. 900 w. Eng & Min Jour—Dec. 2, 1899.

**Nevada.**—Nevada Silver. Charles Howard Shinn. An interesting account of the discovery of silver in Nevada, the history of the great Comstock lode, the methods of reducing the ore, and facts connected with the industry. 8000 w. Pop Sci M—Oct., 1896.

See also **Comstock Lode.**

**Utah.**—The Chloride Point Mine, Utah. Description, with illustration, of this silver mine, which was pronounced worthless, but by methods of handling the low-grade ores, has proved of value. 1200 w. Eng & Min Jour—Nov. 19, 1898.

The Daly West Mine, Park City, Utah. H. L. J. Warren. An outline sketch of this lead-silver mine, with illustration and map. 2000 w. Eng & Min Jour—Oct. 14, 1899.

The Silver King Mine and Mill, Utah. H. L. J. Warren. Illustrated description. 1500 w. Eng & Min Jour—Nov. 4, 1899.

See also **GOLD MINE.**

**SILVER MINING.**

See also **COPPER MINING; GOLD MINING; MINERAL REGION; MINING; MINTING; SILVER METALLURGY; SILVER MINE; SILVER REGION.**

**Boston and Montana.**—See **COPPER MINING.**

**British Columbia.**—See **GOLD MINING; GOLD REGION; MINERAL REGION; SILVER MINE; SILVER REGION.**

**Butte, Mon.**—See **COPPER MINING.**

**Leadville, Colo.**—See **MINERAL REGION; SILVER MINE.**

**Nevada.**—See also **SILVER MINE—Comstock; Nevada; MINE DRAINAGE—Sutro Tunnel.**

**SILVER PRODUCTION.**

See also **GOLD PRODUCTION.**

**1851 to 1893.**—The Silver Question. Diagrammatic representation of the output of silver and gold from 1851 to 1893, and of the prices per ounce of these metals during the same time, with explanatory text. 1600 w. Bradstreet's—July 18, 1896.

**1896.**—See **GOLD.**

**1898.**—The World's Silver Production. Shows the production of 1898 to have been larger than any year since 1892 and gives information of interest. 900 w. Eng & Min Jour—Aug. 19, 1899.

**Russia.**—See **GOLD PRODUCTION.**

**SILVER REGION.**

See also **GOLD REGION; MINERAL REGION; SILVER MINE.**

**Arizona.**—See **Silver King.**

**Australia.**—A New Australian Silver Field. John Plummer. Brief account of recent discoveries in New South Wales. 600 w. Eng & Min Jour—Dec. 10, 1898.

Mount Deddick Silver-Lead Field. Full text of the government geologist's report on this Australian field, with sketch plans. 2000 w. Aust Min Stand—May 26, 1898.

**British Columbia.**—The Silver-Lead Deposits of the Slocan, British Columbia. J. D. Kendall. Read before the Inst. of Min. & Met. An interesting illlustrated account of this district, which promises to be one of the most important producers of silver-lead ore in the world. 9500 w. Can Min Rev—June 30, 1899.

**Colorado.**—Silver Cliff District. Arthur Lakes. A description of a unique geological occurrence, and of the Racine Bay, Silver Cliff, Geyser, John Jay, and other mines, and of peculiar outbursts of carbonic-acid gas. Ill. 2000 w. Mines & Min—Feb., 1898.

**Colorado, Ouray.**—A Peculiar Clastic Dike, near Ouray, Colo., and Its Associated Deposit of Silver Ore. F. L. Ransome. Illustrated description of a deposit of unusual character. 1600 w. Trans Am Inst of Min Engs—Feb., 1900.

**Colorado, Rico.**—See also **GOLD REGION.**

**Colorado, San Juan.**—See also **GOLD REGION.**

**Mexico.**—The Topia District, Durango, Mexico. Frank B. Fowler. Describes this region; the ores are of silver, carrying a high percentage of lead. 1700 w. Eng & Min Jour—June 3, 1899.

**Silver King, Arizona.**—Geological Elements of the Silver King Basin. W. H. Lampker. Describes an interesting geological formation of great economic importance in Arizona. 1700 w. Min Rept—Feb. 1, 1900.

**Tasmania.**—The Lode Structure of the Zeehan Silver-Lead Fields, Tasmania. E. Moriarty-Weston. A geological and mineralogical description of the rich argentiferous galena deposits on the west coast of Tasmania. Serial. Aust Min Stand—Oct. 26, 1895.

The Zeehan and Dundas Silver Field, Tasmania. W. F. A. Thomas. A paper read before the Inst. of Min. & Met. The geology and methods of mining are fully described. Serial. Min Jour—Nov. 30, 1895.

**Utah.**—Silver-Bearing Sandstones of Southern Utah. Don Maguire. A description of one of the few localities where silver is found in a sandstone formation. 2700 w. Mines & Min—Feb., 1900.

See also **GOLD REGION.**

**SIMILAR STRUCTURES.**

Similar Structures and Machines. Archibald Barr. Read before the Inst. of Engs. and Shipbuilders in Scotland. Recalls principles brought forward in a paper read in 1875 by James Thomson, giving further illustrations and applying similar reasoning to questions involving kinetic as well as static actions. Serial. Engng—Oct. 13, 1899.

**Propellers.**—See **PROPELLER—Law of Similarity.**

**SINGLE-RAIL.**

See also **ELECTRIC RAILWAY—High Speed; SUSPENDED RAILWAY.**

A One-Rail System of Light Railway. Fred. J. Rowan. Abstract of a paper read before the Federated Inst. of Mining Engs. Presents the advantages of the system under consideration. 1600 w. Col Guard—Sept. 24, 1897.

**Behr.**—The Behr Monorail System. Brief history of the monorail systems, with description of the permanent way of the Behr system at Tervuren. Ill. Serial. Engng—June 11, 1897.

See also **Manchester-Liverpool.**

**"Bicycle" System.**—A New Form of Elevated Railway Construction (Ein Neues Hochbahn System). This appears to be practically the well-known "bicycle" system, with single rail below and guide rail above, revived in Germany. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—March 5, 1897.

**Caillet Monorail.**—A Single-Rail Railway. Illustrated description of a monorail system, designed by Mr. Caillet, possessing the qualities demanded for limited traffic in thinly populated districts, though not applicable to steam or other power traction. Serial. Engng—Feb. 5, 1897.

The Portable Monorail Surface Road (Le Monorail Portatif à Niveau du Sol). Description of the Caillet system of one-rail portable railway for temporary agricultural and exploration service, with many illustrations of practical applications. 2500 w. 1 plate. La Rev Tech—Nov. 10, 1897.

The Portable Monorail Transport System. C. C. Hoyer Millar. Read before the Inst. of Min. & Met., London. Gives a general description of the system and considers it advantages. 1100 w. Col Guard—June 10, 1898.

**England.**—Lightning Express Railway Service. A criticism of a proposed 150 mile an hour "single-rail" system, exhibited in model. 1600 w. Elec Rev, Lond—Aug. 7, 1896.

**Manchester-Liverpool.**—Behr's Single-Rail High-Speed Railway (Ueber Behr's Einschienenbahn und Hohe Schnellzug-Geschwindigkeiten). Rolf Sansin. A discussion of the single-rail high-speed road proposed by Behr for use between Liverpool and Manchester. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 20, 1899.

Manchester & Liverpool Railway: Brakes and Signals. F. J. Behr. A paper before the British Association, discussing braking and signalling on the proposed high-speed monorail line. 1400 w. Elec Engr, Lond—Sept. 14, 1900.

The Manchester and Liverpool Express Railway. Sir W. H. Preece. Paper before the British Association, giving a brief description of a proposed monorail line, with single-car train having a speed of 110 miles an hour. 700 w. Elec Rev, Lond—Sept. 14, 1900.

The Proposed Lightning Express Railway Between Liverpool and Manchester. Proposing to construct and work a railway on this system which will enable passengers to travel between Liverpool and Manchester in eighteen minutes. 1200 w. Transport—Jan. 20, 1899.

**Portable.**—See **Caillet Monorail.**

**SIPHON.**

See also **SEWER; WATER PIPE; WATER-WORKS.**

Hydraulic Apparatus. William Perry. The operation of the siphon and the origin of the name "ram" and why applied to the invention bearing its name. 1200 w. Can Eng—Aug., 1896.

Something About the Siphon. Paul Plimton. An explanation of the principle upon which the siphon acts, with illustrations of its application, etc. 1200 w. San Plumb—Sept. 1, 1897.

Siphon Mains (Heberleitungen). Heinrich Adolf. An illustrated description of siphon plants for connecting artesian wells and raising water from rivers. 2300 w. Zeitschr d Oest Ing u Arch Ver—July 20, 1900.

Siphons. Thomas McKeown. Notes on the history of siphons, and their use in water supplies and sewage transfer. Discussion. 2200 w. Jour Assn of Engng Socs—June, 1900.

**Flow.**—See **WATER FLOW—Siphons.**

**Nussdorf, Elbe River.**—See **AQUEDUCT.**

**Paris Sewer.**—See **SEWER; SEWERAGE.**

**Relief Device.**—Automatic Air Relief Device for Siphons (Automatische Entluftungs-Vorrichtung für Heberleitungen). Rudolf Muller. A description with illustrations of the apparatus constructed for the purpose of automatically relieving the siphon in the Bielitz water supply main affair, by a system of traps and floats. 6000 w. Oesterr Monatschr f d Oeff Bau—Dec., 1896.

**Turkish.**—Turkish Siphons at Constantinople. Edward Wegmann. Illustrated description of the souterazi which the Turks consider necessary for the successful operation of a long water main. 700 w. Eng Rec—Nov. 11, 1899.

**SIPHON RECORDER.**

See **SUBMARINE TELEGRAPH; TELEGRAPH.**

**Duplex.**—See **TELEGRAPH—Duplex.**

**SISAL.**

See also **ROPE.**

**Bahamas.**—The Sisal Industry in the Bahamas. D. Morris. A very full account of the entire industry, including a botanical description of the plant, methods of extracting the fibre, etc., with discussion. 10000 w. Jour Soc of Arts—March 20, 1896.

**SKATE.**

**Manufacture.**—The Making of a Skate. Illustrated detailed description of processes, tools and methods. 5500 w. Ir Age—Jan. 2, 1896.

The Manufacture of Skates (Die Herstellung der Schlittschuhe). An illustrated description of the methods of manufacturing skates of various kinds, with details of processes and special machines. 2500 w. Stahl und Eisen—May 1, 1898.

**SKATING RINK.**

See also **REFRIGERATION.**

Artificial Skating Rinks (Künstliche Eislaufbahnen). Illustrated description, with practical data, of artificial ice surfaces for skating, with especial reference to the rink at Nuremberg, 150x80 feet. 2500 w. Zeitschr d Ver Deutscher Ing—June 12, 1897.

**SKELETON CONSTRUCTION.**

See also **BUILDING CONSTRUCTION; FRAME-WORK; OFFICE BUILDING; STEEL—Structural; STEEL CONSTRUCTION; TALL BUILDING.**

Constructional Steel Work. T. C. Cunnington. Read at meeting of the Arch. Assn., London. Part first considers columns and stanchions and their fireproofing. Ill. Serial. Arch, Lond—April 1, 1898.

Steel Skeleton Construction. Abstract of paper read at meeting of Civ. Engs., England, by E. C. Shankland on "Steel Skeleton Construction in Chicago." 1300 w. Col Guard—Dec. 24, 1896.

Some Features of the Structural Design of Buildings. William H. Burr. Part first considers the need of the most advanced engineering principles in the construction of modern high buildings, and discusses foundations, metal frame-work, need of wind-bracing, etc. Serial. Jour Fr Inst—June, 1899.

The Construction of Sky-Scrapers. C. T. Purdy. The knowledge required for success in structural iron work, especially house building; the importance of accuracy, and of safe foundations. 6400 w. Trans Assn of Civ Engs of Cornell Univ—June, 1896.

The Planning and Construction of High Office Buildings. William H. Birkmire. Part first discusses the transformation in building construction methods, the cause of the development, with general introductory remarks and many illustrations. Serial. Arch & Build—Dec. 5, 1896.

The Design of Steel Skeleton Buildings. Some contributions to the history of this construction by architects and engineers who are familiar with the work, called forth by the query of F. T. Gates, in regard to the originator of this construction. 2000 w. Eng Rec—July 11, 1896.

The Evolution of Structural Design. F. T. Llewellyn. Discusses especially frame design and the use of effective materials, thus overcoming the forces exerted by dead and live loads, wind pressure, etc., showing that development is due more to conditions and materials than to mechanical statics. Ill. 4000 w. Jour Assn of Engng Socs—Nov., 1898.

The Legitimate Design of the Architectural Casing for Steel Skeleton Structures. C. H. Blackall. Read before the Am. Inst. of Archts. Considers the designs most generally accepted and discusses some absurdities. 2800 w. Am Archt —Dec. 2, 1899.

The Steel Skeleton, or the Modern Sky-Scrapers. W. L. B. Jenney. Illustrated discussion of the engineering problems. 6400 w. Cal Arch't—Feb., 1900.

The Use of Steel in Buildings. Edward Wood. Read before the Manchester, Eng., Assn. of Engs. A discussion of the advantages of steel as a material for the framework of buildings. 4000 w. Mech Wld—Dec. 2, 1898.

**American vs. English.**—See **STEEL CONSTRUCTION.**

**Architectural.**—The Architectural Relations of the Steel Skeleton Building. F. H. Kimball. The problems confronted in the creation of a high building, and the order in which they must be studied. Ill. 3300 w. Eng Mag—July, 1897.

**Astoria Hotel, N. Y.**—The Structural Framework of the Astor Hotel, New York City. Illustrated description of the principal details of the structural work of the new Astor Hotel, now being erected at 5th ave. and 34th st.; also editorial. 4000 w. Eng News—Dec. 24, 1896.

**Bracing.**—Bracing in High Buildings. A. W. Barnes. Submitted to the International Convention of Building Commissioners and Inspectors, at Detroit. A discussion of the subject, and urging more uniformity in practice. 1600 w. Arch & Build—Feb. 12, 1898.

**Chicago.**—Chicago's Latest Steel Frame Building. Illustrated description of the Trude Commercial Building. 1500 w. In Arch—Aug., 1896.

**Column Loads.**—Balanced Column Loads. Illustrated description of steel construction in an 8 story warehouse. 1200 w. Eng Rec—Nov. 26, 1898.

**Details.**—Column and Beam Connections in the Williamson Building. Illustrates new details adopted in a Cleveland office building, 16 stories high. 450 w. Eng Rec—April 22, 1899.

**Durability.**—Topical Discussion—Durability of Iron in Modern Building Construction. Processes, investigations, experiences and suggestions. 9500 w. Pro Engs' Club of Phila—July-Oct., 1895.

**Early.**—Early Skeleton Construction. An examination of the claims of various architects for priority in the use of steel frames to carry outside walls as well as floors and partitions. 1700 w. Eng Rec—Aug. 12, 1899.

**Fire.**—Effect of High Temperatures on the Strength of Structural Metals. H. K. Landis. The fire problem in steel skeleton buildings makes this a subject of importance. The article reviews tests made by competent authorities. 1100 w. Fire & Water—Jan. 22, 1898.

See also **FIRE.**

**Fire and Rust.**—Two Questions in Connection with Steel Construction in Buildings. Edmund Burke. Read at the annual convention of the Ontario Assn. of Architects. The questions considered are protection from rust, and from high temperature caused by fire. Discussion 5000 w. Can Arch —Feb., 1898.

**Fireproof.**—See also **FIREPROOF CONSTRUCTION.**

**New York.**—Column and Girder Construction in Dun Building, New York City. Illustrated description of steelwork in a 15-story building, having a unique pintle construction of Phoenix columns and a new method of horizontal quadrant girders over a corner entrance. 900 w. Eng Rec—Dec. 3, 1898.

The American Exchange National Bank Building, New York. Illustrated description of the novel features in the skeleton of a 40x100 ft. office building, 16-stories high. 1100 w. Eng Rec—Oct. 14, 1899.

The De Dino Building, New York City. Illustrated description of steel-cage and steel grillage work in a 13-story office building. 500 w. Eng Rec—Aug. 15, 1898.

The Morton Building, New York City. Illustrated description of cast-iron column framing with novel connections for girders. 800 w. Eng Rec—Dec. 31, 1898.

**St. Louis Coliseum.**—The Steel Frame of the St. Louis Coliseum. E. W. Stern. The remarks are confined to the ironwork of the structure. Gives a general description, with details of construction, illustrations and diagrams. 3000 w. Jour Assn of Engng Socs—May, 1898.

**San Francisco.**—The Spreckels Building, San Francisco. A 19-story steel-cage structure which withstood the earthquake of March 30, 1898, without injury. Gives illustrations of foundations and details of steel framework. Serial. Eng Rec—April 9, 1898.

**Stone Use.**—The Use of Stone in Skeleton Construction. E. McL. Long. On the present practice in constructing steel-frame buildings, and the wrong ideas due to the habits acquired when stone was the strength-giving material. 2800 w. Bridges—June, 1899.

The Use of Stone in Skeleton Construction. E. McL. Long. States the conditions to be fulfilled in the construction of these buildings, criticising the deception in giving the building the appearance of solid masonry, and offering suggestions. Ill. 2700 w. Stone—Jan., 1898.

**Terra - Cotta Cornices.**—See **TERRA COTTA—Cornices.**

**Wall Supports.**—Wall Supports in a Steel-Cage Building. Illustrated description of the characteristic steel-cage details in a 16-story building for offices and light manufacturing. The Vincent Building, New York. 1000 w. Eng Rec—Nov. 4, 1899.

**SKETCHING.**

See also **DRAWING—Sketching.**

**Mechanical Engineering.**—See **MECHANICAL ENGINEERING—Sketches and Photographs.**

**SKIN EFFECT.**

See **ELECTRIC RESISTANCE—Alternating Currents.**

**SKIN RESISTANCE.**

See **SHIP RESISTANCE.**

**SLAG.**

See also **BLAST FURNACE; SMELTING—Slags and Mattes.**

**Analysis.**—See **Lime.**

**Artificial Stone.**—The Manufacture of Building Stone from Granulated Slag (Mauersteine aus Granulirten Schlacken). Describing a plant for making artificial stone from blast furnace slag. The granulated slag is mixed with lime mortar and compressed into blocks. A number of such plants are in successful operation in Germany. 4500 w. 1 plate. Stahl and Eisen—Dec. 1, 1897.

**Basic.**—See **Fertilizer; Martin Process; PHOSPHATE—Magnetic Iron Ore.**

**Bricks.**—Brick Manufacture from Granulated Blast Furnace Slag. Condensed translation of article by F. W. Luermann, in "Stahl und Eisen." Information relating to the manufacture and testing of these bricks. 900 w. Am Mfr & Ir Wld—Jan. 14, 1898.

Slag Bricks in Germany. Information concerning the bricks made from granulated slag, and their superiority to bricks made of fluid slag. 700 w. U S Cons Repts, No. 144—June 18, 1898.

**Cement.**—Nitrosylised Blast Furnace Slag as an Addition to Hydraulic Cement. A. D. Elbers. Information regarding the efficiency and the treatment. 1800 w. Eng & Min Jour—June 26, 1897.

The Utilisation of Blast Furnace Slag. Cecil von Schwarz. Read before the Iron and Steel Inst. Briefly describes a method recently employed in Germany and Belgium for manufacturing cement out of slag, which has given the best results as to strength and reliability. 1700 w. Col Guard—May 11, 1900.

See also CEMENT—Slag.

**Disposal.**—Special Device for the Elevating of Granulated Slag. A method of removing furnace slag. It is granulated by being run into water, raised by a special basket elevator and carried off in a sluice. 400 w. Eng & Min Jour—Jan. 18, 1896.

Plant for the Separation and Disposal of Slag. L. S. Austin. This plant is in use at the Omaha & Grant Smelting & Refining Works. Allowing sufficient time for the matte to settle from the slag is the principal feature. Ill. 750 w. Eng & Min Jour—Nov. 23, 1895.

**Fertiliser.**—Basic Slag as a Fertiliser. F. E. Thompson. Gives experiments and results from its use in Europe, as condensed in a paper by Dr. William Frear, in the "Agricultural Report of Pennsylvania for 1890." 2400 w. Sci Am Sup—March 6, 1897.

Blast Furnace Slag for Fertilizing. Alexander D. Elbers. Showing that it contains lime beneficial to the soil, and presenting the possible merits and essential points relating to its use. 2300 w. Am Mfr & Ir Wld—Oct. 11, 1900.

See also PHOSPHATE—Magnetic Iron Ore.

**Gas Producing.**—A By-Product of Iron Making. William Gilbert Irwin. Reports the discovery of a method for utilizing iron slag. The product is called carbolite and from it is produced ethylene gas which is a great improvement over acetylene. 1200 w. Sci Am—June 25, 1898.

**Heat Utilization.**—Utilizing the Heat of Molten Slag. Herbert Lang. A letter discussing Mr. Bretherton's invention and the subject in general. 2800 w. Eng & Min Jour—April 28, 1900.

See also Disposal; Utilization; SMELTING—Granulating Matte.

**Lime.**—A Rapid Method of Determining Lime in Blast Furnace Slags. Titus Ulke. Describes a method recommended to smelter chemists, on account of the rapidity with which accurate lime determinations can be made by it. 300 w. Eng & Min Jour—Feb. 10, 1900.

**Martin Process.**—Basic Slag in the Martin Process (Thomasschlacke im Martinbetrieb). O. Thiel. An examination of the chemical composition of the slag produced by the basic open hearth furnace with various kinds of charges. 3000 w. Stahl und Eisen—Aug. 15, 1898.

**Potash and Soda.**—Potash and Soda Salts from Natural Decomposition of Lead Slags. Malvern W. Iles and Charles F. Shelby. A statement of facts obtained in the analysis of a white efflorescent salts found at the base of a slag dump. 600 w. Eng & Min Jour—June, 1899.

**Smelting Works.**—See SMELTING—Slags and Mattes.

**Thomas.**—The Manufacture and Use of Thomas Slag. F. E. Thompson. This basic slag is the scoria produced in Bessemerizing phosphoritic pig iron according to the patents of Messrs. Thomas & Gilchrist. Its production, chemistry, analysis and use are discussed. 4200 w. Ir Age—Jan. 7, 1897.

**Tri-Axial Diagram.**—See GRAPHICS.

**Utilization.**—The Utilization of Blast Furnace Slag. Alex. D. Elbers. Part first discusses the possibilities of this product, considering the most promising to be the utilizing it for building material. Serial. Eng & Min Jour—June 3, 1899.

The Use of Blast Furnace Slag. Translated from "L'Industrie." The use of acid slag by charging it, instead of ore, in blowing out a furnace. Also the advantage of using slag in place of a poor ore to increase the slag made to the required percentage. In actual practice both these methods were found to be economical. 1200 w. Am Mfr & Ir Wld—Nov. 8, 1895.

See also Artificial Stone; Brick; Cement; Fertilizer; Gas Producing; Heat Utilization; Potash and Soda; Thomas; BLAST FURNACE.

**SLATE.**

See also BUILDING MATERIAL; ROOFING; STONE.

**American in Great Britain.**—American Slate in Great Britain. Comments upon the probable large future trade for American slate in Great Britain, by "The Quarry" of London; with the editor's opinion upon the subject. 1300 w. Stone—April, 1896.

**Ireland.**—See ROOFING—Slate.

**New York.**—The New York Slate Industry. J. Nelson Nevius. Part first gives the location of the slate belt and illustrated description of some of the quarries. Serial. Eng & Min Jour—May 20, 1899.

**Pennsylvania.**—The Slate Regions of Pennsylvania. Mansfield Merriman. Gives the general characteristics of the slates of the five Pennsylvania regions, with other information. Ill. 4000 w. Stone—July, 1898.

**Roofing.**—See ROOFING—Slate.

**Scandinavia.**—See STONE—Norway and Sweden.

**Thuringia.**—See QUARRY.

**United States.**—Slate Production in the United States. James Hess. A review of the slate industry, the different localities, varieties, etc., with description of operation of slate quarries. 1800 w. Yale Sci M—March, 1897.

See also American in Great Britain; New York; Pennsylvania.

**Welsh Quarries.**—The Welsh State Quarries. Describes some of the important quarries and the systems of working. 2400 w. Eng & Min Jour—Dec. 31, 1898.

**Westmoreland.**—Westmorelard Slates: Their Geology, Chemistry, and Architectural Value. J. J. Thomas. The magnitude of the industry; its importance; its geological position; chemical composition; method of preparing; etc. 5800 w. Jour Roy Inst of Brit Arch—Jan. 23, 1898.

**SLEEPER.**

See CROSS TIE; TRACK.

**SLIDE REST.**

See LATHE—Slide Rest.

**SLIDE RULE.**

See also COMPUTER.

The Slide Rule and How to Use it. G. D. Snyder. A very thorough exposition of the principles underlying the construction of this instrument and its use, with examples showing its numerous labor-saving applications in scientific and technical work. 2000 w. Engng News—Nov. 21, 1895.

The Slide Rule. A. H. Eldridge. How to make and use a slide rule. 1400 w. Mach, N. Y.—Dec., 1897.

The Slide Rule in Everyday Work. Angus Ballard. An explanation of its uses and advantages as a time-saver. 2700 w. Mines & Min—Sept., 1898.

The Slide Rule. Edwin H. Lockwood. Describes the slide rule and its use. 2000 w. Yale Sci M—Nov., 1898.

**Circular.**—A New Computing Instrument. W. H. Schuermann. Illustrated description of a new instrument, differing from the ordinary slide-rule by the use of angular instead of rectilinear units. 2400 w. Eng Assn of the South—April, 1896.

**Gear Computing.**—The Slide Rule for Computing Gears for Screw Cutting. J. H. Gill. Describes the writer's way of selecting compound gears for thread cutting. 700 w. Am Mach—Nov. 16, 1899.

See also COMPUTER; GEAR—Strength Computer.

**Railway Surveying.**—The Slide Rule as an Aid to Railroad Field Work. George Duncan Snyder. Displays its adaptability to the numerous calculations necessary in a railroad survey. Gives the settings the author has found useful in his own work, with applications to grades, curves, transition curves, etc. Serial. R R Gaz—Jan. 22, 1897.

**Selection.**—How to Select a Slide Rule. William Cox. As indicated by the title this is a practical article designed to aid in and extend the use of the slide-rule in mechanical and other computations. 800 w. Mach—May, 1896.

**Use.**—The Use of the Slide Rule. F. A. Halsey. The first part deals with general principles. Serial. Am Mach—May 28, 1896.

**SLOT MACHINERY.**

See also GAS METER; TICKET MACHINE—Electric Tramway.

Slot Machinery. R. I. Clegg. Explains the coin attachment and its working. 1200 w. Am Mach—Sept. 14, 1899.

Coin-Controlled Machinery. Arthur F. Wines. Describes a device of the writer's invention which is intended for use in connection with automatic telephones, but applicable to other machines. Ill. 1500 w. Sib Jour of Engng—March, 1899.

Coin-Controlled Machinery. Arthur F. Wines. Considers the design of these machines and the defects to be guarded against. Also the application of the mechanism to the automatic telephone. Ill. 1500 w. Sib Jour of Engng—June, 1899.

**SLOTTING MACHINE.**

See also **MACHINE TOOL.**

**Portable.**—Portable Slotting Machine. Illustrated description of an electrically-driven machine. 700 w. Engr, Lond—Nov. 17, 1899.

**SLUICE.**

See also **CANAL; DAM; RIVER DISCHARGE; RIVER REGULATION; WEIR.**

**Betwa River, India.**—Sluices of the Betwa Canal Head and Weir. Robert Macalister. Descriptive. 700 w. Prac Engr—Jan. 12, 1900.

**SMALL TOOL.**

See **TOOL.**

**SMELTING.**

See also **BLAST FURNACE; COPPER METALLURGY; CUPOLA; FURNACE; GOLD METALLURGY; IRON MANUFACTURE; LEAD METALLURGY; METALLURGY; SILVER METALLURGY; TIN METALLURGY; ZINC METALLURGY.**

**Altitude.**—The Influence of Altitude on Smelting. Herbert Lang. An explanation of the increased fuel consumption found necessary in smelting at high altitudes. 800 w. Eng & Min Jour—Jan. 29, 1898.

**America, Northwest.**—Smelters and Reduction Works of the Northwest. Arthur Lakes. Facts in regard to the location and capacities of the various works. 2000 w. Mines & Min—May, 1900.

See also **British Columbia.**

**British Columbia.**—British Columbia Smelting Development. Reviews the present conditions and the opportunities for development, giving report of numerus projects of great importance. 1800 w. Can Min Rev—Oct., 1897.

Matte Smelting at the Hall Mines, British Columbia. Robert R. Hedley. Brief illustrated description of what is probably the largest furnace of its kind. 500 w. Eng & Min Jour—Dec. 11, 1897.

The Granby Smelter, Boundary District, British Columbia. Charles A. Bramble. An illustrated description of the plant in process of erection. 2200 w. Eng & Min Jour—Dec. 16, 1899.

The Possibilities for Smelting in British Columbia. R. A. Hedley. Read before the Fed. Can. Min. Inst. Information concerning the character of the ores and cost of smelting. 1400 w. Can Engr—June, 1898.

The Possibilities of Smelting in B. C. R. A. Hedley. Paper to be discussed at the Montreal meeting of the Federated Canadian Mining Inst. The opinions of the writer, based on a knowledge of the country and a study of its ores. 1500 w. Can Min Rev—Feb., 1898.

The Smelting of Gold and Silver Ores in British Columbia. A statement of the situation of the smelting business in British Columbia, with a discussion of the remedies. 2000 w. Can Min Rev—Nov. 30, 1898.

See also **America Northwest; Matte.**

**Colorado.**—Recent Smelting Practice in Colorado. L. S. Austin. Improvements in the practice of smelting, confined to the so-called lead and copper smelters, wher these metals are used for collectors of gold and silver in the ores. 3000 w. Eng & Min Jour—March 5, 1898.

Smelting Gold and Silver Ores in Colorado. Thomas Tonge. The development of the industry and its effects on the mining business. The locations and capacities of the plants and statistics in regard to their output of precious and other metals. Ill. 3700 w. Mines & Min—Oct., 1898.

**Copper.**—See **COPPER METALLURGY.**

**Denver, Col.**—Notes on Lead Smelting and Gold and Silver Refining. Malvern W. Iles. On the cost of smelting and refining at the Globe Works, Denver, Col. 2000 w. Eng & Min Jour—Aug. 18, 1900.

**Dubuque Ores.**—The Smelting of Dubuque Ores. H. Foster Bain. History of the industry, the methods in use, and some observations on making spelter at Dubuque. 1700 w. Mines & Min—May, 1900.

**Durango, Mexico.**—Smelting in Durango, Mexico. H. Van F. Furman. Describes the ores and the methods used. 1700 w. Aust Min Stand—June 14, 1900.

See also **MINING—Mexico, Durango.**

**Electric.**—Electric Smelting. W. S. Horry. Abstract of paper read before the Northwestern Electrical Assn. giving investigations made with electric smelting, and stating that there is every reason to expect great things from this method. 1300 w. Elec Wld—June 25, 1898.

See also **ELECTRIC FURNACE; ELECTRO-METALLURGY.**

**Ellesmere Park, Eng.**—The Smelting Corporation's Works at Ellesmere Park, England. J. L. F. Vogel. An account, with illustrations, of the Fry process of treating zinc-lead sulphides. 2500 w. Eng & Min Jour—Sept. 29, 1900.

**Fry Process.**—See **Ellesmere Park, Eng.**

**Germany.**—Smelting in Germany. Henry Watson. Describes the process of smelting zinc-lead ores, as carried on at the Herzog Julius and Frau Sophien works, situated on the borders of the Harz Mountains. 1200 w. Aust Min Stand—Nov. 3, 1898.

**Gold and Silver.**—See **Denver; Colorado; Losses; GOLD METALLURGY; SILVER METALLURGY.**

**Granby, B. C.**—See **British Columbia.**

**Granulating Matte.**—Granulating Matte. S. E. Brotherton. A brief article showing the advantages of granulating matte and how it is done at the American Smelter in Leadville, Colo. 400 w. Eng & Min Jour—Jan. 9, 1897.

See also **SLAG —Disposal; Heat Utilization.**

**Hamilton, Ont.**—Hamilton Smelting Works. Illustrated description of a new iron furnace plant. 1800 w. Can Eng—Jan., 1896.

**Keswick, California.**—Matte Smelting in California. Herbert Lang. Description of the smelting works at Keswick, Cal. Serial. Eng & Min Jour—July 25, 1896.

**Lang Furnace.**—The Lang Smelting Furnace. Illustrates and describes a form of furnace recently patented. 1000 w. Eng & Min Jour—Aug. 6, 1898.

**Lead.**—See **Denver; Losses; LEAD METALLURGY; SILVER METALLURGY.**

**Losses.**—Notes on Lead Smelting and Gold and Silver Refining. Malvern W. Iles. Illustrates and describes apparatus for collecting solids from smoke and fumes. 1100 w. Eng & Min Jour—June 2, 1900.

Notes on Silver Losses in Smelting. Malvern W. Iles. Discusses the conditions and causes. Serial. Eng & Min Jour—Sept. 9, 1899.

Silver and Lead Losses in Lead Smelting. L. D. Godshall. Discusses statements made and conclusions drawn by Dr. Iles. 2400 w. Eng & Min Jour—Jan. 13, 1900.

See **DUST—Collection; LEAD METALLURGY; SILVER METALLURGY.**

**Matte.**—Matte Smelting. W. L. Austin. A general discussion containing a few new facts and numerous comments upon Mr. Herbert Lang's book on "Matte Smelting." 3000 w. Min & Sci Pr—March 28, 1896.

See also **British Columbia; Granulating Matte; Slags and Matte; COPPER METALLURGY; LEAD METALLURGY.**

**Ore Buying.**—Ore Buying. F. Danvers Power. Showing that much of the supposed unfairness of the smelter is imaginary. 3300 w. Aust Min Stand—Sept. 20, 1900.

**Pyritic.**—Pyritic Smelting and Its Bearing on Certain South African Ores. D. Dörffel. Refers to the two ways of disposing of ores of this character, and some points of importance in pyritic smelting. 2000 w. Jour of Chem & Met Soc of S Africa—April, 1898.

Pyritic Smelting. W. L. Austin. Abstract of a paper read before the North of England Institute of Engineers. A smelting process aiming to utilise the calorific power of the combustible in the ore. Considers what ores are adapted, the style of furnace, the concentration and saving. 4300 w. Col Guard—Oct. 15, 1897.

The Present Status of Pyritic Smelting. Herbert Lang. Explanation of the reasons for abandoning the process at Keswick, and a defense of the process. 2500 w. Eng & Min Jour—July 10, 1897.

See also **PYRITES WORKS.**

**Reverberatory Furnace.**—Reverberatory Furnace Smelting of Ores. Thomas J. Dyson. Describes a method in use at a European smelting works, based on the mutual reduction of oxide and sulphide of lead when heated together. 1400 w. Trans of Aust Inst of Min Engs—Vol. V.

**Silicate Fusion Temperatures.**—The Temperature at Which Certain Ferrous and Calcic Silica.es are Formed in Fusion, and the Effect upon These Temperatures of the Presence of Certain Metallic Oxides. H. O. Hofman. Describes investigations made to obtain accurate details on this subject. 8800 w. Trans Am Inst of Min Engs—Sept., 1899.

**Silver-Lead.**—A Modern Silver-Lead Smelting Plant. L. S. Austin. Discussion of Mr. Austin's paper by Henry A. Vezin. Argues in favor of works on a level, considering the good ventilation worth the extra cost, and discusses related subjects. 2700 w. Trans Am Inst of Min Engs—May, 1897.

Argentiferous Lead Smelting at Leadville. Franklin Ballou, Jr. Discusses the daily operations in a smelter. 3000 w. Yale Sci M—Feb., 1897.

Heat Requirements of the Silver-Lead Blast Furnace. L. S. Austin. Investigation of this subject. 1000 w. Eng & Min Jour—June 19, 1897.

Recent Advances in Silver-Lead Smelting. R. H. Terhune. Read at the Salt Lake session of the International Mining Congress. Reviews the improvements in recent years in silver-lead smelting. 2800 w. Min & Sci Pr—Aug. 6, 1898.

Silver Lead Blast Furnace Construction. H. V. Croll. Notes based on observations of the construction and improvements in the smelting practice of Colorado and Utah, reviewing the progress. 1900 w. Eng & Min Jour—May 23, 1896.

A Modern Silver-Lead Smelting-Plant. L. S. Austin. Describes a plant whose site is assumed to possess natural advantages which are utilized to their full extent. 5400 w. Trans Am Inst of Min Engs—Sept., 1896.

See also **LEAD METALLURGY; SILVER METALLURGY.**

**Slags and Mattes.**—Notes on the Handling of Slags and Mattes at Smelting Works in the Western United States. William Braden. Designs of settling pots and forehearths are given and the practice in the principal works described. 3700 w. Trans Am Inst of Min Engs—Feb., 1896.

See also **Granulating Matte; SLAG—Disposal.**

**South Australia.**—Smelting Ores in South Australia. Illustrated description of the Dry Creek works, Adelaide. 2000 w. Aust Min Stand—Feb. 4, 1897.

**Trusts.**—Smelter and Other Trusts. W. C. Wynkoop. Remarks on the former effort to establish a trust, on the effect on labor and industry, and on trusts in general. 1500 w. Ores & Metals—March, 1899.

**Water Gas.**—Blast Furnace Smelting by Water Gas. C. C. Longridge. Considers the use of water gas for lead ore smelting, thus illustrating its adaptability for blast furnace use. 2000 w. Engr, Lond—Aug. 17, 1900.

**Zinc.**—See also **ZINC METALLURGY.**

**Zinc and Iron, Bethlehem, Pa.**—The Smelting of Mixed Zinc Ores at Bethlehem, Pa. Josef von Ehrenwerth. Describes the process through which the ore is passed. 1100 w. Col Guard—Oct. 22, 1897.

**Zinc-Lead Ores.**—A Furnace for Smelting Zincy Lead Ores. Ludwig Kloz. Drawings and description of a furnace designed to meet special conditions. 800 w. Eng & Min Jour—Sept. 2, 1899.

See also **Ellesmere Park, Eng.**

**SMOKE.**

**Density Scale.**—A Method of Estimating Smoke (Méthode d'Estimation des Fumées). Max Ringelmann. A description by Prof. Ringelmann of his smoke scale for classifying the degrees of smokiness of a factory chimney; showing how the scale is constructed and used. 2000 w. La Revue Technique—June 25, 1898.

A Scale for Determining the Density of Smoke. Describes the system invented by Ringelmann, of Paris, used in Europe in connection with tests of steam boilers and of smoke preventing appliances, with cards required for using the system. 600 w. Eng News—Nov. 11, 1897.

**SMOKE BOX.**

See **LOCOMOTIVE SMOKE BOX.**

**SMOKE NUISANCE.**

See **SMOKE PREVENTION.**

**SMOKE PREVENTION.**

See also **BOILER; COAL DUST FUEL; COMBUSTION; FIRING; FUEL—Economical Production; FURNACE; GRATE; MECHANICAL DRAFT; MECHANICAL STOKING.**

Economy in Combustion and Smoke Prevention. C. F. Mabery. The subject is treated from both chemical and mechanical standpoints. Discussion. 5800 w. Jour Assn Engng Socs—May, 1896.

On Smoke and Its Diminution. Bryan Donkin. Part first considers the need of pressure to secure the prevention of smoke, its nature, combustion, determination, smoke, scales, etc. Serial. Engr, Lond—May 26, 1899.

On Smokeless Combustion and Boiler Firing. W. Hempel. Abstract from "Stahl und Eisen." The author combats the statement commonly made in text books that the two compounds, carbon monoxide and carbon dioxide result in combustion according to the quantity of air supplied to the fuel, and holds that the character of the products depends also upon conditions of temperatures and pressure. 700 w. Col Guard—July 24, 1896.

Practical Smoke Prevention. W. Nicholson. Suggestions from a smoke inspector of large experience. Serial. San Rec—April 15, 1898.

Progress in the Matter of Smoke Abatement (Fortschritte auf dem Wege zur Russbeseitigung). With especial reference to the devices recently tried in Berlin and Dresden. 2500 w. Gesundheits-Ingenieur—Aug. 31, 1897.

Smoke Abatement. Editorial review of the report of an English committee for testing smoke-preventing appliances. 1500 w. Engng—Aug. 7, 1896.

Smoke Abatement. E. A. Brayley Hodgetts. A discussion of the smoke question and the remedy. 2000 w. Jour San Inst—April, 1900.

Smoke Abatement. E. A. Brayley Hodgetts. From a paper read at San. Inst. Cong. On the danger to public health and the means of prevention. 4500 w. Br Arch—Sept. 22, 1899.

Smoke Prevention and Smokeless Furnaces. Discussion of smokeless furnaces and kindred devices, waste due to smoke, hygienic questions, city ordinances relating to smoke, etc., with editorial comments on the desirability, practicability, and means of burning soft coal without producing smoke. 7000 w. Eng News—Jan. 2, 1896.

Smoke Prevention from a Mechanical Standpoint. C. H. Benjamin. Extract from paper read before the Civil Engs.' Club of Cleveland. The essentials of a good smoke preventing device, and causes for failures in mechanical stokers as smoke preventing devices. 1500 w. Safety V—July, 1896.

Smoke Prevention from a Mechanical Standpoint. C. H. Benjamin. General remarks upon existing methods. 1500 w. Can Eng—Sept., 1896.

Smoke Prevention. W. H. Booth. States the conditions causing smoke and the means of controlling the difficulty. 1800 w. Am Mach—Sept. 29, 1898.

Smoke Prevention. R. H. Hawkins. Remarks on the necessity of getting the combustion as nearly perfect as possible, the importance of careful stoking, and on mechanical stokers. 1200 w. Yale Sci M—Oct., 1899.

The Smoke Nuisance and the Medical Officer of Health. Joseph Priestley. Reviews acts dealing with smoke in Great Britain. 2000 w. Jour San Inst—April, 1900.

The Smoke Problem. Richard J. McCarty. One of the ablest expositions of the principles of smoke production, and of the converse smoke prevention, that has ever been printed. The author concludes that while a great mitigation of the smoke nuisance can be reached, its total suppression, in the present state of knowledge, is impracticable. 5800 w. St Ry Jour—Dec., 1895.

**Berlin.**—The Smoke Prevention Legislation in Berlin (Das Bevorstehende Verbot des Schornsteinrauchens in Berlin). W. Hantzschel. A discussion of the proposed legislation by which the production of smoke from chimneys in Berlin is forbidden. 1800 w. Gesundheits Ingenieur—June 30, 1899.

**British.**—Smoke. Editorial discussion of the recent agitation in England over the smoke prevention question. 2000 w. Engr, Lond—Dec. 9, 1898.

English Smoke Consumers. W. A. Carlile. Takes the ground that English smoke consumers are for the most part more appropriately "money consumers." Causes of their inefficiency are given. Present state of the art. 1500 w. Am Mach—Dec. 5, 1895.

The Law and Practice of Smoke Prevention. Comments on the agitation of this subject by Sir W. B. Richmond, and the results of experiments made for the purpose of furnishing a basis of comparison. 2300 w. Jour Gas Lgt—Dec. 6, 1898.

The Smoke Nuisance. Editorial on the attitude of the English people toward this question, the loss it represents, the need of educating public opinion, etc. 3000 w. Builder—Aug. 12, 1899.

**British Law.**—The Smoke Nuisance in Its Legal Aspect. Gives a summary of the existing law in England, reviewing certain Acts of Parliament and some of the more important cases which have been decided. 4300 w. Engng—March 10, 1899.

**Coal Combustion.**—Coal Combustion and Smoke Prevention. John L. Howard. Read before the sixth annual meeting of the Pacific Coast Gas Assn., San Francisco. Considers the character and composition of fuels and the conditions that favor complete combustion. 2600 w. Jour of Elec—Sept., 1898.

**Coal Dust Fuel.**—See **COAL DUST FUEL.**

**Coke.**—The Suppression of Smoke by the Use of Coke. O. Simmersbach, in "Zeitschrift der Dampfkessel-Ueberwachungs-Vereine." Treats of the substitution of coke for coal and arrives at the conclusion that general heating by coke is practicable, and presents important technical and economical advantages. 5500 w. Pro Age—Feb. 15, 1897.

**Cornelius Process.**—Smoke Consumption and Economy of Fuel. Describes the process of Paul Cornelius for the consumption of low-grade fuels, as exhibited in an installation in Berlin, and at Guben, reporting results and tests. 1500 w. U S Cons Repts, No. 431—May 20, 1899.

Smoke Consumption and Economy of Fuel. Frank H. Mason. Describes the process of Mr. Paul Cornelius for the consumption of low-grade fuels, as exhibited in Berlin, Germany. 1800 w. Am Arch—July 29, 1899.

**Dellwik Process.**—Smoke. A reference to the cause of smoke, the possibilities of prevention by the use of gaseous fuel, and especially the Dellwik water-gas process as an economical solution. 1600 w. Pro Age—Sept. 15, 1898.

**Density Scale.**—See **SMOKE.**

**Detroit Water-Works.**—Competitive Tests of Murphy Stoker and Hawley Down-Draft Furnace at Detroit Water-Works. Tests made to determine the relative efficiency of the two as regards smoke prevention and economy of fuel. 1800 w. Eng Rec—April 30, 1898.

**Economical Limits.**—The Limits of Economy in Smoke Consumption (Die Kohlenersparnis der Rauchverbrennungsanlagen und deren Grenze). E. Nicolaus. An examination of the thermal conditions of smoke consumption, including gas-firing and the use of pulverized fuel. 2000 w. Gesundheits Ingenieur—Nov. 15, 1899.

**France.**—See **Paris Competition.**

**Furnace.**—An Improvement in Smoke Consuming Furnaces. Illustrated description of an invention for supplying atmospheric oxygen to the fire only at the time when smoke is produced. 700 w. Sci Am—March 31, 1900.

See also **Detroit Water-Works; Hiustin Furnace; Kent Furnace; COAL DUST FUEL; FURNACE.**

**Glasgow.**—The Atmosphere of Glasgow and Its Effects. The effects discussed are chiefly on statuary, decorations, buildings, etc. 3000 w. Arch, Lond—Jan. 8, 1897.

**Hawley Furnace.**—See **Detroit Water-Works.**

**Hinstin Furnace.**—The Hinstin Smoke-Consuming Furnace. From "La Revue Technique." Illustrated description. 600 w. Col Guard—July 22, 1898.

The Hinstin Smokeless Furnace (Les Foyers Fumivores de M. J. Hinstin). Describing and illustrating the Hinstin furnace as applied to steam boilers, and accepted by the municipal authorities for use within the city limits of Paris. 1200 w. La Revue Technique—July 10, 1898.

**House Fires.**—The Combustion of Coal and Gas in House Fires. J. B. Cohen and G. H. Russell. Describes experiments instituted to determine how far coal combustion in residences and public buildings,—apart from the use of coal in industrial establishments,—contributes to the smoke nuisance, and how far this nuisance may be mitigated by the domestic use of gaseous fuel. 2600 w. Jour Gas Lgt—March 24, 1896.

**Inclined Grate.**—See **FIRING.**

**Internal Combustion Motors.**—Internal Combustion Motors and the Prevention of Smoke in Cities (Verbrennungskraft Maschinen und die Rauchbelästigung der Städte). Joh. Körting. Setting forth the important aid the general introduction of gas and petroleum motors would give to the abatement of the smoke nuisance. 4000 w. Zeit d Ver Deutscher Ing—Feb. 25, 1899.

See also **GAS ENGINE; GASOLINE ENGINE; OIL ENGINE.**

**Kent Furnace.**—The Smokeless Combustion of Soft Coal. William Kent. Considers why smoke is produced and the remedy, with an illustrated description of a steam-boiler patented by the writer. 1200 w. Stevens Ind—Oct., 1899.

**Locomotive.**—See **LOCOMOTIVE OPERATION—Smoke Prevention.**

**Long Island Ry.**—Indictment of Railroad Companies for Nuisance. Editorial commenting on the recent indictment of the Long Island Railroad Co. for the smoke nuisance. 1300 w. R R Gaz—Nov. 11, 1898.

**Lowe Apparatus.**—The Prevention of the Emission of Dense Smoke in Cities and Other Places. Reviews methods devised for the prevention of smoke emission, and describes the "Lowe" smoke preventer, which is considered the most simple, least costly, and most efficient device yet invented. Ill. 8400 w. Ind & Ir—Dec. 22, 1898.

**Murphy Stoker.**—See **Detroit Water-Works.**

**Orvis Apparatus.**—The Orvis Smoke Prevention Apparatus (Appareil Fumivore Orvis). An illustrated account of one of the furnaces which received honorable mention at the recent tests in Paris. Steam jets are used to deliver air blasts above the grate. 1200 w. Elec—Sept. 24, 1898.

**Paris Competition.**—Competition for the Suppression of Smoke Produced by Boiler Furnaces in Paris (Concours de la Ville de Paris pour la Suppression des Fumées Produites par les Foyers des Chaudières à Vapeur). This most important review of the tests made by the city of Paris of various smoke-suppressing devices goes at great length into details of tests and conclusions reached. Fully illustrated. 38000 w. Rev de Mécanique—April, June, Sept., and Dec., 1898.

The Suppression of the Production of Smoke by Boiler Furnaces (Suppression des Fumées Produites par les Foyers des Chaudières à Vapeur). A. Boyer-Guillon. A condensation of the report of the Paris Smoke-Prevention Commission with illustrations of the apparatus and of the successful furnaces in the competition. Two articles. 6000 w. Génie Civil—July 16, 23, 1898.

Apparatus for Consuming Smoke. From "La Nature." A decree awarding prizes for the best smoke-consuming devices, in France, in the year 1894 brought numerous projects, and thirty were selected for study. Experiments were made, and the awards assigned. The article describes the apparatus of successful competitors. Serial. Sci Am Sup—Feb. 25, 1899.

**Patterson's Suction Draft.**—Patterson's Suction Draught and Smoke Preventing Apparatus. Archibald Barr. Illustrated detailed description of the system, with tabulated results obtained by a series of experiments at the works of Paul & Co., Dumbarton, Eng. 2800 w. Engng—Dec. 20, 1895.

**Philadelphia.**—The Smoke Nuisance and Its Regulation with Special Reference to the Condition Prevailing in Philadelphia. Discussion at meeting of the Franklin Institute. 8500 w. Jour Fr Inst—June, 1897.

The Smoke Nuisance and Its Regulation, with Especial Reference to the Condition Prevailing in Philadelphia—Improved Furnaces and Mechanical Stokers. Illustrated detailed description of the construction and operation of various stokers and furnaces. Serial. Jour Fr Inst—Dec., 1897.

**Rossell.**—Rossell's Patent Smoke Preventer. Illustrates and describes an apparatus for securing perfect combustion and thus overcoming the smoke nuisance. 1400 w. Prac Engr—Aug. 25, 1899.

**Saxony.**—Report on Smokeless Boiler Plants in Saxony (Bericht über Rauchfreie Dampfkesselanlangen in Sachsen). A very full review of Prof. Lewicki's report to the Minister of the Interior, showing the performance of a great variety of furnaces and fuels. Two articles. 12000 w. Zeitschr d Ver Deutscher Ing—April 17 and 24, 1897.

**Washing Device.**—An Interesting Smoke-Washing Device. Description, with plan and elevation of the economizer, mechanical draft and smoke-washing plant recently added to the equipment of Station J. of the N. Y. Steam. Co., located near the corner of Fifty-ninth street and Madison ave., New York. 700 w. Eng Rec—Feb. 6, 1897.

**Wegener Furnace.**—See **COAL DUST FUEL.**

### SMOKE STACK.

See **CHIMNEY.**

### SNOW.

See also **SNOW FENCE; SNOW PLOW.**

**Alaska Railways.**—Fighting Snow in Alaska. An illustrated account of the difficulties encountered in operating trains on the White Pass & Yukon Ry. 500 w. Ry & Engng Rev—April 7, 1900.

**Long Island Railways.**—The November Snow Storm on Lond Island. An illustrated account of the struggle against the recent heavy snow on the railroads, especially on Long Island. 600 w. R R Gaz—Dec. 16, 1898.

**Northwest Railways.**—Fighting Snow on the Railroads of the Northwest. Description received from E. W. Hadley, of Santa Barbara, Cal., with illustrations. 3000 w. Sci Am—July 10, 1897.

**Street Cleaning.**—See **STREET CLEANING—Snow.**

**Street Railways.**—Fighting Snow. Illustrates and describes plans used on roads in various cities of the west. 1000 w. St Ry Rev—Jan. 15, 1899.

Snow-Bound Street Car Systems. William Herbert Donner. Suggestions for keeping lines open, and details concerning the management. 900 w. Am Elect'n—Feb., 1899.

### SNOW FENCES.

**Railways.**—Snow Fences in France. Illustrates and briefly describes the styles tried in different countries. 900 w. R R Gaz—Nov. 11, 1898.

### SNOW FLANGER.

Snow-Flanger Operated by Air—Lake Shore and Michigan Southern Railway. Oscar Ants. Illustrated detailed description. 1500 w. Am Eng & R R Jour—March, 1897.

### SNOW PLOW.

See also **SNOW.**

The Battle of the Snow Plows. Cy Warman. Illustrated description of a snow plow contest in the Rocky Mountains, with a brief account of pilot plows and snow bucking. 2000 w. McClure's Mag—Nov., 1896.

**Colorado Midland.**—Machine Snow Plows on the Colorado Midland Ry. Gives the results of this road in trials of the two kinds of excavators used in this country. 1500 w. Eng News—Aug. 23, 1900.

**Electric Railway.**—A Four-Motor Snow Plow. Joseph H. Smith. Illustrated description of a powerful plow built for the Interstate Consolidated St. Ry. Co., of North Attleborough, Mass. 1000 w. St Ry Rev—Feb. 15, 1900.

**Electric Tramway.**—See **ELECTRIC TRAMWAY—Express Service.**

**Grand Trunk Ry.**—Snow Plow, Grand Trunk Railway. Illustrated description of a plow made in the shops of the company, which successfully clears the tracks. 1000 w. Ry Mas Mech—Nov., 1896.

**Hydraulic Attachment.**—Hydraulic Attachment for Raising Rotary Snow Ploughs. Illustrated description of an attachment for raising the end of the machine complete. 700 w. Ry Rev—Nov. 21, 1896.

**Pneumatic.**—A Pneumatic Snow Plow. Illustrated description of a pneumatic snow plow used on the Atlanta Consolidated Street Railway. 500 w. St Ry Rev—March 15, 1897.

**Vermont Railway.**—Snow Plow, Vermont Valley R. R. Illustrated description. 800 w. Ry & Engng Rev—Oct. 6, 1900.

### SNOW SHED.

**Central Pacific R. R.**—Snow Sheds of the Central Pacific R. R. An illustrated description of the sheds, and the system employed to lessen damage by fire in the sheds, and consequent delay of traffic. 900 w. Safety V—Feb., 1896.

**Fire Protection.**—Snow Shed Fire Protection. A description of the fire trains and the system of preventing and extinguishing fires in Southern Pacific sheds. 1700 w. Ry Rev—Dec. 7, 1895.

### SNOWSLIDE.

**Ophir, Colo.**—The Avalanche at Ophir. An account of the snowslide which overwhelmed the Rio Grande Southern depot and tracks, with illustrations. 1100 w. Ry Age—March 19, 1897.

### SODA.

**Electrolytic.**—See also **ELECTRO-CHEMICAL WORKS; ELECTRO-CHEMISTRY.**

**Gulf of California.**—Native Sodium Carbonate. W. P. Blake. Information concerning a deposit near the head of the Gulf of California, known as the Santa Helena Soda Deposit. 800 w. Eng & Min Jour—Feb. 12, 1898.

**Hargreaves-Bird Electrolytic.**—The Electrolytic Production of Soda and Bleach by the Hargreaves-Bird Process. Describes the Hargreaves-Bird cell and its action, and other features of the process. 1000 w. Engng—July 22, 1898.

The Hargreaves-Bird Electrolytic Soda Process. Illustrated description of apparatus and process. 1200 w. Eng & Min Jour—May 21, 1898.

See also **ELECTRO-CHEMISTRY.**

**Slag.**—See **SLAG—Potash and Soda.**

**U. S. Western.**—Occurrence and Treatment of the Carbonate of Soda Deposits of the Great Basin. S. A. Knapp. Information concerning these extensive deposits in the western United States, and their increasing economic importance. 2000 w. Min & Sci Pr—Nov. 5, 1898.

### SODA WORKS.

**France.**—See **SALT WORKS.**

### SOLDERING.

See also **TIN ALLOY.**

The Art of Soldering. From "The Textile Journal," Bombay, India. Some points bearing on this subject and the materials used. 1700 w. Dom Engng—Aug., 1899.

### SOLUTION THEORY.

**Alloys.**—See **ALLOY—Solution Theory.**

**Iron.**—See **IRON—Solution Theory.**

**Metals and Alloys.**—Surfusion in Metals and Alloys. Sir W. C. Roberts-Austen. Abstract of a paper read at the Royal Society, May 26, 1898. Reviews the results of investigations from this point, and experiments made, and gives the method adopted by the author which gives evidence as to the identity of the behavior of saline solutions and metallic alloys as regards selective surfusion. 900 w. Nature—Oct. 27, 1898.

See also **METAL—Diffusion.**

**Steel.**—See **IRON—Solution Theory; METALLOGRAPHY—Steel; STEEL.**

### SOUDAN.

See also **AFRICA; RAILWAY.**

**French.**—The Trade and Industries of the French Soudan. Information regarding the articles of import, price, etc.; also brief notice of the resources of the country. 1500 w. Bd of Trd Jour—Feb., 1898.

See also **RAILWAY—Soudan French.**

### SOUNDING.

See also **HYDROGRAPHIC SURVEY; NAVIGATION.**

**Bathometer.**—A Bathometer Operating With Crushing Cylinders (Sur un Bathymetre Fondé sur l'Emploi de Cylindres Crushers). MM. Charbonnier and Galy-Arché. A device for determining depths of sea by the crushing pressure of the water upon cylinders such as are employed in determining artillery pressures. 1500 w. Comptes Rendus—July 24, 1899.

### SOUND REFLECTOR.

See also **ACOUSTICS.**

**Paraboloid.**—Paraboloid Sound Reflector at the Senate House, Calcutta. Descriptive of the construction of a device for improving the acoustic properties of the Senate Hall, which was most successful and is recommended. 900 w. Ind Engng —March 21, 1896.

### SOUTH AFRICA.

See also **AFRICA; GOLD MINE; GOLD MINING; GOLD REGION; MINERAL REGION; RAILWAY.**

South Africa from an Engineering Standpoint. Albert Williams, Jr. An impartial expert review of the causes leading up to the Boer war, the general conditions under which mining has been conducted, the expansion certain to follow under just and liberal government, and the interest of the engineering world in the newly opening African empire. 4000 w. Eng Mag—Dec., 1899.

### SPACE TELEGRAPHY.

See also **COHERER; ELECTRO-PHYSICS.**

Aetheric Telegraphy. W. H. Preece. Showing that wireless telegraphy has passed the experimental stage and reached practical use. Discussion. 5000 w. Jour Soc of Arts—May 5, 1899.

A Non-Technical Account of Wireless Telegraphy. Brief review of discoveries made and explanation of the principles. 2000 w. Min & Sci Pr—Dec. 2, 1899.

Ethereal Telegraphy. Editorial on the investigations in this field. 1800 w. Eng, Lond—May 28, 1897.

Experiments with Spark Telegraphy. K. Strecker. Abstract of a paper read before the Elektrotechnischer Verein. Describes an experiment with the Hughes type-printer, and improved connections for Morse instruments. Ill. 800 w. Elect'n, Lond—April 8, 1898.

Experiments with Wireless or Space Telegraphy. Dr. I. Kitsee. Describes a series of experimental tests, and gives the deductions drawn from them, and the practical applications possible, describing an arrangement that it is believed will effectually prevent collisions on steam roads. 2500 w. Elec Wld & Elec Engr—June 24, 1899.

Herz-Wave Telegraphy (La Telegraphie Hertzienne sans Fil). E. Ducretet. An illustrated historical and descriptive paper clearly presenting the status of present knowledge of the subject. 4500 w. Bulletin de la Société d'Encour—Dec., 1898.

On Wireless Telegraphy. A. S. Dolbear. Recalls some early experiences with the telephone which were explained as due to induction, reviews experiments of Prof. Trowbridge, made in 1880, and also of others, calling attention to the distinction between conduction and induction. 2500 w. Elec Wld & Elec Engr—June 10, 1899.

Signalling Through Space Without Wires. W. H. Preece. Delivered before the Royal Institution June 4, 1897. Explains the system of telegraphy invented by Signor Guglielmo Marconi, and describes his own experiments. Also editorial. Ill. 4800 w. Elec Rev, Lond—June 11, 1897.

Telegraphy Across Space. Silvanus P. Thompson. A lecture giving an excellent explanation of this subject, discussing conduction methods, induction methods, and wave methods. 5400 w. Jour Soc of Arts—April 1, 1898.

Telegraphing Without Line Wires. William Bissing. Reviews the electrical development bearing on this form of signaling. Part first considers conduction, induction, and electro-magnetic methods. Serial. Elec Wld—Jan. 14, 1899.

Telegraphing Without Wires. H. J. W. Dam. Gives interviews with Dr. Bose and Signor Marconi and explains their investigations in this field. Ill. 7400 w. McClure's Mag—March, 1897.

Telegraphing Without Wires (La Télégraphic sans Fil). A review of the experiments of Preece, Steinheil and others. 2500 w. La Revue Technique—April 10, 1897.

Telegraphing Without Wires. Ernesto Mancini. Translated from the Italian "Nuova Antologia." Reviews the work that has been done in this field and the degree of success attained. 2700 w. Chau—Feb., 1898.

Telegraphy Without Wires (Die Telegraphie ohne Draht). A paper by Dr. Müllendorff, discussing the various stages of the development of wireless telegraphy leading up to Marconi's practical application. 3500 w. Glaser's Annalen —Nov. 1, 1897.

The Development of Wireless Telegraphy. Patrick B. Delany. A historical review of the developments and discoveries which led up to the practical applications of Marconi, showing the present methods of operation and possible future advances. 8500 w. Eng Mag—Feb., 1900.

The Future of Wireless Telegraphy. Charles R. Gibson. Does not think these methods will take the place of ordinary telegraphy, but thinks if an apparatus can be made practicable for use at sea or in warfare it will greatly benefit mankind. Ill. 1600 w. Elec, Lond—Feb. 4, 1898.

The History and Present Development of Wireless Telegraphy. Greenleaf W. Pickard. Read at meeting of the Maine Academy of Medicine and Science. 5000 w. Sci Am Sup—Jan. 13, 1900.

The Mooted Wireless Telegraphs. D. H. Keeley. A discussion of the different systems, and the possibilities. 2000 w. Can Elec News—June, 1898.

The Possibilities of Wireless Telegraphy. A topical discussion introduced by Reginald A. Fessenden. Ill. 17400 w. Trans Am Inst of Elec Engs—Dec., 1899.

The Transmission of Energy to a Distance (Sur la Transmission d'Energie à Distance). A mathematical discussion of the application of rotary polarisation, by M. André Broca; presented to the French Academy by M. Cornu. 1000 w. Comptes Rendus—Nov. 15, 1897.

Wireless Telegraphy—A Forecast. J. Rees. Predicting great changes, socially, commercially, and economically from the success of this recent discovery. 1100 w. Elec Rev, Lond—Feb. 11, 1898.

Wireless Telegraphy. An editorial calling attention to some of the practical difficulties involved. 1400 w. Elect'n, Lond—May 13, 1898.

Wireless Telegraphy. Edwin J. Houston and A. E. Kennelley. Reviews the work in this field and the results thus far attained. 2200 w. Elec Wld—Jan. 1, 1898.

Wireless Telegraphy. Illustrates and explains the apparatus designed by W. J. Clarke, of the United States Electrical Supply Co., of New York, suitable for the requirements of wireless telegraphy. 1200 w. Sci Am—April 2, 1898.

Wireless Telegraphy. Jas. L. Adams, Jr. Describes experiments made and the effects produced. Ill. 1500 w. Elec World—Aug. 19, 1899.

Wireless Telegraphy. Rankin Kennedy. An explanation of this transmitting force from one vertical wire to another. 1600 w. Elec Rev, Lond—April 14, 1899.

Wireless Telegraphy. John Trowbridge. A history of the new application of the transformer and its possibilities. Ill. 4000 w. Ap Pop Sci M—Nov., 1899.

Wireless Telegraphy. W. L. Howard. Reviews the Preece system and the Marconi system, and the trials in the U. S. navy. Ill. 3200 w. Marine Rev—May 17, 1900.

**America-Cup Races.**—Observation on the Operation of Wireless Telegraphy on "La Grande Duchesse." William Mayer, Jr. Gives an interesting account of the work during the recent yacht races. 1500 w. Elec Wld & Engr—Oct. 14, 1899.

Wireless Telegraphy. William Baxter, Jr. An explanation of the principles of the system used by Marconi in reporting the recent races for the America's cup. Ill. 2500 w. Mach, N. Y.—Nov., 1899.

**Apparatus.**—The Apparatus for Wireless Telegraphy. Jerome J. Green. Illustrates and describes the parts required for complete sending and receiving stations. 2800 w. Am Elect'n—July, 1899.

**Balloon Experiments.**—Wireless Telegraphy Experiments with a Free Balloon (Experiences de Télégraphie sans Fil en Ballon Libre). J. Vallot, J. and L. Lecarme. The receiver was on the balloon and signals were received at a height of 800 metres and at a distance from the transmitter of 6 kilometres. 500 w. Comptes Rendus—May 14, 1900.

**Braun System.**—Prof. Braun's System of Wireless Telegraphy (Telegraphie ohne Draht nach dem System des Prof. Braun-Strassburg). The transmitter is a Leyden jar, with self-induction in its discharge circuit, which sends out longer waves than the customary apparatus. 900 w. Elektrizität—July 21, 1900.

**Chicago.**—Marconi System in Chicago. An illustrated account of the very successful test made in a city crowded with steel structures, electric circuits and electric apparatus. 1800 w. W Elect'n—April 29, 1899.

**Coast-Telegraphs.**—Coast-Telegraphs and Space-Telegraphy. Rollo Appleyard. The present limits of space telegraphy, the methods of coast telegraphs tried, and the success attained, with the methods now in favor. 4200 w. Nature—Jan. 12, 1899.

See also **TELEGRAPH—British Coast.**

**Detectors.**—Various Forms of Detectors for Magnetic Space Telegraphy. Dr. Oliver Lodge. Abstract of a paper read before the Inst. of Elec. Engs. Illustrates and describes a number of devices. 1800 w. Elec Eng, N. Y.—March 2, 1899.

See also **Magnetic Receiver; Receiver; COHERER.**

**Ducretet.**—Ducretet on Hertzian Telegraphy. Calls attention to some statements made by Ducretet in a lecture before the Société Internationale des Electriciens, and describes a new arrangement of apparatus for automatically printing messages in the Morse code. Ill. 1200 w. Elec Rev, Lond—Aug. 12, 1898.

Telegraphing Without Wires (Télégraphie sans Fil). Paul Janet. A discussion of currents of high frequency and electrical oscillations, especially in connection with the experiments in space telegraphy in Paris by M. Ducretet. 5000 w. Soc Ing Civ de France—Feb., 1899.

Wireless Telegraphy. Translation of an article by M. Ducretet, explaining his theory. 1000 w. U S Cons Repts, No. 306—Dec. 23, 1898.

**Electric Light.**—Telegraphy by Means of the Electric Light. Brief explanation of the system patented by Carl Zickler. 700 w. Elec, Lond—Aug. 11, 1899.

**English Company.**—Wireless Telegraph and Signal Co. (Limited). A report of the second general meeting of an interesting speech by H. J. Davis, chairman and managing director. Also editorial. 4500 w. Elect'n, Lond—Oct. 14, 1898.

**Germany.**—Telegraphy Without Wires in Germany. Charles de Kay. An account of experiments made in Germany and in England. 1100 w. Elec Rev—Sept. 29, 1897.

**Guarini Relay.**—The Guarini Relay System (Relais Sistema Guarini). A description of the Guarini relay, by means of which the space covered by the Marconi apparatus may be greatly increased. The action of the coherer operates a fresh transmitter. 2500 w. L'Elettricità—Nov. 25, 1899.

The Guarini Automatic Repeater (Repétiteurs Automatiques Guarini). Detailed description of an apparatus by which the range of communication can be extended from one station to another. 2000 w. L'Electricien—March 17, 1900.

**Hertzian.**—The Hertzian Telegraphy Without Wires (La Télégraphie Hertzienne, sans Fil). E. Ducretet. Containing numerous illustrations of the apparatus used in space telegraphy, and a general description of the method; being an address before the International Society of Electricians. Two articles. 2500 w. Electricien—Oct. 8, 15, 1898.

**Hughes.**—The Experiments of Prof. Hughes on Ether Telegraphy. J. Munro. An account of the original experiments of Prof. Hughes, showing that he discovered all the elements of wireless telegraphy as now known, nearly twenty years ago. 2200 w. Elec Rev, Lond—June 2, 1899.

**Hughes's Researches.**—Prof. D. E. Hughes's Researches in Wireless Telegraphy. A letter concerning the priority of the invention of wireless signalling, giving an account of the writer's researches as early as 1879. 2400 w. Elect'n, Lond—May 5, 1899.

**Induction.**—Some Experiments on Induction with Currents of High Frequency at Long Distance. Edwin F. Northrup, George W. Pierce and Frits Reichmann. An account of some experiments showing the action of the ether and the power of resonance in electrical circuits. Ill. Serial. Elec Wld—Dec. 18, 1897.

**Interception.**—Arrangement Intended to Prevent the Interception of Despatches in Wireless Telegraphy. D. Tommasi. An illustrated description of the arrangement. 800 w. Elec Rev, Lond—July 13, 1900.

**Light.**—See **Zickler Luminous.**

**Lighthouses and Lightships.**—See also **TELEGRAPH—Lighthouses and Lightships.**

**Lodge.**—Improvements in Magnetic Space Telegraphy. Oliver Lodge. Read before the Inst. of Elec. Engs., London. Reviews briefly the three chief methods, and explains the writer's system of magnetic induction telegraphy, and the sensitive receiving instrument which may be employed with it. Serial. Ind & Ir—Dec. 16, 1898.

Lodge's System of Syntonized Wireless Telegraphy. A detailed description of this system with illustrations. 2500 w. Elec Rev, Lond—Aug. 19, 1898.

**Lodge and Muirhead.**—Improvements Relating to Electric Telegraphy. Particulars from the specification of Lodge and Muirhead's patent for telegraphing by means of Hertzian waves. The invention has for its objects to provide means of obtaining greater certainty of action and an increase of distance. 1000 w. Elec Rev, Lond—Aug. 12, 1898.

**Magnetic Induction.**—Telegraphy by Magnetic Induction. S. Evershed. Read before the Inst. of Elec. Engs., England. The low-frequency electromagnetic system is presented; the method of forming the primary and secondary circuits, transmitting and receiving devices. 2700 w. Ind & Ir—Dec. 30, 1898.

**Magnetic Receiver.**—Novelties in Receiving Apparatus in Wireless Telegraphy (Sur l'Emploi de Nouveaux Radio-conducteurs pour la Télégraphie sans Fil). C. Tissot. Filings of magnetic and non-magnetic substances were used in the coherer, which was placed in a magnetic field parallel with the lines of force, with good results as regards reliability. 600 w. Comptes Rendus—April 2, 1900.

See also **COHERER.**

**Marconi.**—Marconi Telegraphy. Abstract of the patent specification. Ill. 3500 w. Elect'n—Sept. 17, 1897.

Marconi Telegraphy. Description of the experiments made in Berlin and Vienna. Ill. 1400 w. Elec Rev, Lond—Dec. 3, 1897.

Recent Patents for Telegraphing Without Wires (Neue Patente für das Telegraphiren ohne Draht). Especially discussing the later patents of Marconi in regard to the use of transformers and condensers. 2000 w. Elektrotech Zeitschr—Jan. 4, 1900.

Recent Progress in Wireless Telegraphy. G. Marconi. Abstract of a discourse delivered at the Royal Inst., with editorial comment. On problems recently solved and developments of the last few months. Ill. 5500 w. Elect'n, Lond—Feb. 9, 1900.

Some Facts about Wireless Telegraphy. Relates to the experiments that are being conducted in England by Mr. Marconi, with reference to work in other countries. 2300 w. Elec Rev, Lond—April 22, 1898.

Telegraphy Without Wires. H. Melville Dowsett. Brief account of a demonstration of "telegraphy without wires," which took place in New Southgate, Eng., under the direction of Signor Marconi. Ill. 1200 w. Elec Eng, Lond—Oct. 1, 1897.

The Marconi System of Telegraphy. Additional information about the apparatus used in this system of telegraphy by electric waves. Ill. 2200 w. Elec Rev, Lond—July 16, 1897.

Wireless Telegraphy. Abstract of a lecture by Monsignor Molloy, delivered before the Royal Dublin Society, descriptive of the work of Marconi. 800 w. Arch, Lond—Sept. 2, 1898.

Wireless Telegraphy. Gerald Molloy. An account of Signor Marconi's apparatus and its workings. 1300 w. Ind Engng—June 11, 1898.

Wireless Telegraphy. G. Marconi. Read before the Inst. of Elec. Engs., England. Describes a series of very successful experiments with the writer's system, and calls attention to the importance of this method in naval and military operations. Ill. 6700 w. Ind & Ir—March 10, 1899.

Wireless Telegraphy. J. A. Fleming, in the London "Times." On the importance of Signor Marconi's methods and the results he has brought about. 900 w. Ry & Engng Rev—April 22, 1899.

See also South Foreland Station.

**Marconi, Germany.**—Telegraphy Without Wires in Germany. A summary description of experiments by Marconi and by Prof. Rubens of Frankfort. 1100 w. Cons Repts—Sept., 1897.

**Marconi Patents.**—Marconi Wireless Telegraph Patents. From the London "Electrician." Gives the substance of the first three patents, with illustrations. 2200 w. Elec Wld & Engr—Nov. 11, 1899.

**Marconi, Spezia.**—The Trial of the Marconi Telegraph at Spezia. Report of the trials made July 11, 12 and 13, and of other work. Ill. 1700 w. Sci Am Sup—Sept. 4, 1897.

**Metal Shield.**—Obstruction of Hertz Waves by a Metallic Envelope (Une Enveloppe Métallique ne se Laisse pas Traverser par les Oscillations Hertziennes). A note by M. Branly, showing how the emission or reception of Hertz waves may be controlled by metallic envelopes; a valuable feature in connection with space telegraphy. 1000 w. Comptes Rendus—July 4, 1898.

**Mont Blanc.**—Experiments in Wireless Telegraphy between Chamounix and the Summit of Mont Blanc (Expériences de Télégraphie sans Fil, Executées entre Chamounix et le Sommet du Mont Blanc). MM. J. and L. Lecarme. A communication to the French Academy, giving the details of these successful communications between stations of widely differing altitude. 1000 w. Comptes Rendus—Oct. 16, 1899.

**Naval Manœuvres.**—Wireless Telegraphy During the Naval Manoeuvres. A brief account of the service messages sent at a maximum distance of 60 sea miles. 500 w. Elect'n, Lond—Sept. 1, 1899.

**Preece.**—Etheric Telegraphy. W. H. Preece. An interesting review of personal experience with this form of communication, and remarks on the Marconia system. 3000 w. Engr, Lond—Nov. 25, 1898.

Signalling Through Space Without Wires. W. H. Preece. An address given before the Royal Institution. An interesting lecture giving a description of the method applied by the author, and also the method of Hertz used by Mr. Marconi. The first method utilizes electri-magnetic waves of very low frequency; the second utilizes waves of very high frequency. Ill. 3500 w. Science—Dec. 17, 1897.

See also Telephone.

**Radiation.**—Electrical Radiation. Arthur V. Abbott. Considers the general qualifications of transmitting and receiving apparatus, and the practical operation of signalling by electrical waves. Ill. 6800 w. Jour W Soc of Engs—April, 1899.

Electrical Radiation. J. E. Taylor. The article aims to throw more light on the mystery of wireless telegraphy. Serial. Elec Rev, Lond—May 12, 1899.

**Receiver.**—Automatic Receiver for Hertzian Wireless Telegraphy (Poste Recepteur Pour la Télégraphie Hertzienne sans Fils). E. Ducretet. A receiver to be used in connection with the Branly Coherer, recording the message in Morse signals on paper strip. 1000 w. Comptes Rendus—May 2, 1898.

See also **Detector; Magnetic Receiver; COHERER.**

**Repeater.**—A Repeater for Use in Wireless Telegraphy. Illustrates and describes an instrument designed by Emile Guaicci-Foresio. 900 w. Elec Rev, Lond—Nov. 10, 1899.

See also **Guarini Relay.**

**Review.**—Wireless Telegraphy. Reviews editorially what has been accomplished in this form of communication. 1200 w. Eng Rec—May 20, 1899.

**Ship Collisions.**—Space Telegraphy and Collisions at Sea (Télégraphie sans Fil et Collisions en Mer). A note by M. Branly in connection with the suggestion of MM. Berget and Décombe showing how a Hertz exciter and Branly coherer may be used to give warning of approaching ships, and prevent collisions. 1000 w. Comptes Rendus—July 18, 1898.

**Slaby.**—The New Telegraphy. A. Slaby. Gives recent experiments in telegraphy with sparks, showing also the shortcomings and weaknesses of the system, but regarding the subject hopefully. Ill. 4500 w. Century Mag—April, 1898.

**Slaby-Arco.**—The Slaby-Arco System of Wireless Telegraphy. Illustrates and describes this system, and states the advantages that caused it to be adopted by the German Navy. 800 w. Elec Rev, Lond—Aug. 31, 1900.

**South Foreland Station.**—The South Foreland Wireless Telegràphy Station. Illustrates and describes this station with some comments on Mr. Marconi's experiments. 2000 w. Elect'n, Lond—April 28, 1899.

**Synchronism.**—Synchronism in Wireless Telegraphy. An account of experiments by Dr. Martin Tietz, in "Electrotechnishche Zeitschrift." 1100 w. Elec Rev, Lond—Sept. 16, 1898.

**Syntony.**—Syntony in Wireless Telegraphy (Sur la Syntonie dans la Télégraphie sans Fil). A Blondel. A description of a system of selective signalling by means of a telephone and resonating circuits. 700 w. Comptes Rendus—May 21, 1900.

Wireless Telephony. Sir Wm. H. Preece. Paper before the British Association, giving an illustrated description of the author's successful experiments in telephoning across several miles of water, without wires. 1200 w. Elec Engr, Lond—Sept. 14, 1900.

**Tesla.**—Tesla's Latest Invention. Text of a recent patent describing an invention for controlling the operations of a mechanism without any tangible connection and from a great distance. Also editorial. 2 parts. 1000 w. Elec Rev, N. Y.—Nov. 9 and 16, 1898.

**Theory.**—The Theory of Wireless Telegraphy. M. Blondel, in the "Comptes Rendus de l'Association Français pour l'Avancement des Sciences." Attributes the principal effect to an oscillating system. 1100 w. Elec Rev, Lond—May 5, 1899.

**Thermopile and Bolometer.**—Communication by Spark Telegraphy without the Coherer (Die Abstimmung der Funkentelegraphie ohne Fritter). Martin Tietz. An account of experiments in which the thermopile and the bolometer were substituted for the coherer. 3000 w. Elektrotech Zeitschr—Aug. 18, 1898.

**Trowbridge.**—Transmission of Power Through the Air Without Wires. John Trowbridge. Reports some experiments of the writer, interesting in connection with Mr. Tesla's recent patent of a method of transmitting power through the air without wires. 800 w. Sci Am—Nov. 19, 1898.

**Ultra-Violet Light.**—See **Zickler Luminous.**

**War.**—Hertz Wave Signalling in War. Charles T. Child. Shows that this method of communication is not yet ready for service as a military auxiliary. 900 w. Elec Wld—April 30, 1898.

See also **ELECTRIC APPARATUS—Military Uses.**

**Zickler Luminous.**—The Zickler Electric Luminous Wireless Telegraph System. Describes a design differing essentially from proposed systems. It consists in utilizing ultra-violet rays. Ill. 900 w. Elec Eng, N. Y.—Jan. 26, 1899.

Telegraphy by Means of Ultra-Violet Light. Karl Zickler. Abstract of an article in the "Elektrotechnische Zeitschrift." Describes apparatus used, experiments made and gives results obtained. 1800 w. Elect'n, Lond—Sept. 23, 1898.

Further Researches in Telegraphing with Light and Electricity (Weitere Versuche über die Licht-elektrische Telegraphie). K. Zickler. An account of the later experiments with ultra-violet light, and electrical discharges. Communication has been successfully held over a space of 1.3 kilometre. 1200 w. Elektrotech Zeitschr—Dec. 8, 1898.

Telegraphy with Light and Electricity (Licht-elektrische Telegraphie). Karl Zickler. Describing the author's experiments in telegraphing by the use of the ultra-violet waves of light, which, when projected upon a suitable receiver produce electrical discharges in an induction-coil circuit. Two articles. 4500 w. Elektrotech Zeitschr—July 14, 21, 1898.

**SPAIN.**

See also **IRON INDUSTRY; MINERAL REGION.**

Spanish Industries. Enumeration and some statistics of the principal industries carried on in Spain. 3000 w. U S Cons Repts—March, 1896.

The Resources and Industries of Spain. Edward D. Jones. Reviews the characteristics of the chief industrial districts of Spain, showing their diverse character; the undeveloped state of the commerce; and the many needs of the nation if it is to keep pace with the progress of the world. 3000 w. N Am Rev—July, 1898.

**SPANISH AMERICA.**

See also **CENTRAL AMERICA; MEXICO.**

Our Commerce with Latin America. Emilio M. Amores. Reviewing the natural resources of Latin American countries and the conditions upon which the United States can secure an increased share of the commerce therewith. 4700 w. Eng Mag —Feb., 1896.

South and Central American Republics—Their Resources and Trade. Part first reports the conditions found in Mexico by the commission appointed by the British Government to ascertain the prospects of British trade. Map. Serial. Ir & Coal Trds Rev—Feb. 18, 1898.

**SPARK ARRESTER.**

**Bell's.**—Bells's Spark Arrester on the Baltimore & Ohio. Illustrated description of the essential features of the latest type of this device. 600 w. R R Gaz—Sept. 10, 1897.

**SPARKING.**

See also **COMMUTATOR—Sparking.**

A New Method of Avoiding Sparking in Continuous-Current Machines. J. Fischer-Hinnen. From "Electrotechnische Zeitschrift." Remarks on the Ryan winding, and the advantage of its application to motors. Ill. 600 w. Elect'n, Lond —Jan. 14, 1898.

A New Method of Preventing Sparking in Continuous Current Generators (Eine Neue Methode zur Vermeidung der Funkenbildung von Gleichstrommaschinen). J. Fischer-Hinnen. An improvement on the Ryan method, similar to that of Swinburne. Small auxiliary poles are placed opposite the armature with compensating coils to neutralize the armature reaction. 1200 w. Elektrotech Zeitschr—Dec. 30, 1897.

Experiments Upon a Continuous Current Generator With Two Independent Windings (Versuche an einer Gleichstrommaschine mit zwei unabhängigen Wickelungen). A. Sengel. A discussion of experiments with independent windings and a third brush to avoid sparking in a continuous current dynamo. Two articles. 6000 w. Elektrotech Zeitschr—July 27, Aug. 3, 1899.

Sparking, Its Causes and Effects. Thorburn Reid. Read before the Am. Inst. of Elec. Engs. Considers the real injury is done before the segment leaves the brush. A study of commutation. Serial. Elec Rev, N. Y.—Dec. 22, 1897.

Sparking of Closed Coil Direct-Current Armatures. George T. Hanchett. Discussion of the subject, the causes and remedy. 2800 w. Elec Ry Gaz—March 28, 1896.

The Limit of Load Without Sparking (La Limite de la Marche sans Etincelles). A mathematical discussion of the cause of sparking in continuous current dynamos, showing the conditions under which a minimum degree of sparking may be secured. 2000 w. La Rev Tech—Feb. 25, 1899.

The Limits of Sparking With Continuous-Current Dynamos. Gisbert Kapp. Abstract translation from "Elektrotechnische Zeitschrift." A generally applicable formula, based on scientific reasoning, is given, so simple as to admit of its employment by practical men. 2500 w. Elec Eng, Lond—Feb. 17, 1899.

**SPEAKING TUBE.**

**Mines.**—Long-Distance Speaking Tubes in Mines. Schale, in "Zeitschrift für Berg., Hütten-, und Salinenwesen." Conclusions from results of experiments made to obtain material for guidance in setting up long-distance tubes and ascertaining the limits attainable for communication. 1000 w. Col Guard—Dec. 31, 1897.

See also **MINE SIGNAL.**

**SPECIFICATIONS.**

See also **BRIDGE SPECIFICATIONS; STEEL SPECIFICATIONS**; and under other specific titles.

The Ways of Consulting Engineers and Contractors. W. H. Booth. Why some engineers will not allow a specification to be departed from in any particular. 900 w. Am Mach—Oct. 11, 1900.

**Architect.**—Specifications from an Architect's Point of View. A paper read before the Arch. Assn. by B. F. Fletcher in the absence of Mr. Pinks, the author. Critical examination of the specification as it is; consideration of the necessity of specifications; and suggestions for their abolition as separate documents in a contract. 4000 w. Arch & Build—Nov. 30, 1895.

**Building.**—Specifications. The first of a series of articles for students giving directions and explaining the object and uses of the document. Serial. Builder—Jan. 2, 1897.

**Preparation.**—Who Should Prepare Specifications? An editorial upon the proper attitude of the profession toward this question. 1300 w. Eng News—Aug. 20, 1896.

**SPECIFIC HEAT.**

See also **HEAT; PHYSICS; THERMODYNAMICS.**

On "Specific Heat." An explanation, with illustrations. 3800 w. Locomotive—Oct., 1899.

**Metals.**—The Specific Heats of the Metals. F. A. Waterman. Considers the purity of the metals used; the determination of temperatures; the methods employed and results obtained, with tabulated determinations. 5000 w. Phys Rev—Nov.-Dec., 1896.

**SPECTRA.**

See also **PHOTOMETRY.**

**Bunsen Burner and Exhausted Bulbs.**—The Spectra of the Bunsen Burner and Exhausted Bulbs. W. H. Birchmore. Interesting investigations of light. 2300 w. Elec Eng—March 25, 1896.

**Moore's and Edison's Lights.**—A Spectroscopic Examination of Moore's and Edison's Lights. Nelson W. Perry. Examination made by the writer, with remarks and reference to similar spectra observed by scientists. 900 w. Elec—June 3, 1896.

See also **VACUUM-TUBE LIGHTING.**

**SPEED CONES.**

See **PULLEY—Cone.**

**SPEED INDICATOR.**

**Ball Bearing.**—The Paragon Ball-Bearing Speed Indicator. Illustrated description of a device for counting the revolutions of a shaft or spindle, the end of which is accessible. 800 w. Am Mach—Dec. 2, 1897.

**Electric.**—Electrical Speed Indicator. Describes and illustrates a revolution indicator, based upon an entirely new principle. One of the effects of the apparatus in marine work is to enable the two engines of a twin-screw ship to be kept at the same speed. 600 w. Am Mach—Dec. 10, 1896.

**Electric Recording.**—A Simple Electrical Recording Tachometer. L. E. Jones. Describes and illustrates a tachometer constructed and used by the writer at the electric light plant of the West Chicago parks, that proved itself useful in quickly and accurately indicating the number of revolutions, as well as any slipping occurring in many clutches, the jack drive, the rope drive and pulleys. 1200 w. Elec Rev—June 23, 1897.

**Electro-Magnetic.**—Electro-Magnetic Speed Indicators (Les Tachymètres Electro-Magnetiques). The Abdank-Abankowics speed indicator acts by the angular displacement of a metallic disk by a revolving magnet. 1500 w. La Rev Tech—Sept. 10, 1897.

**Fessenden.**—See **ELECTRIC INSTRUMENT.**

**Horn's.**—Speed Indicators and Recorders (Tachometer und Tachographen). Illustrating and describing Dr. Horn's improved apparatus. Two articles. 5000 w. Die Elektrizität—April 10, May 8, 1897.

**Irregular Motion.**—See **ROTARY MOTION.**

**Locomotive.**—The Klose Speed Indicator (Die Geschwindigkeitmesser, System Klose). An automatic recording speed indicator for locomotives which has given good results on the Northeastern Railway of Switzerland. 3000 w. Schweizer Bauzeit —April 24, 1897.

**Slippage.**—Slippage Meter (Ueber Schlüpfungszähler). R. Seeman. Describing the Siemens & Halske device, consisting of separate counters on generator and motor, with attachment for simultaneous starting and stopping. 3000 w. Elektrotech Zeitschr—Nov. 2, 1899.

**Stroboscopic.**—Stroboscopic Methods of Determining the Revolutions and Slip of Small Motors, and the Frequency of Alternating Currents. Illustrates and describes methods devised by Dr. G. Benischke, and the apparatus used. 1200 w. Elec Rev, Lond—Jan. 5, 1900.

The Stroboscopic Method of Determining the Speed of Small Motors (Stroboskopische Methoden zur Bestimmung der Umdrehungszahl Kleiner

Motoren). G. Benischke. The speed is determined by viewing the fan driven by the motor to be tested through openings in a disk driven by another motor of known and controlled speed. 1800 w. Elektrotech Zeitschr—Feb. 16, 1899.

**SPEED TRIAL.**

See **SHIP PROPULSION**; and under specific types and names of vessels.

**SPEEDWAY.**

See also **BOULEVARD; PARK.**

**Harlem River.**—The Harlem River Speedway, New York City. Illustrated description, with editorial comment. Serial. Sci Am—Feb. 6, 1897.

**SPINDLE.**

**Interchangeable.**—An Example of Shop Work. A. L. G. Illustrated description of how a number of special interchangeable spindles were made. 1200 w. Mach, N. Y.—Jan., 1898.

See also **INTERCHANGEABILITY.**

**SPIRAL.**

**Hyperbolic.**—The Hyperbolic Spiral. Walter K. Palmer. A description of the properties of the hyperbolic spiral, showing its use in connection with the drawing board for the solution of geometrical and trigonometrical problems. 3000 w. Kan Univ Qr—July, 1898.

**SPIRAL WHEEL.**

See **WHEEL—Spiral.**

**SPIRE.**

See **DOME; STEEPLE; TOWER.**

**SPLICE BAR.**

See **RAIL—Illinois Central; N. Y. Central.**

**SPONTANEOUS COMBUSTION.**

**Coal.**—Method of Ascertaining Whether a Coal May Be Safely Stocked or Shipped. From an article by O. Lang, in "Glückauf." Extracts and conclusions from a work of Prof. Fischer, of Göttingen. 1500 w. Col Guard—Oct. 13, 1899.

Spontaneous Ignition of Coal. Extract from a report to the Soc. of the U. S. Navy, showing the conditions under which it occurs in bituminous coal, and how it may be guarded against. 3500 w. Mines & Min—Dec., 1899.

The Combustibility of Coals. O. Lang, in "Glückauf." Investigations of the causes of spontaneous combustion. 1200 w. Am Mfr & Ir Wld—Dec. 7, 1899.

The Spontaneous Ignition of Coal Cargoes. Vivian B. Lewes. Results of a long series of experiments throwing some light on the cause of this class of phenomena, with suggestions for prevention. 6000 w. Pro age—Jan. 15, 1897.

See also **COAL—Spontaneous Combustion.**

**SPRING.**

**Automobiles.**—Steel Springs for Motor Cars. Excerpt of a paper read before the Liverpool Centre of the Self-Propelled Traffic Assn., by J. Bedford. Gives an outline of the methods of making bars suitable for making all kinds of springs, with analysis of acid steels used for laminated springs, with list of springs and their leading particulars. 1000 w. Prac Eng—May 6, 1898.

**Cars.**—Springs for Freight Car Trucks. H. C. McCarty. Committee report of results of investigation of the question of "Coil Springs for Freight Car Trucks." Ill. 1800 w. Cent Ry Club—Jan., 1898.

Coil Springs for Freight Cars. A report to the Central Railroad Club by Messrs. H. C. McCarty, H. F. Ball, and J. R. Petrie. Considers spring space, type of spring, sizes, etc., and summary of recommendations. Ill. 1500 w. R R Gaz—Feb. 18, 1898.

Development of the Car Spring. Angus Sinclair in "The Pall Mall Magazine." A short account of the first real improvement made in springs, and the added comfort secured. 600 w. Loc Engng—June, 1898.

**Coiled.**—Coiled Springs. E. T. Adams. General discussion of the practicability of a table of average strength and deflection that will be of service to practical men, with a diagram. 1300 w. Am Mach—May 21, 1896.

Concerning Coiled Springs. E. T. Adams. Considers springs made of round steel wire wound on a cylindrical mandrel, the data being taken from tests made on a considerable number of springs, mostly governor springs. 1800 w. Sib Jour of Engng—March, 1897.

See also **CAR.**

**Cylindrical Spiral.**—Cylindrical Spiral Springs. George R. Bale. Diagrams, giving dimensions of cylindrical spiral springs for given loads, limiting the stress on the material to 16-tons per square inch, with explanations. 1300 w. Mech Wld—Oct. 8, 1897.

**Elliptic.**—Some Constants for Use in Designing Elliptic Springs. F. F. Gaines. Gives constants which have proven their correctness and value. 1000 w. Am Mach—July 20, 1899.

**Flat.**—Flat Springs. Robert A. Bruce. Discusses what design will secure the best economy of material, and gives a table to enable designers to settle the dimensions of a given spring with the minimum amount of trouble. 1500 w. Am Mach—July 19, 1900.

**Helical.**—Carrying Capacity and Deflection of Helical Springs of Round Steel. W. B. Travell. Gives curve diagrams plotted according to the formulae of J. Begtrup. 350 w. Am Mach—Sept. 21, 1899.

Safe Loads for Helical Springs. Robert A. Bruce. The discussion considers the cylindrical helical spring. Ill. 2000 w. Am Mach—April 20, 1899.

**Intermittent.**—Intermittent Springs. Walter C. Garretson. A new theory, which the writer thinks confirmed by experiments which he describes. 1200 w. Sci Am Sup—April 11, 1896.

**Locomotive Driving.**—Helical versus Elliptical Driving-Springs. Edward Grafstrom. Describes a trial of helical springs made at the writer's suggestion and gives the favorable results of the experiment. 2000 w. R R Gaz—Oct. 1, 1897.

Locomotive Driving Springs. Editorial discussion of the proper methods of shop treatment. 900 w. Ry & Engng Rev—Sept. 16, 1899.

Underhung Driving Spring Rigging. L. R. Pomeroy. Calls attention to the difficulties that may arise in the changed conditions and their remedy. Ill. 700 w. Am Eng & R R Jour—Feb., 1899.

**Machine Designing.**—What a Machine Designer Should Know About Springs. J. Begtrup. Presents the principles upon which their action depends in a form that may be easily understood. Ill. Serial. Mach, N. Y.—May, 1898.

**Tables.**—Spring Tables. G. R. Henderson. Tabulated data for determining the various properties of a helical or elliptical spring, and considered preferable to diagrams on logarithmic cross-section paper, presented by the same author at the Dec., 1894, meeting. Read before the A. S. M. E. 2000 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

**Theory.**—The Theory of Springs (Theorie der Federn). Prof. Kirsch. An elaborate mathematical treatment of plate, helical and spiral springs, with diagrams for aid in performing computations. 5000 w. Zeitschr d Ver Deutscher Ing—April 16, 1898.

**Valves.**—The Computation of Springs for Valves of Engines and Compressors (Berechnung der Federn für die Ventile von Dampfmaschinen und Kompressoren). W. Trinks. A very thorough discussion of the proportioning of springs for the correct closing of valves, with numerous practical examples. 4500 w. Zeitschr d Ver Deutscher Ing—Oct. 15, 1898.

**Water.**—See **ARTESIAN WELL; GROUND WATER; WATER SUPPLY; WELL.**

**Winding Attachments.**—Spring Winding Attachments. Describes fixtures used by the writer in the making of helical springs. Ill. 2500 w. Am Mach—Sept. 8, 1898.

**SPRINGFIELD ARMORY.**

See **RIFLE.**

**SPROCKET WHEEL MACHINE.**

See **BICYCLE MANUFACTURE.**

**STABLE.**

See also **COUNTRY ESTATE.**

Stables. C. H. Blackall. The first of a series of articles on things to be considered in the construction of stables. Serial. Am Arch—Oct. 10, 1896.

Sanitary Stables and Farm Buildings. Louis Hanks. Suggestions on drainage and other important matters. 2800 w. San Rec—July 16, 1897.

**Casino.**—A Suburban Stable and Casino. Illustrated description of a stable in the suburbs of Philadelphia which not only accommodates the horses and cows, but is fitted with living rooms for the employés, billiard and card rooms, bowling alleys amusement hall and musical studio. 2200 w. Eng Rec—Oct. 7, 1899.

**Fireproof Construction.**—See **FIREPROOF CONSTRUCTION—Stable.**

**Germantown, Pa.**—The Strawbridge Stable, Germantown, Philadelphia, Pa. Illustrates and describes the remodeling of an old stable. 2000 w. Eng Rec—May 27, 1899.

**Grocery Firm.**—The Acker, Merrall & Condit Stables, New York. Illustrates and describes two large stables for a firm in the wholesale and retail grocery business. 4500 w. Eng Rec—March 18, 1899.

**Havemeyer.**—Stable Construction for a Country Estate. Plans and details of the stable and coachhouse built for W. F. Havemeyer on his estate at Seabright, N. J. Illustrations of ground plan, elevation and section. 1000 w. Eng Rec—May 9, 1896.

**Hospital.**—A Hospital Stable. Describes the veterinary stable at Cornell University, which is fitted for the treating of sick animals. 1700 w. Eng Rec—June 3, 1899.

**Mountain Station, N. J.**—See **HOUSE—Mountain Station, N. J.**

**New York.**—The L. L. Sterns Stables, New York. Illustrated description of the arrangement and fittings of an unusually large private stable and riding hall. 1900 w. Eng Rec—Aug. 19, 1899.

Two Noteworthy New York Stables. Illustrated description of the construction and architectural fittings of the stables of H. O. Havemeyer, and O. H. Payne. 3200 w. Eng Rec—July 15, 1899.

**Stern's, Tarrytown.**—Stables on the Stern Country Estate. Illustrates and describes the arrangement of the farm buildings and horse stables on a large Tarrytown estate. 2500 w. Eng Rec—March 10, 1900.

**Wanamaker, N. Y.**—The Wanamaker Stables, New York. Illustrated description of the buildings employed by a large retail dry-goods house for its delivering department. 2100 w. Eng Rec—April 22, 1899.

**STACK.**

See **CHIMNEY.**

**STADIA.**

See **SURVEYING—Stadia.**

**STADION.**

**Athens.**—The Stadion at Athens. From a special correspondent to the London "Times." Historical and descriptive. 1800 w. Arch, Lond—May 8, 1896.

**STAGE.**

See **THEATRE.**

**STAGING.**

**Car Painting.**—See **PAINTING—Car.**

**STAIR.**

Stairs. Fred T. Hodgson. Helpful suggestions on the design and construction of stairs. 5000 w. Nat Build—Oct., 1897.

**Austrian Experiments.**—Report Upon the Thrust of Staircases (Bericht des Stiegenstufen Ausschusses). Prof. J. E. Brik. An illustrated report of the tests made by the Austrian Society of Engineers upon the behavior of a flight of masonry steps under various conditions of loading and material. A valuable paper. Two articles. 9000 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 5, 12, 1898.

The Statics of Overhanging Steps in the Staircase Experiments (Die Statischen Verhältnisse der Freitragenden Stiegenarme bei den Versuchen des Stufenausschusses). J. E. Brik. A mathematical discussion of the statical equilibrium of the members of the experimental staircases tested by the Austrian Society of Engineers. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Aug. 19, 1898.

**Circular.**—The Construction of Circular Stairs and Spiral Vaults. Lawrence Harvey. Read before the British Arch. Assn. An account of the origin of this form of stairway, with some hints on the construction. 1500 w. Brit Arch—Nov. 3, 1899.

**Metal.**—A German System of Metal Stair Construction. The system illustrated and described is a Prussian invention. 400 w. Eng News—Aug. 27, 1896.

Metal Stair Design. Karl Burghardt. Illustrated description of typical structural details in metal stair work, now so much in demand in the construction of fireproof buildings. 2800 w. Eng News—April 16, 1896.

**Moving.**—See **MOVING STAIRWAY.**

**Spiral.**—Spiral Staircases. W. and A. Mowat. From "The Stone Trades Journal," England. Illustrated account of early construction, improvements, etc. 1700 w. Stone—Aug., 1900.

**STAMPING.**

See also **METAL WORKING; PRESS; PUNCHING; SHEET METAL.**

A Difficult Job of Stamping. B. E. Minard. Illustrates and describes the tools used and the method of making the stamping shown. 900 w. Am Mach—Aug. 10, 1899.

**Head.**—Lock Joint Head Stamping. How to Make It and the Tools for It. W. A. Warman and Thomas A. Dicks. Describes a process which gives a stamping in which the metal is thicker by 10 to 20 per cent. at the points of greatest strain. Ill. 1200 w. Am Mach—Feb. 25, 1897.

**Machinery.**—Development of Machinery for Sheet Metal Stamping. Oberlin Smith. A review of the increasing use of stamped metal work for many purposes in which more expensive methods were formerly used; with many examples of products of the stamping and drawing press. 3500 w. Eng Mag—March, 1898.

**STAMP MILL.**

See **GOLD MILLING; SILVER MILL.**

**STANDARDIZING.**

See also **ELECTRIC APPARATUS; SCREW THREAD.**

Standardising in Engineering Construction. Sir Benjamin C. Browne. A forcible statement, by the manager of one of the largest British engineering works, of the changes introduced by widening competition; showing very plainly the direction of mechanical evolution and the necessity for reorganising works in accord with it. 3500 w. Eng Mag—Oct., 1899.

Standardizing in Engineering Construction. Sir Benjamin C. Browne. The second paper shows that in specialization lies not only the highest economy and surest industrial success, but the keenest stimulus to the mind and faculties of the workman. 3500 w. Eng Mag—Nov., 1899.

Standardizing in Engineering Construction. Sir B. C. Browne. Shows the fallacy of the labor party's attitude toward economy of production and the dangers of unionism, either of employers or workers; proves the identity of interest of capital and labor in reducing manufacturing cost, and urges co-operation between workmen and employers. 3000 w. Eng Mag—Dec., 1899.

**STANDPIPE.**

See also **STANDPIPE FAILURE; WATER TOWER; WATERWORKS.**

Standpipes. Byron I. Cook. Describes the construction of several. Also discussion. 3500 w. Jour N E W Wks Assn—Dec., 1899.

**Atlantic City.**—An Overlooked Standpipe Incident at Atlantic City, N. J. An account of a narrow escape from destruction of a stand-pipe. The incident as related by Mr. George T. Prince and Mr. E. Graves 1400 w. Eng News—Nov. 12, 1896.

**Brick Casing.**—See **Racine; WATER TOWER.**

**Fire Protection.**—Standpipes for Fire Protection and Street Flushing. Louis L. Tribus. Describing a method of dispensing with steam fire engines by the substitution of hose companies, and at the same time increasing the safety of property and life. 3000 w. Eng Mag—March, 1896.

**Flushing, N. Y.**—Erection of the Flushing Standpipe. Illustrates a floating stage inside the tank and raised by pumping water into the space below it as the work progresses. 1800 w. Eng Rec—March 26, 1898.

**Lawrence, Mass.**—See **WATERWORKS.**

**Leaning.**—Leaning Standpipes at Red Oak and Griswold, Ia. W. D. Lovell. Describes the two cases named and the straightening of the first. The second still stands and no further settlement has taken place. 900 w. Eng News—May 13, 1897.

**Racine, Wis.**—Racine's Standpipe and Its Brick Casing. Describes this standpipe and its location, explaining the reasons for encasing it, and giving the specifications for the work. Ill. 3000 w. Fire & Water—Aug. 27, 1898.

Racine's Standpipe and Its Brick Casing. Read before the Am. W. W. Association. Describes the construction of the pipe and the means used in dealing with ice. 700 w. Am Arch—Sept. 17, 1898.

Standpipes with Brick Casing at Racine, Wis. Illustrated description of a brick casing built around an elevated tank to prevent freezing and injurious strains from wind. 1400 w. Eng Rec—Feb. 18, 1899.

**Scotland, Pa.**—The Scotland, Pa., Standpipe and Tower. Full detailed illustrated description. 1000 w. Eng Rec—Nov. 23, 1895.

### STANDPIPE FAILURE.

**Collingswood, N. J.**—Standpipe Failure at Collingswood, N. J. Illustrated description of a failure due to the accumulation of ice in the top of tne pipe, which caused a vacuum when the water was drawn down. 350 w. Eng Rec—Jan. 20, 1900.

**Elgin, Ill.**—The Failure of the Standpipe at Elgin, Ill. William D. Pence. An illustrated account, giving information relative to the standpipe and its failure, with discussion of the cause. Also other reports. 5500 w. Eng News—May 3, 1900.

**Murphysboro, Ill.**—Standpipe Failure at Murphysboro, Ill. Illustrated description of the complete failure of a standpipe, 145 ft. high and 15 ft. in diameter, 15 ins. out of plumb at the time of the accident. 700 w. Eng Rec—March 18, 1899.

See also **WATER TOWER.**

### STARTING BOX.

See **RHEOSTAT.**

### STATE OWNERSHIP.

See also **MUNICIPAL CONTROL; MUNICIPAL OWNERSHIP.**

Equality of Opportunity: How Can We Secure It? James L. Cowles. Considering the making of the railways, tramways, telegraph and telephone systems of the country, free to the use of the whole people in their ordinary transactions, and supporting these great public works by the ordinary forms of taxation. 6000 w. Arena—Dec., 1895.

**Railways.**—See **RAILWAY—State Ownership.**

**Telegraph.**—See **TELEGRAPH—Government Control.**

**Telephone.**—See **TELEPHONE—British; Municipal Ownership.**

### STATION.

**Electric.**—See **ELECTRIC STATION.**

**Electric Power.**—See **ELECTRIC POWER STATION.**

**Electric Railway.**—See **ELECTRIC POWER STATION.**

**Railway.**—See **RAILWAY STATION; RAILWAY TERMINAL.**

### STATISTICS.

See also under specific headings.

**British Blue Book.**—Statistics. Editorial review of the blue book of the Board of Trade; the forty-third issue of the Statistical Abstract for the U. K. in each of the last fifteen years. A study of the report shows fair indications of advancing prosperity. 4000 w. Engng—Jan., 1897.

### STAVE PIPE.

See **WATER PIPE—Stave.**

### STAYBOLT.

See also **BOILER; LOCOMOTIVE BOILER; LOCOMOTIVE FIREBOX.**

Concerning Staybolts. A discussion of means of detecting broken staybolts, and the cause of the breakage. 1800 w. Locomotive—Dec., 1897.

Staybolts and Braces. L. A. Caldera. Considers the tensile strain that may be allowed, the fastening of these, stiffness of sheets, etc. Ill. 2700 w. Power—Dec., 1898.

Staybolt Progress. Considers material used, form of the firebox, and of staybolts, riveting, etc., with conclusions. Ill. 5200 w. Am Engr & R R Journal—Dec., 1899.

Staybolt Progress. Willis C. Squire. A letter discussing the movement of the side sheets and firebox sheets relative to one another, due to differences of temperature, and suggesting a line of investigation. Ill. 1200 w. Am Engr & R R Jour—Feb., 1900.

**Applying.**—Best Method of Applying Staybolts to Locomotive Boilers. Abstract of committee report presented at the annual convention of the Mas. Mechs. Assn. Ill. 2200 w. Eng News—June 29, 1899.

Best Methods of Applying Staybolts. Opinion of Mr. Archie Baird, foreman boilermaker at the Topeka shops, with illustrations of experimental tests. 1200 w. Ry & Engng Rev—June 16, 1900.

**Bending Tests.**—Bending Tests of Locomotive Staybolts. Francis J. Cole. Illustrates the machine used for testing, discussing the results, giving photographs of test specimens and information concerning cost. 1500 w. Am Soc of Mech Engs, No. 775—June, 1898.

**Breaker.**—Pneumatic Staybolt Breaker, Atchison, Topeka & Santa Fé Railway. Illustrated description of the invention of John Player, by use of which the removal of the inner shell of the firebox from a locomotive boiler becomes a simple operation. 1200 w. Ry & Engng Rev—Dec. 18, 1897.

Notes on the Breaking of Staybolts (Bemerkungen über Stehbolzenbrüche). An examination of the probable cause of the frequent breakage of staybolts in particular locations in locomotive fire boxes. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—March 19, 1897.

The Breaking of Staybolts. A summary of the troubles, their causes and possible remedies, with suggestions that have been made. 3300 w. Am Eng & R R Jour—Sept., 1897.

**British.**—Staying of Locomotive Fireboxes. A discussion of this subject, dealing with fireboxes made in accordance with English practice, with internal plates of copper and exterior shell plates of iron or steel, the material used for the stays being copper. Serial. Engng—Nov. 19, 1897.

**Flexible.**—Flexible Staybolts. F. W. Johnstone. Illustrates and describes these staybolts as applied on the locomotives of the Mexican Central railroad. 2300 w. Am Engr & R R Jour—Jan., 1900.

**Manufacture.**—Recent Improvements in Making Staybolts. Shows the method of punching test holes, and the method devised and developed by James Hartness for cutting the threads accurately in a turret lathe by means of dies. Ill. 1500 w. Am Eng & R R Jour—April, 1898.

**Seating Machines.**—Staybolt Seating Machine. John Randol. Describes the construction and operation of an excellent special device, with illustrations. 2000 w. Loc Engng—Aug., 1896.

**Threading.**—A Staybolt Threading Device. James Hartness. Describes a means for threading staybolts. Ill. 400 w. Trans Am Soc of Mech Engs —Dec., 1897.

### STEAM.

See also **STEAM ENGINEERING.**

**Circulation in Pipes.**—See also **BOILER; STEAM HEATING; WATER-TUBE BOILER.**

**Condensation.**—Some Experiments on the Condensation of Steam. Read before the British Assn., at Toronto. Part first considers a new apparatus for studying the rate of condensation of steam on a metal surface at different temperatures and pressures, by H. L. Callendar and J. T. Nicholson; and part second explains an electrical method of measuring the temperature of a metal surface on which steam is condensing, by H. L. Callendar. 3300 w. Engng—Oct. 15, 1897.

The Law of Condensation of Steam. Illustrated review of Callendar and Nicholson's experiments and their results. 2000 w. Eng Rec—Oct. 22, 1898.

See also **CYLINDER CONDENSATION.**

**Cutting.**—Cutting by Steam. James P. Hobart. Shows that pure steam does not cut, but that the action is produced by other substances carried by the steam. Cites examples. Ill. 1500 w. Am Elect'n—Oct., 1898.

**Density.**—Concerning Regnault's Calorie and Our Knowledge of the Specific Volumes of Steam. G. P. Starkweather. Reviews experiments with superheated steam, noting discrepancies and concluding that knowledge concerning the density of steam is limited to the saturation line. 7200 w. Am Jour of Sci—Jan., 1899.

**Dryness.**—Methods of Determining the Dryness of Saturated Steam. Osborne Reynolds. Abstract of a paper read before the Manchester Literary and Philosophical Society. A discussion with consideration of conditions necessary for securing accuracy. 500 w. Prac Eng—Nov. 13, 1896.

See also **Quality.**

**Evaporation.**—The Evaporation of Steam in Boilers. A comparison with nature's process in the evaporation of the dew. 1800 w. Bos Jour of Com—Sept. 24, 1898.

**Exhaust.**—Heating Value of Exhaust Steam. E. P. Roberts and I. H. Sherwood. Discusses the uses of exhaust steam, giving table of the properties of saturated steam, and showing the loss of its heating value to be a large waste. Ill. 2000 w. Engr, Cleveland, O.—Sept. 15, 1898.

Economic Utilization of Exhaust Steam. William J. Baldwin. Extract from pamphlet on the Separation of Grease from Exhaust Steam. This paper answers the following questions: (1) How hot can feed water be made? (2) What percentage of the coal does the heating of the feed water represent? (3) How much of the exhaust steam from an engine can be used in heating the feed water necessary to supply the loss caused in the boiler by supplying steam to the same engine? (4) How much of it is left for use elsewhere, partly or wholly, to heat the building in winter or for drying purposes? 2000 w. Heat & Ven—April 15, 1896.

Some Considerations of the Economical Use of Exhaust Steam. Willard T. Hatch. Read at meeting of Providence Assn. of Mech. Engs. Considers its use in the heating of buildings and the production of additional power by its use in a condensing engine. 2800 w. Ir Age—May 6, 1897.

The Economical Utilization of Exhaust Steam. Bryan Donkin. Reviews the various methods of utilizing the energy in exhaust steam, comparing the relative economy of jet and surface condensation as well as the use of exhaust for feed water heating. 2500 w. Eng Mag—March, 1898.

The Utilization of Waste Steam. From "The Paper Makers' Circular." Treats of the utilization of waste steam in manufacturing, more particularly in paper-making. 1400 w. Ind & East Eng—Jan. 18, 1896.

Utilization of Waste Heat. Editorial discussion of the steam engine and steam boiler in this connection. 2000 w. Engr, Lond—Feb. 23, 1900.

See also **HEATING—Electric Station; STEAM HEATING; ELECTRIC POWER STATION—By-Products.**

**Expansion Drop.**—See **STEAM ENGINEERING—Drop.**

**Explosive Substitute.**—High-Pressure Steam as a Substitute for Explosives in Coal Mines. H. Schaw. Abstract of a paper taken as read at the Birmingham meeting of the Inst. of Min. Engs. Suggests that a cartridge of pure water, lodged in a shot-hole be converted into steam by means of electricity. 700 w. Col Guard—Oct. 21, 1898.

**Flow.**—Experiments on the Flow of Steam Through Pipes. R. C. Carpenter. Describes experiments made to determine the coefficient of friction of steam flowing at different velocities through pipes and fittings. 8800 w. Trans Am Soc of Mech Engs., No. 806—Nov., 1898.

Formulae for Flow of Steam Through Pipes. R. C. Carpenter. Investigations, with explanations of table given. 2000 w. Sib Jour of Engng—Dec., 1898.

On the Flow of Steam Through Pipes. A discussion of this problem, with tables. 3000 w. Locomotive—Feb., 1899.

See also **GASES; STEAM METER; STEAM PIPE.**

**Flow, Locomotive Cylinders.**—The Flow of Steam in Locomotive Cylinders (Die Dampfeinströmung in die Cylinder der Lokomotiven). A mathematical discussion by Inspector Leitzmann, with curves constructed for various pressures and port openings. 3000 w. Glaser's Annalen—April 15, 1899.

**Flow, Pipes.**—See **GASES—Flow.**

**High-Pressure.**—See **STEAM ENGINEERING.**

**Moisture.**—Determination of the Moisture in Steam. R. C. Carpenter. This paper points out errors likely to be made in the use of calorimeters, and endeavors to show that if proper allowancee be made for losses, correct results in the determination of moisture in steam may be obtained by the calorimetric method. 4000 w. Sib Jour of Engng—March, 1896.

Moisture in Steam (De l'Humidité de la Vapeur). N. François. A discussion of the various methods of determining the proportion of water entrained in steam. 6000 w. Rev Univ des Mines—Nov., 1899.

The Determination of Water in Steam (Die Mengenbestimmung des Wassergehaltes im Kesseldampf). Ernst Brückner. A very full examination of the various methods of testing moisture in steam, with illustrations of calorimeters, methods of attachment, etc. Three articles. 12000 w. Zeitschr d Ver Deutscher Ing—May 28. June 4, 11, 1898.

See also **Dryness; STEAM PIPE; STEAM TURBINE—Test, Wet Steam.**

**Potential.**—The Potential of Steam. Howard Pentland. Read before the Inst. of Civ. Engs., Ireland. Suggesting the estimating of saturated steam, expanded steam and electricity all by work, instead of by different means. Serial. Mech Wld—Dec. 11, 1896.

**Pressure.**—Something About Pressure. W. H. Wakeman. Gives a list of various pressures, showing how some of them are misplaced, and gives directions for calculating different pressures. 2800 w. Engr, Cleveland, O.—June 1, 1899.

**Quality.**—The Quality of Steam. Editorial discussion of means to secure the purity of steam, and dry steam. 1700 w. Engr, Lond—Feb. 9, 1900.

See also **Dryness.**

**Reaction.**—The Reactive Influence of Steam. W. J. M. Considers the reactive influence of a fluid, such as steam, in producing motion, when the steam flows into the atmosphere. 1000 w. Engr, Lond—Jan. 6, 1899.

**Superheated.**—See **SUPERHEATED STEAM.**

**Temperatures.**—Measurement of Temperatures of Steam. D. S. Jacobus. This paper presents experiments made to determine how nearly thermometers, placed in mercury or oil wells inserted in pipes, register the temperature of steam passing through the pipes. Apparatus illustrated and method explained with some of the conclusions derived. 6500 w. Stevens Ind—Jan., 1896.

**Thermodynamics.**—Steam. De Volson Wood. Abstract of a lecture delivered before the students of Sibley College. The consideration of the subject is from the scientific and thermodynamic standpoints. 2500 w. Sib Jour of Engng—Feb., 1896.

See also **STEAM ENGINEERING; THERMODYNAMICS.**

## STEAM BICYCLE.

See also **MOTOR CYCLE; STEAM VEHICLE.**

S. H. Roper's Steam Bicycle. R. I. Clegg. Illustrated description, with an account of the work of the inventor. 1500 w. Am Mach—May 18, 1899.

## STEAMBOAT.

See also **FERRYBOAT; GUNBOAT; LAUNCH: MARINE ENGINE; STEAMSHIP; STEAM YACHT; TOW BOAT.**

**"Adirondack."**—The Hudson River Steamer "Adirondack," of the People's Line. Illustrated description. 1700 w. Sci Am—Dec. 26, 1896.

The New Steamboat "Adirondack." Illustrated detailed description. 500 w. Am Ship—May 21, 1896.

**American Paddle-Wheel.**—American Paddle-Wheel Steamers with Beam Engines. Particulars and description of the engines and steamers used so extensively for inland navigation in the United States. Serial. Engr, Lond—Sept. 23, 1898.

**American Rivers.**—Early Steamboats on Western American Rivers. Cons. D. Miller. Historical review of steamer traffic on the Ohio and Mississippi. Ill. 4100 w. Eng Mag—Aug., 1897.

The Western River Steamboat. William H. Bryan. Read before the A. S. M. E. Defense of the present type of western river steamers as adapted to the commerce it is employed in, and an answer to criticisms that have been made upon them, as not sharing the improvements that have marked our lake marine construction. 1800 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

Our Western Rivers. Part first considers the Mississippi and its tributaries, the commerce and types of craft navigating these streams. Ill. Serial. Naut Gaz—May 11, 1899.

See also **Columbia River; Ohio River.**

**"Augusta."**—A Magnificent Inland Steamer. Description of the "Augusta," just completed for service on Chesapeake Bay. 1800 w. Naut Gaz—March 1, 1900.

**"Chester W. Chapin."**—New Sound Flyer. Illustrated description of the "Chester W. Chapin," the latest addition to the New Haven Steamboat Company's fleet. 1600 w. Naut Gas—Jan. 11, 1900.

Particulars of the Long Island Sound Steamboat, "Chester W. Chapin." Illustrations, plans and description. 450 w. Marine Engng—May, 1900.

**"City of Lowell" Tests.**—Performance of the Steamer "City of Lowell." James E. Denton. An account of tests of performance. Condensed from a paper read at the N. Y. meeting of the Soc. of Naval Arch. & Marine Engineers. 1500 w. Eng News—Nov. 14, 1895.

**Columbia River.**—Record-Breaking Stern-Wheel Steamer "Hassalo," for Columbia River. Illustrates and describes a new river steamer built for the Oregon Railroad & Navigation Co. 1100 w. Marine Engng—July, 1899.

**Congo River.**—Stern Wheel Missionary Steamer "Samuel N. Lapsley." Illustrates and describes a light-draft, stern-wheel boat for use on the Congo River. 500 w. Marine Engng—Sept., 1900.

**Early Paddle-Wheel.**—Early Paddle-Wheel Steamships. Part first illustrates and describes the Hudson River steamers and the steamers of the Fall River Line. Serial. Engr, Lond—Oct. 13, 1899.

**Ferryboat.**—See **FERRYBOAT; ICE BREAKER.**

**Fishing, Europe.**—Steam Power in the Fishing Business in Europe. Charles Theodore Mason. Information of steamboats used for this business in various countries. 800 w. Sci Am Sup—Oct. 16, 1897.

**"Francis J. Torrance," Pittsburg.**—Elegant Western River Excursion Packet. Illustration and description of the new steamboat "Francis J. Torrance," built for service at Pittsburg. 2000 w. Naut Gas—July 26, 1900.

**"Francis Joseph I."**—The Danube River Side-Wheel Steamboat "Francis Joseph I." Illustrated description of an interesting example of foreign practice. 900 w. Eng News—Aug. 26, 1897.

The Danube Steamer "Francis Joseph I." (Der Donaudampfer "I. Ferencz Josef"). Full details of this fine new river steamer, with drawings of boilers, engines and hull. 2 plates. 3000 w. Zeitschr d Ver Deutscher Ing—July 24, 1897.

Paddle Steamer "I. Ferencz Josef." Brief description, dimensions and illustrations of Danube steamer. 900 w. Engr, Lond—Aug. 27, 1897.

Hungarian-Paddle Steamer "I. Ferencz Josef." Working drawings and description of the engines of this steamer. 700 w. Engr, Lond—Feb. 4, 1898.

**"Genève."**—Saloon Steamboat "Genève," on the Lake of Geneva (Das Salonboot "Genève" auf dem Genfer See). An illustrated description of this fine new Swiss lake steamer, built by Sultzer Bros., of Winterthur. 1000 w. 1 plate. Zeitscher d Ver Duetscher Ing—April 1, 1899.

**"Hartford."**—Passenger and Freight Steamer "Hartford," Built for the New York & Hartford Transportation Co. Illustration, with description, of a twin-screw steel vessel of 1488 gross registered tons and having a cargo capacity of about 800 tons of freight, and accommodations for from 250 to 350 passengers. 1500 w. Marine Engng—Sept., 1900.

**History.**—See **Early Paddle; New York; Thames; FERRYBOAT; STEAMSHIP.**

**"Kaiserin Auguste Victoria."**—The First-Class Passenger Steamboat "Kaiserin Auguste Victoria" (Der Salondampfer "Kaiserin Auguste Victoria"). A fully illustrated description of this boat and her engines. She runs on the Rhine. 2500 w. 2 plates. Zeitschr d Ver Deutscher Ing—March 24, 1900.

**Lengthening "New York."**—See **SHIPBUILDING.**

**Light-Draught.**—The Increasing Demand for Light-Draught Steamers. Waldon Fawcett. Reviewing the rapid extension in the use of boats of this type, the mechanical and marine problems solved in the construction, and presenting important examples built in many shipyards. Ill. 3000 w. Eng Mag—May, 1900.

See also **American; Congo; Mexican; Niger; Russian; Volga; Yukon; GUNBOAT.**

**Mexican Stern-Wheel.**—Shallow Draft Stern-Wheel Steamers and Barges for Mexican Government. Illustrated description of interesting small vessels built at Algiers, La. 500 w. Marine Engng—Dec., 1899.

**"Middletown."**—The Long Island Sound Passenger Propeller "Middletown," Built by the Neafie & Levy Ship and Engine Building Company of Philadelphia. Illustrated general description. 600 w. Sea—May 21, 1896.

**New York, 1850.**—New York's Passenger Steamboats of 1850. Illustrated review of the Sound and river boats of fifty years ago. Serial. Naut Gas—July 12, 1900.

See also **FERRYBOAT.**

**Niger River.**—The Niger Stern-Wheel Steamers "Empire" and "Liberty." Two-page plate with description. 1400 w. Engng—March 12, 1897.

**Ohio River.**—The Modern Ohio River Boat. Hunter Morrison. Showing the improvements made in river boats and describing the "Queen City," owned by the Pittsburg & Cincinnati Packet line. Ill. 2000 w. Yale Sci M—March, 1898.

See also **American River; "Queen City."**

**"Ontegra."**—The New Steamboat "Ontegra." Illustrates and describes a new vessel that recently made its first trip on the Hudson River from New York to Catskill. 1800 w. Sea—July 7, 1898.

**"Pennsylvania."**—New Type Propeller Steamer. Illustration and description of the "Pennsylvania," a speedy inland passenger boat, in operation on Chesapeake Bay. 1900 w. Naut Gas—June 28, 1900.

Twin-Screw Steamboat "Pennsylvania," Built for the Cape Charles Route. Illustration, plans and cross-sections, with detailed description. 2400 w. Marine Engng—July, 1900.

**"Priscilla."**—See **STEAMSHIP—Paddle.**

**"Queen City."**—Pittsburg and Cincinnati Packet Line Stern-Wheel Steamer "Queen City." Bert L. Baldwin. A statement of the conditions and requirements of the river service in the Western United States, with illustrated description of the steamer named. Serial. Marine Engng—Oct., 1897.

See also **Ohio River.**

**Robert Fulton.**—Robert Fulton and the Steamboat. Robert H. Thurston. On the amount of credit due to Fulton for the invention, and the claims of others. 1500 w. Sci Am—Jan. 21, 1899.

**Russian War Service.**—Shallow Draught Steamer for Russian War Service. Illustrated detailed description of a steamer, designed specially for service in shallow water on the Amu Darya River, and of which the official trials gave very satisfactory results. 1200 w. Engng—Dec. 13, 1895.

**Shallow Draught.**—See **Light Draught.**

**Siberian Railway.**—The Marine Department of the Trans-Siberian Railroad. Waldon Fawcett. Information concerning the boats which will serve as connecting lines in the breaks of rail line, with illustrations. 1400 w. Sci Am—March 31, 1900.

**"Southend Belle."**—Thames Paddle Steamer "Southend Belle." Illustrated general description. 1500 w. Eng, Lond—June 12, 1896.

**Stern-Wheel.**—See **American; Columbia; Congo; Light Draught; Mexican; Niger; Ohio; "Queen City"; Yukon.**

**"Tashmoo."**—Magnificent River Steamer. Illustrated description of the "Tashmoo," a vessel similar to Hudson River boats, building at Detroit for service on St. Clair and Detroit rivers. 900 w. Marine Rev—Feb. 8, 1900.

Magnificent Passenger Steamboat. Description of the "Tashmoo," a fine boat on the Great Lakes. 1100 w. Naut Gas—April 5, 1900.

**Thames.**—Some Early Thames Steamboats. An account of these boats and their work, dating back to 1815. 2400 w. Engr, Lond—July 7, 1899.

The Thames Passenger Steamboat Service. Reviews the origin and history of the late passenger traffic on this river, the kind of vessels and machinery that have been in use, etc. Ill. Serial. Engr, Lond—Aug. 24, 1900.

See also **"Southend Belle."**

**"Toronto."**—Fast Side-Wheel Steamer. Illustrated description of the "Toronto," built at the Bertram Engine Works, for Richelieu & Ontario Navigation Co., for lake service. 1200 w. Marine Rev—Jan. 12, 1899.

**Tow Boat.**—See **TOW BOAT.**

**"Turbinia."**—See **STEAM TURBINE.**

**United States Western.**—See **American; Columbia River; Ohio River.**

**Volga River.**—Boats on the Volga (Schiffe auf der Wolga). R. Wels. Illustrating and describing the shallow draft steamers for Russian river service, especially the tank vessels for the transport of petroleum and naphtha. 3000 w. Zeitschr d Ver Deutscher Ing—March 3, 1900.

**Yukon.**—Novel Type of Towing Steamers and Barges for Service on the Yukon. Illustrates and describes the eight new boats for the Yukon. They will operate in two fleets, each consisting of one tug, two freight barges, and one passenger barge. 1800 w. Marine Engng—June, 1898.

Steamboats for the Yukon Trade. Describes boats designed and built by Lewis Nixon to ply on the rivers of Alaska and South America, of interest because of their carrying capacity, light draft, and original features of design. Ill. 1200 w. R R Gaz—March 25, 1898.

Stern-Wheel River Steamboat for the Klondike Trade. An illustrated description of the "Willie Irving," a vessel plying on the upper Yukon river. 1200 w. Marine Engng—Oct., 1899.

**STEAM CALORIMETER.**

See **CALORIMETER—Steam.**

**STEAM CAR.**

See **CAR—Steam Motor; STEAM TRAMWAY; STEAM VEHICLE.**

**STEAM CONSUMPTION.**

See also **STEAM ENGINEERING.**

Steam Consumption of an Engine—How It May Be Measured. Thomas Hawley. Extract of lecture delivered in Lowell Free Course, at Wells Memorial Institute, Boston. Discusses methods of interpreting indicator cards, and the use of data so obtained in computation. 2000 w. Bos Jour of Com—Jan. 11, 1896.

**Auxiliary Engines.**—See **AUXILIARY ENGINES.**

**Indicator Card.**—See **INDICATOR DIAGRAM—Steam Consumption.**

**Vertical vs. Horizontal Engines.**—Steam Consumption. Editorial comment on a paper by R. A. Ziese, in "Zeitschrift des Vereines Deutscher Ingenieure," dealing with vertical vs. horizontal engines for stationary purposes, insisting that maximum efficiency can only be obtained with the vertical engine. 2000 w. Engng—Jan. 13, 1899.

**STEAM COOKING.**

See also **COOKING; STEAM HEATING.**

**Egrot Apparatus.**—The Egrot Steam Cooking Apparatus (Les Cuisines à Vapeur Egrot). An illustrated description of the steam cooking apparatus used in many of the large hotels and institutions of Paris. 2500 w. La Rev Tech—Jan. 10, 1897.

**STEAM DISTRIBUTION.**

See **STEAM HEATING; STEAM PIPE; STEAM POWER—Distribution.**

**STEAM ENGINE.**

See also **HOISTING ENGINE; MARINE ENGINE; PUMPING ENGINE.**

A Patent Steam Engine. I. A. Ferrari. An explanation, from a theoretical point of view, of the efficiency of a patent steam engine, as an improved means for producing a rotary from a reciprocating motion. Ill. 1100 w. Prac Eng—Jan. 7, 1898.

On the Use of Steam Engines. W. H. Hoffman. Lecture before Boston No. 12, N. A. S. E., as reported by A. J. Guernsey. Notes of the design, construction and use of steam engines. 1600 w. Safety V—Dec., 1896.

Some Notes on Inquiries for Engines. J. A. Seager. Suggestions for guidance and to facilitate the delivery of a satisfactory engine. 2200 w. Am Gas Lgt Jour—Sept. 3, 1900.

The Steam Engine. A. Selwyn Brown. Part first considers various rotary engines of recent invention. Ill. Serial. Aust Min Stand—March 9, 1899.

The Steam Engine. William Frederick Durand. An elementary discussion of the principles which govern the economical use of steam for the development of power. Serial. Marine Engng—Sept., 1900.

The Steam Engine. F. F. Hemenway. A general article on the science of the steam engine. Serial. Mach—Jan., 1896.

**Armington-Sims.**—Armington and Sims New Slow Speed Engine. Illustrates general design and details of new form of inertia governor and releasing gear with steam dash-pot. 600 w. Eng Rec—April 30, 1898.

**Attendant's License.**—See **STEAM ENGINEER.**

**Augsburg-Nuremberg.**—See **DYNAMO—Helios.**

**Balancing.**—A Curious Problem in Balancing. Charles P. Paulding. Explains the problem and the graphical construction showing how satisfactory is this method of computation. 1300 w. Am Mach—May 4, 1899.

Balancing Steam Engines. Editorial on paper of James Whitcher, read before the Manchester Assn. of Engs. explaining principles of construction and means of avoiding vibration. 1000 w. Engr, Lond—April 26, 1898.

The Action of Masses in Crank Transmission, and their Equalization in Multiple Crank Engines (Die Massenwirkungen am Kurbelgetriebe und ihre Ausgleichung bei Mehrkurbligen Maschinen). A very full and valuable contribution to the study of balancing the reciprocating parts of steam engines, by Prof. Dr. Lorenz. Two articles. 9000 w. Zeitschr d Ver Deutscher Ing—Aug. 28, Sept. 4, 1897.

The Balancing of Beam Engines. Answer to an inquiry regarding the method of calculating the balance weight of beam engines. Shows how the work is done. 1500 w. Am Mach—Nov. 19, 1896.

The Balancing of Engines. James Whitcher. Read before the Manchester (Eng.) Assn. of Engs. Treats the subject in an explanatory manner, showing on what the science of balancing is founded, discussing the effect of the balancing effort upon the bearing pressures, the balancing proper of engines, etc. Serial. Ind & Ir—March 25, 1898.

The Influence and Balancing of Moving Masses in Steam Engines (Die Massenwirkungen der Dampfmaschinen und ihre Balancirung). A geometrical investigation, including simple and multiple-expansion engines with various crank relations. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—April 30, 1897.

See also Vibration; **LOCOMOTIVE—Counterbalancing; LOCOMOTIVE TEST—Strong Balanced; MARINE ENGINE—Balancing; STEAM ENGINEERING—Accelerity Diagram; STRONG LOCOMOTIVE.**

**Beam Compound.**—Trial of a Pair of Beam Engines, Working Compound, Cylinders Steam Jacketed. Description of boilers and of the engine tests, and conditions under which the latter were performed with tabulated results and numerous engine diagrams. 2800 w. Prac Eng—Nov. 29, 1895.

Trial of Compound Engines. Michael Longridge. Trial of a pair of beam engines with steam-jacketed cylinders working compound. Extensive list of data obtained, followed by comments upon indicator diagrams and conclusions. 3500 w. Engng—Jan. 24, 1896.

**Behrend Zimmermann.**—See Efficiency; **BINARY-VAPOR ENGINE.**

**Belleville.**—See **DYNAMO—Breguet.**

**Berlin Electric Station.**—Compound Engine 1500 Horse Power (Verbunddampfmaschine von 1500 P S). A short description of this handsome vertical engine with photograph and plate of detailed drawings. 500 w. 2 plates. Zeitschr d Ver Deutscher Ing—July 16, 1898.

The 1500-Hp. Engines for the Berlin, Germany, Electric Works. From the "Zeitschrift des Vereines Deutscher Ingenieure." Illustrated description of the cross-compound engines built for this company which operates the five central lighting stations of Berlin. 600 w. Eng News—Aug. 25, 1898.

See also Luisenstrasse.

**Berlin Tramway Station.**—Engines for the Berlin Tramways. Illustrates and describes triple-expansion engines of the marine type, each group having one high, one intermediate, and two low pressure cylinders, arranged as twin vertical tandems coupled at 180 deg. with two fly-wheels. 1600 w. Engr, Lond—May 25, 1900.

**Bohemian Mine.**—An Old Mine Engine. K. Müller. "Oesterreichische Zeitschrift für Berg und Hüttenwesen." Brief illustrated description of engine constructed in 1813 and used in Bohemia. 900 w. Col Guard—April 27, 1900.

**Bollinckx Belgian.**—Some Features about the Belgium Engines of H. Bollinckx. John E. Sweet. Illustrated description, with comments upon the system of active steam jackets, which is a feature of these engines. 1300 w. Am Mach—Aug. 6, 1896.

**Borsig at Paris.**—A Giant Steam Engine at the Exposition (Une Machine à Vapeur Géante à l'Exposition). A. Mahoudeau. An illustrated description of the 2500 h. p. triple-expansion engine to be exhibited by Borsig, of Berlin, driving the Siemens & Halske electric generators. 1200 w. Revue Technique—Jan. 25, 1900.

The Borsig Triple-Expansion Engine at the Paris Exposition. Illustrated description of the principal features of a marine type, four-cylinder engine and alternating generator direct-connected to it. 1500 w. Eng Rec—July 14, 1900.

See also **DYNAMO—Siemens-Halske.**

**Boston Elevated Ry.**—New Corliss Engine for the Boston Elevated Railway Co. Illustrated detailed description. 2800 w. Power—Nov., 1899.

**Boultes and Larbodière.**—See **Light Weight.**

**Breakdown.**—See **STEAM ENGINE ACCIDENT.**

**Brussels Exposition.**—Steam Engines at the Brussels Exposition, 1897 (Exposition de Bruxelles 1897. Les Moteurs à Vapeur). Emile Masson. A general account of the steam engines exhibited, including among others, the Schmidt Superheated steam engine. 6000 w. 1 plate. Revue Universelle des Mines—Jan., 1898.

**Budapest Power-Station.**—Compound Engine in the Power-House of the Budapest Electric Railway. Brief illustrated description of this stationary engine. From the "Zeitschrift der Vereines Deutscher Ingenieure." 350 w. Eng News—Dec. 1, 1898.

**Capacities.**—See also **DYNAMO.**

**Carels-High-Speed.**—The Carels High-Speed Steam Engine (Machine à Vapeur à Grand Vitesse, Système Carels). A compound, single-acting engine with two sets of cylinders, with rotary valves, the whole encased after the manner of the Westinghouse engine. 2000 w. La Revue Technique—March 25, 1897.

**Cary.**—A Condensed Engine. Illustrated description of a steam engine design by Mr. Frank Cary, Penn Yan, N. Y., with low centre of gravity and singular compactness. 800 w. Am Mach—Jan. 30, 1896.

**Compound.**—2000 I. H. P. Compound Mill Engines. Illustrated description of an improved type of compound engines in favor where large power is required. 1800 w. Engr, Lond—Jan. 12, 1900.

Compound Engines and the Cost Account. R. H. Thurston. Discussion of what type engine shall be used. 2300 w. Bos Jour of Com—Aug. 14, 1897.

Compound Non-Condensing Engines for Office Buildings. Editorial review of all published data concerning advantages of simple and compound types. 1600 w. Eng Rec—Sept. 3, 1898.

Non-Condensing Compound Engines for Office Buildings. Letters from Charles G. Darrach and Phoenix Iron Works Co., comparing the advantages of condensing and non-condensing engines for such service. 1200 w. Eng Rec—July 9, 1898.

Non-Condensing Compound Engines for Office Buildings. William H. Bryan. A letter advocating their use in place of simple engines. 1000 w. Eng Rec—July 2, 1898.

The Effect of Size upon the Economy of Compound Engines. An analysis of comparable tests showing large cylinders to give from 2 to 5 per cent. better results. 500 w. Eng Rec—June 4, 1898.

See also **Beam Compound; Berlin; Corliss; Cylinder Ratios; Electric; Greene-Wheelock; Multiple Expansion; Robey; Vertical.**

**Compound and Condensing.**—Compound and Condensing Engines. Alfred Siebert. Discusses when it is advisable to condense and when to compound, and other related subjects. 2800 w. Ice & Refrig—May, 1899.

**Compound Non-Condensing.**—Non-Condensing Compound Engines for Office Buildings. Editorial discussion of their value compared with simple engines. 1600 w. Eng Rec—June 18, 1898.

**Compound-Tandem.**—Horizontal Tandem-Compound Steam Engine. Illustrated description of an engine possessing many features of interest, special devices for obtaining steady running at a predetermined speed, with a minimum of attention. 2700 w. Prac Eng—Aug. 12, 1898.

Horizontal Tandem Steam Engine (Horizontale Tandem-Dampfmaschine). Brief description of an 800 h. p. horizontal tandem compound engine, arranged with low pressure cylinder nearest the crank-shaft. A modified Corliss valve is used. 600 w. 1 plate. Stahl und Eisen—Dec. 15, 1899.

**Corliss.**—Corliss Engines. Fleming Fitzroy. Proportions of steam ports and valve seat diameters, with diagrams and formulae. 1700 w. Prac Eng Dec. 20, 1895.

Overhauling a Corliss Engine. Charles J. Mason. On the details of practical methods of successfully operating a tandem-compound Corliss condensing engine. Ill. 7000 w. Mod Mach—Sept., 1899.

The Construction and Operation of Corliss Engines. Gives its history and an illustrated description of the machine and its operation. 18800 w. Engr, U. S. A.—Nov. 15, 1899.

The Corliss Engine in Great Britain. Part first gives an account of its pioneers, their work and opposition. Ill. Serial. Prac Engr—Oct. 27, 1899.

See also **Boston Elevated Railway; De Beers Mines; Dow; STEAM ENGINE ACCIDENT; STEAM ENGINE TEST—Cooper Corliss; VALVE GEAR.**

**Corliss Erection.**—Erection of the Corliss Engine. Paul Stapanskey. Detailed description of a method whereby rapidity and rigidity in erection, together with proper alignment of parts, etc., are secured. Serial. Safety V—June, 1896.

**Corliss, Paris Exposition.**—Compound Corliss Steam Engine at the Paris Exposition (Exposition de 1900. Machine à Vapeur Compound Corliss à Soupapes). An illustrated description of a 240-horse-power engine, with special pop-valves on the high-pressure cylinder and ordinary Corliss valve-gear on the low-pressure. 1000 w. 1 plate. Génie Civil—July 14, 1900.

**Cotton Mill.**—Another Vertical Cotton Mill Engine. Illustrated detailed description of a four cylinder triple-expansion engine of 2000 horse-power, to make 232 revolutions per minute. 1500 w. Power—Sept., 1896.

See also **Mill; Whitman Mill; Willans.**

**"Crankless."**—Ljungstrom's "Crankless" Engine. Illustrated description of this invention of a Swedish engineer. 1700 w. Col Guard—April 6, 1900.

**Cylinders and Pistons.**—Caring for Steam Cylinders and Pistons. W. H. Wakeman. Practical hints derived from authority and experience. 2800 w. Safety V—Sept., 1896.

**Cylinder Ratios.**—Cylinder Ratios for Compound Engines. George I. Rockwood. Read before the Providence Assn. of Mech. Engs. A discussion of the merits of large ratios. 6000 w. Eng Rec—Jan. 7, 1899.

Cylinder Proportions for Compound and Triple-Expansion Engines. Bert C. Ball. Presented at Junior meeting, March 6, 1900. A discussion of this question, and of the drawing of indicator diagrams by these engines. 4500 w. Trans Am Soc of Mech Engs, No. 857—May, 1900.

Cylinder Proportions for High-Pressure Steam. Editorial discussion of means of securing the greatest economy of the engine. 1000 w. Loc Engng—May, 1898.

Cylinder Ratios. James Andrews. Read before the North East Inst. of Engs. & Shipbuilders, in Sunderland. Aims at the systematic determination of the relative dimensions of the cylinders in multiple-expansion engines. Diagrams. Serial. Ind & Ir—April 22, 1898.

Cylinder Ratios for Compound Engines. George I. Rockwood. Condensed from a paper read before the Providence Assn. of Mech. Engs. The views of the writer on the design of compound engines, giving them far larger cylinder ratios, with lengthy editorial discussion. 3800. Eng News—March 2, 1899.

Economy in Compound Engines. The "Rockwood" system of proportioning cylinders. Principles underlying the system explained. A description of the system and a statement of advantages claimed for it. 1200 w. Bos Jour of Com—Nov. 23, 1895.

Method for Determining Cylinder Dimensions for Multi-Cylinder Steam-Engines. A. W. Smith. The method is a modification of Prof. Unwin's method, extended to triple expansion, and may be applied to four or more cylinders. 2500 w. Engng Jour—May, 1897.

The Computation of Triple Expansion Engines (Die Berechnung und Dimensionirung der Dreifach-Expansionmaschinen). J. Illeck. An elaborate application of the author's graphical method to the determination of cylinder ratios for triple expansion steam engines. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 16, 1898.

The Determination of Cylinder Sizes. J. C. Cornock. A study of the consideration affecting the sizes of cylinders, the effect of compounding, etc. 3000 w. Mech Engr—Dec. 24, 1898.

The Graphical Computation of Multiple Cylinder Engines (Die Graphische Berechnung Mehrcylindriger Dampfmaschinen). J. Illeck. Giving a graphical diagram from which the proper cylinder ratios may be determined for given conditions. 1500 w. Zeitschr d Ver Deutscher Ing—Jan. 7, 1899.

See also **Multiple Expansion; Proportions.**

**De Beers Mines.**—Inverted Triple-Expansion Vertical Corliss Engine at the De Beers Mines, South Africa. Illustrated detailed description. 1100 w. Power—Nov., 1896.

**Design.**—American Engine Design from an English Standpoint. Charles Day. A letter calling attention to one or two points where the writer thinks American engine-builders might take a hint from English practice. Ill. 900 w. St Ry Jour—Nov., 1898.

Constants for Steam-Engine Design. W. S. Goll and L. J. Gray. Account of an investigation instituted to derive from reliable data constants to be used in steam-engine design. 1100 w. Sib Jour of Engng—June, 1896.

Graphic Methods of Engine Design. A. H. Barker. Will discuss the application of graphic methods to the design of engines in which these methods are often more rapid and satisfactory than mathematical calculations. Serial. Prac Eng—Feb. 7, 1896.

The Dow Engine (Corliss Foundation). Josiah Dow. An illustrated description of the writer's engine, an outgrowth of the Corliss, with a statement of the advantages secured. 6800 w. Pro of Engs Club of Phila, No. 67—Nov., 1898.

**Dynamo.**—See **Electric Power Station; Electric Station: ELECTRIC POWER STATION; ELECTRIC STATION.**

**Economy.**—Improvement in the Economy of the Steam Engine. W. F. Durand. A study of the thermal efficiency of the engine, and the various conditions upon which it depends. 1700 w. Am Elect'n—Jan., 1899.

See also **Efficiency; Load Economy.**

**Economy Condensing.**—Steam Engine Economy: Condensing Engines. Henry Davey. A paper read before the Inst. of Civ. Eng. Treats of a method for examining results of engine tests, and which is substantially a comparison of indicator diagrams, with ideal theoretical diagrams at the same point of cut off. 4000 w. Col Guard—Nov. 1, 1895.

Steam Engine Economy. Condensing Engines. Interesting and very full discussion by members of the Inst. of Civ. Engs. on the paper by Henry Davey. 9000 w. Col Guard—Nov. 8, 1895.

**Efficiency.**—A Critical Examination of the Steam Engine (Ueber die Beurteilung der Dampfmaschine). Richard Mollier. A discussion of the theoretical thermal and mechanical efficiencies of the steam engine, in comparison with results obtained by actual test. A large comparative table is given. 4500 w. Zeitschr d Ver Deutscher Ing—June 18, 1898.

Efficiency of Different Types of the Steam Engine. Comparisons made on the basis of engines working in a Carnot cycle are given in part first. Serial. Am Elect'n—Feb., 1897.

Efficiency of the Steam Engine. The author herein enunciates and discourses upon what he considers a rational basis for determination of real efficiency, from which he proceeds to a method for determining practical efficiency. 1400 w. Am Elect'n—Aug., 1896.

The Efficiency of Motors. Editorial review of the technical meaning attached to the word "efficiency" as now applied in records of steam engine trials. 700 w. Prac Eng—Jan. 17, 1896.

The Efficiency of the Steam Engine. Ed. C. de Segundo. Remarks on the Behrend and Zimmerman engine, and results obtained from other engines. 1000 w. Elec Rev, Lond—June 22, 1900.

The Efficiency of Steam Engines. Editorial together with the report of the Thermal Efficiencies Committee of the Institution of Civil Engineers, discussing the basis for a comparison of the efficiency of steam engines. A valuable paper. 5000 w. Elect'n, Lond—Sept. 2, 1898.

Report on the Thermal Efficiency of Steam Engines. A discussion of the report presented by the committee appointed by the Institution of Civil Engs. 4000 w. Engr, Lond—Aug. 18, 1899.

The Thermal Efficiency of Steam Engines. The report of the committee of the Institution of Civil Engineers, in connection with a standard basis of steam engine trials. An important paper. Two articles. 3500 w. Engr, Lond—Sept. 2, 9, 1898.

Thermal Efficiency of Steam Engines. R. H. Thurston. Abstract and summary of conclusions of the committee of the British Inst. of Civ. Engs. in their report on this subject. 1600 w. Science—Dec. 2, 1898.

The Thermal Efficiency of Steam Engines. A letter from J. Morrow calls out the discussion given. 3500 w. Engr, Lond—Sept. 1, 1899.

The Thermal Efficiency of Steam Engines. Main portion of the report of the committee appointed by the Institution of Civil Engineers to consider a standard or standards of thermal efficiency for steam engines. 8500 w. Jour Am Soc of Nav Engs—Nov., 1899.

The Efficiency of Steam Engines. Considers briefly several standards of efficiency. 1000 w. Am Eng & R R Jour—June, 1897.

See also **Economy; Load Economy; Load Variations; BOILER—Efficiency; GAS ENGINE; MACHINE.**

**Efficiency Calculations.** — Logarithmic-Graphical Method of Determining the Power and Efficiency of Steam Engines (Logarithmisch-Zeichnerisches Verfahren zur Bestimmung des Arbeit und des Gütegrades der Dampfmaschinen). A. S. Oesterreicher. With graphical diagrams for enabling the capacity and efficiency of steam engines to be determined with a minimum of calculation. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 18, 1899.

**Efficiency, Standard.**—The Standard of Efficiency for Steam Engines and Other Heat Motors. R. H. Thurston, The essentials of a satisfactory standard are stated, and standards discussed and studied in some detail in part 1st. Serial. Jour Fr Inst—Dec., 1896.

**Electric Lighting.**—See **Electric Station.**

**Electric Power Station.**—Direct Connected Engines for Electric Power Stations in Germany. Descriptions with illustrations of three engines recently installed in electric power stations in Germany. These will interest engineers in showing that the trend of practice in Germany is like that in America. 1500 w. Eng. News—Oct. 15, 1896.

Economical Manner of Working Steam in Electric Power Plants. William S. Aldrich. Considers the increased economies to be obtained in the manner of working steam in the engine cylinders. 2700 w. Am Elect'n—June, 1898.

Economy of Simple or Compound Engines for Traction Work. W. H. Booth. A discussion of the advantages and disadvantages of the two types. 2200 w. Elec Rev, Lond—June 15, 1900.

Engines for Electric-Railway Power-Stations. Charles E. Emery. Some remarks on the general subject of engine building, with description of a number of the more prominent steam engines for operating electric-railway generators. Ill. Serial. St Ry Jour—Oct., 1897.

Notes on American Corliss Engines for Electric Traction. Charles Day. A record of observations made during a visit of the writer to the United States for the purpose of studying the practice in regard to engines for electric traction. Ill. Serial. Engr, Lond—May 25, 1900.

Steam Engines for Electric Railway Service. Discussion, with illustrations of various types. 4000 w. Am Elect'n—Oct., 1896.

The Selection of an Engine for a Power Station. R. C. Carpenter. A discussion of types, with the conclusion that it is probable that the compound condensing engine is the type best adapted for power-house work under present conditions. 1800 w. Am Elect'n—June, 1900.

The Selection of a Power Plant Steam Engine. Abstract of a lecture delivered by Prof. Hutton at the rooms of the Amer. Inst. The questions discussed were high and low-speed engines, automatic cut-off engines as contrasted with throttling engines, and the arguments in favor of condensing engines. 1500 w. Elec Wld—March 13, 1897.

The Steam Engine for the Electric-Traction Power-House. C. A. Hague. Displays forcefully the way in which the service differs from mill and marine practice and discusses the changes in design required by the unique and severe conditions. 3000 w. Eng Mag—Dec., 1899.

The Steam Engine for the Electric-Traction Power-House. C. A. Hague. Mr. Hague's second paper discusses detailed problems in design as well as in the erection of large steam units, giving valuable illustrations from the best current practice. 3000 w. Eng Mag—Jan., 1900.

See also **Berlin; Boston Elevated Railway; Budapest; Glasgow; Sheffield; Stopping Device; STEAM ENGINE TEST—Cooper Corliss.**

**Electric Power Station Tests.**—The Fuel Economy of Engines in Electric Railway Power Stations. R. C. Carpenter. Read at meeting of the N. Y. Street Ry. Assn. Gives results of 35 tests of electric railway power stations made during the past eight years by trained students of Cornell Univ., under the supervision of the writer. 2800 w. Eng News—Oct. 12, 1899.

**Electric Railway Station.**—See **Electric Power Station.**

**Electric Station.**—Development of Electric Lighting Engines. H. Lindley. Abstract of a paper read before the Northern Society of Electrical Engineers. 3000 w. Elec—March 18, 1896.

Development of Electric Lighting Engines. H. Lindley. Showing the considerations and improvements that have led to the substitution of engines of moderate and high speed for those of slow speed, in electric lighting work. 2800 w. Eng Mag—May, 1896.

Electric Light and Traction Engines. The object of the article is to describe some specimens of the work of English engine-makers. Ill. 1700 w. Elec Rev, Lond—June 16, 1899.

Large Electric Light Engines. R. D. Summerfield. Considers the types most used, aiming to give a general idea of the direction in which the makers are trending, and his opinion as to which type will survive. 2500 w. Elec Eng, Lond—Jan. 5, 1900.

Multiple-Expansion Engines and the Cost Account. R. H. Thurston. The purpose of the article is to state briefly the facts and principles mainly influential in determining the best engine to adopt for a light or power station. 5000 w. Am Elect'n—June, 1897.

Relative Efficiency and Desirability of Various Types of Engines on Central Station Loads. A. W. Richter. Abstract of a paper read before the Northwestern Electrical Assn. Discusses various types, and the points to be considered in connection with the local conditions in choosing an economical outfit. 3000 w. St Ry Rev—March 15, 1900.

Selection of Steam Engine for Electric Lighting Plants. Francis B. Crocker. The importance of the question. The proper size, number and type, etc. 2400 w. Elec Eng—Dec. 25, 1895.

Steam Engines for Direct Connected Electric Generators. E. A. Sperry. Illustrated description of a new design of an engine for direct connected electric generators. 2200 w. Jour Assn of Engng Socs—May, 1896.

Steam Engines for Electric-Lighting Purposes. John Davidson. Papers read before the Salford Science Students' Assn., at Salford, England. Remarks on a few of the main features of high-speed steam engines, and the difficulties met with in satisfactorily designing them. Ill. Serial. Mech Wld—Oct. 15, 1897.

Steam Engine Construction and its Relation to Electrotechnics (Der Dampfmaschinenbau und Seine Beziehungen zur Elektrotechnik). A paper by Prof. Gutermuth, of Dresden, discussing the special influence which the development of electric stations has had upon the construction and design of steam engines. 6000 w. Zeitschr d Ver Deutscher Ing—Dec. 11, 1897.

Steam Engine Construction and its Relation to Electrotechnics (Der Dampfmaschinenbau und Seine Beziehungen zur Elektrotechnik). A general discussion by Prof Gutermuth of the modifications which have been wrought in engine construction by the demands for electrical service. 7000 w. Zeitschr d Ver Deutscher Ing—Dec. 11, 1897.

Steam-Using Plant. J. A. Jeckell. Read at meeting of Munic. Elec. Assn., London. Discusses various types of engines and their efficiency, and other means of economy and efficiency. Discussion. 5300 w. Elec Eng, Lond—June 10, 1898.

The Steam Engine and the Dynamo—A Chapter in Evolution. Charles T. Child. A review of the reciprocal development of the engine and the dynamo in response to the demands of power-house practice. Each machine has acted to produce an improvement in the other. 3500 w. Eng Mag—April, 1898.

Triple-Expansion Engine for Direct Connected Electric Generator. Illustrated description with full details of an entirely new valve motion called "pouse-gear," with which the intermediate pressure valves are fitted. 2300 w. Am Mach—April 30, 1896.

See also **Berlin; Compound; Electric Power Station; Greene-Wheelock; Luisenstrasse; Robey; Single Cylinder; Stockholm; Triple Expansion; Vienna; ELECTRIC STATION.**

**Electric Station Standards.**—Standards for Direct Connected Generating Sets. J. B. Stanwood. Discusses the features that need standardization. 1500 w. Trans Am Soc of Mech Engs—May, 1899.

See also **Proportions; Standardization; ELECTRIC APPARATUS—Standardization.**

**Erection.**—See **Corliss Erection; ENGINE WORKS; ERECTING SHOP; STEAM ENGINE FRAME.**

**Escher-Wyss.**—See **DYNAMO—Oerlikon; TURBINE WORKS.**

**Expansion.**—See **Cylinder Ratios; Multiple Expansion.**

**Flour Mill.**—See **Mill.**

**Flour Mill, Wolverhampton.**—Coupled-Compound Horizontal Mill-Engine. Illustrated description of a condensing engine recently erected for driving the large flour mills, known as the "steam mills," in Wolverhampton, England. 800 w. Engr, Lond—Oct. 1, 1897.

**Four-Crank.**—Examples of Four-Crank Engines, and Their Auxiliaries. John Thom. Read before the Inst. of Engs. & Shipbuilders in Scotland. Illustrates and describes the principal features. 1800 w. Engs' Gaz—March, 1899.

**Friction.**—Note on the Variations of Frictional Resistance in Steam Engines (Ein Beitrag zur Beurteilung der Zusätzlichen Reibung bei Dampfmaschinen). A discussion of the conditions under which the friction increases and diminishes with the variations of the load upon the engine. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 20, 1897.

See also **FRICTION.**

**Friction and Lubrication.**—Friction Losses and Oiling Systems for Steam Engines. E. T. Adams. Losses of engine power through friction and reduction of these losses through methods described and illustrated. 2400 w. Mach—Oct., 1896.

**Geneva Exposition.**—Steam Engines at the Swiss National Exposition at Geneva, 1896 (Schweizerische Nationalausstellung in Genf. 1896. Die Dampfmaschinen). Describes and illustrates engines by the leading builders of Switzerland, including compound and triple expansion stationary, and lake steamer engines. 2500 w. and 2 plates. Zeitschr d Vereines Deutscher Ingenieure—March 6, 1897.

The Steam Engines at the Geneva Exhibition in 1896 (Die Dampfmaschinen auf der Schw. Landes-Ausstellung in Genf. 1896). The first of a series of articles. This contains drawings and a description of vertical compound engine by Sulzer Bros. of Winterlhur. 3000 w. Schweizerische Bauzeitung—March 13, 1897.

The Steam Engines at the Geneva Exposition (Die Dampfmaschinen an der Schweiz. Landesausstellung in Genf. 1896). With illustrations of compound engines and air compressor by leading vantages claimed for it. 1200 w. Bos Jour of Com—Nov. 23, 1895.

Method for Determining Cylinder Dimensions for Multi-Cylinder Steam-Engines. A. W. Smith. The method is a modification of Prof. Unwin's method, extended to triple expansion, and may be applied to four or more cylinders. 2500 w. Engng Jour—May, 1897.

The Computation of Triple Expansion Engines (Die Berechnung und Dimensionirung der Dreifach-Expansionmaschinen). J. Illeck. An elaborate application of the author's graphical method to the determination of cylinder ratios for triple expansion steam engines. 4000 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 16, 1898.

The Determination of Cylinder Sizes. J. C. Cornock. A study of the consideration affecting the sizes of cylinders, the effect of compounding, etc. 3000 w. Mech Engr—Dec. 24, 1898.

The Graphical Computation of Multiple Cylinder Engines (Die Graphische Berechnung Mehrcylindriger Dampfmaschinen). J. Illeck. Giving a graphical diagram from which the proper cylinder ratios may be determined for given conditions. 1500 w. Zeitschr d Ver Deutscher Ing—Jan. 7, 1899.

See also **Multiple Expansion; Proportions.**

**De Beers Mines.**—Inverted Triple-Expansion Vertical Corliss Engine at the De Beers Mines, South Africa. Illustrated detailed description. 1100 w. Power—Nov., 1896.

**Design.**—American Engine Design from an English Standpoint. Charles Day. A letter calling attention to one or two points where the writer thinks American engine-builders might take a hint from English practice. Ill. 900 w. St Ry Jour—Nov., 1898.

Constants for Steam-Engine Design. W. S. Goll and L. J. Gray. Account of an investigation instituted to derive from reliable data constants to be used in steam-engine design. 1100 w. Sib Jour of Engng—June, 1898.

Graphic Methods of Engine Design. A. H. Barker. Will discuss the application of graphic methods to the design of engines in which these methods are often more rapid and satisfactory than mathematical calculations. Serial. Prac Eng—Feb. 7, 1896.

The Dow Engine (Corliss Foundation). Josiah Dow. An illustrated description of the writer's engine, an outgrowth of the Corliss, with a statement of the advantages secured. 6800 w. Pro of Engs Club of Phila, No. 67—Nov., 1898.

**Dynamo.**—See **Electric Power Station; Electric Station: ELECTRIC POWER STATION; ELECTRIC STATION.**

**Economy.**—Improvement in the Economy of the Steam Engine. W. F. Durand. A study of the thermal efficiency of the engine, and the various conditions upon which it depends. 1700 w. Am Elect'n—Jan., 1899.

See also **Efficiency; Load Economy.**

**Economy Condensing.**—Steam Engine Economy: Condensing Engines. Henry Davey. A paper read before the Inst. of Civ. Eng. Treats of a method for examining results of engine tests, and which is substantially a comparison of indicator diagrams, with ideal theoretical diagrams at the same point of cut off. 4000 w. Col Guard—Nov. 1, 1895.

Steam Engine Economy. Condensing Engines. Interesting and very full discussion by members of the Inst. of Civ. Engs. on the paper by Henry Davey. 9000 w. Col Guard—Nov. 8, 1895.

**Efficiency.**—A Critical Examination of the Steam Engine (Ueber die Beurteilung der Dampfmaschine). Richard Mollier. A discussion of the theoretical thermal and mechanical efficiencies of the steam engine, in comparison with results obtained by actual test. A large comparative table is given. 4500 w. Zeitschr d Ver Deutscher Ing—June 18, 1898.

Efficiency of Different Types of the Steam Engine. Comparisons made on the basis of engines working in a Carnot cycle are given in part first. Serial. Am Elect'n—Feb., 1897.

Efficiency of the Steam Engine. The author herein enunciates and discourses upon what he considers a rational basis for determination of real efficiency, from which he proceeds to a method for determining practical efficiency. 1400 w. Am Elect'n—Aug., 1896.

The Efficiency of Motors. Editorial review of the technical meaning attached to the word "efficiency" as now applied in records of steam engine trials. 700 w. Prac Eng—Jan. 17, 1896.

The Efficiency of the Steam Engine. Ed. C. de Segundo. Remarks on the Behrend and Zimmerman engine, and results obtained from other engines. 1000 w. Elec Rev, Lond—June 22, 1900.

The Efficiency of Steam Engines. Editorial together with the report of the Thermal Efficiencies Committee of the Institution of Civil Engineers, discussing the basis for a comparison of the efficiency of steam engines. A valuable paper. 5000 w. Elect'n, Lond—Sept. 2, 1898.

Report on the Thermal Efficiency of Steam Engines. A discussion of the report presented by the committee appointed by the Institution of Civil Engs. 4000 w. Engr, Lond—Aug. 18, 1899.

The Thermal Efficiency of Steam Engines. The report of the committee of the Institution of Civil Engineers, in connection with a standard basis of steam engine trials. An important paper. Two articles. 3500 w. Engr, Lond—Sept. 2, 9, 1898.

Thermal Efficiency of Steam Engines. R. H. Thurston. Abstract and summary of conclusions of the committee of the British Inst. of Civ. Engs. in their report on this subject. 1600 w. Science—Dec. 2, 1898.

The Thermal Efficiency of Steam Engines. A letter from J. Morrow calls out the discussion given. 3500 w. Engr, Lond—Sept. 1, 1899.

The Thermal Efficiency of Steam Engines. Main portion of the report of the committee appointed by the Institution of Civil Engineers to consider a standard or standards of thermal efficiency for steam engines. 8500 w. Jour Am Soc of Nav Engs—Nov., 1899.

The Efficiency of Steam Engines. Considers briefly several standards of efficiency. 1000 w. Am Eng & R R Jour—June, 1897.

See also **Economy; Load Economy; Load Variations; BOILER—Efficiency; GAS ENGINE; MACHINE.**

**Efficiency Calculations.** — Logarithmic-Graphical Method of Determining the Power and Efficiency of Steam Engines (Logarithmisch-Zeichnerisches Verfahren zur Bestimmung des Arbeit und des Gütegrades der Dampfmaschinen). A. S. Oesterreicher. With graphical diagrams for enabling the capacity and efficiency of steam engines to be determined with a minimum of calculation. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 18, 1899.

**Efficiency, Standard.**—The Standard of Efficiency for Steam Engines and Other Heat Motors. R. H. Thurston, The essentials of a satisfactory standard are stated, and standards discussed and studied in some detail in part 1st. Serial. Jour Fr Inst—Dec., 1896.

**Electric Lighting.**—See **Electric Station.**

**Electric Power Station.**—Direct Connected Engines for Electric Power Stations in Germany. Descriptions with illustrations of three engines recently installed in electric power stations in Germany. These will interest engineers in showing that the trend of practice in Germany is like that in America. 1500 w. Eng. News—Oct. 15, 1896.

Economical Manner of Working Steam in Electric Power Plants. William S. Aldrich. Considers the increased economies to be obtained in the manner of working steam in the engine cylinders. 2700 w. Am Elect'n—June, 1898.

Economy of Simple or Compound Engines for Traction Work. W. H. Booth. A discussion of the advantages and disadvantages of the two types. 2200 w. Elec Rev, Lond—June 15, 1900.

Engines for Electric-Railway Power-Stations. Charles E. Emery. Some remarks on the general subject of engine building, with description of a number of the more prominent steam engines for operating electric-railway generators. Ill. Serial. St Ry Jour—Oct., 1897.

Notes on American Corliss Engines for Electric Traction. Charles Day. A record of observations made during a visit of the writer to the United States for the purpose of studying the practice in regard to engines for electric traction. Ill. Serial. Engr, Lond—May 25, 1900.

Steam Engines for Electric Railway Service. Discussion, with illustrations of various types. 4000 w. Am Elect'n—Oct., 1896.

The Selection of an Engine for a Power Station. R. C. Carpenter. A discussion of types, with the conclusion that it is probable that the compound condensing engine is the type best adapted for power-house work under present conditions. 1800 w. Am Elect'n—June, 1900.

The Selection of a Power Plant Steam Engine. Abstract of a lecture delivered by Prof. Hutton at the rooms of the Amer. Inst. The questions discussed were high and low-speed engines, automatic cut-off engines as contrasted with throttling engines, and the arguments in favor of condensing engines. 1500 w. Elec Wld—March 13, 1897.

The Steam Engine for the Electric-Traction Power-House. C. A. Hague. Displays forcefully the way in which the service differs from mill and marine practice and discusses the changes in design required by the unique and severe conditions. 3000 w. Eng Mag—Dec., 1899.

The Steam Engine for the Electric-Traction Power-House. C. A. Hague. Mr. Hague's second paper discusses detailed problems in design as well as in the erection of large steam units, giving valuable illustrations from the best current practice. 3000 w. Eng Mag—Jan., 1900.

See also Berlin; Boston Elevated Railway; Budapest; Glasgow; Sheffield; Stopping Device; STEAM ENGINE TEST—Cooper Corliss.

**Electric Power Station Tests.**—The Fuel Economy of Engines in Electric Railway Power Stations. R. C. Carpenter. Read at meeting of the N. Y. Street Ry. Assn. Gives results of 85 tests of electric railway power stations made during the past eight years by trained students of Cornell Univ., under the supervision of the writer. 2800 w. Eng News—Oct. 12, 1899.

**Electric Railway Station.**—See Electric Power Station.

**Electric Station.**—Development of Electric Lighting Engines. H. Lindley. Abstract of a paper read before the Northern Society of Electrical Engineers. 3000 w. Elec—March 18, 1896.

Development of Electric Lighting Engines. H. Lindley. Showing the considerations and improvements that have led to the substitution of engines of moderate and high speed for those of slow speed, in electric lighting work. 2800 w. Eng Mag—May, 1896.

Electric Light and Traction Engines. The object of the article is to describe some specimens of the work of English engine-makers. Ill. 1700 w. Elec Rev, Lond—June 16, 1899.

Large Electric Light Engines. R. D. Summerfield. Considers the types most used, aiming to give a general idea of the direction in which the makers are trending, and his opinion as to which type will survive. 2500 w. Elec Eng, Lond—Jan. 5, 1900.

Multiple-Expansion Engines and the Cost Account. R. H. Thurston. The purpose of the article is to state briefly the facts and principles mainly influential in determining the best engine to adopt for a light or power station. 5000 w. Am Elect'n—June, 1897.

Relative Efficiency and Desirability of Various Types of Engines on Central Station Loads. A. W. Richter. Abstract of a paper read before the Northwestern Electrical Assn. Discusses various types, and the points to be considered in connection with the local conditions in choosing an economical outfit. 3000 w. St Ry Rev—March 15, 1900.

Selection of Steam Engine for Electric Lighting Plants. Francis B. Crocker. The importance of the question. The proper size, number and type, etc. 2400 w. Elec Eng—Dec. 25, 1895.

Steam Engines for Direct Connected Electric Generators. E. A. Sperry. Illustrated description of a new design of an engine for direct connected electric generators. 2200 w. Jour Assn of Engng Socs—May, 1896.

Steam Engines for Electric-Lighting Purposes. John Davidson. Papers read before the Salford Science Students' Assn., at Salford, England. Remarks on a few of the main features of high-speed steam engines, and the difficulties met with in satisfactorily designing them. Ill. Serial. Mech Wld—Oct. 15, 1897.

Steam Engine Construction and its Relation to Electrotechnics (Der Dampfmaschinenbau und Seine Beziehungen zur Elektrotechnik). A paper by Prof. Gutermuth, of Dresden, discussing the special influence which the development of electric stations has had upon the construction and design of steam engines. 6000 w. Zeitschr d Ver Deutscher Ing—Dec. 11, 1897.

Steam Engine Construction and its Relation to Electrotechnics (Der Dampfmaschinenbau und Seine Beziehungen zur Elektrotechnik). A general discussion by Prof Gutermuth of the modifications which have been wronght in engine construction by the demands for electrical service. 7000 w. Zeitschr d Ver Deutscher Ing—Dec. 11, 1897.

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**Escher-Wyss.**—See DYNAMO—Oerlikon; TURBINE WORKS.

**Expansion.**—See Cylinder Ratios; Multiple Expansion.

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**Flour Mill, Wolverhampton.**—Coupled-Compound Horizontal Mill-Engine. Illustrated description of a condensing engine recently erected for driving the large flour mills, known as the "steam mills," in Wolverhampton, England. 800 w. Engr, Lond—Oct. 1, 1897.

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**Friction.**—Note on the Variations of Frictional Resistance in Steam Engines (Ein Beitrag zur Beurteilung der Zusätslichen Reibung bei Dampfmaschinen). A discussion of the conditions under which the friction increases and diminishes with the variations of the load upon the engine. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 20, 1897.

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**Friction and Lubrication.**—Friction Losses and Oiling Systems for Steam Engines. E. T. Adams. Losses of engine power through friction and reduction of these losses through methods described and illustrated. 2400 w. Mach—Oct., 1896.

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The Steam Engines at the Geneva Exhibition in 1896 (Die Dampfmaschinen auf der Schw. Landes-Ausstellung in Genf. 1896). The first of a series of articles. This contains drawings and a description of vertical compound engine by Sulzer Bros. of Winterlhur. 3000 w. Schweizerische Bauzeitung—March 13, 1897.

The Steam Engines at the Geneva Exposition (Die Dampfmaschinen an der Schweiz. Landes-ausstellung in Genf. 1896). With illustrations of compound engines and air compressor by leading

Swiss builders. Two articles. 5000 w. Schweiserische Bauzeitung—March 20 and 27, 1897.

**Germany.**—See also **Nuremberg; Stuttgart; Vertical; STEAM PLANT—Leipsig.**

**Glasgow Tramways.**—Engines for Glasgow Tramways. From the "Glasgow Herald." A discussion of the facts and considerations relating to this contract, with an account of the Allis type of engine. 3300 w. Am Mfr & Ir Wld—Sept. 21, 1899.

Glasgow Corporation Tramways. Text of Mr. Parshall's specification in so far as it refers to the construction of the main engines, with editorial discussion of the American tenders. 6200 w. Engr, Lond—Aug. 25, 1899.

The Contract for the Engines of the Municipal Electric Railways of Glasgow, Scotland. Editorial review of the controversy in Great Britain over the recent action of the Town Council of Glasgow in connection with the bids for four 4000-H. P. and two 800-H. P. engines. 3700 w. Eng News—Sept. 21, 1899.

The Glasgow Tramways Contract. G. L. Addenbrooke. A letter to the editor giving a very interesting explanation of the present position of electrical engineering in Great Britain. 2300 w. Engr, Lond—Sept. 8, 1899.

The Glasgow Tramway Contracts. Editorial review of the trouble in connection with the contracts for the engines for the electric tramways. 2300 w. Engng—Aug. 25, 1899.

**Governing.**—See **Regulation; GOVERNOR.**

**Greene-Wheelock Vertical Compound.**—Greene-Wheelock Vertical Compound Engine at the Atlantic Avenue Station of the Edison Illuminating Co., of Boston. Illustrated detailed description. 2000 w. Power—June, 1896.

**Guaranties.**—Engine Guaranties. Editorial on the worthlessness of the guaranties usually given. 1700 w. Engr, Lond—Sept. 8, 1899.

Impossible Guaranties. A cause of great annoyance connected with the operation of steam plants is discussed. 1000 w. Eng Rec—March 14, 1896.

**High Speed.**—A Triple-Expansion High-Speed Engine. Illustrated detailed description. 1000 w. Am Mach—Oct. 29, 1896.

High-Speed Engines. Illustrated abstract of paper by J. H. Dales before Inst. Civ. Engs. on new methods of adjusting clearance in bearings and governing double-acting engines for high speeds. 4000 w. Eng Rec—Aug. 12, 1899.

High-Speed Self-Lubricating Steam Engines. Alfred Morcom. Read before the Institution of Mechanical Engineers (England). An account of the part taken in their development by the firm of Messrs. G. E. Belliss and Co. and a comparison of their engines with other makes. 5500 w. Jour Am Soc of Nav Engs—Nov., 1897.

High-Speed Self-Lubricating Steam Engines. Alfred Morcom. An important paper on quickly rotating engines and automatic lubrication read at meeting of the Inst. of Mech. Engs. at Birmingham, Eng. 5000 w. Engr, Lond—Aug. 6, 1897.

High Speed Engine Design. Practical hints relating to the design of the ordinary double-acting engine of the vertical inverted cylinder type. Ill. Serial. Mech Wld—March 24, 1899.

High-Speed Engines. J. H. Dales. Read at meeting of British Inst. of Civ. Engs. Abstract of paper stating that the ordinary rates of rotation could with impunity be exceeded to the extent of 30 to 50 per cent. by the application of an adjustment of bearing brasses; also gives suggestions on good governing. 1300 w. Ir & Coal Trds Rev—Jan. 13, 1899.

High-Speed Reciprocating Engines. Allan Coats. Read before the Glasgow Tech. Col. Sci. Soc. A detailed study of this class, discussing in the present article the subjects of leakage, port design, lubrication, steam vs. air buffers, etc. Ill. Serial. Elec Engr, Lond—Oct. 5, 1900.

Quick Revolution Steam Engines. Arthur Herschmann. Historic review of the evolution of quick-revolving engines, considering the present practice and discussing the merits of a few types. Ill. 6000 w. Pro Engs' Soc of W Penna—April, 1899.

The Evolution of the "High-Speed" Engine. R. H. Thurston. A comparison of low, medium and high-speed engines, a statement of the advantages and disadvantages, with copious tabulated data and diagrams. Concludes with an illustrated description of a high-speed quadruple-expansion engine, designed by Messrs. Hall and Treat at Sibley College, and tested in the shops of the institution, which the author states, gives a horse-power with a consumption of less than ten pounds of steam. 5400 w. Elec—May 6, 1896.

The Proportions of High Speed Engines. John H. Barr. An attempt to derive empirical formulas from general experience in engine construction. An instructive and interesting paper. 2000 w. Trans Am Soc of Mech Eng—Dec., 1895.

The Rapid Coming in of High-Speed Engines. States their advantages, and the objections when they are built on low-speed models. 8300 w. Engng Mech—April, 1897.

See also **Carels; Electric Station; Merts; Raworth; Willans.**

**History.**—An Historical Chapter on the Steam Engine. Traces from B. C. down to the present time, in chronological order, the different stages the steam engine has passed through. Taken from a treatise on "Smokeless Heat" issued by the General Engineering Co. of Toronto. 1400 w. Can Elec News—April, 1898.

How the Common Syringe Became the Steam Engine. Robert L. Galloway. Traces the mechanical evolution. Serial. Col Guard—April 20, 1900.

The History and Structure of the Steam Engine. Robert H. Thurston. Early history of the steam engine. First of a series of twelve articles to describe and illustrate the birth and growth of the steam engine to date. Abstracted from "The Manual of the Steam Engine." Serial. Ry Mag—April, 1897.

Steam Engine Development. Traces the great improvements that have been made and the development from low-pressure single cylinders to the high pressure compound. 1300 w. Bos Jour of Com—Feb. 6, 1897.

The Evolution of the Stationary Steam Engine. Andrew Robert Robertson. Contributed to the Inst. of Civ. Engs., England. Showing that the main features and principle of the engine as laid down by Watt differ only in detail from those employed by successive experimenters and designers. 4200 w. Col Guard—Dec. 29, 1899.

The Steam Engine at the End of the Nineteenth Century. R. H. Thurston. A scientific study of the machine, presenting data illustrating the approximation attained to the ideal engine of Carnot. Illustrations and plates. 11300 w. Trans Am Soc of Mech Engs, No. 833—Dec., 1899.

The Steam Engine. J. S. Raworth. A summary of the last twenty-five years. 2800 w. Elec Rev, Lond—Nov. 12, 1897.

The Steam Engineering of To-Day and To-Morrow. R. H. Thurston. The article deals with the subject of the steam engine for electric lighting principally, reviews progress and describes the modern engine. 2800 w. Elec Eng—Jan. 6, 1897.

The Story of the Steam Engine. Its history and development are reviewed. Serial. Loc Engng—June, 1900.

See also **Bohemian Mine; Watt; STEAMSHIP.**

**Hoisting.**—See **GAS ENGINE—Hoisting; HOISTING ENGINE.**

**Hollingsworth.**—A Novel Engine Design. Illustrated description of a novel steam engine designed by L. Hollingsworth, Jr. 1000 w. Am Mach—Jan. 7, 1897.

**Horizontal.**—See **Compound Tandem; Mill; Preudhomme-Prion; Vertical vs. Horizontal.**

**Intermediate Receivers.**—Heating from Intermediate Receivers. An attempt to show wherein heating by this method results in gain, and to determine the gain quantitatively. 900 w. Eng Rec—Jan. 18, 1896.

**Keying Up.**—Keying Up an Engine. W. H. Wakeman. Describes the writer's practice in the engine room. 2000 w. Engr, U. S. A.—Aug. 15, 1900.

**Knocking.**—Knocking in Engines. The causes of knocks in steam spaces and the difficulty of locating them. 1400 w. Prac Eng—Aug. 20, 1897.

**Light Weight.**—150 H. P. Steam Engine Weighing 1800 Pounds (Machine à Vapeur de 150 Chevaux Effectifs Pèsant 600 Kilogrammes). A brief account of a very light engine built by Boultes and Larbodière, France. 200 w. Revue Technique—March 25, 1900.

**Ljungstrom.**—See **Crankless.**

**Load Economy.**—The Best Load for the Compound Steam Engine. Albert K. Mansfield. Graphical record of tests of two compounds of Buckeye Engine Co.'s make, both condensing engines, with brief explanation. 500 w. Trans Am Soc of Mech Engs, Vol. XVIII.—May, 1897.

The Dependence of Economy Upon Load in Steam Engines (In Welcher Weise ändert sich mit der Belastung der Dampfverbrauch einer Dampfmaschine?). E. Meyer. A careful study of steam economy, comparing load curves and steam consumption, with a mathematical analysis of their relation. 2500 w. Zeitschr d Ver Deutscher Ing—April 8, 1899.

The Law of Averages—Simple vs. Compound Engines under Variable Load. W. H. Booth. A discussion of the relative advantages of single and compound engines under variable loads. 2300 w. Am Mach—Sept. 27, 1900.

The Variation of Steam Engine Economy with Change of Load. W. F. Durand. A careful study and graphic representations of the variations and causes of economy in engines working under variable load, with tabulated data. 2500 w. Am Elect'n—June, 1896.

See also **Economy; Efficiency; Multiple Expansion.**

**Loads and Stresses.**—Investigation of the Actual Working Loads, Stresses, etc., on the moving Parts of a Compound Non-Condensing Steam Engine. Q. E. D. Investigations of interest in showing the methods of determining the various stresses, etc. Describes the engines used. Serial. Prac Engr—May 26, 1899.

**Locomobile.**—See **Portable.**

**Losses.**—The Relative Importance of the Wastes in a Steam Engine. Arthur L. Rice. Computations undertaken in an investigation of the subject of initial condensation from standpoints of both theory and experiment. 2200 w. Sib Jour of Engng—April, 1896.

See also **STEAM ENGINEERING; STEAM PLANT.**

**Luisenstrasse, Berlin.**—Vertical Steam Engine of 3000 Horse Power (3000-Pferdige Vertikale Ventildampfmaschine). An illustrated description of the triple-expansion Sulzer engine built for the Luisenstrasse electric station at Berlin. Three articles. 2 plates. 3000 w. Schweizerische Bauzeitung—Aug. 12, 19, 26, 1899.

Sulzer Triple-Expansion Engines for the Berlin Municipal Electric Lighting System. Translated from the "Schweizerische Bauzeitung." Drawings and description of vertical two-crank engines with the cylinders arranged steeple-fashion. 900 w. Eng News—Jan. 25, 1900.

The 3000-Horse-Power Engines of the Luisenstrasse Central Station, Berlin. Illustrated description from "Zeitschr d. Ver. Deutscher Ing.," of three vertical, direct-connected, triple-expansion engines, with the results of a test of one of them, using steam with and without superheating. 2200 w. Eng Rec—Oct. 13, 1900.

**Luisenstrasse Test.**—Tests of a 3000 Horse-Power Engine in the Luisenstrasse Central Station, Berlin (Stehende Dampfdynamomaschinen von 3000 PS in der Zentrale "Luisenstrasse" der Berliner Elektrizitätswerke). A short account, with tables, of tests made of a vertical triple expansion engine. 400 w. Zeitschr d Ver Deutscher Ing—May 12, 1900.

**Marine.**—See **MARINE ENGINE.**

**Mertz High-Speed.**—The Mertz High-Speed Steam Engines (Machines à Vapeur à Grande Vitesse Système E. Mertz). The Mertz balanced engine has two opposing pistons in each cylinder, enabling high speeds to be obtained without vibration. 1500 w. Génie Civil—Oct. 13, 1900.

**Mill.**—See also **Cotton Mill; Flour Mill; Rolling Mill; Whitman Mill; Willans; STEAM ENGINE ACCIDENT; STEAM PLANT—Grosvenordale.**

**Mill Compound.**—Compound Mill Engines. Illustrated description. 1300 w. Engng—May 29, 1896.

**Mill, Triple-Expansion.**—1600 Indicated Horse-Power Triple-Expansion Mill Engine. Illustrated description of engine made by Messrs. Cole, Marchent and Morley (England). 1500 w. Engr, Lond—Jan. 14, 1898.

**Mines.**—See **Bohemian Mine; De Beers Mines; HOISTING ENGINE; PUMPING ENGINE.**

**Modern Practice.**—Some Points in Modern Steam-Engine Practice. Henry Hodgson. Abstract of paper read before the Manchester (Eng.) Assn. of Engs. Gives the writer's views as to the best type of steam-engine for general use, discussing details. 2500 w. Eng's Gaz—Nov., 1898.

**Multiple Expansion.**—A Study of the Action of Multiple Expansion Engines (Etude du Fonctionnement des Moteurs à Plusieurs Cylindres). M. E. Lefer. A general examination of the action of steam in several cylinders, with the aid of theoretical diagrams. Numerous examples are worked out for various cylinder ratios. 20000 w. Bull de la Soc d'Encour—Jan. 31, 1900.

Economy of Multiple Expansion Engines. William S. Aldrich. Considers the effects of changes of load, systems of installations, speed regulations, etc., in relation to the economical working. Serial. Am Elect'n—May, 1899.

Expansion Engines for Land Service. W. H. Hoffman. A lecture before the Massachusetts Assn. of Steam Engineers. Considers compound, triple and quadruple expansion engines, and gives suggestions helpful to those in charge. Ill. 1700 w. Elec Eng, N. Y.—Dec. 9, 1897.

Multiple-Cylinder Steam Engines. Effects of Variation of Proportions and Variable Loads. Robert H. Thurston and Louis L. Brinsmade. Results of experimental investigation of the relative efficiencies of different engines, under stated conditions. 9000 w. Trans Am Soc of Mech Engs—Dec., 1897.

See also **Compound; Cylinder Ratios; Quadruple Expansion; Triple Expansion; STEAM ENGINEERING—Drop.**

**Non-Condensing.**—The Economical Use of Steam in Non-Condensing Engines. James B. Stanwood. A discussion of the conditions under which the use of a fixed point of cut-off and throttling governor may be preferable to automatic cut-off. 3500 w. Eng Mag—May, 1898.

The Economical Use of Steam in Non-Condensing Engines. James B. Stanwood. A discussion of the economy which may be obtained by the throttling compound non-condensing engines as compared with the automatic cut-off type. 3000 w. Eng Mag—July, 1898.

See also **Compound Non-Condensing.**

**Nuremberg Exposition.**—Power Exhibits at the Nuremberg Exposition (Die Kraftmaschinen auf der II bayerischen Landesausstellung in Nürnberg). With illustrations of double-deck boilers and a variety of engines by leading German builders. Two articles, and plates. 10000 w. Zeitschr d Vereines Deutscher Ingenieure—March 20 & 27, 1897.

**Office Building.**—See **Compound.**

**Oscillating.**—See **OSCILLATING ENGINE.**

**Packing.**—See **PACKING.**

**Paris Exposition.**—Some Prominent Engines at the Paris Exposition. Illustrated detailed description of interesting engine exhibits. 5700 w. Power—Aug., 1900.

Steam Engines at the Paris Exposition (Die Weltausstellung in Paris, 1900; Die Dampfmaschinen). M. F. Gutermuth. A general review of the exhibited engines, with table showing varieties. Serial. Zeitschr d Ver Deutscher Ing—Sept. 1, 1900.

The Engines of the Paris Exposition. Illustrates and describes steam engineering exhibits of interest. 4500 w. Power—July, 1900.

See also **Augsburg-Nuremberg; Belleville; Borsig; Corliss; Escher Wyss; Robey; Single Cylinder; Sulzer.**

**Piston Ring.**—See **PISTON RING.**

**Piston Rod.**—See **PISTON ROD.**

**Politics.**—The Politics of the Steam Engine. Fred W. Lehmann. Discusses the influence the steam engine has had in the development of the national life in the United States. 6800 w. Pro St Louis Ry Club—March 9, 1900.

**Portable.**—A Locomobile with Compound Engine (Machine Compound Demi-Fixe à Faisceau Tubulaire Amovible). An illustrated description of this locomobile, made by Wolf, of Magdeburg, in which the engine cylinders are placed in the steam dome on top of the boiler. 700 w. Génie Civil—June 23, 1900.

Some Trials of Portable Engines. Describes trials carried out on what was practically the same engine under three different conditions and under three different loads, giving results. 5000 w. Mech Wld—June 23, 1899.

**Power Calculations.**—The Calculation of Power. W. H. Wakeman. Points out errors in rules used and explains why they are errors. 2200 w. Mod Mach—May, 1899.

**Preudhomme-Prion, Belgium.**—Horizontal Engine at the Brussels Exhibition. Illustrated description of engine constructed by the firm of M. J. Preudhomme-Prion, of Huy, Belgium, which was received with favor. 600 w. Engng—Feb. 11, 1898.

**Proell-Corliss.**—See **VALVE GEAR—Proell-Corliss.**

**Proportions.**—Current Practice in Engine Proportions. John H. Barr. Results of investigations made upon "low-speed"-engine proportions, with several interesting diagrams. 4000 w. Trans Am Soc of Mech Engs, Vol. XVIII—May, 1897.

Engine Proportions. James Christie. Reasons why it is difficult to make them always conform to an arbitrary standard. Especially considers shafts and bearings of engines. 1200 w. Am Mach—Dec. 15, 1898.

Proper Proportional Parts of Engines. A topical discussion by Messrs. Vail, Schumann, Dow, Christie, and Schermerhorn. 4200 w. Pro of Engs Club of Phila, No. 67—Nov., 1898.

See also **Cylinder Ratios; Multiple Expansion; Standardisation.**

**Pumping.**—See **PUMPING ENGINE.**

**Quadruple Expansion.**—The Economy of Quadruple Expansion Engines. Arthur O. Druhsler. Describes the anti-vibration system and investigates the economy of this class and their ability for practical working. Diagrams. 1300 w. Ind Engng—May 1, 1897.

See also **High Speed; Multiple Expansion.**

**Raworth "Universal."**—Raworth's "Universal" High Speed Steam Engine. Illustrated detailed description of a design containing many novelties in construction. 1800 w. Ind & East Eng—Aug. 1, 1896.

The Raworth Universal Steam Engine (Machine à Vapeur Universelle, Système Raworth). With illustrations of details, and some account of the Raworth high-speed engine as shown at the Brussels Exposition, and installed at Vincennes and at Wandsworth, England. 3500 w. 1 plate. La Revue Technique—Oct. 10, 1897.

The Raworth "Universal" Steam Engine. Illustrated description and an account of tests and results. 700 w. Elect'n—Sept. 11, 1896.

See also **History; Short-Stroke.**

**Raworth "Universal" Tests.**—The "Universal" High-Speed Engine. Results of tests. 1000 w. Engng—Sept. 11, 1896.

**Reciprocating Parts.**—The Inertia of the Reciprocating Parts of a Steam Engine. C. H. Benjamin. The object of the article is to show the method of determining the excess and deficiency of energy for different speeds and points of cut-off. 2700 w. Mach, N. Y.—Sept., 1900.

**Regulation.**—Speed Regulation of Engines. G. J. Wells. Read before the Brit. Assn. of Draughtsmen. Part first investigates the causes of variations in the mean effective pressure, and illustrates by taking a case from practice. Ill. Serial. Prac Engr—April 27, 1900.

The Determination of the Degree of Irregularity of Steam Engines (Ermittlung des Ungleichförmigkeitsgrades von Dampfmaschinen). A method of computing the degree of inequality in the forces acting in a given engine to enable the proper weight of fly wheel to be computed. 3500 w. Zeitsch d Oesterr Ing u Arch Vereines—March 12, 1897.

See also **GOVERNOR.**

**Reversing.**—See **Rolling Mill.**

**Robey Compound.**—Paris Exhibition—Compound Engine. Illustrated description of the new compound electric light engine exhibited by Robey & Co., Limited. 900 w. Engr, Lond—Sept. 21, 1900.

**Rolling Mill.**—Reversing Engines for Rolling Mills (Ueber Reversirmaschinen für Walzwerke). L. Ehrhardt. With numerous indicator diagrams, and plans of vertical, three-cylinder, reversing rolling-mill engine. 4000 w. 1 plate. Stahl und Eisen—Sept. 15, 1899.

Modern Practice in Rolling Mill Driving (Neue Gesichtspunkte und Erfahrungen im Walzwerksbetriebe). H. Ehrhardt. With especial reference to the rolling mill engines exhibited at Paris. 1500 w. Stahl und Eisen—Sept. 1, 1900.

Rolling Mill Engines (Walzenzugmaschinen). Giving illustrated description of a cross-compound reversing engine, and of a Schmidt tandem compound engine for superheated steam, with diagrams showing the distribution of pressures on the crank pin. 1000 w. 1 plate. Stahl und Eisen—July 15, 1899.

Rolling-Mill Engines (Motoren zum Antrieb der Walzenstrassen). C. Kiesselbach. A discussion of the difficult conditions of operation in rolling-mill practice, together with plan and elevation of tandem compound engines designed for such service. Serial. Zeitschr d Ver Deutscher Ing—May 13, 1899.

Rolling Mill Engines (Die Motoren zum Antrieb der Walzenstrassen). C. Kiesselbach. A paper read before the Verein Deutscher Eisenhüttenleute, giving a very detailed account of German practice, with many illustrations. The discussion is appended. Two articles, 10 plates, 15000 w. Stahl und Eisen—May 1, 15, 1899.

German Rolling Mill Engines. C. Kiesselbach. Abstract of a paper read before the Verein Deutscher Eisen-Huettenleute. An illustrated review of recent developments in this class of engines, discussing the general points of compound engines in this first part. Serial. Ir Age—June 8, 1899.

Tandem Reversing Engine (Tandem Reversirmaschine). C. Kiesselbach. Describing and illustrating a double tandem compound reversing rolling mill engine constructed for the Hernádthaler Iron Works, Krompach, Hungary. 1500 w. 1 plate. Stahl und Eisen—Sept. 15, 1898.

Rolling-Mill Reversing Engines. Illustrated detailed description of engines built for the Keystone Axle Company, of Beaver Falls, Pa., giving dimensions. 500 w. Engng—Aug. 11, 1899.

The Ball Engines at the Apollo Iron and Steel Works. Illustrated detailed description of engines installed at the great rolling-mill of the Apollo Iron and Steel Co., at Vandergrift, Pa. 600 w. Ir Age—Oct. 15, 1896.

See also **Mill; ROLLING MILL; STEEL WORKS.**

**Rotary.**—See **ROTARY ENGINE.**

**Safety Stop.**—See **Stopping Device.**

**Sawmill.**—See **SAWMILL ENGINE.**

**Schmidt Superheated.**—See **Brussels Exposition; SUPERHEATED STEAM.**

**Selection.**—Points in the Selection of Steam Engines. W. H. Wakeman. Showing the factors that enter into a steam engine's usefulness, and the consdireations that should govern purchasers. 3900 w. Eng Mag—May, 1896.

**Sheffield Electric Tramways.**—Engines for the Sheffield Electric Tramways. H. W. Morley. Description, with illustrations, of engines of the slow-speed type. 1500 w. Engr, Lond—Oct. 27, 1899.

**Shocks.**—The Action of Shocks in Steam Engines (Stösse und Momente in Dampfmaschinen). J. Melfort. A discussion of the inertia of the reciprocating parts in steam engines, with especial reference to the reduction of vibration in multiple cylinder marine engines. 2500 w. Zeitschr d Ver Deutscher Ing—July 8, 1899.

See also **Knocking; Vibration.**

**Short-Stroke.**—Short-Stroke Steam Engines. J. S. Raworth. Read before the Yorkshire College Engng. Soc. Explains the construction and development of what has been named "high-speed" steam engines; considers the principles involved in engines suitable for driving machines which run at a high speed of rotation, such as dynamos, fans, centrifugal pumps, etc. 3800 w. Engng—Jan. 29, 1897.

**Single-Cylinder Compound.**—Single-Cylinder Compound Steam Engines (Eincylinder-Verbunddampfmaschine). C. Sondermann. A trunk piston is used, with an annular space in the middle portion, serving as a high-pressure cylinder. 1500 w. Zeitschr d Ver Deutscher Ing—Dec. 9, 1899.

**Single Cylinder, Paris Exposition.**—High Power Single-Cylinder Engines at the Paris Exposition. E. Kilburn Scott. A short account of some large engines coupled to alternators. 700 w. Elec Rev, Lond—Sept. 7, 1900.

**Small.**—The Economical Production of Power in Small Units. E. T. Adams. Showing the desirability of developing small engines with higher fuel-economy. 3200 w. Eng Mag—Sept., 1897.

**Specifications.**—Engine Specifications. An editorial on the proper method of calling for tenders for an engine plant where special machinery is not wanted. 1600 w. Eng Rec—April 1, 1899.

Engine Specifications. Letters from R. H. Thurston and W. H. Bryan on the best method of writing specifications for engines without special features which are to be installed for private parties. 2500 w. Eng Rec—April 15, 1899.

**Standardization.**—Standardization. J. E. Sweet. Read before the Engine Builders' Assn. of the U. S. Showing the advantages of making and using standard sizes. 2800 w. Am Mach—July 19, 1900.

See also **Electric Station Standards; Proportions.**

**Stockholm Electric Station.**—The New 500 h. p. Triple Expansion Engine of the Stockholm Electrical Works (Die Neue 500 Pferdige Dreifach-Expansionmaschine des Stockholmer Elektrizitätswerkes). S. J. Ledin. A general view of the engine, also detail drawings, and data of tests, with indicator diagrams. 2500 w. Zeitschr d Ver Deutscher Ing—Oct. 28, 1899.

**Stopping Device.**—An Automatic Device for Stopping Engines. Illustrates an apparatus, worked by electricity from any part of a shop. 1200 w. Eng Rec—June 18, 1898.

Safety Stop. Attachment for Power-House Engines. Illustrates the attachment applied by the E. P. Allis Co. to the engines driving the electric generators of the Lenox avenue line of the Metropolitan Traction So. of N. Y. They are equally applicable to engines doing other duty. 450 w. Am Mach—Dec. 17, 1896.

**Stuttgart Exposition.**—The Steam Engines at the Electrical and Technical Exposition at Stuttgart, 1896 (Die Dampfmaschinen auf der Ausstellung für Elektrotechnik und Kunstgewerbe in Stuttgart, 1896). A fully illustrated description of some excellent simple and compound engines adapted for electrical service. 5000 w. Zeitschr d Ver Deutscher Ing—May 8, 1897.

**Sulzer.**—The Sulzer Exhibit at the Paris Exhibition. A short illustrated description of some Sulzer engines, including a four-cylinder, triple-expansion one of 1700 horse-power. 400 w. Elec Rev, Lond—Sept. 14, 1900.

See also **Luisenstrasse; STEAM ENGINE TEST.**

**Superheated Steam.**—See **Brussels Exposition; SUPERHEATED STEAM.**

**Switzerland.**—Steam Engine Building in Switzerland. A Stodola. An interesting account of the remarkable development of engine building under seemingly adverse conditions, with numerous illustrations of the products of the leading builders of Switzerland. 4000 w. Eng Mag—March, 1900.

See also **Geneva Exposition.**

**Tandem.**—See **Compound Tandem; Rolling Mill.**

**Test.**—See **Luisenstrasse Test; Raworth "Universal" Test; STEAM ENGINEERING; STEAM ENGINE TEST.**

**Theory.**—The Mathematical Theory of the Steam Engine (Principes de la Théorie Mathématique de la Machine à Vapeur). J. Nadal. An elaborate treatise and review of existing theories. 18000 w. Rev de Mecanique—Nov. and Dec., 1898.

See also **STEAM ENGINEERING; THERMODYNAMICS.**

**Thermal Efficiency.**—See **Efficiency; OIL ENGINE—Diesel Thermal Efficiency.**

**Thermodynamics.**—See **THERMODYNAMICS.**

**Triple Expansion.**—See **Cotton Mill; De Beers Mines; Electric; High Speed; Luisenstrasse; Mill; Multiple Expansion; Stockholm; Vienna; Wigzell; Willans.**

**United States.**—The Steam Engines in the United States (La Machine à Vapeur aux Etats-Unis). R. H. Thurston. A general account of modern steam engine practice in the United States, followed by a description of the construction of the experimental engines at Cornell University, and accounts of tests made upon them. Four articles. 16000 w. Revue de Mécanique—May, July, Sept., Nov., 1897.

**Valve.**—See **VALVE; VALVE GEAR.**

**Variable Load.**—See **Load Economy.**

**Vertical.**—Vertical Steam Engines (Stehende Dampfmaschinen). G. Marx. A very full review of the more recent designs of the leading German builders, with numerous illustrations. 6000 w. Zeitschr d Ver Deutscher Ing—May 13, 1899.

**Vertical Compound.**—Vertical Compound Engine at Warren, R. I. Illustrated description of new engine. 600 w. Power—Jan., 1897.

**Vertical vs. Horizontal.**—Vertical and Horizontal Engines for Stationary Plants (Stehende und Liegende Dampfmaschinen für Stationäre Anlagen). R. A. Zeise. Showing the constructive and operative advantages of vertical engines. 2500 w. 1 plate. Zeitschr d Ver Deutscher Ing—May 28, 1898.

**Vibration.**—An Investigation in the Forces Tending to Produce Vibration in High Speed Engines. Conditions of inertia including both rotary and reciprocating parts with and without balance weights, and independent of, as well as combined with, the effect of steam under usual working conditions, are considered in these investigations, and the data arrived at experimentally are systematically presented. 700 w. Eng's Gas—Jan., 1896.

The Vibration of Engine Foundations. James Whitcher. The proposition toward which the argument is directed is that elaboration of foundations affords no security against injurious vibrations, which can only be obtained by perfect balancing of the engine plant. Serial. Elec Rev, Lond—July 17, 1896.

See also **Balancing; Knocking; Shocks; MARINE ENGINE.**

**Vienna Electric Station.**—High Speed Vertical Triple Expansion Engine of 1500 Horse Power (Schnellgehende Stehende Dreifach-Expansionsmaschine von 1500 PS). Leopold Kliment. A well illustrated description of engines for driving pairs of dynamos in a Vienna central station. 1000 w. 8 plates. Zeitschr d Ver Deutscher Ing—June 2, 1900.

High-Speed Vertical Triple-Expansion Engine; Central Electric Station, Vienna, Austria. Illustrated description of an engine installed in an electric-lighting station which possesses many features of interest. Special attention is called to the method of governing. 1100 w. Eng News—Aug. 2, 1900.

**Watt.**—A Forgotten Steam Engine. Editorial on an engine patented by Watt in 1769 which is claimed to be the most perfect steam engine, from the thermal efficiency point of view, it is possible to construct. 1800 w. Engr, Lond—Aug. 11, 1899.

**Watt Soho Foundry.**—A Curious Old Steam Engine. Engraving of a free hand sketch, accompanied by a description of a Watt Engine at Soho foundry, designed by James Watt during his father's lifetime. 1000 w. Engr, Lond—Feb. 28, 1896.

**Westinghouse.**—Westinghouse Steam and Gas Engines and Generators. An account of a visit made to inspect some of the new engines and electrical apparatus about to be shipped to England. 800 w. R R Gas—Aug. 5, 1898.

**Whitman Mills, New Bedford, Mass.**—New Vertical Cross Compound Engine at Whitman Mills, New Bedford, Mass. Illustrated detailed description. 1400 w. Power—Aug., 1896.

**Wigzell Triple-Expansion.**—Wigzell's Double Triple-Expansion Engine. An illustrated account of tests of a very well balanced engine, with diagrams. 2500 w. Engng—Sept. 7, 1900.

Wigzell's Triple-Expansion Engine. Illustrated description. 800 w. Engng—May 5, 1899.

**Willans.**—Some Modern Modifications and Accessories of the Steam Engine. J. Warren. A detailed description of a Willans triple expansion engine, and the Parsons steam turbine. 1800 w. Elec, Lond—Oct. 23, 1896.

The Willans Central Valve Engine. Illustrates and describes this high-speed engine, with report of tests. 2200 w. Eng & Min Jour—Oct. 1, 1898.

High Speed Engines for Industrial Purposes (Les Machines à Grand Vitesse dans l'Industrie). Describing the successful and economical performance of the Willans high speed engine in French spinning mills. 1200 w. La Revue Technique—August 10, 1897.

**Winding.**—See **HOISTING ENGINE**

## STEAM ENGINE ACCIDENTS.

Accidents to Steam Engines. W. H. Wakeman. Illustrated account of accidents and the methods of repairing them. 1200 w. Power—June, 1900.

Engine Failures. Editorial on the last report of Michael Longridge, to the Engine, Boiler, and Employers' Liability Insurance Co., Limited. 900 w. Engng—Sept. 16, 1898.

**Breakage.**—Some Strange Breakages. John E.

Sweet. Illustrated description of interesting examples. 800 w. Am Mach—May 17, 1900.

**Breakdowns.**—Breakdowns of Stationary Steam Engines. Michael Longridge. Read before the British Inst. of Mech. Engs. A short digest of the author's experience. Statistics derived from the last thousand breakdowns with which the writer had to deal previous to Dec. 31, 1894, are given, with statements of facts and explanations. Serial. Col Guard—Nov. 13, 1896.

Engine Breakdowns. Extracts from the annual report of the chief engineer of the Engine, Boiler, and Employers' Liability Insurance Co., Limited. Mr. Michael Longridge; with editorial. Ill. 3300 w. Prac Eng—Oct. 22, 1897.

**Corliss Tandem.**—Accident to a Steam Engine (Unfall an einer Dampfmaschine). O. Meyerhoff. A description with illustrations, of the breakdown of a tandem Corliss engine at Widzew near Lods, Poland. The intermediate piston rod broke, causing much damage; the constructive defects which led to the accident are discussed. 1500 w. Zeitschr d Ver Deutscher Ing—April 9, 1898.

**Mill.**—Mill Engine Breakdowns. Items of interest from the chief engineer's report to the Engine, Boiler and Employers' Liability Insurance Company, Limited, describing causes of breakdowns in steam and gas engines, etc. Ill. 1600 w. Mech Wld—Aug. 19, 1898.

**Syracuse, N. Y.**—A Peculiar Engine Accident. Illustrates and describes the accident at the Tracy St. station of the Syracuse, N. Y., Rapid Transit Railway Co., on Aug. 1, 1898. 1300 w. Power—Sept., 1898.

**STEAM ENGINEER.**

**Apprenticeship.**—Five Years Apprenticeship in an Engine Room. M. W. Danielson. The work necessary to perfect an engineer is briefly reviewed and information given on several subjects. 1800 w. Age of St—Dec. 5, 1896.

**Licensing.**—Licensing Engineers. W. H. Wakeman. An argument in favor of licensing engineers to operate steam plants, which however admits that there are some good grounds for opposing the system. 3000 w. Safety V—April, 1896.

The Certification of Boiler and Engine Attendants. Editorial discussion of the bill before the House of Commons to secure the granting of certificates to persons in charge of engines and boilers. 2400 w. Engng—March 5, 1897.

**Machinist.**—Should a Steam Engineer Be a Machinist? H. H. Kelley. A discussion of this question with the writer's views. 2000 w. Engr, Cleveland, O.—Sept. 15, 1898.

**STEAM ENGINEERING.**

See also **BOILER; COMBUSTION; FUEL; INDICATOR; INDICATOR DIAGRAM; MECHANICAL DRAFT; SMOKE PREVENTION; STEAM ENGINE TEST; STEAM GENERATION; STEAM POWER; THERMODYNAMICS.**

**Accelerity Diagram.**—The Accelerity Diagram of the Steam Engine. J. Macfarlane Gray. Read at session of the Inst. of Naval Archts. Explanation of method of plotting acceleration forces, with diagrams. 1800 w. Ind & Ir—April 15, 1897.

See also **MARINE ENGINE—Balancing; STEAM ENGINE—Balancing.**

**Back Pressure.**—Experimental Determination of the Influence of Back Pressure on the Economy of a Surface Condensing Engine with Independent Vacuum Pump. Percy Allan, Everett Bruen. Frederick K. Vreeland. Illustrated description of apparatus and method and an account of test, with diagrams and tabulated data. 6000 w. Stevens Ind—April, 1896.

**Circulation.**—See **BOILER; STEAM HEATING; WATER-TUBE BOILER.**

**Clearance.**—Computing Clearance in Steam Engines. Illustrates and describes four methods of finding clearance. 1600 w. Power—Sept., 1898.

**Clearance and Compression.**—Clearance and Compression. F. F. Hemenway. The influence which they extend upon the economy of a steam engine is explained. 2000 w. Mach, N. Y.—Nov., 1897.

**Compression.**—Compression as a Factor in Good Running Engines. Showing the benefit of compression in a condensing engine, as well as a non-condensing, if the compression is properly obtained. 500 w. Eng Rec—Dec. 26, 1896.

Compression in Steam Engines (La Compression dans les Machines à Vapeur). Bryan Donkin. A discussion of the experiments of Prof. Dwelshauvers-Dery in comparison with those made in other countries. 2000 w. Rev de Mécanique—Feb., 1899.

Experiments on the Compression of Steam in the Clearance Space. M. Dwelshauvers-Dery. Translated from the "Revue de Mécanique." A full translation of Prof. Dwelshauvers' paper. Serial. Power—Jan., 1898.

Experiments on the Compression of Steam in the Clearance Space (Expériences sur la Compression de la Vapeur dans l'Espace Mort). M. Dwelshauvers-Dery. A very important paper showing the causes for the inability of compression to prevent the losses due to excessive clearance. 8000 w. Rev de Mécanique—Oct., 1897.

A Defense of the Practical Theory of the Steam Engine (Défense de la Théorie Pratique de la Machine à Vapeur). V. Dwelshauvers-Dery. A general examination of the analysis of Hirn, as sustaining the author's experiments on the wastefulness of compression. 6000 w. Revue de Mécanique—Jan., 1899.

Experiments on the Compression of Steam in the Clearance Space. M. Dwelshauvers-Dery. Report of experiments demonstrating not only that compression is not detrimental, but that it is indispensable for the attainment of maximum efficiency. 7000 w. Jour Am Soc of Naval Engs—Aug., 1898.

Experiments upon the Economy of Cylinder Compression in Condensing and Non-Condensing Engines (Expériences faites, Sans et Avec Condensation, sur l'Economie de la Compression dans l'Espace Mort). V. Dwelshauvers-Dery. A long illustrated article with many tables of test data. The conclusion drawn is that, for either form of engine, each point of cut-off has a corresponding best degree of compression. 12000 w. Rev Uni de Mines—Oct., 1898.

The Compression of Steam in the Clearance Space (Sur la Compression de la Vapeur dans l'Espace Mort). Dwelshauvers-Dery. An account of the author's further tests upon the experimental engine at the University of Liége, together with a reply to the recent comments of Prof. Boulvin. 10000 w. Rev de Mécanique—Aug., 1898.

The Compression of Steam in the Clearance Space (Sur la Compression de la Vapeur dans l'Espace Mort). H. Hubert. A discussion of Prof. Dwelshauvers-Dery's investigations into the losses due to condensation during compression. 3500 w. Rev Universelle des Mines—Jan., 1898.

The Compression of Steam in the Clearance Space (La Compression de la Vapeur dans l'Espace Mort). J. Boulvin. A critical review of the experiments of Prof. Dwelshauvers Dery, showing that the losses charged to compression of the exhaust steam are those inevitably due to the action of the cylinder walls. The entropy diagram is applied in an instructive manner. 7000 w. Rev de Mécanique—June, 1898.

The Compression of Steam in the Clearance Space (La Compression de la Vapeur dans l'Espace Mort). L. Anspach. A general review of the discussion between Professors Dwelshauvers-Dery and Boulvin, showing the correctness of the conclusions of the former, but urging the necessity of further experiments. 7500 w. Rev de Mécanique—Jan., 1899.

On the Compression of Steam in Engines. Is it Economical in Practice? Gives a report of Belgian, American and German experiments, with the conclusion that a certain amount of compression is desirable and economical. 3000 w. Engr, Lond—Nov. 25, 1898.

I. Regarding Effect of Compression in Steam Cylinders on Economy. B. C. Ball. II. On the Compression of Back-Pressure Steam Into the Water Space of Cylinders. B. F. Isherwood. A criticism of reported tests, and a reply. 5000 w. Jour Am Soc of Nav Engs—Aug. 1, 1900.

The Influence of Compression in Cylinder Clearance Space Upon Steam Consumption per I. H. P. Extracts from notes by B. F. Isherwood and Prof. Dwelshauvers-Dery. 2000 w. Jour Am Soc of Nav Engs—May, 1900.

**Connecting Mechanism.**—Diagrams of Piston Position, Velocity and Acceleration. Part first considers the mechanism of the steam engine, crank and connecting rod, piston position: exact formulae. Mathematical discussion. Serial. Prac Eng—June 25, 1897.

See also **MECHANICAL CONNECTIONS; VALVE GEAR.**

**Consumption.**—See **STEAM CONSUMPTION.**

**Coupling.**—Theory of Coupling and Connecting Rods. Ivanhoff Veder. Considers the case in relation to slow-running and also high-speed engines. Serial. Prac Eng—May 21, 1897.

**Crank Position.**—Finding the Position of the Crank when the Position of the Piston or Cross-Head is Given. Michele Ferrero. Gives a solution of this problem. 500 w. Am Mach—Aug. 17, 1899.

**Crank Shaft Speed Variations.**—Speed Variations in Crank Shafts. George P. Starkweather. Gives a method of discussing engine dynamics which is quite exact. 1500 w. Jour Fr Inst—Feb., 1897.

**Cushion vs. Compression.**—Cushion vs. Compression. W. H. Wakeman. A brief review of the meaning of the terms is given, pointing out the way to tell the difference on an indicator diagram, and discussion of the subject. 2500 w. Engr, Cleveland, O.—Oct. 1, 1898.

**Cut-Off.**—How to Find the Point of Cut-Off. Mathematical and graphic methods both given, and the superiority of the graphic demonstrated. 900 w. Power—May, 1896.

Most Economical Cut-Off. From advance sheets of Buckeye Engine Company's catalogue. Gives results of experiments of Professor Denton. 700 w. Am Mach—Aug. 5, 1897.

See also **VALVE GEAR.**

**Cut-Off and Compression.**—The Most Economical Cut-Off for Steam Compression. Henry T. Eddy. Abstract of a paper read before the Am. Assn. for the Advancement of Science. The conclusion is reached that for maximum economy the cut-off must be such that the ratios of expansion and of compression shall be equal. 900 w. Elec Wld—Sept. 26, 1896.

**Cut-Off, Early.**—Steam Distribution at Early Cut-Off. E. J. Armstrong. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

**Cylinder Condensation.**—See **CYLINDER CONDENSATION.**

**Cylinder Ratios.**—See **STEAM ENGINE.**

**Drop.**—Drop in Multiple Expansion Engines. Editorial discussion of a paper by B. L. Weighton, read before the Northeast Coast Inst. of Engs. and Shipbuilders. 2200 w. Engr, Lond—Jan. 26, 1900.

Receiver and Condenser Drop. A. C. Elliott. The belief that "drop" dries steam is declared to be an ancient superstition. Deals with the subject mathematically and thermodynamically. 1600 w. Engng—Jan. 17, 1896.

Receiver Drop in Multiple Expansion Engines. R. L. Weighton. Explains results obtained from recent trials on experimental engines at the College of Science, Newcastle-upon-Tyne, made to determine the most economical point of steam cut-off. Also discussion. 8500 w. Trans N E Coast Inst of Engs & Shipbuilders—April, 1900.

Steam Expansion Drop. A review and criticsm of A. C. Elliott's paper upon Steam Expansion Drop, read before the meeting of the British Assn., at Ipswich. The ground is taken that the clear enunciation of the limit of expansion made, in ordinary language, by Prof. Elliott, is observed rather than rendered clearer, by the mathematical analyses which follows and supports the statement. Serial. Engng—Dec. 6, 1895.

**Economic.**—Economic Steam Raising and Utilisation. Arthur Heischmann. A discussion of the questions affecting the efficiency of boilers and engines, the systems in use, and the advantages of superheated steam. 2800 w. Mach, N. Y.—May, 1897.

**Economy.**—Economy in the Generation and Use of Steam. W. H. Wakeman. Calls attention to some things that might be done better than they usually are, and suggests some changes. 1400 w. Mach, N. Y.—Sept., 1897.

Steam Economies. W. H. Booth. General discussion of the subject. 1800 w. Mach—Dec., 1896.

**Elbows and Valves Drop.**—Drop of Steam Pressure in Elbows and Valves. E. C. Sickles. Gives results deduced from recent experiments, compare with the values commonly used to determine the drop in steam pressure for elbows and valves. 800 w. Sib Jour of Engng—March, 1898.

**Expansion.**—Use of Expansion in Winding Engines. M. Berne. From a communication to the Société de l'Industrie Minerale, St. Etienne. The advantages and results in the use of expansion are given. 8500 w. Col Guard—Dec. 4, 1896.

**Expansion Ratio.**—Economy as Effected by Expansion. C. H. Brustlein. Showing the effect of the variation of the ratio of expansion, upon the ideal engine, and the modifications introduced by the imperfections of the real engine. 2000 w. Sib Jour of Engng—April, 1899.

**Fallacies.**—Some Common Fallacies with Regard to Steam and the Steam Engine, and the Lessons They Teach. Calls attention to a few fallacies, some of which are a source of danger to the inexperienced. 1500 w. Ind & Ir—Nov. 27, 1896.

**Heat-Absorption of Water.**—Experiments on the Heat Absorption of Water. An account of experiments carried out by Mr. G. Halliday in the Inst. of Marine Engs. (England), to ascertain the heat-absorptive power of water at different temperatures and different ratio of velocity across the surfaces. 1500 w. Engr, Lond—May 12, 1899.

**Heat Cycle.**—A Complete Heat Cycle for the Steam Boiler and Engine. L. C. Auldjo. Read before the Engng. Assn., of New South Wales. Describes tests made and gives results brought about by the use of this heat cycle. 2500 w. Ind & Ir—Dec. 29, 1899.

**Heat Transmission.**—See **HEAT TRANSMISSION.**

**High-Pressures.**—High Steam Pressures on Sea-Going Ships and in General. Dr. R. H. Thurston. Reviews the advance in pressures and expansion in part first. Serial. Marine Engng—April, 1897.

The Promise and Potency of High-Pressure Steam. R. H. Thurston. Read at N. Y. meeting of the A. S. M. E., in Dec., 1896. A study of high-pressure steam in the saturated state. The facts are in part deduced from a triple-expansion and a quadruple-expansion high-pressure engine used experimentally at Sibley College. Serial. Ind & Ir—Jan. 8, 1897.

Some of the Practical Difficulties of the Higher Pressures. E. Richards. Reviews some of the difficulties that have had to be met by modern engineers, and details that require attention before future advance may be expected. 3300 w. Prac Eng—Feb. 25, 1898.

See also **STEAM FITTING.**

**Hinge Bolts.**—The Use of Hinge Bolts on Movable Covers (Boulons à Charnière des Obturateurs Amovibles). MM. Polonceau and Walckenaer. Reviewing a large number of accidents which have occurred from the use of hinged bolts to secure covers upon vessels containing steam under pressure. Illustrations of many cases are given. 10000 w. Ann des Ponts et Chaussées—1 Trimestre, 1898.

**Holly Gravity Return System.**—The Holly Gravity Return System. Illustrates and describes the recent installation in the Twenty-sixth St. power station of the Edison Electric Illuminating Co., of New York. 1700 w. Sci Am—Aug. 20, 1898.

**Horse-Power.**—A Method of Determining the I. H. P. of an Engine Under Varying Load. W. H. Macgregor and R. T. Kingsford. Investigation of the power required to operate an Otis electric elevator, with diagrams. 1000 w. Power—Oct., 1896.

**Improvements.**—The Improvement and Development of Boilers and Steam Engines. Thomas Begrie. Abstract of a paper read before the Mech. Engs. Assn., Johannesburg. A discussion of recent improvements and their results. 3000 w. Ir & Coal Trds Rev—Nov. 3, 1899.

**Indicator Diagrams.**—See also **INDICATOR DIAGRAM; STEAM CONSUMPTION.**

**Indicator Diagrams Combined.**—The Application of Combined Diagrams in the Design of Compound Engines (Die Mittel zur Erzielung des Gewünschten Diagramm-Verlaufes bei der Konstruktion des Diagramms einer Verbunddampfmaschine). H. Lynen. Showing the method of applying the combination of ideal indicator diagrams to the proportioning of compound engines. 4500 w. Zeitschr d Ver Deutscher Ing—April 29, 1899.

**Leakage.**—See **STEAM ENGINE TEST.**

**Locomotives.**—Steam-Pressure, Throttling and Expansion. Editorial discussion with suggestions as to superheating and use of higher steam-pressures. 1700 w. Am Eng & R R Jour—Nov., 1897.

See also **LOCOMOTIVE BOILER—Steam Pressure.**

**Loop.**—The Steam Loop. Its use, the principles upon which it acts, etc. 1300 w. San Plumb—March 15, 1897.

The Steam Loop. James Mackay. Illustrated description of this device and its operation. 1000 w. Dom Engng—Sept., 1898.

**Loop Losses.**—Loop Losses in Compound Engines.

Charles M. Jones. A demonstration that looping between the cylinders of a multi-expansion engine not only involves a loss of power, but that the loop area is not a criterion of this loss. The true measure of the loss is also explained. 1100 w. Elec Engng—May, 1896.

**Losses.**—See also Loop Losses; **STEAM ENGINE; STEAM PLANT.**

**Neutral and Reverse Compounding.**—Neutral and Reverse Compounding. Charles M. Jones. Showing that cylinders of equal volume may be compounded in single series, and that engines may be constructed in which the higher pressured cylinders are of greater volume than the cylinders which they supply with steam. 1200 w. Eng—Dec. 19, 1896.

**Pressure Graphics.**—Direct Graphic Determination of Initial, Terminal, and Cut-Off Pressures, in the Trailing Cylinders of Multi-Expansion Engines Having Fixed Cut-Offs. Charles M. Jones. Full description of method with diagrams. 2700 w. Elec Engng—June, 1896.

**Regenerating Exhaust.**—"Regenerating" Exhaust Steam. A criticism of an apparatus recently patented by Hugh J. Barron, which it claims is "a worthless patent for a worse than worthless device." 2300 w. Eng News—March 2, 1899.

**Reheaters.**—Reheaters in Multiple Cylinder Engines. R. H. Thurston. A review of what is already known of this subject, and conclusions. 5200 w. Trans Am Soc of Mech Engs, No. 856—May, 1900.

**Separator.**—The Steam Separator. Some of its advantages and where it should be placed. 1200 w. Bos Jour of Com—Feb. 6, 1897.

**Separator Test.**—Test of a Steam Separator. F. L. Emory. Record of a test of a baffle-plate pattern separator designed to serve as a live-steam separator, as an exhaust-steam separator or trap, and as an oil extractor. 1300 w. Trans Am Soc of Mech Engs—May, 1899.

**Steam Jet Condensation.**—On the Rate of Condensation in the Steam Jet. A. de Forest Palmer, Jr. Illustrated description of apparatus, method employed, and results attained in an experimental investigation of the subject named. 2500 w. Am Jour of Sci—Oct., 1896.

**Superheated Steam.**—See **SUPERHEATED STEAM.**

**Traps.**—See **STEAM TRAPS.**

**United States.**—American Engines and Power Plants (Amerikanische Maschinen und Maschinenanlagen). C. Regenbogen. The first of a series of articles based upon a recent tour in the United States. This installment is devoted to the pumping machinery of the Cambridge waterworks. 3000 w. Zeitschr d Ver Deutscher Ing—Sept. 23, 1899.

**Vacuum.**—High Vacuum in Condensing Engines. Editorial discussion concluding that in an engine which has tight valves and pistons, and is provided with condensing apparatus and air pump suitably designed for the work, the higher the vacuum the better will be the economy. 700 w. Eng Rec—Aug. 6, 1898.

**Valve Gear.**—See **VALVE GEAR.**

**Wiredrawing.**—See **WIREDRAWING.**

### STEAM ENGINE EXHIBITION.

See **ELECTRIC STATION**—Paris Exposition; **POWER PLANT**—Paris Exposition; **STEAM ENGINE**—Geneva; Nuremberg; Paris; Stuttgart; **STEAM PLANT**—Leipzig.

### STEAM ENGINE FRAME.

**Machining.**—Two Ways of Machining an Engine Frame. B. W. T. Illustrates and describes the methods. 1800 w. Am Mach—March 29, 1900.

**Rigidity.**—The Rigidity of Vertical Engi· (Die Standfestigkeit der Stehenden Dampfmaschinen). P. Straube. With drawings of numerous forms of framing for vertical engines, comparing their respective advantages. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 21, 1899.

**Strengthening.**—Strengthening an Engine Frame. Charles A. Hague. Illustrates and describes repairs to a vertical steam engine which was threatened with serious breakdown. 1600 w. Am Mach—Sept. 22, 1898.

### STEAM ENGINE MANUFACTURE.

See also **ENGINE WORKS; STEAM ENGINE.**

### STEAM ENGINE TEST.

See also **STEAM ENGINE; STEAM ENGINEERING; STEAM PLANT.**

Determination of the Fundamental Data of a Steam Engine Test (Detérmination des Données Fondamentales dans un Essai de Machine à Vapeur). M. Dwelshauvers-Dery. Giving instructions as to the application of Hirn's analysis to a steam engine test, including all the necessary data for the computation of the heat exchanges. An important contribution to the science of steam engineering. Three articles. 22000 w. Rev de Mécanique—Jan., March, May, 1897.

Engine and Boiler Testing. Henry W. Spangler. On the value of commercial testing and the methods of making the tests. The subject is discussed in detail. 6300 w. Pro of Engs' Club of Phila—Jan., 1899.

Engine Tests. George H. Barrus. Describes methods of measuring feed water, indicating, and the general scheme of a feed-water test. Serial. Eng Rec—Feb. 17, 1900.

Testing Engines. A consideration of the practical points. 2200 w. Bos Jour of Com—Oct. 16, 1897.

**Cooper-Corliss.**—Test of a Cooper-Corliss Engine at Various Loads. Illustrated report of the efficiency of 1000 h. p. compound condensing engine under the variable duty of electric railway service. 1300 w. Eng Rec—Nov. 18, 1899.

**Donkin.**—Steam Engine Experiments. Bryan Donkin. Results of seven steam engine experiments. A brief summary of the trials. 800 w. Engng—April 9, 1897.

**Durham College, Eng.**—The Experimental Engines at the Durham College of Science, Newcastle-upon-Tyne, with Some Results from Same. R. I. Weighton. Part first comprises a description of the engines and their accessories, with illustrations; also editorial. Serial. Eng, Lond—Jan. 22, 1897.

**Grosvenordale, Conn.**—See Jackets; **STEAM PLANT.**

**Hood Rubber Co.**—See **STEAM PLANT.**

**Horisontal Compound Tandem.**—Trials of a Horisontal Compound Tandem Engine. From Mr. Longridge's report to the Engine, Boiler, and Employers' Liability Assn., 1896. Describes the engine and boiler, giving the measurement of feed water and indicator diagrams, with remarks upon the trials. 1800 w. Prac Eng—Oct. 15, 1897.

**Jackets.**—Test of Grosvenordale Compound Engine With and Without Jackets. G. H. Barrus. An elaborate article showing action of jackets. 1500 w. Eng Rec—April 16, 1898.

**Leakage.**—Leakage Tests of Valves and Pistons. From advance proofs of a book on "Engine Tests," by George H. Barrus. The importance of such tests and the methods of making them are discussed. 1600 w. Eng Rec—Aug. 21, 1897.

**Luisenstrasse, Berlin.**—See **STEAM ENGINE.**

**Raworth.**—See **STEAM ENGINE.**

**Rules.**—See Standard.

**Standard.**—Extension of the Standard Uniform Methods of Conducting and Reporting Steam-Engine Tests. Bryan Donkin. Suggestions bearing on this subject. 2000 w. Am Soc of Mech Engs, No. 774—June, 1898.

Plea for a Standard Method of Conducting Engine Tests. George H. Barrus. Presents the need of devising a method for making engine-tests in general, offering suggestions. 2000 w. Am Soc of Mech Engs, No. 778—June, 1898.

Standard Rules for Testing Steam Boilers and Engines (Normen für Leistungsversuche an Dampfkesseln und Dampfmaschinen). Specifications adopted by the Verein Deutscher Ingenieure and the Verein Deutscher Maschinenbauanstalten, and under consideration by the International Association of Steam Boiler Inspectors. 3000 w. Zeitschr d Ver Deutscher Ing—April 7, 1900.

The Rating of Steam Engines by Their Steam Consumption (Die Beurteilung der Dampfmaschine hinsichtlich ihres Dampfverbrauches). E. Meyer. Review and explanation of the rules recently adopted by the Verein Deutscher Ingenieure, etc.; and the full report of the Institution of Civil Engineers' Committee on Rules for Determining the Utilization of Heat in Steam Engines. Serial. Zeitschr d Ver Deutscher Ing—April 28, 1900.

**Sulser.**—Tests of Three Sulser Engines. Hamilton A. Hill. Reports of three tests of large mill engines, built by Messrs. Sulser Bros., Winterthur (Switzerland), which show unusually fine results. Ill. 2400 w. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

See also **SUPERHEATED STEAM**—Schwoerer.

**STEAM ENGINE WORKS.**

See **ENGINE WORKS.**

**STEAM FITTING.**

See also **STEAM HEATING; STEAM PIPE.**

Steam Fitting. James F. Hobart. Part first discusses the handling of pipe, straightening of bent pipe, cutting off, etc. Ill. Serial. Dom Engng—Aug., 1897.

**STEAM FLOW.**

See **STEAM—Flow.**

**STEAM GAUGE.**

See **PRESSURE GAUGE.**

**STEAM GENERATION.**

See also **BOILER; COMBUSTION; FUEL; MECHANICAL DRAFT; STEAM ENGINE; STEAM ENGINEERING; STEAM POWER.**

Some Notes on Steam Raising. Frank Leslie Watson. Read before the Association of Yorkshire students of the Institution of Civil Engineering. Part first introduces the advantages of forced draught. Ill. Serial. Elec Rev, Lond—Feb. 26, 1897.

Practical Theory of Steam Making from Shovel to Stop-Valve. Winthrop Thayer. Abstract of a paper read before the N. E. Cotton Mfrs. meeting. Directions for securing perfect combustion and intense heat. Advocating forced draught. 2300 w. Lord's Mag—Nov., 1896.

Steam Making. Winthrop Thayer. Paper read at meeting of New England Cotton Mfrs. Assn. The writer gives his views of the essentials of economical steam making. 3000 w. Bos Jour of Com—Oct. 3, 1896.

The Generation of Steam. Two papers by John F. Snell and J. J. Steinitz, with discussion, as presented at the convention of the Municipal Electrical Assn., at Manchester, Eng. The first writer discusses the types of boilers in use, with details; the second writer considers the type of boiler, fuel, water, stoking, and boiler adjuncts. 8800 w. Elec Eng, Lond—July 2, 1897.

**Coal Mines, Pa.**—The Generation and Utilization of Steam by the Lykens Valley Coal Company and Summit Branch Coal Company, Dauphin County, Pa. R. Van A. Norris. Report of investigations made for the purpose of discovering and remedying a large discrepancy in the amount of coal used for firing at two collieries. Illustrations, maps, and tables are given. 5000 w. Trans Am Soc of Mech Engs, No. 796—Nov., 1898.

**Cost.**—The Cost of Steam Raising. John Holliday. Read before the Inst. of Elec. Engs., England. Discusses the cost of producing steam without reference to the production of power, considering the different items. 5800 w. Elec Eng, Lond—Nov. 24, 1899.

**Economy.**—Economy of Steam Production. A. L. Harrison. Considers the boiler and appurtenances, and boiler-room practice. 1700 w. Am Elect'n—Jan., 1899.

The Economical Generation of Steam Power. B. A. Tapp. Considers some of the recent devices for improving the efficiency. Serial. Elec Eng, Lond—Jan. 5, 1900.

**Gas Works.**—Steam. W. E. McKay. Read before the New England Assn. of Gas Engs. On the cheap generation of steam. Discussion. 2000 w. Am Gas Lgt Jour—March 13, 1899.

See also **GAS MANUFACTURE—Steam Raising.**

**STEAM HAMMER.**

See also **HAMMER.**

Steam Hammers—Past and Present. Illustrated description of old forms and new, showing the great progress made in this century. 2000 w. Ir & Coal Trds Rev—Feb. 11, 1898.

**German and American.**—Variation in Steam Hammer Design and Cost—German and American. Henry Hess. Shows graphically various relations, and compares designs and costs. 600 w. Am Mach—July 12, 1900.

**Piston Rod. Bethlehem.**—See **PISTON ROD—Steam Hammer.**

**STEAM HEATING.**

See also **HEATING; HEATING AND VENTILATION; MECHANICAL PLANT.**

Experiments upon High and Low Pressure Steam Heating (Beobachtungen an einer Centralheizung mit Niederdruck Abdampf und Dampf von 2 Atm. Ueberdruck). With a total heating surface of 1405 square metres, steam at 30 pounds gave 740 calories per square metre per hour, and steam at 3.5 lbs., 460 calories. Full details of the test are given. 4500 w. Oesterr Monatschr f d Oeffent Baudienst—March, 1897.

Good and Bad Practice in Steam Heating. W. H. Wakeman. Discusses some points in the heating with exhaust steam. 900 w. Am Mach—Dec. 21, 1899.

Hints on Steam Heating. M. O. Kasson. Calls attention to loss of heat from position of radiators, or from covering tops of radiators, and various other practices. 2400 w. Sta Eng—May, 1897.

Some Points on Steam Heating. F. A. Camp. From a paper read before the Minnesota Archt. Assn. Explains what steam is and how made, the importance of a good draft, and of a good circulation. 1800 w. San Plumb—May 1, 1897.

Steam Heating. An illustrated essay copied from the catalogue of a well-known firm of heating engineers. It gives directions for estimating the heating surface required in radiators, and general instructions for piping. 1400 w. Heat & Ven—Dec. 15, 1895.

Systems and Apparatus for Heating Buildings by Steam. J. J. Blackmore. An exposition of the principles governing the design of an economical plant, reviewing the three distinct systems and the conditions under which they are applicable. 3500 w. Eng Mag—April, 1898.

**Air Pump and Ejector.**—Air Pump and Ejector in Steam Heating. G. W. Scott. Relative efficiency and economy of these devices. 1300 w. Ir Trd Rev—March 12, 1896.

**Appraisers' Stores, N. Y.**—Heating of the U. S. Appraisers' Warehouse. Illustrated description of a direct-radiation plant using the vacuum return system. 1500 w. Eng Rec—Jan. 21, 1899.

**Boiler.**—Boiler Progress. H. J. Barron. Inquiry with view of finding out which is the most practical type for ordinary steam-heating at pressures under fifteen pounds, from the contractor's standpoint. 3000 w. Dom Engng—Jan., 1897.

The Relation that Should Exist Between the Steam and Water Ratings of House Heating Boilers. A. C. Mott. Read at semi-annual meeting of the Am. Soc. of Heating and Ventilating Engs. A discussion of the subject with the aim of drawing out valuable discussion. 2000 w. Heat & Ven—June 15, 1897.

See also **HEATING; HOT WATER.**

**Central Plant.**—Central Heating Stations. Alton D. Adams. Information concerning heating systems for detached buildings, and for public supply. 2400 w. Munic Engng—June, 1900.

Central Station Heating System at Fredonia, N. Y. Illustrated description of the heating of a number of buildings from the engines of the electric railway plant, using the exhaust steam, and in extreme weather by live steam injected from same plant. 1200 w. Heat & Ven—May 15, 1897.

Heating Two Blocks of Flat Houses from One Boiler Plant. Description with plans. 700 w. Eng Rec—Jan. 11, 1896.

Warming Office Buildings and Residences from Central Plants. Notes concerning the design and management of the Harrisburg (Pa.) Steam Heat and Power Co., describing the distribution of steam for the warming of neighboring buildings from a central plant. 1100 w. Eng Rec—Jan. 23, 1897.

See also **Conduit; Dartmouth College; East Cambridge; Exhaust; Indiana University; Kansas University; New York Co.'s Plant; Paris Exposition; Wisconsin University.**

**Circulation.**—Circulation of Steam for Heating Purposes at or below the Pressure of the Atmosphere. Reginald Pelham Bolton. A study of the internal conditions of steam circulation and heating, with a statement of the requirements for effective steam heating systems. 4300 w. Dom Engng—June, 1897.

Some Experiments in Steam Circulation. John Gormly. Describes the peculiar behavior of the water-line, investigations to ascertain the cause, and final remedy. 1000 w. Trans Am Soc of Heat & Ven Engs—Jan., 1898.

See also **BOILER; WATER-TUBE BOILER.**

**Circulation in Pipes.**—The Circulation of Steam in Pipes (Circulation de la Vapeur dans les Tuyaux). A paper by M. Horsin-Déon, showing that vapors circulating in pipes do not readily mingle, but flow in layers or concentric masses. 1200 w. Moniteur Industriel—Nov. 20, 1897.

**College.**—A Complex Job of Steam Heating. Reprinted from the "Plumbers' Trade Journal." Describes a complicated job of steam fitting wherein a new set of appliances was joined to an old one in a college building. 500 w. San Plumb—Dec. 1, 1895.

See also **Dartmouth; Indiana; Kansas; Wisconsin.**

**Condensation Water.**—Pipes for Water of Condensation in Low-Pressure Steam Heating Apparatus (Die Kondenswasserableitung bei Niederdruck Dampfheizungen). With computations for the amount of water discharged, and the methods of providing for its return or removal. 2500 w. Gesundheits Ingenieur—Feb. 28, 1900.

The Removal of Condensation Water in Low Pressure Steam Heaters (Die Kondenswasserableitung bei Niederdruck-Dampfheizungen). An illustrated general account, with particular description of the Poensgen apparatus. 800 w. Gesundheits Ingenieur—April 30, 1900.

**Conduits.**—Steam Pipe Conduits and the Distribution of Steam to Scattered Buildings. An editorial discussion of the best types of construction with an accompanying illustrated article on the system at Dartmouth College. 2100 w. Eng Rec—July 8, 1899.

**Country Residence.**—Heating a Country House. Describes the system in use at the residence of W. S. Opdyke, at Alpine, N. J. It is a combination or direct and indirect steam heating, a part of which is piped on the single-pipe system and a part on the two-pipe system. 1800 w. Met Work—April 2, 1898.

Steam Heating Apparatus in a Country Residence. Illustrated description of the heating arrangements on "Roundtop Farm," the country seat of F. P. Olcott, near Bernardsville, N. J. 600 w. Heat & Ven—Sept. 15, 1897.

**Dartmouth College.**—The Distribution of Steam at Dartmouth College. Illustrated description of the system employed in heating 16 detached buildings from a central station, with details of the special features of the expansion joints and devices. Also gives results of a boiler test. 2500 w. Eng Rec—March 31, 1900.

**Defective Drainage.**—Defective Drainage in Steam Pipes and Its Results. Calls attention to facts which show the intense strain to which pipes are subjected where water is allowed to rest in them. 1000 w. San Plumb—April 15, 1897.

**Defective Plants.**—Defective Steam Heating Plants. W. H. Wakeman calls attention to some defects which cause steam plants used for heating purposes to work in an unsatisfactory manner. 1400 w. Heat and Ven—March 15, 1897.

Defective Steam Heating Plants. W. H. Wakeman. Calls attention to some of the defects that cause a steam plant to work in an unsatisfactory manner. 1500 w. Mach—Feb., 1897.

**Drop System.**—The Drop System of Steam Heating. Thomas Barwick. Advantages of the system for many buildings are urged and examples of its application cited. 2000 w. Heat & Ven—March 15, 1896.

**East Cambridge, Mass.**—Some Interesting Details of a Heating Plant. Illustrated description of the plant for heating a number of large detached buildings at East Cambridge, Mass.; the central station consists of two engine houses and a boiler plant, all in detached buildings. 1000 w. Eng Rec—Oct. 14, 1899.

**Eggert Regulator.**—Pressure Regulator, on the Eggert System (Druckregler, System Eggert). An illustrated description of a pressure regulator for steam heating plants. 1200 w. Gesundheits Ingenieur—July 15, 1900.

**Exhaust.**—Economy of Heating with Exhaust Steam. Presented in form of questions and answers, with tables and formula for computing per cent. of gain or loss. 900 w. Heat & Ven—May 15, 1896.

Exhaust Steam Central Heating Plant at Erie, Pa. Plans and information in regard to this installation for utilising the exhaust steam of the electric railway and electric lighting stations. 700 w. Heat & Ven—May, 1899.

Heating of the Lord's Court Building. Illustrated description of a system of heating by exhaust steam for a fifteen-story building. 1200 w. Eng Rec—June 6, 1896.

Heating with Exhaust Steam (Ueber Abdampfheizungen). Hermann Fischel. With plans of various installations showing the method of using high-pressure steam in connection with a reducing valve in the same system as exhaust steam, when necessary. 3500 w. Zeitschr d Ver Deutscher Ing—May 6, 1899.

Practical Determination of Mean Pressure. Heating with Exhaust Steam. Discusses when it is economical to use exhaust steam, and methods of determining the point at which economy begins. 900 w. Am Elect'n—July, 1897.

Steam Heating Plants. Norman. Experiences with plants using exhaust steam from elevators. 900 w. Sta Eng—May, 1896.

The Project to Warm Buildings from a Central Station in Providence, R. I. Abstract of a report by J. E. Denton on the relative economy of heating buildings by individual plants and by exhaust steam from a large power station. 3800 w. Eng Rec—Aug. 19, 1899.

Utilization of Exhaust Steam. George L. Thayer. Read before the Northwestern Electrical Assn. Describes the earliest attempts at central station heating, the difficulties met, and improvements made, the different systems, condensation, and related matters. 2000 w. W Elec—July 31, 1897.

Utilization of Exhaust Steam. J. H. Harding. Paper read at convention of the Northwestern Elec. Assn., with discussion. Reports satisfactory heating by the Yaryan system, at La Porte, Ind. 6000 w. Elec, N. Y.—March 8, 1899.

See also **Central Plant; HEATING—Electric Station; STEAM—Exhaust.**

**Fittings, High Pressure.**—Screwed Fittings for High Pressure. Hugh J. Barron. Advocates the manufacture of wrought iron or wrought or cast steel or malleable iron fittings for screwed work for heavy pressures and for all large pipe work except that used for very low pressures. 900 w. Dom Engng—April, 1897.

Screwed Fittings for High Pressure. Hugh J. Barron. Paper read before the Am. Soc. of Heat. and Ven. Engs. A practical paper in which the superiority of forged fittings, over cast fittings is urged. Discussion. 900 w. Heat & Ven—Feb., 1896.

**France.**—Steam Distribution in France Without Pressure in Radiators. Other French Practice. G. Debesson. Brief description of systems of steam distribution, through piping into the radiators, also a combination system using both steam and hot water, and other work. Ill. 1100 w. Heat & Ven—March 15, 1898.

The Application of Low Pressure Steam for the Heating of Dwelling-Houses and Public Buildings in France. An account of the introduction of this system of heating in France. 1100 w. Dom Engng—May, 1898.

**Fredonia, N. Y.**—See **Central Plant.**

**Gravity.**—Gravity Steam Heating Problems. Illustrated description of the method of solving a number of questions which arose during the installation of a plenum system in a British schoolhouse. 1500 w. Eng Rec—May 6, 1899.

**Harrisburg, Pa.**—See **Central Plant.**

**High-Pressure.**—A High-Pressure Steam Plant. F. L. Ray. Some observations on its design and operation. 2700 w. Bos Jour of Com—July 17, 1897.

High-Pressure Heating. Frederick Dye, in "Building World," London. Discusses this method of warming buildings, its advantages and disadvantages. Serial. Dom Eng—April, 1897.

High-Pressure Steam Heating Plants (Hochdruck Dampfheizungsanlagen). H. Menz. Discussing especially the methods and devices for returning the water of condensation back to the boiler in high-pressure steam heating installations. 2500 w. Gesundheits Ingenieur—Oct. 15, 1898.

The Disfavor Shown by Fire Insurance Companies to High-Pressure Heating Apparatus. A. E. Grinrod. Read before the British Inst. of Heat and Ven. Engs. Considers the causes of disfavor and how to remove them. Also discussion. 3000 w. Heat & Ven—Sept., 1899.

The High-Pressure System of Heating in England. Frederick Dye. Explains the system which, in England, is considered for certain purposes to excel all others. 1800 w. Heat & Ven—Dec. 15, 1896.

See also **Fittings.**

**Hospital.**—Distributing Steam for a Michigan Hospital. Part first describes the large steam plant and heating conduits in the Newberry hospital, where there are 11 detached buildings to receive steam and hot water. Ill. Serial. Eng Rec—June 25, 1898.

See also **HEATING; HOSPITAL; MECHANICAL PLANT.**

**Hotel.**—Steam Heating in a Country Hotel. Detailed description with plans. 600 w. Eng Rec—Feb. 29, 1896.

See also **HEATING; HEATING AND VENTILATION; MECHANICAL PLANT.**

**Hotel, Paterson, N. J.**—Steam Heating System in the United States Hotel, Paterson, N. J. Illustrated description. 400 w. Heat & Ven—Aug. 15, 1896.

**Indiana University.**—The Centralized Heating and Power Plant of the Indiana University, Bloomington, Ind. J. D. Hoffman. Illustrated description of the installation of a Webster low-pressure or vacuum system. 800 w. Heat & Ven—March, 1899.

**Kansas University.**—A Plan for Increasing the Capacity of the Steam Heating Plant of the Spooner Library, University of Kansas. Frank E. Ward. Showing how a difficulty in forcing the steam over to the library from the boiler-house was overcome. Ill. 900 w. Kansas Univ Quar—July, 1898.

**Lancrenon.**—See **CAR HEATING—France.**

**Laying Up Plants.**—Laying Up Steam Heating Plants. W. H. Wakeman. Caring for the boilers and appliances which must remain out of use. 800 w. Am Mach—May 6, 1897.

See also **Starting Up.**

**Lord's Court Building, N. Y.**—See **Exhaust.**

**Low-Pressure.**—Circulation of Steam for Heating Purposes at or Below the Pressure of the Atmosphere. Reginald Pelham Bolton. A study of the difficulties and limitations, with description of improved apparatus. Followed by discussion. 7000 w. Heat & Ven—Feb. 15, 1897.

Heating by Steam at or Below Atmospheric Pressure. D. M. Nesbit. Read at meeting of the Inst. of Heat. and Ven. Engs., London. Discusses atmospheric steam heating, exhaust steam, etc. 2800 w. Plumb & Dec—March 1, 1900.

Heating with Steam at or Below Atmospheric Pressure. J. H. Kinealy. Read at Saratoga meeting of the Am. Soc. of Heat. & Ven. Engs. Describes investigations made and conclusions reached. 6500 w. Heat & Ven—July, 1899.

The Advantages of Steam Heating at or Below Atmospheric Pressure. M. O. Kasson. Part of a paper read before the Architects' Club of Chicago. Considers steam circulated by air pressure, explaining the merits, and the methods employed. 2700 w. Met Work—Feb. 18, 1899.

**Machine Shops.**—See **Shops.**

**New York Company's Plant.**—New York Steam Company's Plant. Brief illustrated description. 1200 w. Heat & Ven—June 15, 1897.

**Office Building.**—Steam Heating in a Tall Brooklyn Office Building. Illustrated description of a plant in a 14-story building, which will utilize the exhaust from the power plant for heating purposes. Special consideration was given to the design of the pipe work. 1700 w. Eng Rec—Aug. 4, 1900.

See also **HEATING; HEATING AND VENTILATION; MECHANICAL PLANT.**

**Operation.**—Operating a Steam Heating Plant. W. H. Wakeman. The case of a plant where exhaust steam is used under 1 lb. pressure, in connection with live steam coils, one supplementing the other. 1600 w. Am Mach—Feb. 6, 1896.

**Paris Exposition.**—Steam Heating of the Buildings and Offices of the Administration of the International Exhibition of 1900, Paris. G. Debesson. States the conditions required, and gives illustrated description with costs. 1000 w. Heat & Ven—Dec. 15, 1897.

**Piping.**—Piping for Steam Heating. A discussion by W. H. Bryan and W. S. Monroe on the methods of selecting pipe sizes. 1700 w. Eng Rec—March 17, 1900.

Systems of Piping in Steam Heating. William Mansell. Read before the Toronto Chapter of Architects. Recounts some of the improvements and the general progress in this field. 2700 w. Can Arch—April, 1898.

See also **Circulation; Single Pipe; STEAM PIPE.**

**Polle Air Regulation.**—Low Pressure Steam Heating Apparatus with Air Regulation (Niederdruck Dampfheizung mit Ventil-Luft-Regulierung). The Polle system provides an automatic method of admitting air into the radiators to reduce the temperature when it becomes too high. 1800 w. Gesundheits Ingenieur—Jan. 15, 1898.

**Radiators.**—Comparative Tests of Steam Heating Radiators. Describes and illustrates an important series of experiments upon a comparatively little investigated subject. Describes both method and apparatus and gives tabulated results. 1600 w. Eng News—Dec. 26, 1895.

**Radiators, Hot Blast.**—A New Type of Hot-Blast Radiator. George I. Rockwood. Describes a new type of radiator designed to produce a forced circulation of steam, and chiefly advantageous to use with steam of low or atmospheric pressure. Ill. 2800 w. Trans Am Soc of Heat & Ven Engs—Jan., 1898.

**Railway Station.**—Low Pressure Steam Heating Apparatus, Erie Railroad Passenger Station, Jamestown, N. Y. Plans showing the arrangement of the radiators, and the distribution of the surface in various parts of the building. Ill. 400 w. Heat & Ven—May 15, 1898.

See also **HEATING; HEATING AND VENTILATION; MECHANICAL PLANT; RAILWAY STATION; RAILWAY TERMINAL.**

**School.**—A Low-Pressure Gravity Heating Apparatus in a School House. Illustrated description of a one-pipe steam heating system with gravity return, in a Milwaukee high school. 1800 w. Eng Rec—Dec. 16, 1899.

Heating of the Indian School, Genoa, Neb. Illustrated description of a one-pipe steam heating plant for detached buildings. 1000 w. Eng Rec—June 2, 1900.

Heating of the Roslyn, N. Y., School. Illustrates a small plant on the low-pressure indirect gravity system with sufficient direct radiation to counteract the heat transmitted by the walls and windows. 600 w. Eng Rec—April 30, 1898.

See also **HEATING; HEATING AND VENTILATION.**

**Shops.**—Heating of the Shops of the Westinghouse Machine Company. The exhaust steam from the engines is used to heat the building with a blower and duct system. Illustrated description. 1400 w. Eng Rec—June 26, 1897.

**Single Pipe.**—Single Pipe Low-Pressure Steam Heating Systems. Mark Dean. Discusses the circuit system giving the requirements of the steam mains and branches, with rules, but emphasizing the need of common sense in the engineer to meet the varying conditions. 1400 w. Trans Am Soc of Heat & Ven Engs—Jan., 1898.

**Starting Up.**—Starting Up a Steam Heating Plant. W. H. Wakeman. Calling attention of the inexperienced to points needing examination before the plant is started. 900 w. Am Mach—Sept. 30, 1897.

See also **Laying Up.**

**Tube Diameters.**—Tube Diameters in Low-Pressure Steam Heating (Die Rohrweiten der Niederdruck Dampfheizung). H. Krug. Showing a method of proportioning the tube diameters with regard to the fall of pressure in a low-pressure system. 6000 w. 1 plate. Gesundheits Ingenieur—Sept. 30, 1900.

**Vacuum.**—Pressure Records from a Vacuum Steam Heating System. Data from records of observations of vacuum steam heating plant in a building exposing 28000 sq. ft. of surface to northerly winds. 500 w. Eng News—June 11, 1896.

The "Vacuum" System of Heating. C. C. Dennis. A comparison of the advantages possessed by two different methods of operation of the system. 2200 w. Ir Trd Rev—June 18, 1896.

The Vacuum System of Heating. D. F. Morgan. On the advantages of this system, and the use of the vacuum producing air valve. 1900 w. Met Work—Sept. 16, 1899.

See also **Appraisers' Stores, N. Y.**

**Warehouse.**—See **Appraisers' Stores, N. Y.**

**Wisconsin University.**—The Central Heating Plant of the University of Wisconsin, at Madison, Wis. Storm Bull. Describes the plant, with tests, of interest because of the difficulties overcome. Ill. 7400 w. Trans Am Soc of Mech Engs—May, 1899.

**STEAMING APPARATUS.**

**Purdue University.**—See **GLUING APPARATUS.**

**STEAM JACKETS.**

See also **STEAM ENGINE TEST—Jackets; STEAM PIPE—Covering.**

A Study of the Function of the Steam Jacket (Etude du Role de l'Enveloppe de Vapeur). M. Lefer. A critical analysis of the influence of the jacket on steam economy under various conditions, with indicator diagrams. 6000 w. Bull de la Soc d'Encour—March, 1899.

The Value of the Steam Jacket. Charles T. Porter. The thermal changes and exchanges in steam cylinders are traced, and it is shown that the jacket is an economical appliance. 1500 w. Am Mach—Jan. 30, 1896.

**Locomotive.**—See **LOCOMOTIVE—Steam Jacket.**

**Efficiency.**—The Efficiency of Steam Jackets. An editorial claiming that jacketing is not worth its expense. 700 w. Eng Rec—April 16, 1898.

**Thoroughfare.**—The Thoroughfare Steam Jacket. Charles T. Porter. Reply to a criticism by Mr. W. H. Booth, of views previously expressed by the author, relating to the advantages of steam jacketing. 1100 w. Am Mach—March 19, 1896.

**STEAM LAUNCH.**

See also **LAUNCH; STEAMBOAT; STEAM YACHT.**

**Ambulance Service.**—New Steam Launch for the Ambulance Service of the Metropolitan Asylums Board. Illustrated description of an ambulance boat designed and built for river ambulance service. 1500 w. Ind & Ir—Oct. 9, 1896.

**English Canal.**—Steam Launch "Dragon Fly," for English Canal Inspection. A minute, detailed, illustrated description of a steamboat specially designed for inspection of narrow canals in England. 1600 w. Engr, Lond—Nov. 8, 1895.

**STEAM LOOP.**

See **STEAM ENGINEERING—Loop.**

**STEAM METAL.**

Steam Metal. Erwin S. Sperry, in "The Aluminum World." The name is applied to a copper alloy used in the manufacture of steam goods. Gives results of experiments, considering its composition, strength etc. 1800 w. Foundry—May, 1900.

**STEAM METER.**

See also **STEAM—Flow.**

**Lindenheim.**—Apparatus for Measuring Steam (Dampfmess-Apparate). An illustrated description of the Lindenheim steam meter, in which the induced flow of steam in a nozzle is used to measure the volume passing. 2000 w. Gesundheits Ingenieur—April 15, 1899.

**STEAM MOTOR CAR.**

See **CAR—Steam Motor.**

**STEAM NAVIGATION.**

See also **STEAMBOAT; STEAMSHIP.**

**U. S. History.**—See **MARINE ENGINE.**

**STEAM NAVVY.**

See **STEAM SHOVEL.**

**STEAM PACKING.**

See **PACKING.**

**STEAM PILOT YACHT.**

**Humber.**—See **PILOT BOAT.**

**STEAM PIPE.**

See also **PIPE FITTING; PIPING; STEAM FITTING; STEAM HEATING.**

Remarks on Steam Pipes. J. T. Milton. Abstract of a paper read before the Inst. of Nav. Arch. A consideration of dangers and difficulties to be overcome with results of tests made by the Elmore Copper Co. 2500 w. Elect'n—Dec. 18, 1895.

Steam Pipes. J. T. Milton. Full abstract of a paper read before the British Inst. of Naval Archts. Considers the materials used, their design, the conditions in actual use, etc. Ill. 5000 w. Engs Gas—April, 1899.

Steam Pipe Work. W. S. Huyette. Part first briefly discusses materials and valves. Serial. Heat & Ven—March 15, 1897.

Steam Piping. Review of a paper by J. T. Milton, before the Inst. of Nav. Archts. with discussion. 2300 w. Eng Rec—April 15, 1899.

Steam Pipes. H. de B. Parsons. Discusses the materials, brazing, duplicate system, allowance for expansion, general design, valves, and drips. 4500 w. Stevens Ind—April, 1900.

**Arrangement.**—Neglected Considerations in the Arrangement of Steam Piping. W. Cooper. A careful discussion of the correct proportions of steam piping, showing the causes for loss, and the best methods of meeting them. 3500 w. Eng Mag—Aug., 1898.

**Capacity.**—The Capacity of Pipes to Convey Steam. E. C. Sickles. Describes some experiments made to determine friction of steam in wrought iron pipes, and discusses some of the results obtained. 1800 w. Sib Jour of Engng—Oct., 1897.

See also **STEAM—Flow.**

**Copper.**—Brazed Copper Steam Pipes. Editorial on the accident to the steam pipe of the "Prodano," and the investigations recently made by Prof. Arnold, for the committee of Lloyd's Register of British and Foreign Shipping. 1700 w. Engng—April 15, 1898.

The Failure of Copper Steam Pipes. Remarks of the chief engineer surveyor of Lloyd's Register of the British and Foreign Shipping, respecting Prof. Arnold's report on the exploded steam pipe of the steamship "Prodano." 4800 w. Engr, Lond—April 15, 1898.

The Use of Copper Steam Pipes. Review of latest British investigations. 600 w. Eng Rec—July 30, 1898.

See also **PIPE FLANGE—Tool.**

**Coverings.**—Experimental Determination of the Efficiency of Pipe Coverings. F. G. Gasche. Explains a method of investigation, apparatus used, etc. 3000 w. Power—Dec., 1896.

I. Experimental Determination of the Efficiency of Pipe Coverings. F. G. Gasche. Reprint from "Power" of Dec., 1896. II. The Heat-Insulating Properties of Different Steam Pipe Coverings. Tests made by F. J. Emery and J. H. Godfrey. Also other reported tests. 6500 w. N Y R R Club—Feb. 17, 1898.

Insulation of Steam Pipes by Means of Zinc and Tinplate Jackets. Dr. John Russner. Translated from "Wochenblatt für Papierfabrikation," showing that by a proper arrangement of zinc and sheet jackets a system of steam pipes can be as well protected against loss of heat as with the best insulating material now in use. 1100 w. Power—Dec., 1896.

Condensation in Steam Pipes and Insulating Materials. Dr. John Russner. Translated from "Wochenblatt für Papierfabrikation." A study of the loss of heat from radiation and conduction, and the value of insulation. 2200 w. Power—May, 1897.

The Protection of Steam Heated Surfaces. C. L. Norton. Partial report of uncompleted investigations to determine the efficiency of several kinds of pipe covering, the fire risk of certain methods of insulation, and the gain in economy, etc. 4400 w. Am Soc of Mech Engs, No. 796—June, 1898.

Pipe Covering as an Investment. C. H. Lietse. Calculations of the loss from bare pipes, and of the percentage to be saved by covering. 1500 w. Heat & Ven—June 15, 1897.

The Selection of Steam Pipe Coverings. Editorial on the fallacy of judging the efficiency of coverings by tests of short duration. 800 w. Eng Rec—July 2, 1898.

See also **Underground Covering; LAGGING.**

**Dangers.**—On Some Dangers Attending the Use of Steam Pipes. A. L. Steavenson. Considers thickness of steam pipes, the fact that they may be the cause of fire, water rams, etc. 2000 w. Ir & Coal Trds Rev—June 11, 1897.

**Electric Plants.**—Good and Bad Steam Piping for Electric Lighting Engines in Office Buildings. Deals with the steam piping of an office building where the head room is restricted and the practice of large central stations is impossible. Discusses methods and dangers. 1600 w. Eng Rec—Jan. 2, 1897.

**Electric Power Station.**—Steam Piping for Electric Railway Power Plants. George H. Davis. A discussion of various methods of installation, with their comparative merits. Cuts, and a suggestion of a new system. 4500 w. St Ry Jour—July, 1896.

See also **PIPING.**

**Electric Stations.**—Steam Mains for Electric Supply Stations. R. Summerfield. Discusses the general arrangement, material, joints, expansion, pipe covering, etc. Ill. 1800 w. Engng—March 10, 1899.

See also **PIPING.**

**Explosions.**—Experiments on Steam Pipe Explosions. Condensed account of German experiments carried out at the Royal Dockyard, at Wilhelmshaven, with important deductions. 1500 w. Am Mach—Jan. 2, 1896.

Experiments to Determine the Causes of Steam Pipe Explosions on Board German Naval Vessels. Translated by William Wachsmann. Full account of preparations for, and manner of conducting the tests, with plates, results and conclusions. A valuable paper. 2300 w. Jour Am Soc of Nav Engs—Nov., 1895.

**Flange.**—See **FLANGE; PIPE FLANGE.**

**Flow.**—See **STEAM FLOW.**

**High-Pressure.**—Piping for High-Pressure Steam Power Plants. A description of the various kinds of pipe, fittings, valves and gaskets, with the well-known methods of making joints and some of the advantages and disadvantages of each. 3000 w. Power—Aug., 1897.

**Insulation.**—See **Covering.**

**Jacket.**—See **Covering; STEAM JACKET.**

**Moisture.**—Determining the Moisture in Steam Pipes. D. S. Jacobus. Abstract from a paper in "The Stevens Indicator." Describes a method which has given reliable data, pointing out the advantages over other methods. 1300 w. Eng News—Jan. 27, 1898.

**Pressure Loss.**—Table Showing the Loss of Pressure in Steam Pipes. A. F. Nagle. 250 w. Eng News—Jan. 25, 1900.

The Computation of the Loss of Pressure in Steam Pipes (Die Berechnung der Druckverluste in Dampfleitungen). J. B. Goebel. A mathematical discussion, deriving fundamental equations, and showing their practical application to high and low-pressure steam; with sheet of tables for practical use. Two articles. 1 plate. 4500 w. Gesundheits Ingenieur—July 15, 31, 1898.

**Strengthening.**—Method of Strengthening Copper Steam Pipes Longitudinally. T. Messenger. Read before the Northeast Coast Inst. of Engs. & Shipbuilders, England. Illustrates and describes the system adopted by the writer. 500 w. Marine Engng—Aug., 1899.

**Traps.**—See **STEAM TRAP.**

**Underground Covering.**—Insulating Underground Steam Pipes. Edgar Kidwell. The methods described by R. C. Carpenter, in a previous issue, are criticised as examples of "how not to do it," after which the writer illustrates a method which seems to him more efficient. His method is substantially the use of a wooden box sheathed exteriorly with copper, and having a space to be filled with mineral wool surrounding the pipe, which latter rests on cast-iron supports. 900 w. Eng, Lond—April 10, 1896.

Methods of Insulating Underground Systems of Steam Piping. R. C. Carpenter. Read before the Soc. of Heat. & Ven. Engs. Results of experience, with diagrams showing loss of heat from pipes under different conditions. Discussion. 3500 w. Heat & Ven—Feb., 1896.

**Water Hammer.**—See **WATER HAMMER—Steam Pipe.**

**STEAM PIPING.**

See **PIPING; STEAM PIPE.**

**STEAM PLANT.**

See also **BOILER; ELECTRIC PLANT; MECHANICAL PLANT; POWER PLANT; STEAM GENERATION; STEAM POWER.**

**Auxiliaries.**—Steam Plant Auxiliaries. P. C. Percy. Discusses feed pumps of various types. 1900 w. Am Elect'n—June, 1900.

See also **AUXILIARY ENGINE; PUMP—Feed Water.**

**Coal Breaker.**—Steam Plant at an Anthracite Breaker. H. G. Merrill. Illustrated description of the machinery at South Wilkesbarre breaker of the L. & W. B. Coal Co. 2000 w. Safety V—Dec., 1895.

**Design.**—The Design of Steam Power Plants. Henry C. Meyer, Jr. Introduction to a series of articles on power-plant design, outlining the considerations governing the location of plants, and the methods of purchasing apparatus. Serial. Eng Rec—June 23, 1900.

**Electrical Exposition, N. Y., 1896.**—The Steam Plant of the National Electrical Exposition. A brief illustrated description of a plant especially designed by a committee appointed for the purpose, to be a strictly modern plant, containing only the latest appliances. 900 w. Eng News—April 30, 1896.

**Electric Station.**—The Steam End of an Electric Plant. A. M. Wickens. An inquiry into the working, the efficiency and cost of operating an electrical plant by steam. 2500 w. Can Elec News—June, 1897.

See also **BOILER; ELECTRIC STATION; STEAM ENGINE.**

**Electric Station, Newcastle.**—On the Surface Condensing Plant at the Newcastle and District Company's Electric Light Works, Forth Banks, Newcastle-on-Tyne. William Cross. Read before the Northeast Coast Inst. of Engineers and Shipbuilders. Illustrated detailed description of an interesting installment. 1800 w. Engs' Gas—Dec., 1895.

**Flour Mill.**—Economy of Steam Production. A. L. Harrison. Describes a flour mill plant in the central West, and the means of securing economy. 1300 w. Am Elect'n—Feb., 1899.

**Grosvenordale, Conn.**—An Efficient Steam Plant. An interesting test made by George H. Barrus, at the Grosvenordale Mills, in Connecticut, to determine whether the engine fulfilled the guarantee of its builders, and including a test of the boilers and economizers. 2500 w. Eng Rec—Nov. 20, 1897.

See also **STEAM ENGINE TEST—Jackets.**

**Guaranties.**—See **STEAM ENGINE.**

**High-Pressure.**—The Operation of a High-Pressure Multiple-Expansion Steam Plant. Frederick L. Ray. Discusses the boiler appliances and engine of a steam plant. 4000 w. St Ry Rev—May 15, 1897.

See also **BOILER; STEAM; STEAM ENGINE; STEAM HEATING.**

**Hood Rubber Co.**—Test of Steam Plant of the Hood Rubber Co., East Watertown, Mass. George H. Barrus. Illustrates complete test of engines and boilers. 3000 w. Eng Rec—Feb. 5, 1895.

**Hotel Waldorf-Astoria.**—Steam Plant of the Astoria Hotel. Illustrated description of the 2500 h. p. steam plant for heating and power purposes. 1800 w. Eng Rec—April 16, 1898.

**Improving.**—Improving Old Steam Plants. The possibility of large economy, by substituting up-to-date steam plants in old buildings, for those put in at an earlier date is demonstrated by an example and a statement is given of saving in fuel thereby. 1300 w. Mas St Fitter—May, 1896.

**Increase.**—Selecting Economical Means for Increasing the Power of a Plant. H. H. Kelley. Discusses the means of determinig whether the installing of a new boiler, the purchase of a larger engine or the use of a condenser will prove most economical. 2500 w. Engr, Cleveland, O.—Sept. 15, 1899.

**Installation.**—Essential Principles of Economy in Steam Power Installation. W. Cooper. Showing economy of a well designed steam plant as compared with one which has been installed without due system and judgment. 4000 w. Eng Mag—Nov., 1898.

**Leipzig Exhibition.**—Boilers and Motors at the Saxon-Thuringian Exhibition at Leipzig, 1897 (Dampfkessel und Motoren auf der Sächsisch-Thüringischen Gewerbeausstellung zu Leipzig, 1897). With plans of engine and boiler house, and description of general arrangement, including condensers, feed pumps, and coal-handling plant. Serial. Zeitschr d Ver Deutscher Ing—Oct. 2, 1897.

**Library.**—See also **MECHANICAL PLANT.**

**Library, Boston.**—Boston Public Library and Its Steam Plant. A. J. Guernsey. Brief account of the working equipment, ventilation, lighting, steam plant, boilers, etc. 2200 w. Safety V—Jan., 1897.

**Losses.**—Some Preventable Wastes of Heat in the Generation and Use of Steam. William Kent. A lecture delivered before the Franklin Institute. The subject is well covered but the lecture contains little that is new. 4500 w. Jour Fr Inst—Dec., 1895.

Losses of Heat in a Steam Plant. Gives a diagram reproduced from the report recently issued by a committee of the Institution of Civil Engineers. It was made by Capt. Sankey, and shows the various heat losses in a real and an ideal steam plant. Also a summary of the recommendations of the committee. 3000 w. Eng News—Oct. 20, 1898.

See also **STEAM ENGINE; STEAM ENGINEERING.**

**Management.**—Management of Steam Plants. M. W. Danielsen. The importance of giving attention to small things. 1400 w. Age of St—Dec. 19, 1896.

The Management of Boilers and Steam Plant, Including Details of Steam Pipes and Fittings. A. B. Mountain. Read before the Northern Society of Electrical Engineers, at Manchester, Eng. The author's experience with various types of steam generators is given and consideration of details named. 5500 w. Ind & Ir—Dec. 17, 1897.

The Safe and Economical Management of a Steam Plant. Charles H. Garlick. The question is discussed from the practical side purely. 3500 w. Safety V—Feb., 1896.

**Office Building.**—Steam Plant of the American Surety Company's Building, Broadway, New York. Illustrated detailed description. 1500 w. Power—June, 1896.

See also **ELECTRIC PLANT; MECHANICAL PLANT; POWER PLANT; STEAM HEATING.**

**Oil Refinery.**—See **ELECTRIC DRIVING.**

**Tests.**—Testing Steam Plants. Editorial argument favoring the testing of steam in working condition when operated in the manner which the designer planned, and determined how much coal is required to do the work. 1300 w. Eng Rec—Oct. 17, 1896.

Test of a Four-Cylinder Triple-Expansion Engine and Boilers. A. H. Eldredge. Read before the A. S. M. E. Illustrations of plant indicator diagrams and very full data are presented, the latter in tabulated form. 1400 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

The Economy of the Modern Engine-Room. E. J. Armstrong. Showing the significance and value of duty tests for engines and boilers. 2800 w. Eng Mag—Dec., 1896.

See also **Grosvenordale; Hood Rubber Co.; BOILER TESTS; STEAM ENGINE TEST.**

**Woolen Mills.**—The New Power Plant of the Washington Mills Co., Lawrence, Mass. Illustrated description of the power plant of what is claimed to be the largest woolen mills in the world. 2000 w. Eng News—Nov. 26, 1896.

### STEAM PLOW.

See **PLOW—Steam.**

### STEAM POWER.

See also **STEAM ENGINE; STEAM ENGINEERING; STEAM GENERATION.**

**Cost.**—The Cost of Steam Power. Horatio A. Foster. Describes the methods pursued in testing the plants reported, with tabulated data of results and general information. 7000 w. Trans Am Inst of Elec Engs—June and July, 1897.

Foster on Cost of Steam Power. Discussion of paper by H. A. Foster, read July 28, 1897. 3300 w. Trans Am Inst of Elec Engs—Oct., 1897.

The Cost of Steam Power. Horatio A. Foster. Abstract of paper read before the Am. Inst. of Elec. Engs. Showing that any general statement of the cost of power per horse power per annum is incorrect, and that no such statement is of any value unless for plants employed in similar work under similar conditions. Gives tabulated data of plants tested. 4000 w. St Ry Jour—Aug., .1897.

On Cheap Steam Power. J. S. Raworth. Read before the Northern Soc. of Elec. Engs. A discussion as to whether the cost of steam power can be reduced. 3800 w. Elec Eng, Lond—Nov. 13, 1896.

**Cost Reduction, 1870-1897.**—Reduction in Cost of Steam Power from 1870 to 1897. F. W. Dean. Presents the economics of this period and the actual cost. 4000 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Distribution.**—The District Distribution of Energy. Charles E. Emery. Dealing especially with plants for the distribution of steam. 4100 w. Eng Mag—Oct., 1897.

**Iron and Steel Works.**—The Economical Development and Use of Steam Power in Iron and Steel Works. E. J. Duff. Read before the West of Scotland Iron and Steel Inst. Considers where improvement may be made in the generation and application of steam power. Serial. Ir & St Trds Jour—May 1, 1897.

**Mines.**—Economizing Steam Power at Mines. From an abstract for the Société de l'Industrie Minérale, of a report, published in the "Zeitschrift für das Berg-Hütten und Salinenweseen, by R. Zörner, on the saving he effected in the power required for working the Royal König collieries, near Neunkirchen. 2300 w. Col Guard—Nov. 26, 1897.

### STEAM ROLLER.

**Road.**—Origin and Use of Steam Road Rollers. E. Purnell Hooley. Abstract of paper read before the British Assn. of Munic. and County Engs. Reviews the history and the working and general usefulness. 5000 w. Munic Engng—Aug., 1896.

### STEAM SEPARATOR.

See **STEAM ENGINEERING—Separator.**

### STEAMSHIP.

See also **MARINE ENGINE; MERCHANT MARINE; NAVAL ARCHITECTURE; SHIPBUILDING; STEAMBOAT; STEAM YACHT; TRANSPORTATION—Ocean; WARSHIP;** and specific types of warships.

Merchant Steamers. Dimensional data, etc., of recent American and foreign merchant vessels. 3500 w. Jour Am Soc of Nav Eng—Nov., 1895.

**"Alberta."**—New Channel Steamer. The "Alberta." Illustrated description of a fast English passenger boat, built for night service. 1800 w. Naut Gas—Aug. 16, 1900.

The Twin-Screw Channel Steamer "Alberta." Illustrated description of a steamer especially built for the Paris Exposition traffic between Southampton and Havre. 1600 w. Engng—July 13, 1900.

**"Albertville."**—The New Steamship "Albertville." Description of a vessel built for the line between Antwerp and the River Congo. 1700 w. Steamship—Aug., 1896.

**American Line.**—American Line Ships. Story of their operation in connection with mail subsidies, as told by Clement A. Griscom. 1800 w. Marine Engng—Feb. 9, 1899.

**"Arundel."**—The Newhaven and Dieppe Channel Steamer "Arundel." Illustrations with description of vessel and equipment. 1100 w. Engng—Aug. 17, 1900.

**Atlantic Speed Record.**—The Atlantic Record. Comment on the records of the "Kaiser Wilhelm der Grosse," of the North German Lloyd Co., and the "Deutschland," of the Hamburg-American line, as compared with English vessels. 1700 w. Engr, Lond—Aug. 24, 1900.

See also **History.**

**"Atlas."**—See **Tank.**

**"Avon."**—The Carron Company's T. S. S. "Avon." Illustrated description. 1500 w. Engng—Nov. 19, 1897.

**Ballasting.**—The Ballasting of Steamers. Editorial on a resolution discussed in the House of Lords having for its object the regulation of the ballasting of steamers. The dangers of navigation in ballast are considered. 1700 w. Engr, Lond—Feb. 25, 1898.

The Ballasting of Steamers. Editorial discussion of this subject and the need that something be done to remedy the trouble and lessen the casualties due to this cause. 1700 w. Engr, Lond—March 24, 1899.

See also **BALLAST.**

**Bath, Me.**—First American Steel Tramp Steamship Now Building at Bath, Maine. Illuserated description of a boat designed with great care and much skill. 900 w. Marine Engng—Jan., 1898.

See also **SHIPBUILDING—Maine.**

**"Bavarian."**—The Twin-Screw Steamer "Bavarian" of the Allan Line. Illustration and description of a fine steamer to run between Liverpool and Canadian ports. 1200 w. Engr, Lond—Aug. 25, 1899.

**Belgian Channel.**—The Belgian Steamers of the Ostend-Dover Line (Les Paquebots Belges de la Ligne Ostende-Douvres). D. Bellett. A very fully illustrated account of these fine new Channel steamers; referring especially to the Princess Clementine, of 1540 tons displacement, and of more than 22 knots speed. 3500 w. La Revue Technique—Dec. 25, 1898.

**Boston Towboat Co.**—Steel Freighters "Pleiades" and "Hyades," for the Boston Towboat Co. Illustrated detailed description of vessels designed to carry freight in bulk; such as coal, grain, etc. 1800 w. Marine Engng—Aug., 1900.

**"Briton."**—The Latest Union Liner. Descriptive and illustrated account of the latest addition to the Union Steamship Company's fleet, the twin-screw R. M. S. Briton. 1200 w. Transport—Sept. 30, 1898.

The Union S. S. Co.'s Twin-Screw R. M. S. "Briton." An account of a visit to this steamship, with illustrations and description. 700 w. Steamship—Aug., 1898.

**"Cambria."**—New Vessel for the Holyhead and Dublin Service. Describes a fine vessel built for use of the London and Northwestern Railway Co., recently launched from the Leven Shipyard. 1400 w. Steamship—Sept., 1897.

**Canadian Mail.**—The New Canadian Mail Service. Editorial discussing the probabilities of success, and the choice of designs for vessels. 2000 w. Eng, Lond—July 2, 1897.

**Cargo.**—See **Freight; SHIPBUILDING — Cargo Steamers.**

**"Carinthia."**—See **"Sylvania" and Carinthia."**

**Caspian Sea.**—Taking Steamers by Inland Route to the Caspian Sea. Illustrates the method adopted for taking the twin-screw steamer "Meridian" from St. Petersburg through the Marinski Canal system and down the Volga. 700 w. Engr, Lond —Sept. 22, 1899.

**Castle Line.**—The Latest Additions to the Castle Line to the Cape. Illustrated description of two steamers to be used on the route between England and South Africa. 2500 w. Steamship—Oct., 1898.

See also **Kinfauns Castle.**

**Channel Service.**—The New French Steamers for the Channel Service. Illustrated description of the new high-speed steamers for the Channel service, owned by the Northern Railway of France, with a résumé of the conditions under which this company has obtained the contract for conveying the mails between France and England. 2000 w. Engng—June 24, 1898.

See also **Alberta; Arundel; Belgian; Duke of Cornwall; Roebuck; Zeeland Line; STEAM TURBINE.**

**"Chesapeake."**—New Coastwise Steamers. Illustrated description of the "Chesapeake," just completed for the New York and Baltimore outside line. 1000 w. Naut Gaz—May 17, 1900.

**"Chippewa."**—Fine New Great Lakes Passenger Steamer. Illustration with description of the "Chippewa," built for the Arnold Transit Co. 2000 w. Naut Gaz—Aug. 2, 1900.

**"Clan Macdonald."**—S. S. "Clan Macdonald." Illustrated description of a screw-steamer, the first of four sister "Turret" vessels building for a Glasgow Co. 2200 w. Eng's Gaz—July, 1897.

**Cold Storage.**—U. S. Cold Storage Ship "Glacier." Gives a description of the vessel and its machinery, which takes cargo of frozen meat to Manila. 600 w. Ice & Refrig—July, 1899.

**"Comus."**—New Steamship "Comus." Illustration and description, of the Cromwell liner that went into commission this month, running between New York and New Orleans. 1800 w. Naut Gaz—May 24, 1900.

**Construction.**—See **SHIPBUILDING—Steamship.**

**"Cymric."**—New White Star Freight and Passenger Transatlantic Liner "Cymric." Brief illustrated description of one of the largest freight steamships afloat. 700 w. Marine Engng—April, 1898.

**"Deutschland."**—Additional Particulars of the New Transatlantic Record Breaker "Deutschland." Gives detailed dimensions of the machinery and interesting views of the hull, with other information. 2000 w. Marine Engng—Oct., 1900.

The Express Steamer "Deutschland" (Der Schnelldampfer "Deutschland"). A general description of the vessel, with views of the work of construction in progress, and of the engines erected in the works; also an account of the ceremonies of the launch. 1800 w. Stahl und Eisen—Jan. 15, 1900.

The German Express Steamer "Deutschland" (Der Deutsche Schnelldampfer "Deutschland"). An illustrated general description of this great steamer, of 23,000 tons displacement, 684 feet long and of 23 knots speed. 1300 w. Glaser's Annalen—May 15, 1900.

The Hamburg - American Atlantic Liner "Deutschland." Brief illustrated description. 800 w. Engng—March 23, 1900.

The Hamburg-American Liner "Deutschland." Remarks on recent progress in steamship construction with illustrations and interesting features of the vessel named. 1500 w. Sci Am—Aug. 4, 1900.

See also **MARINE ENGINE.**

**Disinfecting.**—See **DISINFECTION—Ship.**

**"Duke of Cornwall."**—The "Duke of Cornwall." Illustrates and describes this new Channel mail steamer, built for the Fleetwood and Belfast route. 2000 w. Engng—Dec. 16, 1898.

Twin-Screw Steamer "Duke of Cornwall." Illustrated description of the latest vessel added to the fleet in service between England and the North of Ireland. These are all vessels of the highest class, resembling Atlantic liners. 2000 w. Engr, Lond—July 29, 1898.

**Dutch Paddle.**—See **Zeeland Line.**

**"Empress Queen."**—The Largest and Fastest Paddle Steamer in Great Britain. A. J. Sinclair. An exterior and interior view of the new steel paddle steamer "Empress Queen," with description 1300 w. Sci Am—Oct. 23, 1897.

See also **Paddle.**

**Fishing, Europe.**—See **STEAMBOAT.**

**Freight.**—Large Atlantic Cargo Steamers. G. B. Hunter. Read before the Institution of Naval Architects. Discusses some leading features of what the writer considers a typical American freight steamer of the present. Ill. 3000 w. Engng—Aug. 18, 1899.

Recent Developments in Cargo Steamers. Edward William de Rusett. Read before the Engineering Conference of the Inst. of Civ. Engs, England. General notes on British steamers, considering type, size, construction, capacity, cargo, appliances, ballasting, economy of working. 2200 w. Engng—June 16, 1899.

The Designing of Cargo Steamers. Aragh E. Long. Abstract of paper read at the meeting of the North-East Coast Inst. of Engs. & Shipbuilders, at Newcastle-on-Tyne. Considers dimensions, form, and other questions. 2000 w. Steamship—April, 1898.

See also **MARINE ENGINE; SHIPBUILDING.**

**Future Liners.**—The Atlantic Greyhound of the Future. J. H. Biles, in "Cassell's Family Magazine." A review of the increase in speed and a prophecy for the future. 900 w. Safety V—Nov., 1896.

**"German."**—The Union S. S. Co.'s New Steamer "German." Illustrated description of the latest vessel added to the line between England and Africa. 800 w. Steamship—Jan., 1899.

**Germany.**—Great Modern Steamships (Die Riesendampfer der Neuzeit). Oswald Flamm. A descrip-of the development of the large steamers of the last ten years, with illustrations of numerous examples of German vessels, both of the navy and the merchant marine. 3000 w. Stahl und Eisen —Dec. 1, 1899.

See also **SHIPBUILDING.**

**"Glacier."**—See **Cold Storage.**

**Goodrich Line.**—See **Lake Michigan.**

**"Governor Dingley."**—Magnificent Coastwise Steamer. Illustration and description of the new Boston and Portland Propeller. "Governor Dingley." 1300 w. Naut Gaz—May 31, 1900.

**"Great Eastern."**—See **"Oceanic" vs. "Great Eastern."**

**Great Lakes.**—The Ore Carrying Fleet of 1900. Waldon Fawcett. Illustrates and describes the ships that will transport the 20,000,000 tons on the lakes. 1600 w. Am Mfr & Ir Wld—Feb. 1, 1900.

See also **Chippewa; Lafayette; Jessie Spalding; Lake Michigan; Northwest and Northland; Paraguay and Asuncion; Starrucca; Tampico; Wooden; Zenith City; GREAT LAKES; HARBORS—Great Lakes; IRON ORE TRANSPORTATION; STEAMBOAT—Tashmoo.**

**"Grecian."**—New Coast Steamship. Illustration and description of the "Grecian," built for the Boston and Philadelphia route. 2000 w. Naut Gaz—July 12, 1900.

**"Grosser Kurfürst."**—The North German Lloyd Steamer "Grosser Kurfürst" (Der Norddeutsche Lloyddampfer "Grosser Kurfürst"). An illustrated description of this large ocean liner. 800 w. Schiffbau—July 8, 1900.

**"H. B. Plant."**—New Steel Southern Steamer. Illustrated description of the "H. B. Plant," built by the Merrill-Stevens Engng. Co. 2200 w. Naut Gas—April 26, 1900.

**"Helene," Hawaiian Trade.**—Newest American-Built Steamship for Hawaiian Islands Trade. Illustrated description of the "Helene" built by the Union Iron Works of San Francisco, Cal. 800 w. Marine Engng—Nov., 1897.

**History.**—The History of Steamships. A. E. Seaton. A very interesting lecture delivered at a technical school. 1800 w. Prac Eng—Nov. 15, 1895.

Notable Incidents in Early Ocean Steam Navigation. Part first gives a brief account of the first iron steamship, the "Great Britain," how she came to be built, and the disaster that overtook her. Ill. Serial. Engr, Lond—March 16, 1900.

Ocean Sailings. Reviews the record since 1838. 1000 w. Ill Car & Build—Nov. 27, 1896.

Steamship Passages. Comments on the passages of the present year and reviews the progress since the beginning of Victoria's reign. 2000 w. Ill Car & Build—Nov. 27, 1896.

The Place of Our Destination. John E. Sweet. A comparison between a journey just completed, and one made thirty-five years ago is given in part first. 1600 w. Am Mach—June 17, 1897.

The Transatlantic Steamship. Historical development during seventy-five years. 3500 w. Ill. Sci Am—July 25, 1896.

Transatlantic Navigation. R. C. Lanphier. Historical. Beginning with the earliest attempts of steam propulsion, the account is brought down to date. 6500 w. Yale Sci M—Jan., 1896.

See also **New York, 1850; Ocean Liners; Savannah"; FERRYBOAT; STEAMBOAT; WARSHIP—"Fulton."**

**Ice-Breaking.**—See **ICE-BREAKER.**

**"India," P. & O.**—The New P. and O. Steamship "India." History of the Peninsular and Oriental Steam Navigation Company, the oldest and largest shipping concern in existence, followed by an illustrated description of this latest addition to the company's fleet. 4800 w. Eng Lond—Dec. 4, 1896.

**India Relief, "Quito."**—Relief Ship for India's Starving. Illustrates and describes the S. S. "Quito," now en-route to Bombay with 200,000 bushels of corn. 850 w. Marine Engng—June, 1900.

**Irish Channel.**—See **Cambria; Empress Queen.**

**"Ivernia."**—The Cunard Liner "Ivernia." Gives the leading particulars of this new vessel, and compares its size with other large steamships. 1800 w. Engng—Sept. 22, 1899.

The Cunard Liner "Ivernia." Longitudinal section and deck plans, with brief description. 800 w. Engng—Sept. 21, 1900.

See also **MARINE ENGINE.**

**"Ivernia" and "Saxonia."**—Additions to Fleet of the Cunard Line—S. Ss. "Saxonia" and "Ivernia. Illustrated description of vessels for the Boston-Liverpool service. 600 w. Marine Engng—Feb., 1900.

Mammoth Transatlantic Liners. A description of the "Ivernia" and Saxonia," just added to the Cunard fleet. 2000 w. Naut Gaz—June 7, 1900.

**"Jaltra."**—The S. S. "Jaltra." Illustrated detailed description. 1200 w. Eng, Lond—Aug. 14, 1896.

**"Jessie Spalding."**—A Modern Lake Lumber Carrier. An illustrated description of the steel steamer "Jessie Spalding," recently built at West Bay City, Mich. 2000 w. Marine Rev—Nov. 2, 1899.

**"Kaiser Friedrich."**—Concerning the New North German Lloyd Liner "Kaiser Friedrich." Notes some of the dimensions and chief characteristics of this ship, and examines the cause of her failing to make a record on her maiden voyage. 1600 w. Marine Engng—July, 1898.

The Latest North German Lloyd Passenger Steamer. Description of the "Kaiser Friedrich," which has recently made its maiden trip from Bremen to New York. 1000 w. Eng News—June 23, 1898.

The T. S. S. "Kaiser Friedrich." Brief description of a fine vessel, of the North German Lloyd, recently launched in Dantsig. 1100 w. Engng—Oct. 8, 1897.

See also **North German Lloyd; SHIPBUILDING—Germany.**

**"Kaiser Wilhelm der Grosse."**—Steamship "Kaiser Wilhelm der Grosse" (Le Paquebot "Kaiser Wilhelm der Grosse"). M. Hachebet. Illustrated description of the boilers and engines, refrigerating and electric lighting plants, with plate giving two plans and longitudinal section. 6000 w. Génie Civil—Oct. 15, 1898.

The Steamship "Kaiser Wilhelm der Grosse." (Le Paquebot "Kaiser Wilhelm der Grosse"). Illustrated description of the great Atlantic liner, with views of the interior, and data about the growth of the North German Lloyd Company. 3500 w. 1 plate. Génie Civil—Aug. 6, 1898.

The "Kaiser Wilhelm der Grosse." Description, with engravings showing the interior decorations. 1600 w. Engng—Oct. 1, 1897.

Transatlantic Record Breaker "Kaiser Wilhelm der Grosse." Illustrated description of the fine North German Lloyd liner which recently broke the record of the route from Southampton to New York. 1800 w. Marine Engng—Oct., 1897.

"Kaiser Wilhelm der Grosse." A description of the launch of this large vessel, with illustrations. The ship is 648 feet long. 66 feet beam, 43 feet deep. 1500 w. Stahl und Eisen—June 1, 1897.

See also **North German Lloyd.**

**"Kaiserin Maria Theresia."**—The North German Lloyd Liner "Kaiserin Maria Theresia." Illustrated description of the reconstructed steamship, which has had 66 feet of the hull introduced amidships, and been thoroughly overhauled. 900 w. Sci Am—March 31, 1900.

**"Kherson."**—See **CRUISER; MARINE BOILER; MARINE ENGINE.**

**"Kinfauns Castle."**—The "Kinfauns Castle." Describes and illustrates one of the new steamers of the Castle Mail Packets Co., Limited, which will be used in the Cape trade. 2800 w. Engr, Lond—May 19, 1899.

**"König."**—The New German Mail Steamer "König." Illustrated description of a new steamer in service between Hamburg and the German colonies in East Africa. 500 w. Sci Am Sup—March 13, 1897.

**"Lafayette."**—Mammoth Lake Steamer. Illustration and description of the "Lafayette," one of five new 474-ft. vessels for the Carnegie Line. 1100 w. Naut Gaz—Sept. 6, 1900.

**"La Grande Duchesse."**—The New Steamship "La Grande Duchesse." Illustrated description. 1000 w. Eng—Oct. 10, 1896.

The Plant Line Steamship "La Grande Duchesse." Illustrated description of new steamship running between New York and Savannah. 700 w. Eng News—March 25, 1897.

The Steamship "La Grande Duchesse." Illustrated description of a new steamer recently built by the Newport News Shipbuilding and Dry-Dock Company. 1200 w. Eng, Lond—May 21, 1897.

**Lake Michigan.**—For Lake Michigan Service. Illustration and description of new Goodrich Line passenger steamer, with remarks on the attention given to life-saving appliances. 2000 w. Marine Rev—April 12, 1900.

**"Laos."**—The French Passenger Steamer "Laos." An account of the Compagnie des Messageries Maritimes, with description of this new high-class vessel. Ill. Serial. Engng—March 31, 1899.

**Large.**—List of German, English and American Merchant Steamers of over 10,000 Tons (Rundschau. Abmessungen der Dampfer der Deutschen, Englischen und Amerikanischen Handelsmarine). A table giving the principal dimensions of 19 German, 9 English and 3 American merchant steamships of over 10,000 tons. 500 w. Zeitschr d Ver Deutscher Ing—June 2, 1900.

**"La Savoie."**—The Launch of the Ocean Liner "La Savoie" (Le Lancement du Paquebot "la Savoie"). A brief illustrated description of this fine addition to the fleet of the Compagnie Générale Transatlantique. 600 w. Génie Civil—April 7, 1900.

**Lumber Carrier.**—See **"Jessie Spalding."**

**Management.**—The Management of an Ocean Steamship Line. Franklin Matthews. A review of the work of various departments, showing the great executive ability required, the responsibility of those in charge, and many details of the work. 2800 w. Harper's Wk—Jan. 7, 1899.

**Manoeuvring Power.**—The Manoeuvring of Ocean Steamers. Information given by commanders of various vessels in reply to stated questions. 1700 w. Naut Gaz—Jan. 26, 1899.

**"Meridian."**—See **Caspian Sea.**

**Messageries Maritimes.**—See **"Laos."**

**"Moskva."**—T. S. S. "Moskva," for the Russian Volunteer Fleet. Profile and deck plans with description of this twin-screw mail and passenger steamer. 600 w. Engng—May 12, 1899.

**New York-Buenos Ayres.**—Steamship Communication Between New York and Buenos Ayres. Presents the conditions to be considered under existing American law, in establishing a fortnightly fast mail service between these ports. 3000 w. Cons Repts—April 12, 1898.

**New York, 1850.**—Ocean Steamers Plying Out of New York Fifty Years Ago. An illustrated description of the types of ocean steamers in service in 1850. 3000 w. Naut Gaz—July 19, 1900.

**New York-Syria-Egypt.**—Wanted: Direct Steamship Service with Syria and Egypt. Explains the need of direct merchant steamers at regular intervals, in the interest of trade. 1000 w. U S Cons Repts, No. 709—April 20, 1900.

**North German Lloyd.**—The New Twin Screw Express Steamships of the North German Lloyd Company. Illustrated description of the "Kaiser Wilhelm der Grosse," and the "Kaiser Friedrich." 1200 w. Sci Am—June 19, 1897.

**"North West" and "Northland."**—Twin-Screw Steamships "North West" and "Northland." Description of engines with illustrations, showing details. 500 w. Am Mach—Nov. 14, 1895.

**"Oceanic."**—Launch of the "Oceanic." Full details of this vessel and the novel method of launching. Ill. 2500 w. Marine Rev—Jan. 19, 1899.

Magnificent Decorations and Furnishings of the "Oceanic." Interesting views with description. 1500 w. Marine Rev—Oct. 12, 1899.

The "Oceanic." Particulars concerning this vessel. It is the largest vessel yet built but does not aim to be the fastest, planning rather for uniformity in passage. 2000 w. Engr, Lond—Jan. 6, 1899.

The "Oceanic." Illustrates the vessel before and immediately after the launch, giving some particulars of interest. 1200 w. Engng—Jan. 20, 1899.

The "Oceanic." Illustration and description of the internal fittings of this great White Star Liner. 2500 w. Engng—Sept. 1, 1899.

The "Oceanic," and How It Was Launched. Interesting particulars in regard to this vessel and the manner of launching, which proved so successful. Ill. 5400 w. Engr, Lond—Jan. 20, 1899.

The Steamship "Oceanic" (Le Paquebot "Oceanic"). M. Hachebet. A general description of the White Star liner, with numerous illustrations. 2500 w. Génie Civil—Nov. 25, 1899.

The White Star Liner "Oceanic." Editorial describing this largest vessel ever launched, and giving comparison with other notable vessels. 5500 w. Engng—Jan. 13, 1899.

The White Star Liner "Oceanic." Illustrates and describes this large vessel, and compares it with the "Great Eastern," giving also some account of the launching. 1800 w. Sci Am—Feb. 11, 1899.

The White Star Twin-Screw Steamer "Oceanic." Illustrated description of interior arrangements and decorations. 2000 w. Engr, Lond—Sept. 15, 1899.

**"Oceanic" vs. "Great Eastern."**—Particulars of the Marine Monsters "Oceanic" and "Great Eastern." Illustrates and describes these two large vessels, giving information of details in the construction of the "Oceanic." 2800 w. Marine Engng—Sept., 1899.

The "Great Eastern" and the "Oceanic"—A Comparison. An illustrated article bringing out the great progress made during the last forty years in the building of transatlantic liners. 2000 w. Sci Am—Sept. 23, 1899.

**Ocean Liners.**—Great Steamships (Les Grands Paquebots). M. L. de Chasseloup-Laubat. A general review of the great ocean liners, from the "Savannah," 1819, to the "Kaiser Wilhelm der Grosse," with many illustrations of notable vessels. 50000 w. Bulletin de la Société d'Encour—Aug., 1898.

Our Great Ocean Liners. Interesting information, with illustrations, from the latest edition of Rhodes' Steamship Guide. 1500 w. Transport—Sept. 16, 1898.

The Structural Features of Large Ocean Steamers. Editorial discussion of the modifications made necessary by growth in dimensions. 1700 w. Engr, Lond—Feb. 10, 1899.

See also **Future Liners; History.**

**Ocean Passages.**—See also **Atlantic Speed Record; History; Pacific Speed Record.**

**Oil.**—See **Tank.**

**"Oscar II."**—See **Trunk Deck; SHIPBUILDING—Tonnage.**

**"Ortona."**—The New Australian Liner "Ortona." Description, with report of trials. 1000 w. Engng—Nov. 24, 1899.

**Pacific Lines.**—Steamship Lines of the Pacific Coast—Present Facilities and Probable Future Growth. D. S. Kimball. An account of the principal companies and illustrations of vessels. 3200 w. Marine Engng—March, 1900.

**Pacific Mail.**—New 18,000 Ton Vessels for the Pacific Mail Steamship Co. Illustrated description of fine steamers being built at the Newport News yard 1300 w. Marine Engng—May, 1900.

**Pacific Speed Record.**—An Account of a Record-Breaking Trip Across the Pacific Ocean. William H. Crawford, Jr. An account of fine record made by the steamship "Empress of Japan" in 1897. 1000 w. Marine Engng—May, 1900.

**Paddle.**—Largest Paddle Steamship Afloat, British or American? Descriptions, with illustrations of the British steamship "Empress Queen," being constructed for service in the Irish Sea, and the "Priscilla" of the Fall River Line, running from New York. 1200 w. Marine Engng—June, 1897.

See **Channel Service; Empress Queen; Zeeland Line.**

**"Paraguay" and "Asuncion."**—Freight Steamers "Paraguay" and "Asuncion," Built on the Great Lakes for Atlantic Coasting Trade. Plans and brief description. 500 w. Marine Rev—Oct. 4, 1900.

**Passenger.**—Swift Passenger Steamers of Moderate Size. Edwin Lewis Martin. Read before the Engng. Conference of the British Inst. of Civ. Engs. Briefly suggests important considerations which affect the speed, safety and comfort of such vessels. 1200 w. Engng—June 9, 1899.

**Peninsular and Oriental.**—See **"India," P. & O.**

**"Pennsylvania."**—The "Pennsylvania," the Largest Freight Steamer in the World. Illustrated description. 900 w. Sci Am—Feb. 27, 1897.

Twin-Screw Steamer "Pennsylvania." An illustrated description of this large Hamburg-American liner. 1100 w. Am Shipbuilder—Nov. 12, 1896.

**Performance.**—Steamship Performances Compared. J. D. McArthur. Abstract of a paper read before the Inst. of Marine Engs., England. Gives the leading dimensions and particulars of the vessels, and the comparative results of their working. 1200 w. Steamship—June, 1899.

The Performances of Ocean Steamships. Arthur J. Maginnis. Suggests and advocates the estimation of steamship performance from the single basis of coal consumption. The unit basis being 1 lb. 2500 w. Steamship—Dec., 1895.

See also **COAL CONSUMPTION; MARINE ENGINE.**

**"Pointer" and "Spaniel."**—The Screw Steamers "Pointer" and "Spaniel." Illustrated description of two recently built coasting steamers, for service from the Clyde to Belfast, Liverpool, and Manchester. 1400 w. Engng—July 2, 1897.

**"Ponce."**—Steamship "Ponce" for Regular Service between New York and Porto Rico. Illustrates and describes this large new freight and passenger steamer, of the spar deck type. 500 w. Marine Engng—Nov., 1899.

**"Ponce" and "San Juan."**—The "Ponce" and the "San Juan." Illustrated description of the two new steamships now under construction at the shipyard of the Harlan & Hollingsworth Co., for the Porto Rico trade. 1800 w. Naut Gaz—March 2, 1899.

**"Princess Anne."**—Latest Addition to the Fleet of the Old Dominion Steamship Co. Illustrated description of a fine coast line vessel. 2000 w. Marine Engng—Aug., 1897.

**"Princess Clementine."**—See **Belgian Channel.**

**Propulsion.**—See **SHIP PROPULSION.**

**"Quito."**—See **India Relief "Quito."**

**Revenue Cutter.**—See **REVENUE CUTTER.**

**River.**—See **STEAMBOAT.**

**"Roebuck."**—Twin-Screw Channel Steamer "Roebuck." Illustrated description of two new English channel steamers, giving longitudinal section, deck plans, and photograph of the "Roebuck." 1100 w. Engng—Sept. 24, 1896.

**Russian Waterways.**—See **Caspian Sea.**

**Sanitation.**—See **PLUMBING—Yacht; SANITATION—Ship.**

**"San Juan."**—See **"Ponce" and "San Juan."**

**"Savannah."**—The Type of Steamships Years Ago. Illustration and brief description of the "Savannah," the first vessel to cross the Atlantic under steam. 500 w. Am Shipbuilder—Sept. 13, 1900.

See also **Atlantic Speed Record; History; Ocean Liners; TRANSPORTATION—Ocean.**

**"Saxonia."**—The Cunard Steamer "Saxonia." Describes a large cargo carrier which has excellent passenger accommodations, but is not designed for great speed. 1500 w. Engr, Lond—Dec. 22, 1899.

See also **"Ivernia" and "Saxonia."**

**Spithead Review, 1897.**—See **WARSHIP.**

**"Starrucca."**—Steel Lake-Steamship "Starrucca," of Five Thousand Tons Displacement. Illustrated description of the vessel and the launching. 900 w. Marine Engng—Oct., 1897.

**"Sylvania" and "Carinthia."** The Cunard Liners "Sylvania" and "Carinthia." Full illustrated description, with two full page inset of engravings containing deck plans, vertical, longitudinal and cross sections, and other details. 2000 w. Engng—Nov. 1, 1895.

**"Tampico."**—New Type Steamship. Illustrated description of the "Tampico," built at Toledo, Ohio, and designed for ocean as well as lake service. 1500 w. Naut Gaz—May 10, 1900.

**Tank.**—Oil-in-Bulk Steamers. The advantages of shipping oil in bulk are in some measure neutralized by the difficulties met with in applying the method. These difficulties are explained and suggestions for possible improvement are presented. 1000 w. Eng's Gaz—April, 1896.

See also **STEAMBOAT—Volga River.**

**Tank "Atlas."**—New Oil-Carrying Steamship. Illustrated detailed description of the steel screw steamer "Atlas." Serial. Naut Gaz—Feb. 23, 1899.

S. S. "Atlas." New Oil Tank Steamer for the Standard Oil Co. Plans, photograph and description. 1600 w. Marine Engng—April, 1899.

**Tank, Fire Risk.**—Oil Tank Steamers. H. Joshua Phillips. Fire risks in oil tank steamers and how to lessen them. Best method of extinguishing shallow depths of burning oil. 500 w. Engng—April 17, 1896.

**Tank, Weakness.**—On Signs of Weakness in Tank Steamers. Otto Schlick. Read at meeting of Inst. of Naval Architects. An attempt to account for the symptoms of weakness in tank steamers in strakes of outside plating, and suggestions for remedying the difficulty. 1000 w. Eng, Lond—June 26, 1896.

**"Thomas Cranage."**—See **Wooden.**

**Trunk Deck.**—Trunk Deck Steamer "Oscar II." W. Hök. Read before the Inst. of Naval Archt's, England. States the principles which form the basis for the construction of trunk-deck vessels, showing the differences between this type and ordinary vessels, giving particulars of the steamer named. Ill. 3800 w. Engng—April 15, 1898.

See also **SHIPBUILDING—Tonnage.**

**Turret Deck.**—Turret Deck Steamers. Illustrated description of one of the latest designs of this class, which embodies the best features of the whale-back and the ordinary cargo steamer. 500 w. Sci Am Sup—Dec. 12, 1896.

See also **"Clan Macdonald."**

**"Vaderland."**—A New Atlantic Liner. Describes the twin-screw steamer "Vaderland," of the Red Star service. 2500 w. Engng—July 13, 1900.

**Vibrations.**—See also **MARINE ENGINE—Balancing; Vibrations.**

**Water Ballast.**—See **Ballasting; BALLAST.**

**Whale Collision.**—Collisions Between Steamers and Whales. A résumé of the occurrences of this kind which were on record prior to the collision of a steamer and whale, recently noticed in the daily and weekly press. Ill. 600 w. Sci Am Sup—Dec. 21, 1895.

**"Winifred."**—S. S. "Winifred," the Pioneer American Steel Cargo Ocean Steamship. William A. Fairburn. Illustrated detailed description with dimensions and report of trials. 1700 w. Marine Engng—Nov., 1898.

Trial of the Steel Cargo Steamship "Winifred." A. D. Haughton. A full description of the vessel and report of the trials. The ship goes immediately on the New York and Porto Rico steamship route. 3300 w. Jour Am Soc of Nav Engs—Nov., 1898.

**Wooden.**—Details of the Largest Wooden Steamship in Commission in the World. Illustrated description of the steamship "Thomas Cranage," a cargo vessel on the Great Lakes. 1500 w. Marine Engng—June, 1898.

**Zeeland Line.**—The Paddle Steamers "Koningin Wilhelmina," "Koningin Regentes," and "Prins Hendrik." Illustrated detailed description of swift paddle steamers, built for the Zeeland Steamship Co., by the Fairfield Shipbuilding and Engineering Co., Limited, of Glasgow. 1300 w. Eng, Lond—March 13, 1896.

**"Zenith City."**—See **MARINE BOILER.**

**"Zenith City" and "Victory."**—Trials of the Lake Steamships "Zenith City," and "Victory." B. C. Bryan. Dimensions and account of test trials, with tabulated results. 4000 w. Jour Am Soc of Nav Eng—Nov., 1895.

### STEAMSHIP CONSTRUCTION.

See **SHIPBUILDING.**

### STEAM SHOVEL.

See also **DREDGE; IRON MINING.**

**Ann Arbor Railway.**—Record of Steam Shovel Work; Ann Arbor Railroad. Abstract of a paper read before the Mech. Engng. Soc., by H. E. Riggs. Tabulated records of work done on the Ann Arbor R. R. improvements, for seasons of 1894 & 95, with a variety of steam shovels. 800 w. Eng News—July 23, 1896.

Work of Steam Shovels on the Ann Arbor Road. Gives tabular statement of the work of a number of steam shovels, and information regarding the method by which the work was done. 900 w. Ry Age—Aug. 7, 1896.

**Bucyrus.**—Sixty-Ton Bucyrus Steam Shovel. Illustrated description of an unusually heavily constructed dredge used in hard pan and iron ore. The thrust is derived from two strong engines on the boom itself. 500 w. Ir Tr Rev—Feb. 6, 1896.

**Mining.**—The Steam Shovel in Mining. A. W. Robinson. Considers briefly the design and construction of the steam shovel, and the considerations which should govern the selection of a shovel to suit the work of the mining regions. 3800 w. Pro L Sup Min Inst—Aug., 1896.

**Thew.**—The Thew Steam Shovel. Illustrates and describes a machine designed especially for loading iron ore from stack piles into modern high railway cars, but also useful in various kinds of work. 1100 w. Ry & Engng Rev—March 19, 1898.

### STEAM TRAMWAY.

See also **CITY RAILWAY; STREET RAILWAY.**

**Rowan.**—The Rowan Steam Street Car Motors in France. Descriptive account of the equipment and operation. 600 w. Eng News—Oct. 15, 1896.

**Serpollet.**—Power-Worked Tram Cars. The Serpollet system of steam propulsion described and illustrated with commendation for efficiency and economy. 2500 w. Engng—May 15, 1896.

See also **CAR—Steam Motor; STEAM VEHICLE; STREET RAILWAY—Paris.**

### STEAM TRAP.

See also **STEAM ENGINEERING; STEAM PIPE.**

About Steam Traps. W. H. Paine. Notes from a paper recently read before the Rhode Island No. 2, National Assn. of Stationary Engineers of Pawtucket. Describes the trap under discussion and considers piping and connections, repairs, etc. 2000 w. Bos Jour of Com—Sept. 25, 1897.

### STEAM TURBINE.

See also **TORPEDO-BOAT DESTROYER.**

Report on Steam Turbines (Rapport sur les Turbines à Vapeur). M. Rateau. A paper presented at the Congrès de Mécanique at Paris, discussing mainly jet turbines of the de Laval type. 15000 w. Revue de Mécanique—Aug., 1900.

Steam Turbines. Some remarks on the three well known types of steam turbines, the Parsons, the Dow, and the De Laval, and their successful use in driving electrical machinery. Ill. 1500 w. St Ry Rev—July 15, 1897.

Steam Turbines. Rankin Kennedy. Part first considers the turbine from its historical point of view, especially during the past fifty years, and also its construction. Serial. Elec Rev, Lond—Feb. 17, 1899.

Steam Turbines (Die Dampfturbinen). A well illustrated description of various Laval and Parsons turbines in practical operation. Serial. 2 parts. 1 plate. 4000 w. Schweiz Bauzeitung—May 26, June 2, 1900.

**Channel Steamer.**—Fast Cross-Channel Steamer. C. H. Parsons. Read before the British Assn., at Dover meeting. Describes a proposed 30-knot turbine boat, stating its advantages. 1200 w. Engng—Sept. 22, 1899.

**De Laval.**—Memoranda on Tests of a 300 H. P. De Laval Steam Turbine. Test at 12th St. Station of Edison Illuminating Company of New York. Tabulated statement, with editorial. 2000 w. Elec—Sept. 9, 1896.

Tests of a Ten-Horse-Power De Laval Steam Turbine. William F. M. Goss. Illustrated account of a test conducted at the engineering laboratory of the Purdue University. Results tabulated. 1700 w. Trans Am Soc of Mech Eng—Dec., 1895.

The De Laval High-Pressure Steam Turbines at the Stockholm Exhibition. Illustrated description of the high-pressure steam turbine and boiler plant which furnished electric light for the entire exhibition. 1000 w. Elec Eng, N. Y.—Nov. 11, 1897.

The De Laval Steam Turbine (Die de Laval-'sche Dampfturbine). Illustrated description of the de Laval Steam turbine, especially as applied to dynamo driving. 3500 w. Die Elektrizität—June 5, 1897.

**De Laval Nozzles.**—See **AIR FLOW—Nozzles.**

**De Laval Shaft.**—The Influence of the Motion of a Ship upon the Flexible Shaft of the de Laval Steam Turbine (Die Beanspruchung der Federn Achse der de Lavalschen Dampfturbine in Folge von Schwankungen bei Aufstellung in Schiffen). A. Böttcher. Showing the effect of gyroscopic action, and demonstrating that the effect of the ship's motion is but slight. 2000 w. Zeitschr d Ver Deutscher Ing—Oct. 8, 1898.

**Dynamos.**—The Application of the Steam-Turbine to the Working of Dynamos and Alternators. Charles Algernon Parsons. Brief description of the compound steam-turbine and statement of its advantages for driving dynamos and alternators, with short discussion. Presented at Civil Engineers' Conference. 1200 w. Elec Eng, Lond—May 28, 1897.

The Steam Turbine Engine and Its Applications. Jno. D. Bailie. Abstract of a paper read before the Yorkshire College Engng. Soc. Describes the leading features of the "Twin Parallel Flow" and the "Radical Flow" turbines, the modern type, and the steam turbodynamo. 3200 w. Elec Rev, Lond—May 6, 1898.

The Steam Turbine Engine. J. D. Bailie. Abstract of a paper read before the North Staffordshire Inst. of Min. & Mech. Engs. Presents the advantages claimed for this type, and for the turbo-electric generator. 1300 w. Col. Guard—July 16, 1897.

See also **Elberfeld Electric Station.**

**Economy.**—See **Test, Wet Steam.**

**Efficiency.**—The Efficiency of the Direct-Coupled Steam Turbine. Ed. C. de Segundo. On the achievement, from the point of view of relative efficiency, of the improved steam turbine of the Westinghouse Co. 600 w. Elec Rev, Lond—April 27, 1900.

**Elberfeld Electric Station.**—Test of a Steam Turbine Driving a Rotary Current Dynamo (Versuche an einer Dampfturbine mit Wechselstrommaschine). W. H. Lindley, M. Schröter and H. F. Weber. A full account of an acceptance test made of a Parsons steam turbine driving a 1000-kilowatt rotary current dynamo in the city electrical works at Elberfeld, Germany. Serial. 2 parts 6500 w. Zeitschr d Ver Deutscher Ing—June 30, July 7, 1900.

The Parsons Steam Turbine at Elberfeld (Die Parsons-Dampfturbine). A short illustrated description of a steam turbine driving a 1000-kilowatt dynamo. 1 plate. 300 w. Schweiz Bauzeitung—June 16, 1900.

**Marine.**—Motive Power. Steam Turbines. High Speed Navigation. C. A. Parsons. A discourse delivered at the Royal Inst. An account of the progress of the steam turbine and its application and advantages. 6000 w. Nature—March 1, 1900.

Rotary vs. Reciprocating Marine Engines. Charles Algernon Parsons. Presents the relative advantages and disadvantages of rotary and reciprocating engines as applied to ship propulsion. Read at the Inst. of Civ. Engs—Engineering Conference. Ill. 1500 w. Jour Am Soc of Nav Engs—Aug., 1897.

Presidential Address by the Hon. Charles A. Parsons, before the Institution of Junior Engineers. Dealing largely with steam turbines and their applications. 6000 w. Engr, Lond—Nov. 10, 1899.

Steam Turbines and High-Speed Vessels. Charles A. Parsons. Abstract of the Presidential Address to the Inst. of Jun. Engs. Considers the Applications of the steam turbines and the advantages. Ill. 3000 w. Ap Pop Sci M—April, 1900.

The Turbine for Naval Propulsion. Discusses the great speed that has been attained, the probability of the turbine soon replacing the steam engine for marine propulsion, and the defects to be overcome before it can be used on shore. 800 w. Bos Jour of Com—Oct. 22, 1898.

See also **Channel Steamer; Parsons; "Turbinia"; TORPEDO-BOAT DESTROYER—"Viper."**

**Parsons.**—Parsons' Steam Turbine. An account of the work done by Mr. Parsons, in introducing the steam turbine, with some of the results. Ill. Serial. Engng—Aug. 18, 1899.

The Parsons Steam Turbine. An illustrated account of some of the applications of the steam turbine. 1400 w. Sci Am—Nov. 18, 1899.

See also **Elberfeld; Marine; "Turbinia"; Westinghouse-Parsons; STEAM ENGINE—Willans; TORPEDO-BOAT DESTROYER—"Viper."**

**Parsons Patent.**—Parsons Patent. Report of the proceedings of the Judicial Committee of the Privy Council in regard to the extension of the patent of Charles Algernou Parsons for steam turbines, with editorial. 3300 w. Engr, Lond—May 20, 1898.

**Parsons, Tests.**—Tests of 200-Kilowatt Continuous Current Parsons Turbo-Generator. W. D. Hunter. Describes a series of tests for the purpose of determining the steam consumption under different conditions of service and various grades of output. 400 w. Elec Rev, Lond—Feb. 19, 1897.

**Phenomena.**—Some Phenomena of High-Speed Rotation. James F. McElroy. Abstract of a paper read before the Albany Institute. Illustrated description of phenomena observed while engaged in the development of a steam turbine running at very high speeds. 1700 w. Elec Wld—Oct. 16, 1897.

**Test, Wet Steam.**—Tests to Show the Influence of Moisture in Steam in the Economy of a Steam Turbine. D. S. Jacobus. Gives conditions of tests and the results. 1300 w. Trans Am Soc of Mech Engs—Vol. XVIII., May, 1897.

**Theory.**—The Theory of the Steam Turbine (Theorie der Dampf-Turbinen). A. Fliegner. A thorough mathematical discussion of the subject, showing the difference between pressure and reaction turbines, and the conditions which conduce to the highest efficiency. Five articles. 7500 w. Schweizerische Bauzeitung—March 25, 31, April 15, 29, May 6, 1899.

**"Turbinia."**—The Application of the Compound Steam Turbine to the Purpose of Marine Propulsion. Chas. Parsons. Read at session of Inst. of Naval Archts. Describes the fitting of the "Turbinia" with turbine engines, and the result as far as ascertainable. 2000 w. Eng, Lond—April 16, 1897.

The Application of the Compound Steam Turbine to the Purpose of Marine Pronulsion. Chas. Parsons. Describes the "Turbinia," with a summary of advantages claimed. Trials and abstract of discussion. 3800 w. Jour Am Soc of Nav Engs—May, 1897.

The Fastest Vessel Afloat. Cleveland Moffett. An account of the "Turbinia" from personal observations, with discussion of the effect on ocean travel. Ill. 5000 w. McClure's Mag—July, 1898.

The New Marine Motor. Describes a trip in the "Turbinia," which made thirty-eight miles an hour at sea. Ill. 2200 w. Prac Engr—April 30, 1897.

**"Viper."**—See **TORPEDO-BOAT DESTROYER.**

**Westinghouse-Parsons.**—The Westinghouse-Parsons Steam Turbine. Describes and illustrates the turbines recently installed in the power plant of the Westinghouse Air Brake Co., at Wilmington, Pa. 2300 w. Am Engr & R R Jour—March, 1900.

The Westinghouse-Parsons Steam Turbines Operating Westinghouse Air-Brake Works. Illustrated detailed description of this plant, where these machines furnish the motive power and lighting. 2800 w. Ir Age—April 12, 1900.

Westinghouse-Parsons Steam Turbine Plant. Burcham Harding. Illustrated description of steam turbine plants now in use in American works, with notes on their efficiency in regular service. 3500 w. Eng Rec—May 5, 1900.

**STEAM VEHICLE.**

See also **AUTOMOBILE; AUTOMOBILE COMPETITION; TRACTION ENGINE.**

A Short Account of Some Modern Steam Wagons. George A. Burls. Excerpt of paper read before the Civil and Mech. Engs. Soc. A general discussion of the efficiency, durability, power, speed, etc., of these vehicles, with table of data, and short discussion. 5000 w. Auto Jour—Nov., 1899.

A Short Account of Some Modern Steam Wagons. George A. Burls. Part first discusses the tare limit, power, etc. Serial. Prac Engr—Jan 12, 1900.

A Steam Road Carriage. R. I. Clegg. Illustrates and describes an experimental steam carriage having interesting features, particularly in methods devised to secure automatic regulation of the fuel, steam pressure and water supply. 800 w. Am Mach—Oct. 6, 1898.

Steam Driven Road Carriages. William H. Harrison. Describes a proposed construction of a steam carriage weighing about 1500 pounds with riders. 2200 w. Am Mach—April 6, 1899.

Steam Locomotion on Common Roads. W. Fletcher. Illustrated description of the lighter types of road locomotives, and a comparison of their merits with those of the larger traction engines. 4200 w. Eng, Lond—Sept. 4, 1896.

The Application of Steam to Self-Contained Road Vehicles. Excerpt from a paper read before the Liverpool Self-Propelled Traffic Assn., by W. Norris. Discusses the writer's view of the correct lines on which a successful steam motor-driven vehicles should be designed. 2500 w. Auto Jour—Feb., 1899.

**American.**—See **United States.**

**Bicycle.**—See **MOTOR CYCLE; STEAM BICYCLE.**

**Boiler Feeding.**—Boiler Feeding Apparatus. R. I. Clegg. Illustrates and describes various devices. 4000 w. Horseless Age—Dec. 6, 1899.

**Boiler Fire-Tube.**—Is the Fire-Tube Carriage Boiler Dangerous? Editorial discussion of recent criticisms of this type. 1400 w. Horseless Age—Aug. 22, 1900.

**Boilers.**—Boilers for Motor Cars. Editorial advocating the use of steam for the propulsion of vehicles on common roads. 1500 w. Engr, Lond—March 4, 1898.

Considerations in the Design of Vehicle Boilers. P. M. Heldt. Discusses the time required in the operation, the fuel, types of boilers, etc. 2200 w. Horseless Age—Dec. 6, 1899.

Steam Boilers for Motor Vehicles. R. I. Clegg. An illustrated historical review. 7400 w. Horseless Age—Dec. 6, 1899.

**Bourdon.**—See **Weidknecht.**

**Crouch.**—The Crouch Steam Wagon. Hugh Dolnar. Illustrated description. 1700 w. Am Mach—Aug. 17, 1899.

**Cunningham Truck.**—The Cunningham Steam Truck. Illustrated description of a vehicle for heavy haulage. 2200 w. Horseless Age—Oct. 3, 1900.

**Dudgeon Wagon.**—The Dudgeon Steam Wagon. Hugh Dolnar. Illustrated detailed description. 1500 w. Am Mach—Aug. 2, 1899.

**Dust Cart.**—A Steam Dust Cart. Description, with illustration, of a composite vehicle in use in Chiswick. 1500 w. Engng—Sept. 17, 1897.

See also **AUTOMOBILE—Street Cleaning; STREET CLEANING—Machinery.**

**English.**—English Steam Carriages. William Fletcher. The leading feature of this article is the discussion of weight as related to the different purposes for which this class of vehicle is adapted. Ill. 1500 w. Mach, Lond—Feb. 15, 1896.

**Experiments.**—Experiments Concerning Steam Road Vehicles, and the Conclusions Drawn from Them. D. H. Simpson and W. L. Bodman. Read before the Liverpool Centre of the Self-Propelled Traffic Assn. A statement of the difficulties to be overcome, the investigations made and conclusions. 6800 w. Ind & Ir—Feb. 25, 1898.

**Freakley.**—The Freakley Steam Carriage. Illustrated description of an experimental carriage which has stood severe tests. Its great feature is its flexibility. 2400 w. Engr, Lond—April 22, 1898.

**Gardner-Serpollet.**—The Gardner-Serpollet Steam Car. Brief illustrated description. 600 w. Auto Jour—April, 1900.

**History.**—Early Motor Vehicles and Modern Practice. Illustrated notes of early steam carriages. 1700 w. Auto Jour—June, 1899.

**Le Blant.**—The Le Blant Steam Road Carriage. Illustrated detailed description. 4400 w. Engng—Jan. 3, 1896.

**Locomobile.**—The Locomobile. R. I. Clegg. Illustrated description of the operating mechanism. 1800 w. Horseless Age—Dec. 6, 1899.

The "Locomobile" Steam Carriage. Illustrated description of the vehicle, its machinery, and operation. 2000 w. Sci Am—Jan. 27, 1900.

**Lorry.**—See **Simpson and Bodman; Thornycroft.**

**Mason and Stanley.**—Steam Driven Road Wagons. Hugh Dolnar. An illustrated detailed description of William B. Mason's carriage, and an explanation of its connection with the Stanley carriage. 2500 w. Am Mach—Dec. 1, 1898.

**Martyn's Omnibus.**—Martyn's Locomotor Car or Steam Omnibus. Illustrates and describes one of the latest forms of steam carriages for common roads. The chief points of originality are the steering gear, the compensating gear, and the boiler. 1500 w. Engr, Lond—Dec. 2, 1898.

**Oil Fuel Burners.**—See **LIQUID FUEL—Burners.**

**Omnibus.**—See **Martyn; Purrey; Scotte; Serpollet; Weidknecht.**

**Purrey Omnibus.**—The Purrey Steam Automobile (Automotrice à Vapeur, Système Valentin Purrey). H. Brosselin. A detailed description of the mechanism and operation of the steam omnibus now under practical trial by the Compagnie Genéral des Omnibus of Paris. 7000 w. 2 plates. Rev Gen des Chemins de Fer—Jan., 1900.

**Scotte Omnibus.**—The Scotte System of Automobile Vehicles (Les Voitures Automobiles, Système J. Scotte). An illustrated description of the Scotte steam omnibus, now successfully used for regular suburban road service in France. 2000 w. 1 plate. La Rev Tech—May 10, 1898.

**Serpollet.**—Description of the Mechanism of the New Serpollet Vehicles (Description du Mécanisme des Nouvelles Voitures "Système Serpollet"). A sheet of details with description of the improved Serpollet generator, engine, and driving gear as applied to an automobile. 1500 w. 1 plate. La Rev Tech—Sept. 10, 1898.

The Serpollet Steam Omnibus. Illustrates and describes a vehicle built to accommodate 14 passengers, and carry 1100 lbs. of baggage. 600 w. Auto Jour—April, 1899.

See also **Gardner-Serpollet; CAR—Steam Motor; STEAM TRAMWAY; TRAMWAY—Paris.**

**Simpson and Bodman Lorry.**—The Simpson-Bodman Steam Lorry. Illustrated detailed description of a vehicle for transporting heavy goods. 2500 w. Ind & Ir—Jan. 19, 1900.

The Simpson and Bodman Steam Lorry. An illustrated detailed description of vehicles of new design, the generator, and tests made. 4000 w. Auto Jour—Oct., 1899.

**Stanley.**—The Stanley Steam Car. Illustrated description. 1200 w. Ind & Ir—Dec. 15, 1899.

The Stanley Steam Carriage. Illustrated description. 800 w. Auto Jour—May 17, 1900.

See also **Mason** and **Stanley.**

**Thornycroft.**—Recent Experiences with Steam on Common Roads. John J. Thornycroft. Remarks on the importance of building durable vehicles and on tare weight, with brief description of vehicles built to the writer's designs. Ill. 5500 w. Engng—Sept. 22, 1899.

**Thornycroft Lorry.**—American Built Thornycroft Steam Lorry. Illustrated description of vehicle built in Paterson, N. J. 900 w. Horseless Age—Aug. 29, 1900.

**Thornycroft Works.**—The Thornycroft Steam Wagon Company. An illustrated account of the works and some of the vehicles. 2500 w. Auto Jour—Feb., 1900.

**Tipping-Cart.**—Steam Tipping-Cart. Illustrated description of a cart made in Leeds, England. 700 w. Sci Am—Sept. 8, 1900.

**Toward.**—See **TRACTION ENGINE.**

**United States.**—Some American Steam-Driven Motor-Vehicles. Horace L. Arnold. Illustrates and describes four vehicles made in or near Boston, which collectively exhibit all the features of an ideal automobile. Serial. Ind & Ir—June 30, 1899.

**Vans.**—Steam Road Vans. The first of a series of articles describing some of the best types of steam vans for common roads. Ill. Serial. Mach, Lond—Aug. 15, 1897.

**Weidknecht Omnibus.**—The Weidknecht and Bourdon Steam Omnibus. Illustrated description of this vehicle. 600 w. Auto Jour—July, 1898.

The Weidknecht Steam Omnibus (L'Omnibus à Vapeur Système Weidknecht). Illustrated description of the motor omnibus now in operation on the Boulevard Extérieur, in Paris. A speed of 7½ miles an hour is obtained at a cost of 15 pounds of coke per mile. 2000 w. Le Génie Moderne—April 15, 1897.

**White Dray.**—Steam Dray of the Paul H. White Engineering Works. An illustrated description of a steam vehicle with a capacity of 4000 to 6000 pounds and a normal speed of five miles an hour. 500 w. Horseless Age—Sept. 19, 1900.

## STEAM YACHT.

See also **LAUNCH; STEAMBOAT; STEAMSHIP; YACHT.**

Consideration of the Steam Yacht from the Designer's Point of View. William A. Fairburn. Interesting descriptions of famous yachts, classifying them in five groups. Serial. Marine Engng—Oct., 1899.

**American.**—American Steam Yachts. Irving Cox. Introductory remarks comparing English and American yachts, with illustrations and brief descriptions of representative craft. 3300 w. Jour Am Soc of Naval Engs—May, 1898.

**American Builders.**—American Builders of Steam Yachts. An illustrated article showing the rapid development of this branch of ship-building, that has extended to nearly all of the principal yards. 2000 w. Marine Rev—Feb. 22, 1900.

**"Andria" and "Mayflower."**—Some Notable Steam Yachts. Illustrated descriptions of the "Andria" and the "Mayflower," which have recently been built in Scotland for American owners. 900 w. Sci Am—July 10, 1897.

**"Aphrodite."**—Description of the New Steam Yacht for Colonel Oliver H. Payne. General design, dimensions and description of a fine yacht to be built by the Bath Iron Works, of Bath, Me. 2200 w. Marine Engng—Feb., 1898.

Full-Powered Sea-Going Steam Yacht. "Aphrodite" for Col. Oliver H. Payne, of New York. William A. Fairburn. Gives details of construction and equipment and report of speed tests. Ill. 3200 w. Marine Engng—June, 1899.

**"Atmah."**—Twin-Screw Steam Yacht "Atmah." An illustrated description of the largest and most notable yacht built in Great Britain in 1898. 1800 w. Sci Am Sup—Feb. 18, 1899.

**British Royal.**—See **"Victoria and Albert."**

**"Dreamer."**—Palatial Steam Yacht. Description of the "Dreamer," just completed for T. W. Lawson, by Lewis Nixon. 1800 w. Naut Gaz—March 8, 1900.

**"Ellide."**—Description of the Steam Yacht "Ellide" and Her Speed Trials. Illustrates and describes the boat and machinery, giving report of trials and a discussion of results. 2500 w. Marine Engng—Dec., 1898.

Fastest Steam Yacht in the World. Illustrated description of the "Ellide," said to have attained a speed of forty miles per hour. 1500 w. Engr, Cleveland, O.—May 2, 1898.

**High-Speed.**—The High-Speed Steam Yacht as a Factor in Torpedo Boat Design. W. P. Stephens. The first article deals principally with the historical development of the high-speed steam yacht, with an account of the successive products of leading builders on both sides of the Atlantic. 4000 w. Eng Mag—July, 1898.

The High-Speed Steam Yacht as a Factor in Torpedo Boat Design. W. P. Stephens. The concluding article describes and illustrates the swiftest modern steam yachts, and discusses their peculiar features in comparison with torpedo-boat construction. 3500 w. Eng Mag—Aug., 1898.

See also **"Ellide."**

**"Hildegarde."**—Steam Yacht "Hildegarde." Illustrated detailed description with history of the vessel. 2500 w. Rudder—Dec., 1898.

**"Josephine."**—P. A. B. Widener's New Steam Yacht "Josephine." Illustrated description with side elevation and deck plans. 800 w. Am Shipbuilder—April 2, 1896.

The Steam Yacht "Josephine." Illustrated description of a beautiful yacht built for P. A. B. Widener, of Philadelphia. 1500 w. Sci Am Sup—Oct. 7, 1899.

**"Lysistrata" and "Margarita."**—The Clyde and Palatial Steam Yachts. A short general description of Bennett's "Lysistrata," and Drexel's "Margarita," built on the Clyde. 700 w. Engr, Lond—Sept. 14, 1900.

**"Mayflower."**—A Modern Steam Yacht. Interesting description of the beautiful yacht built for Mr. Ogden Goelet, by the Clydebank Engineering and Shipbuilding Co. 3500 w. Engng—June 18, 1897.

See also **"Andria."**

**Naval Auxiliary.**—The Steam Yacht as a Naval Auxiliary. W. P. Stephens. A paper read before the Society of Naval Architects and Marine Engineers, giving a very complete account of the composition and performance of the auxiliary fleet of steam yachts in the U. S. Navy during the Spanish War. 4500 w. 9 plates. Trans Soc N A & M E—1898.

**"Niagara."**—Details of Construction of the Twin-Screw Steam Yacht "Niagara." Information and exact data concerning this fine vessel being built for Howard Gould, of New York. Ill. 1200 w. Marine Engng—April, 1898.

**Power for Small.**—See **SHIP PROPULSION—Yachts.**

**President's.**—U. S. S. "Sylph," Selected by the Navy Department as the President's Yacht. Illustrated detailed description. 1200 w. Marine Engng—Oct., 1898.

**Russian Imperial.**—The Russian Imperial Yacht "Standart." Elevations and plans of the ship, with interior views and description. 2500 w. Engng—Jan. 28, 1898.

**"Sovereign" Trials.**—See **SHIP PROPULSION.**

**"Speedy."**—The Steam Yacht "Speedy." Illustrated detailed description. 350 w. Engng—Aug. 21, 1896.

**Thames Ironworks.**—Steam Yacht for the English Ambassador at Constantinople. Illustrated description of this vessel built by the Thames Ironworks Company. 500 w. Engr, Lond—Nov. 12, 1897.

**"Varuna."**—The Twin-Screw Yacht "Varuna." Illustrated description of yacht built for Mr. Eugene Higgins, of New York, by Messrs. A. & G. Inglis, of Glasgow. 1500 w. Eng, Lond—Feb. 26, 1897.

**"Victoria and Albert."**—The New Royal Yacht. An illustrated description of Her Majesty's New Yacht—"Victoria and Albert"—with an interesting account of the launching. 4000 w. Engng—May 12, 1899.

**"Victoria and Albert" Trials.**—Speed Trials of the New British Royal Yacht "Victoria and Albert." Report of recent trials, which were satisfactory. 800 w. Marine Engng—Oct., 1900.

The Steam Trials of the New Royal Yacht. A short account of the contract trials of the "Victoria and Albert," with table of results. 1100 w. Engng—Sept. 7, 1900.

**"Yosemite."**—The Steam Yacht "Yosemite." B. F. Isherwood. Tabulated data and results from notes and indicator diagrams taken during a trial of four consecutive runs, with tables of dimensions and description of machinery. 6500 w. Jour Am Soc of Nav Engs—Nov., 1895.

**STEEL.**

See also **IRON; METALLOGRAPHY.**

Steel as Viewed by the Engineer. Briefly reviews a paper read by P. Kreuzpointner at a meeting of the Engineers' Club of Philadelphia, with discussion. 1800 w. Am Mfr & Ir Wld—March 12, 1897.

Steel. Robert Carr Lanphier. The essential features of steel, methods of producing it, its properties, etc. 2500 w. Yale Sci M—Oct., 1896.

**Allotropic Theory.**—Evidence for the Allotropic Theory. Henry M. Howe. Describes experiments made to get light on the effect of allotropy as contributing to the hardening of steel and in the question of stress. 800 w. Eng & Min Jour—Dec. 12, 1896.

**Alloys.**—See Special; **STEEL ALLOY.**

**Boiler.**—See **BOILER SPECIFICATIONS; STEEL SPECIFICATIONS.**

**Bridge and Boiler.**—Some Recent Views of Bridge and Boiler Steel. J. C. Some details of the present trend of thought and practice among American engineers. 1000 w. Ir & Coal Trds Rev—April 16, 1897.

**Brinell's Chart.**—Brinell's Chart of Changes of Fracture and Carbon in Steel. A graphical representation of changes in steel while heating and cooling, with description and rules for treating steel. 1600 w. Eng & Min Jour—Dec. 24, 1898.

**Brittleness.**—Brittleness Produced in Soft Steel by Annealing. J. E. Stead. Read before the Iron & Steel Institute. Discusses the definitions of terms, the different kinds of brittleness, causes of its development, and remedies. 4000 w. Ir & Coal Trds Rev—Sept. 9, 1898.

**Burnt.**—Burnt Steel—An Application of Theory. B. F. Spaulding. Showing the effect of oxidation and giving means for its prevention. 1600 w. Ind & East Eng—Oct. 19, 1895.

**Carbon Effect.**—Effect of Carbon Content on the Endurance of Steel. H. K. Landis. It is shown that an increase of carbon content has a marked effect in increasing the strength and raising the elastic limit. Tables compiled from reports for 1888, 1889 and 1894. 700 w. Ir Trd Rev—Jan. 7, 1897.

**Casting Temperature.**—The Influence of Casting Temperature Upon Steel. Robert Abbott Hadfield. Read before the Engineering Conference of the Inst. of Civ. Engs., England. Suggesting lines upon which research work should be based and indicating the present knowledge of this subject. 900 w. Col Guard—June 16, 1899.

**Cast Tempered.**—Damascus Steel or Tempered Wrought Iron. Describes a new metal which can be cast and yet, it is claimed, can be tempered and hardened as well as tool steel. The importance of this discovery, if confirmed, can scarcely be overrated. Ill. 1600 w. Ry Rev—Dec. 14, 1895.

**Cementation Process.**—On the Passage of Carbon into Iron During the Cementation Process. George J. Pitt. Read before the South Staffordshire Inst. of Iron and Steel Works Managers. Gives a detailed account of experimental study which seems to indicate that molecular interchange is the explanation of the mode in which the carbon passes into the iron in this process. 2500 w. Col Guard—June 10, 1898.

**Chemical and Physical Relations.**—The Relations Between the Chemical Constitution and the Physical Character of Steel. William R. Webster. Investigation concerning the tensile strength of steel, quoting from various authorities and giving results of the writer's investigations. 12000 w. Trans Am Inst of Min Engs—Dec., 1898.

**Color Temperature.**—See Temperature Colors.

**Crucible.**—Crucible Steel (Tiegelstahl). O. Thallner. A paper read before the Upper Silesian branch of the Verein Deutscher Ingenieure, giving an account, with table and curves, of crucible steel and its manufacture at the Bismarck works, in Silesia. 2200 w. Zeitschr d Ver Deutscher Ing—March 31, 1900.

Improved Martin Steel or Crucible Steel (Verbesserter Martinstahl oder Tiegelstahl). Otto Thallner. A discussion of the differences between Bessemer, open-hearth, and crucible steel, showing how open-hearth steel may be remelted in the crucible to advantage. Two articles. 6000 w. Stahl und Eisen—Sept. 15, 1899.

**Crucible vs. Open Hearth.**—Purified Open Hearth Steel vs. Crucible Steel. Richard Moldenke. Reviews an article by Otto Thallner, in "Stahl und Eisen," discussing the differences, and showing how an advantage is gained by remelting open hearth steel in the crucible. 1800 w. Ir Trd Rev—Nov. 30, 1899.

**Elasticity.**—The Elasticity of Steel. H. K. Landis. The main purpose of the paper is to point out an important errort in the methods of determination of quality. 1800 w. Am Mfr & Ir Wld—June 18, 1897.

See also **ELASTICITY.**

**Elastic Limit and Yield Point.**—The Elastic Limit and Yield Point of Steel. Explains the difference between the elastic limit and the yield point in making tensile tests, and shows the importance of an accurate determination. 1000 w. Prac Engr—April 14, 1899.

**Fibrous vs. Crystalline.**—See **IRON MANUFACTURE.**

**Flaw Detection.**—See **SCHISEOPHONE.**

**Hard.**—The Use of Steel. Editorial concerning the increasing use of harder and harder varieties of steel. 1200 w. Engng—March 4, 1898.

**Hardening.**—See also Allotropic Theory; Cementation Process; **METALLOGRAPHY; STEEL MANUFACTURE.**

**Hardening, Carbon.**—Forms of Carbon, and the Hardening of Steel (Kohlenstoff Formen und Stahlhärtung). Discussing the formation of carbide of iron in connection with the hardening of steel. 2000 w. Stahl und Eisen—June 1, 1897.

**Hardening Stresses.**—The Stresses in Large Sections of Hardened Steel (Ueber Spannungen im Gehärteten Stahle Grösseren Querschnitts). Otto Thallner. A discussion of the internal stresses produced by the molecular changes consequent upon hardening, with illustrations and data from many experiments. 3500 w. Stahl und Eisen—April 1, 1899.

**Heat-Treatment.**—The Effect of Heat-Treatment Upon the Physical Properties and the Microstructure of Medium Carbon Steel. Robert Gorham Morse. Gives results of investigations to determine how the tensile strength, the elastic limit, and the size of the grain, of a pure medium-carbon steel are affected by heating to successive temperatures between 500 degrees and 1300 degrees C., with slow cooling therefrom. Ill. 2500 w. Trans Am Inst of Min Engs—Sept., 1899.

**High-Grade.**—High-Grade Steel. J. C. Danziger. Briefly reviews the leading processes, and the means of varying the physical properties. 5000 w. Jour Assn of Engng Soc—July, 1897.

**High Specification.**—High Specification Steels. H. K. Landis. Considers composition, tensile requirements, residual stresses, heat treatment and fatigue. 2300 w. Mach—April, 1897.

**Ideal.**—Ideal Steel. B. F. Spalding. The qualities necessary to make a steel ideal are enumerated. 1800 w. Age of St—Dec. 21, 1895.

**Investigations.**—Recent Investigations in Steel. H. Sylvester. From the presidential address before the Staffordshire Iron and Steel Inst. Reviews the chief facts that have been ascertained in connection with the hardening of steel and the theories advanced to explain the phenomena. 2000 w. Ir Trd Rev—Oct. 26, 1899.

**Iron Compared.**—Steel for Axles, Crank Pins and Piston Rods. Editorial discussing the increasing use of steel, the care needed in the preparation of specifications, the treatment of steel in the drop, etc. 800 w. Am Eng & R R Jour—Nov., 1898.

**Japanese Sword.**—Metallurgical and Other Features of Japanese Swords. Benjamin Smith Lyman. An exceedingly interesting and instructive illustrated account of Japanese forging and tempering by which excellent results are reached through simple methods, some of which appear to have been practicaly unknown to smiths in western countries. 3800 w. Jour Fr Inst—Jan., 1896.

**Low Temperature.**—See **METALLOGRAPHY.**

**Magnetic Properties.**—See **MAGNETISM—Steel.**

**Marine Engines.**—See **TESTING—Steel for Marine Engines.**

**Metallography.**—See **METALLOGRAPHY.**

**Mild.**—See also **WROUGHT IRON—Steel Compared.**

**Molybdenum.**—See **MOLYBDENUM STEEL.**

**Nickel.**—See **NICKEL STEEL.**

**Open Hearth.**—Acid vs. Basic Open Hearth Steel. C. E. Stafford. A communication on the relative value for structural purposes of acid and of basic open hearth steel. 1400 w. Ir Age—April 21, 1898.

The Progress of Open Hearth Cast Steel in Machine Construction. A. W. Discusses the improvement in methods and the investigations needed to remove the uncertainty as to interior integrity, and shows the excellent character of the open hearth cast steel. Ill. 1600 w. Ir Age—March 31, 1898.

See also OPEN HEARTH PROCESS; STEEL MANUFACTURE—Acid vs. Basic.

**Open Hearth vs. Crucible.**—See Crucible vs. Open Hearth.

**Oriental.**—Some Notes on Eastern Metallurgy. The methods of producing weapons of keen edge and ornamental appearance is referred to and briefly described. 1800 w. Ir & Coal Trds Rev—Feb. 7, 1896.

See also Cast-Tempered; Japanese Sword.

**Oxygen.**—The Combined Oxygen in Steel (Ueber den Sauerstoffgehalt des Stahls). A. Ledebur. A discussion of the influence of combined oxygen, and of the best methods of determining the amount present. 3000 w. Stahl und Eisen—March 15, 1899.

**Practical Selection.**—Practical Notes on Steel. S. W. Goodyear. The position is taken that, in general, steel will behave well if applied to the purposes for which it is best adapted, and that, therefore, it does not deserve the reputation of being refractory and unmanageable, in which it is held by mechanics. The article is directed to the guidance of mechanics in the selection of steel adapted to special purposes, and the judicious selection of adaptations for special qualities of steel. 2300 w. Mach—Feb., 1896.

**Pressed.**—See CAR—Steel; STEEL MANUFACTURE; STEEL WORKS.

**Rail.**—Rail Steel—Its Chemistry and Heat Treatment. William R. Webster. A contribution to the problem of the relations between the chemical constitution and physical properties of steel. 3200 w. R R Gaz—Feb. 16, 1900.

Rail Steel. The greater part of the reports for all countries, excepting the United States, at the International Railroad Congress. 2000 w. R R Gaz—Aug. 10, 1900.

See also METALLOGRAPHY—Steel Rail; RAIL—Steel.

**Residual Stresses.**—Residual Stresses in Steel. H. K. Landis. Explains the meaning of the term and the influence; gives a table of effect of cold and hot rolling on endurance; shows that hot rolled bars are less strong and tough than the same material after cold working, etc. 1500 w. Am Mfr & Ir Wld—Dec. 25, 1896.

**Rivet.**—See RIVET.

**Semi.**—What Is Semi-Steel? Alex. E. Outerbridge, Jr. Asserting that there is no such metal, and that the material so called is not a new discovery. 1600 w. R R Gaz—April 15, 1898.

See also IRON—Gun.

**Shearing Strength.**—See RIVET.

**Shipbuilding.**—See SHIPBUILDING—Steel.

**Solution Theory.**—See Carbon; Hardening; IRON; METALLURGY—Steel.

**Special.**—Special Steels. L. Babu. From a paper prepared for the Min. & Met. Cong., at Paris. Considers the making, working, hardening and annealing. 2500 w. Col Guard—Aug. 24, 1900.

The Manufacture of Special Steels. L. Babu. Condensed from a paper read before the Met. Con., at Paris. The critical points of special steels are discussed and their manufacture. 2500 w. Ir Trd Rev—July 19, 1900.

See also RAIL—Special Steel; STEEL ALLOY.

**Specifications.**—See STEEL SPECIFICATIONS.

**Strength.**—See also Tensile Strength; MATERIALS' STRENGTH.

**Structural.**—Some Open Questions Concerning Structural Steel. Topical discussion. Six short papers on special topics, and a general discussion are given. The contributors are H. H. Campbell, Albert Ladd Colby, Frederick H. Lewis, James Christie, G. C. Henning and P. Kreuzpointner. Ill. 15000 w. Pro of Engs' Club of Phila—Jan., 1897.

Steel as Viewed by the Engineer. P. Kreuzpointner. Discusses quality of structural steel, and methods of testing and inspection. Also discussion. 8800 w. Pro Engs' Club of Phila—April, 1897.

Structural Steel. James Christie. A popular lecture in which the history, process of manufacture, testing, necessary properties, etc., are briefly reviewed. 4500 w. Jour Fr Inst—Jan., 1896.

See also BRIDGE MATERIAL; BRIDGE SPECIFICATIONS; TESTING—Impact.

**Structural Details.**—Details of Structural Iron and Steel. Information with regard to this work that may be applied in practice. Part first begins the study of materials. Ill. Serial. Builder—Jan. 6, 1900.

See also IRONWORK.

**Structural Durability.**—Durability of Structural Materials. A. H. Sabin. On what the durability depends, with special discussion of iron and steel. 1500 w. Wisconsin Engr—Jan., 1899.

**Structural Shapes.**—See STEEL MANUFACTURE; STEEL SPECIFICATIONS.

**Structural Strength and Composition.**—The Relation of Tensile Strength to Composition in Structural Steel. A. C. Cunningham. A brief account of notable investigations made of late years, with the conclusions of Mr. H. H. Campbell, with rule adopted by the author. 1500 w. Pro Am Soc of Civ Engs—May, 1897.

**Structural Stresses.**—The Permissible Stresses Upon Structural Iron (Die Zulässigen Inanspruchnahmen des Eisens in Hochbau). F. von Emperger. A mathematical discussion of the relative proportions of beams, columns, girders, etc., in modern building construction. 3500 w. Zeitschr d Ver Deutscher Ing—Dec. 2, 1899.

**Structure.**—See Allotropic Theory; Hardening; Heat Treatment; METALLOGRAPHY.

**Sulphides.**—On the Diffusion of Sulphides Through Steel. E. D. Campbell. Describes experiments selected from 40 diffusion tests, giving possible explanation of observed phenomena. 4000 w. Am Chem Jour—Nov., 1896.

On the Diffusion of Sulphides Through Steel. E. D. Campbell. Read before the Iron and Steel Inst. Describes investigations of diffusion of sulphide of iron through steel. Experiments and results. Serial. Ind & Ir—Aug. 6, 1897.

On the Diffusion of Sulphides Through Steel. E. D. Campbell. Read before the Iron & Steel Inst., at Stockholm. A description of experimental work, and a statement of results. 1800 w. Ir & St Trds Jour—Sept. 3, 1898.

**Taylor-White.**—See STEEL MANUFACTURE.

**Temperature Colors.**—Colors of Heated Steel Corresponding to Different Degrees of Temperatures. Maunsel White and F. W. Taylor. Notes of value to those handling steel. 500 w. Trans Am Soc of Mech Engs, No. 845—Dec., 1899.

The Color Names for High Temperatures. Henry M. Howe. Compares results of Messrs. White and Taylor, and the writer with Pouillet's data concerning colors of heated steel, and advises the abandoning of the latter. 1200 w. Eng & Min Jour—Jan. 20, 1900.

**Tempering Color.**—See STEEL MANUFACTURE.

**Tempering Effect.**—Effects of Tempering on the Properties of Steel. H. K. Landis. The effects of the coustituents of steel and the functions they fulfil, the tests and their value, the phenomena of hardening, annealing and tempering, alloys, etc. 3500 w. Pro Age—March 15, 1897.

**Tensile Strength.**—Tensile Strength of Steel. H. K. Landis. Discusses the influences that affect the strength of steel, and presents equations, the results of a large number of tests, comments on their discrepancies, etc. 2500 w. Am Mfr & Ir Wld—July 30, 1897.

**Tension Tests.**—Tension Tests. Tabulated data for iron and steel obtained in laboratory of Mass. Inst. of Tech. 2500 w. Tech Quar—June-Sept., 1896.

See also MATERIALS' STRENGTH; TESTING.

**Testing.**—See also Tension Tests; TESTING.

**Thin Sheets.**—See IRON.

**Thomas.**—See also Open Hearth; BRIDGE MATERIAL; OPEN HEARTH PROCESS.

## STEEL ALLOY.

See also ALLOY; IRON ALLOY; METALLOGRAPHY; STEEL—Special; STEEL ANALYSIS.

Special Nickel, Chromium, and Silicon Steels. A. Abraham. Abstract from the "Annalen des Mines." Relates the success attained in the use of nickel steel for armor plates, and the tests made, the use of nickel in the manufacture of gun steel, and considers high nickel steels and nickel-chromium steels. 4000 w. 4000 w. Ir Age —Feb. 2, 1899.

**Aluminum.**—Aluminum in Steel. A. E. Hunt. From a paper entitled "The Utilization of Aluminum in the Arts," contributed to the "Aluminum World." Reviews the special advantages to be gained by its use in steel manufacture. 2000 w. Ir Age—Aug. 5, 1897.

**Arsenic.**—Influence of Arsenic upon the Mechanical Properties of Steel (Etude sur l'Influence de l'Arsenic sur les Propriétés Mécaniques de l'Acier). J. Marchal. The conclusion is drawn from the results of numerous experiments, that the small percentages of arsenic met with in steel have practically no effect upon its working qualities. 1400 w. Bull de la Soc d'Encour—Oct., 1898.

Influence of Arsenic on the Mechanical Properties of Steel. M. J. Marchal. Extract from the "Bulletin de la Société d'Encouragement." Reports a series of experimental tests, concluding that steel otherwise pure will not suffer by the presence of such amounts of arsenic as are occasionally found, though defects due to other impurities may be increased by its presence. 800 w. Ir Age—April 13, 1899.

**Copper.**—Copper in Steel. Albert Ladd Colby. A Summary of the report presented at Philadelphia meeting, Nov. 17, of the Am. Soc. of the International Assn. for Testing Materials and the Assn. of Am. Steel Mfrs. Discusses experiments. 6000 w. Ir Age—Nov. 30, 1899.

**Molybdenum.**—See **MOLYBDENUM STEEL.**

**Nickel.**—See **NICKEL STEEL.**

**Vanadium.**—Vanadium Steel. Otto Vogel, in "Stahl und Eisen." Brief statement of the three methods by which basic steel was treated, in the experiments made, M. K. Hélouis. 500 w. Ir & Coal Trds Rev—Aug. 21, 1896.

**STEEL ANALYSIS.**

See also **IRON ANALYSIS; STEEL.**

**Chromium and Tungsten.**—The Analysis of Chrome and Tungsten Steels. A. G. McKenna. Explains satisfactory methods used by the writer. 1000 w. Pro Engs' Soc of W Penna—April, 1900.

**Electrolytic.**—See **ELECTROLYSIS.**

**"Missing Carbon."**—A Note on the Missing Carbon. T. W. Hogg. What the term "missing carbon" means, as used by H. M. Howe in a recent paper, with investigations showing that the carbon concerned is capable of exact measurement. 1200 w. Ir & Coal Trds Rev—Sept. 4, 1896.

**Moist Combustion.**—The Moist Combustion Methods of Determining Carbon in Steel. George Auchy. Presented to the Am. Chem. Soc. Showing that this process may work faultily in particulars mentioned. Serial. Ind & Ir—April 29, 1898.

**Nitrogen.**—A Note on the Presence of Fixed Nitrogen in Steel. F. W. Harbord and T. Twynam. Read at meeting of the Iron & Steel Inst. Investigations of authors, without conclusions being drawn. 800 w. Ir & St Trds Jour—Sept. 12, 1896.

**Phosphomolybdate.**—The Precipitation of Phosphomolybdate in Steel Analysis. George Auchy. Experiments tending to prove that dilute solutions and the presence of ammonia nitrate are essential conditions for complete precipitation. 1000 w. Jour of Am Chem Soc—Feb., 1896.

**Phosphorus.**—On the Influence of Heat Treatment and Carbon upon the Solubility of Phosphorus in Steels. E. D. Campbell and S. C. Babcock. Researches undertaken with a view to determine whether chemical evidence could be obtained to prove that phosphorus may exist in steel in two forms. 1100 w. Am Chem Jour—Nov., 1896.

On the Influence of Heat Treatment and Carbon Upon the Solubility of Phosphorus in Steels. E. D. Campbell and S. C. Babcock. Contribution to the "Am. Chem. Jour." from the Laboratory of Analytical Chemistry of the University of Michigan. Research undertaken to determine whether chemical evidence could be obtained to prove that phosphorus may exist in steel in at least two forms. 1100 w. Am Mfr & Ir Wld—Jan. 22, 1897.

Recent Phosphorus Determinations in Steel. Discussion of the paper of Mr. Thackray. Comparison of results from six methods. Mr. Blair thinks that check assays by different methods are better than duplicate assays by the same method. 1000 w. Trans Am Inst of Min Engs—Feb., 1896.

**Sulphides.**—See **STEEL.**

**Sulphur.**—Sulphur in Mild Steel. F. E. Thompson. The writer first briefly reviews previous investigations, and then shows the treatment of sulphur in the basic converter and in the basic open hearth furnace, giving a large number of analyses, tests, and other data. 3500 w. Ir Age —April 2, 1896.

**STEEL CAR.**

See **CAR—Steel; STEEL MANUFACTURE—Pressing; STEEL WORKS—Fox; Schoen.**

**STEEL CASTING.**

See also **STEEL INGOT; STEEL MANUFACTURE.**

Steel Castings. From a paper by M. Tissot before the International Congress on Mining and Metallurgy, Paris, giving a review of the subject. 1200 w. Ry & Eng Rev—Sept. 22, 1900.

The Steel Castings Industry of To-day. M. A. Tissot. Read before the Min. & Met. Con., at Paris. Reviews the improvements that have made possible the success. 1000 w. Ir Trd Rev—July 12, 1900.

**Alexander III. Bridge.**—Manufacture of the Cast Steel Voussoirs for the Alexander III. Bridge, Paris. Describes the foundry methods adopted, illustrating the principal details. 2400 w. Eng News—Oct. 19, 1899.

The Cast-Steel Construction of the Alexander III. Bridge, in Paris (Die Stahlformguss-Constructionen der Alexanderbrücke, in Paris). Inspector Frahm. Giving especial attention to the molding and casting of the steel voussoirs. Two articles. 7500 w. Stahl und Eisen—Sept. 1, 15, 1900.

**Blacksmith Shop.**—Blacksmith Shop Study of Cast Steel. G. F. Hinkens. From a paper read before the Northwest Ry. Club, U. S. A. On the treatment in tool making, the hardening and tempering, etc. 3400 w. Prac Engr—Jan. 5, 1900.

**Locomotive Parts.**—Cast Steel Parts of the New Chicago and Alton Eight-Wheel Locomotives. Reproduced drawings and table showing the finished weights of the steel-castings used, and also the weights of similar parts in wrought iron or cast iron. 500 w. R R Gaz—April 20, 1900.

See also **LOCOMOTIVE CONSTRUCTION—Cast Steel.**

**Manufacture.**—The Manufacture of Steel Castings. J. E. Fletcher. From a paper read before the Manchester Assn. of Engs. Examines the design of castings used in machine construction, pointing out where the difficulties occur, and suggesting how to overcome them. Ill. 4000 w. Foundry—Feb., 1900.

**Open-Hearth.**—Open-Hearth Steel Castings. E. C. Wheeler. Reviews the advances made in this industry and the uses to which the castings are applied. 3700 w. Ir Trd Rev—June 14, 1900.

**Paris Exposition.**—Steel Castings at the Exposition of 1900 (Les Aciers Moulés à l'Exposition de 1900). A. Abraham. A discussion of the present state of the art as shown by the exhibits at Paris, both of methods and products. Two articles. 4000 w. Génie Civil—Sept. 15, 22, 1900.

**Tests.**—Experiments on the Elasticity, Tensile Strength and Elongation of Steel Castings (Versuche über Elastizität Zugfestigkeit, Dehnung und Arbeitsvermögen von Stahlguss). C. Bach. With tabulated results of tests at various temperatures. 1500 w. Zeitschr d Ver Deutscher Ing —June 10, 1899.

Steel Castings and Malleable Iron. C. H. Benjamin. Record of tests made in these materials in tension, compression and shear. 1200 w. Digest of Phys Tests—April, 1896.

See also **ELASTICITY; MATERIALS' STRENGTH; TESTING.**

**STEEL CONSTRUCTION.**

See also **BUILDING CONSTRUCTION: FRAMEWORK; OFFICE BUILDING; SKELETON CONSTRUCTION; STEEL — Structural; TALL BUILDING.**

Some Recent Examples of Steel Structural Work Adopted in Various Types of Buildings. Andrew S. Biggart. Read before the Inst. of Engs. and Shipbuilders, Scotland. Deals principally with some works carried out by the author's firm, but only in a general way. Ill. 3300 w. Ir & St Trds Jour—March 27, 1897.

**American vs. English.**—American and English Practice in Architectural Steel Construction. Charles V. Childs. A comparison, with illustrations, of the different methods of construction existing in the two countries. 2500 w. Eng Mag—May, 1898.

**Electric Power Station.**—Steel Work in a Modern Power House. Harry R. Jones. Illustrated description of the new electric power house of the Metropolitan Street R. R. Co., at Kansas City, Mo. A good example of modern steel power house construction. 900 w. Eng News—April 8, 1897.

**Fireproof.**—See **FIREPROOF CONSTRUCTION; SKELETON CONSTRUCTION.**

**Rust and Fire.**—See **FIREPROOF CONSTRUCTION; METAL CORROSION; SKELETON CONSTRUCTION—Fire and Rust.**

### STEEL INDUSTRY.

See also **ENGINEERING COMPETITION; IRON INDUSTRY; STEEL MANUFACTURE; STEEL WORKS.**

**British.**—The Bessemer Steel Industry of the United Kingdom in 1895. Statistics collected from the manufacturers by the British Iron Trade Assn., in regard to the production of ingots, of Bessemer steel rails, of finished steel, and extent of employment of plant. 1000 w. Ir & Coal Trds Rev—June 12, 1896.

The British Steel Industry. The returns for the first six months of the current year show the largest output ever produced in the same time in any European country. 1000 w. Arch, Lond—Oct. 22, 1897.

British Production of Steel in 1898. Statistics showing a decrease on the previous year. 800 w. Col Guard—March 17, 1899.

The Make of Open-Hearth and Bessemer Steel in the United Kingdom in the First Half of 1899. Statistics collected by the British Iron Trade Assn. 800 w. Ir & Coal Trds Rev—Sept. 8, 1899.

**Germany.**—The Import of the Recent Development of Low Steel (Die Bedeutung und Neuere Entwickelung der Flusseisenerzeugung). A most valuable paper read before the Düsseldorf convention of the German Association of Iron Manufacturers by Herr Schrödter, with many important tables and diagrams. 20000 w. Stahl und Eisen—May 1, 1897.

**Great Lakes Export.**—Reaching for Export Business. Pittsburg iron and steel producers finding the way to reach the world's markets via the Welland Canal and the St. Lawrence River. 700 w. Am Mfr & Iron Wld—Sept. 13, 1900.

Steel Shipments to Seaboard by All-Water Route. A discussion of the probable traffic between the Great Lakes and the seaboard, by way of the Canadian Waterways. 1700 w. Ir Trd Rev—Sept. 20, 1900.

See also **CANAL; GREAT LAKES; IRON ORE TRANSPORTATION; WATERWAY.**

**Open Hearth, U. S. Production.**—The Production of Open Hearth Steel in the United States. Statistical summary principally from the "Bulletin of the American Iron & Steel Assn." 900 w. Ir Age—April 16, 1896.

**United States.**—See also **SHIPBUILDING—Steel.**

### STEEL INGOT.

See also **BESSEMER PROCESS; STEEL CASTING; STEEL MANUFACTURE.**

**Casting.**—A Method of Casting Steel Ingots. Illustrates and describes a method devised by J. K. Griffith, of casting compound ingots, composed of layers of steel of different composition, to overcome the difficulties from segregation and piping, and to insure homogeneous metal. 1200 w. Ir Trd Rev—May 4, 1899.

**Defects.**—The Defects of Steel Ingots (Les Défauts des Lingots d'Acier). A critical study of the defects caused by over or underheating, sudden cooling, and variations in composition, together with an account of the influence of pressure, and the best precautions to be observed to obtain satisfactory results. Two articles. 7000 w. Génie Civil—Jan. 15, 22, 1898.

**Gun Tubes and Propeller Shafts.**—Ingots for Gun Tubes and Propeller Shafts. F. J. R. Carulla. Read before the Iron and Steel Inst. Reports experiments made and discusses the forms found to best answer the required conditions. 1200 w. Col Guard—June 1, 1900.

**Mold.**—Mold for Steel Ingot. Henry L. Gantt. Specification descriptive of an invention to prevent the ingots from cracking along the surface. Ill. 1600 w. Am Mfr & Ir Wld—July 13, 1899.

**Stripper.**—Evans' Ingot Stripper. Illustrated description of a machine designed to strip two ingots at the same time, the ingots worked being about 6 ft. high, though both long and short pieces can be stripped with equal ease. 1500 w. Engr, Lond—Oct. 13, 1899.

**Tube Manufacture.**—See **TUBE MANUFACTURE—Casting Ingots.**

### STEEL MAKERS.

**Pittsburg.**—The Great Steel Makers of Pittsburg and the Frick-Carnegie Suit. Julius Moritzen. An explanation of the suit with review of Mr. Carnegie's career, and also of the life of H. C. Frick, giving a brief account of the company. Ill. 6500 w. Rev of Revs—April, 1900.

### STEEL MANUFACTURE.

See also **ARMOR PLATE; BESSEMER PROCESS; IRON MANUFACTURE; IRON INDUSTRY; METALLURGY; OPEN HEARTH PROCESS; ROLLING MILL; STEEL INDUSTRY; STEEL WORKS.**

Recent Progress in Methods of Producing Steel (Die Neueren Fortschritte in der Flusseisenerzeugung). Frits Lürmann, Jr. A paper read before the Verein Deutscher Eisenhüttenleute, giving an illustrated account of improvements in converter and open hearth processes; with the ensuing discussion. 11000 w. Stahl und Eisen—Aug. 1, 1900.

Steel Processes. B. F. Spalding. Brief discussion of new processes, and opinions of metallurgists. 2800 w. Prac Eng—March 26, 1897.

The Manufacture of Steel. A review of premodern methods of manufacture is given in the present article. Serial. Auto Jour—Oct., 1900.

**Acid vs. Basic.**—Acid vs. Basic Steel. The views of two leading manufacturers as to the reliability of the two processes. 1300 w. Ir Age—March 10, 1898.

**Annealing.**—See also **ANNEALING.**

**Basic.**—A Study of the Thomas Converter (Etude sur le Convertisseur Thomas). A. Spilberg. A general discussion of the form, dimensions and accessories of a 12 ton basic converter. 800 w. Rev Univ des Mines—Feb., 1900.

Basic Refined Steel on the Continent. C. E. Stromeyer. Read at the Inst. of Engs. and Shipbuilders in Scotland. Discusses the three processes of basic steel in some detail and aims to show that what the writer calls basic refined steel is a material surpassing that produced in the acid open hearth. 5800 w. Engng—June 17, 1898.

Basic Refined Steel on the Continent. C. E. Stromeyer. From a paper read before the Institution of Engineers and Shipbuilders in Scotland. Discusses the three basic processes, and explains how far the basic refining process differs from that of the Thomas open hearth, and further operations on the refined steel. 5800 w. Col Guard—Jan. 28, 1898.

Loss in the Thomas Process. Abstract from "Stahl und Eisen." The article gives the total loss ranges between 18 per cent. and 17 per cent., itemised. 700 w. Am Mfr & Ir Wld—Feb. 14, 1896.

On the Present Condition of the Manufacture of Basic Steel and Its Influence Upon That of Puddled Iron. M. G. Rocour. Abstract of a paper read before the Paris Min. and Met. Cong. Describes the present condition of this industry, and discusses the future outlook. 1500 w. Ir & Coal Trds Rev—July 27, 1900.

Present State of the Basic Process. M. G. Rocour. From a paper prepared for the International Congress, Paris. Considers the great extension of the basic Bessemer process and the causes, and discusses the effect on the iron manufacture. 1100 w. Col Guard—July 13, 1900.

The Metamorphoses of the Basic Steel Process and the Methods of Testing Steel Rails (Metamorphosen der Basischen Schienenstahlbereitung und des Prüfungsverfahrens der Stahlschienen). Prof. L. Tetmaier. A discussion of the basic steel process, especially with regard to its use for rails. Also many illustrations of etched rail sections, showing structure. Five articles. 15000 w. Schweizer Bauzeitung—Nov. 7, 14, 21, 28 and Dec. 12, 1896.

The New Basic Steel Manufacturing Process.

Description, with editorial comment, of the patent of B. P. Stockman, by the use of which it is claimed that Cleveland or other iron not now available for steel making may at small expense be converted into steel which shows excellent analysis and answers to required tests. 2200 w. Ir & Coal Trds Rev—Oct. 9, 1896.

The Thomas Process (Thomas Process). A paper giving a general résumé of the Thomas steel process, read by Herr Kintzlé at the Düsseldorf meeting of the Eisenhüttenleute. 6000 w. Stahl und Eisen—May 15, 1897.

See also **OPEN HEARTH PROCESS.**

**Basic Open Hearth.**—See also **BESSEMER PROCESS—Southern U. S.; OPEN HEARTH PROCESS.**

**Bertrand-Thiel Process.**—See **OPEN HEARTH PROCESS.**

**Bessemer.**—See **BESSEMER PROCESS.**

**Castings.**—See **STEEL CASTING; STEEL INGOT.**

**Cementation.**—A New Cementation Process. A new method with similar purpose to that of the Harvey system; consists in cooling the steel before the carbon can penetrate into the molten mass too far while pouring. A section of the mold is given. 600 w. Col Guard—Nov. 1, 1895.

See also **METALLOGRAPHY; STEEL.**

**Charging Machine.**—Furnace Charging Apparatus. Illustrates and describes an invention to be adopted by the National Tube Works to carry skelp or plates to be heated. 2200 w. Am Mfr & Ir Wld—May 3, 1900.

See also **OPEN HEARTH PROCESS; ROLLING MILL—American.**

**Crucible.**—See **CRUCIBLE; STEEL; STEEL WORKS.**

**Direct Process.**—The Manufacture of Steel Direct from the Ore in the Blast Furnace. Dimitris Tschernoff. Read before the British Iron and Steel Inst. Illustrates and describes a construction of blast-furnace by which this may be attained. 700 w. Col Guard—May 12, 1899.

See also **IRON MANUFACTURE.**

**1897.**—The Metallurgy of Steel in 1897 (La Métallurgie de l'Acier en 1897). A. Boudon. A general review of the progress of the past year, dealing with details of new processes. Serial. 1st part. 4000 w. La Rev Tech—Jan. 25, 1898.

**"Flow" in Rolling.**—"Flow" in Rolling of Steel. William Cuthill. Read before the West of Scotland Iron and Steel Inst. The operation of rolling is considered in relation to the experiments of M. Tresca upon the "flow" of solids, and the three points of speed of bar, diameter of rolls and depth of draft are studied in reference to economy of driving power of the mill. 2200 w. Col Guard—Jan. 22, 1897.

**Fluid Compression.**—Fluid Compression of Steel. H. K. Landis. A criticism of statements made by W. F. Durfee and published in the "Journal of the Franklin Inst." 1800 w. Am Mfr & Ir Wld—Nov. 20, 1896.

**Forgings.**—A Comparison of the Hollow Bored Method and the Fluid Compression Hollow Forged Method of Making Steel Forgings. George H. Bryant. Illustrated description of methods used at the Krupp Works, and why they are used. Written discussion by H. F. J. Porter, with closure by author. 6800 w. Jour W Soc of Engs—Aug., 1898.

See **FORGING.**

**Hardening.**—Early Methods of Hardening Steel (Stahlhärten in Früheren Zeiten). Otto Vogel. A contribution to the history of iron, showing the development of the present knowledge from the earliest times. 3000 w. Stahl und Eisen—March 1, 1899.

Note on Mr. Howe's Researches on the Hardening of Steel. F. Osmond. Read before the British Iron and Steel Inst., with discussion. A comparative examination of manganese, nickel, and active carbon to see how the critical points and the essential physical properties may be correlated. 7200 w. Ir & St Trds Jour—May 16, 1896.

See also **Taylor-White; Tool; STEEL; TOOL.**

**Heat Treatment.**—See **IRON MANUFACTURE; STEEL.**

**India.**—The Prospects of Steel Making in India. M. Investigations into the relative cost of producing iron in India and Durham, England, and Connellsville, U. S., with the conclusion that there is a reasonable prospect for profit in pig iron made in India. 2500 w. Eng, Lond—Nov. 1, 1895.

**Ingot Charging Machine.**—See **ROLLING MILL—American.**

**Ingots.**—See **BESSEMER PROCESS; STEEL INGOT.**

**Japan.**—Experiments in Steel Making in Japan. Briefly notes the experiments, results and considerations entertained by the Japanese Government preparatory to starting a steel making establishment. 1800 w. Engng—Jan. 8, 1897.

**Ladle Carriage.**—A Car for Carrying Molten Metal. Brief illustrated description of a car used by the Carnegie Steel Co. 300 w. Ry Age—Sept. 23, 1898.

Carriage for a Ladle of 20 Tons' Capacity (Giesspfannenwagen für 20000 kg Pfanneninhalt). An illustrated description of two carriages, one operated by steam and hydraulic power, the other electrically, for transporting and pouring ladles containing molten metal. 800 w. Stahl und Eisen—June 15, 1900.

Locomotive Ladle (Locomotivgiesswagen). A traveling ladle including crane, and propelling machinery, the whole traveling on a track. The ladle has a capacity of 25 tons. Photograph and elevation. 1000 w. Stahl und Eisen—July 15, 1897.

**Magnetic Plate Lifters.**—See **ELECTROMAGNET—Steel Works.**

**Martin Process.**—See **OPEN HEARTH PROCESS.**

**Merchant Steel.**—The Continuous System as Applied to the Rolling of Merchant Steel. Illustrated description of the system and plant. 1500 w. Ir Age—Jan. 18, 1900.

**Open Hearth.**—See **OPEN HEARTH PROCESS.**

**Plates.**—See also **ARMOR PLATE; ROLLING MILL; STEEL PLATE.**

**Pressing.**—The Pressing of Steel; With Especial Reference to Economy in Transportation. Henrik V. Loss. Describes a series of experiments giving a general view of the results. Ill. Serial. Jour Fr Inst—Dec., 1899.

See also **CAR—Steel; STEEL WORKS.**

**Sheet Metal.**—See also **SHEET METAL.**

**Siemens-Martin.**—See **OPEN HEARTH PROCESS.**

**Structural.**—See also **STEEL; STEEL SPECIFICATIONS.**

**Structural Shapes.**—The Making of Structural Steel. F. H. Kindl. Read before the Am. Inst. of Archts., at Pittsburg. Describes the operations involved in the manufacture of structural shapes. 4500 w. Ir & Trd Rev—Nov. 16, 1899.

See also **STEEL; STEEL SPECIFICATIONS.**

**Taylor-White.**—The Taylor-White Process of Treating Steel. An illustrated account of a series of tests made to exhibit the quality of steel treated by this process. 1700 w. Am Mach—Aug. 16, 1900.

The Taylor-White Steel Process. A description of the results of a process for hardening tools, employed in the machine shops of the Bethlehem Steel Co. 1100 w. Eng Rec—Aug. 4, 1900.

**Temperature Colors.**—See **STEEL.**

**Tempering.**—Practical Tempering of Steel. W. B. Braucher. Describes peculiarities of steel noticed while working with several kinds of steel in the same set of knives which were being resharpened and hardened. 1500 w. Tech—No. XI., 1897.

Steel, Fire and Water. Contains valuable and practical hints on hardening and tempering. 2400 w. Am Mach—Dec. 5, 1895.

**Tempering Color.**—Tempering by Color. B. F. Spalding. Considers ornamental bluing, methods of heating, tempering sewing machine needles, knife section coloring, gas fuel furnaces, regulation of heat, etc. 2400 w. Am Mach—June 2, 1898.

**Tempering, Commercial.**—Commercial Tempering. H. K. Landis. The tempering and annealing of steel in large masses. The operation is briefly described, and a table is given showing the effect. 1700 w. Ir Age—April 30, 1896.

**Thomas.**—See **Basic; OPEN HEARTH PROCESS.**

**Tipping Furnace.**—See **OPEN HEARTH PROCESS.**

**Tool.**—Handling Tool Steel. S. K. Stupakoff. Urging the use of a reliable pyrometer, free intercourse between steel maker and steel worker, making it compulsory that an analysis should be furnished, and information on all points of service to the steel worker. 2400 w. Ir Age—Feb. 17, 1898.

See also **Hardening; Taylor-White; TOOL.**

**Toughening.**—The Coffin Toughening Process. L. R. Pomeroy. From a paper presented at the Feb. meeting of the Western Railway Club. This process of toughening steel is described, its advantages discussed, and tests reported. 1600 w. R R Gaz—March 18, 1898.

**Tropenas Process.**—Notes on the Tropenas Steel Process. Alexander Tropenas. Read at the Cincinnati meeting of the Am. Foundrymen's Assn. Gives description of plant operation, quality of metal, etc., with cost. 4000 w. Ir Age—June 16, 1898.

The Tropenas Process of Steel Making. A letter from the Imperial Steel Works, of Sheffield, Eng., testifying to the success of the process, with summary of claims made by the inventor in his specification, and comments of Dr. Henry M. Howe. 2700 w. Eng News—Nov. 4, 1897.

The Tropenas Steel Converter. Carl Pixis. Illustrated description of a converter devised for the conversion of phosphoric or hematite pig iron into ingot iron or steel by compressed air at a low pressure. 1200 w. Eng & Min Jour—May 1, 1897.

The Tropenas Steel Making Process. The object of this invention is to obtain by pneumatic means, greater heat than is reached by the ordinary pneumatic process, and to secure a material of greater ductility. Illustrated description of the system is given, with report of tests. 2300 w. Engng—Jan. 14, 1898.

**Thwaite Reverberatory Furnace.**—See **FURNACE.**

**Walrand-Legenisel Process.**—See **BESSEMER PROCESS.**

**STEEL METALLURGY.**

See **STEEL MANUFACTURE.**

**STEEL PEN.**

See **Pen.**

**STEEL PIPE.**

See also **PIPE; WATER PIPE.**

**Friction Coefficient.**—See **WATER FLOW—Steel Pipe Friction Coefficient.**

**STEEL PLATE.**

See also **ARMOR PLATE; IRON PLATE; MATERIALS' STRENGTH; PLATE.**

**American vs. English.**—American and English Methods of Manufacturing Steel Plates. Jeremiah Head. Read before the Inst. of Civ. Engs. Illustrated discussion of the processes used and comparison of methods. 8000 w. Ir Age—Dec. 24, 1896.

**Basic Open Hearth.**—Tests of Basic Open Hearth Steel Plates. T. L. Condron. Presents 46 tests, representing 19 different melts of basic open hearth steel. 900 w. Eng News—March 31, 1898.

**Manufacture.**—Appliances for the Manufacture of Ship and Boiler Plates. Illustrated description of metal-working machines for billet-shearing, slab-shearing, and plate-shearing. 800 w. Ir & Coal Trds Rev—Jan. 28, 1898.

See also **STEEL MANUFACTURE.**

**Tests.**—Some Results of Transverse and Tension Tests of Steel Plates. Abstract of report given by W. K. Hatt, at meeting of the Am. Soc. of the International Assn. for Testing Materials. Interesting and valuable information. 1200 w. R R Gaz—Sept. 8, 1899.

**STEEL SPECIFICATION.**

See also **BRIDGE SPECIFICATIONS; SPECIFICATIONS; TESTING.**

First Principles of Steel Specifications. H. K. Landis. Arguing that a specification defining the qualities which the purchaser desires is not sufficient, but a clause should be added describing the purpose for which the material is intended. 1400 w. Am Mfr & Ir Wld—Jan. 1, 1897.

Standard Specifications for Steel. W. R. Webster. A discussion of the fairest specification requirements from the standpoint of the trained inspector, taking into account chemical composition, conditions of working, and effect of temperature. 4500 w. Eng Mag—March, 1899.

Specifications on Structural Steel and Rails. Discussion by W. R. Webster, H. V. Wille, A. A. Stevenson, John Sterling Deans, Charles B. Dudley and Paul Kreuzpointner. 6000 w. Jour Fr Inst—Jan., 1899.

**Austrian Bridges.**—See **BRIDGE MATERIAL.**

**American.**—American Standard Specifications and Methods of Testing Iron and Steel. Albert Ladd Colby. Read before the Iron and Steel Inst. A critical review of the requirements, as indicated by American manufacturers. 7300 w. Ir & Coal Trds Rev—Sept. 21, 1900.

**Boiler.**—Boiler-Steel Specifications. A collection of figures selected from specifications under which a large quantity of boiler steel is being purchased for both locomotive and stationary boilers, with comments and editorial. 2000 w. Ry & Engng Rev—Aug. 27, 1898.

See also **BOILER SPECIFICATIONS.**

**Bridge.**—The Proposed Specifications for Steel for Bridges, etc. H. R. Seaman. Considers the manufacturers' specification, criticising various clauses. 700 w. R R Gaz—June 22, 1900.

See also **American; Structural; BRIDGE MATERIAL; BRIDGE SPECIFICATIONS.**

**High.**—See **STEEL—High Specification.**

**International.**—International Standard Specifications for Steel and Iron. A discussion of the report of the American section of the International Assn. for Testing Materials. 6700 w. Col Guard—July 27, 1900.

**Structural.**—Specifications for Iron and Steel Work in Buildings. Maurice M. Sloan. Gives a sample specification. 4500 w. Am Archt—June 30, 1900.

Specifications for Structural Iron and Steel. B. L. Worden, in the "Wisconsin Engineer." A paper intended more especially for those whose experience is yet to be acquired, hoping it may lead to more complete study and better understanding of the subject. 1400 w. Arch & Build—Sept. 5, 1896.

Specifications for Structural Steel. Suggestions for their improvement. 900 w. Eng Rec—Nov. 26, 1898.

Standard Specifications for Structural Steel. The text of the specifications adopted by the American Steel Mfrs. 1800 w. 1800 w. Ry Rev—Oct. 10, 1896.

Standard Specifications for Structural Steel. Specifications are given in full as adopted by the Assn. of Am. Steel Mfrs. 1500 w. Eng & Min Jour—Aug. 1, 1896.

Standard Specifications for Structural Steel. Specifications adopted Aug. 9, with diagram showing shape and dimensions of standard test piece for shear plates. 1600 w. Ir Age—Aug. 27, 1896.

See also **STEEL.**

**Structural Shapes.**—Proposed Standard Structural Shapes. Report of a committee of the Assn. Am. Steel Mfrs. giving drawing of sections of I beams and channels, the general formulae for weight, strength, and moment of inertia of such sections, and tables of different weights and dimensions. 450 w. Ir Age—Jan. 9, 1896.

Recent Changes in Structural Shapes of Rolled Steel. F. E. Kidder. Table giving the standard weights for beams and channels, and the weights and areas of the standard sizes of angles, as adopted by the Assn. of Am. Steel Mfrs., with additional information. 800 w. Arch & Build—July 25, 1896.

**STEEL TAPE.**

See **TAPE—Steel.**

**STEEL WORKS.**

See also **BESSEMER PROCESS; IRON WORKS; OPEN HEARTH PROCESS; ROLLING MILL.**

**American.**—Novelties in American Steel Works (Neuerungen bei Amerikanischen Stahlwerken). H. Staunnschulte. An address delivered before the "Eisenhütte Oberschlesien," giving an illustrated description of new improvements in various American steel plants. 2200 w. Stahl und Eisen—April 1, 1900.

**Apollo.**—See **IRON WORKS; STEAM ENGINE—Rolling Mill.**

**Barrow Hematite Co.**—The Works and Operations of the Barrow Hematite Steel Company. Illustrated detailed description of the works, with brief historical account. 5500 w. Ir & Coal Trds Rev—Aug. 4, 1899.

**Bethlehem, Pa. Plate Mills.**—The Bethlehem Plate Mills. Illustrated detailed description. 1800 w. Ir Age—Jan. 21, 1897.

**Braeburn, Pittsburg.**—The Braeburn Steel Works. An account of the organization and opening of new works near Pittsburg, with description and plan. 1800 w. R R Gaz—Dec. 3, 1897.

**Braun's, Germany.**—See **Crucible.**

**China.**—The Han-yang Steel Works, China. F. Lynwood Garrison. An account of the only iron and steel works of any importance in China, with illustration. 1000 w. Ir Age—Sept. 13, 1900.

**Consett, Eng.**—The Consett Steel Works. General description of a notable English works, illustrated by views. 3300 w. Ir & Coal Trds Rev—Jan. 31, 1896.

**Creusôt.**—Messrs. Schneider and Co.'s Works, Creusôt. Historical and descriptive. Ill. Serial. Engng—Jan. 7, 1898.

**Crucible.**—The Crucible Steel Works of J. Braun's Sons at Schloss Schöndorf (Die Tiegel-Gusstahlfabrik von J. Braun's Söhnen in Schloss Schöndorf). With plans of the furnaces and illustrations of armor-plate products. 2500 w. 1 plate. Oesterr Zeitschr f Berg u Huttenwesen—May 27, 1899.

See also **CRUCIBLE; STEEL.**

**Domnarfvet, Sweden.**—The Domnarfvet Works. A brief account of the works of Stora Kopparbergs Bergslags Aktiebolags and the Sandvik Works. Ill. 1200 w. Ir & Coal Trds Rev—Aug. 26, 1898.

See also **Sandvik.**

**Ensley, Ala.**—The Alabama Steel Plant. A. M. Shook. Relates to the large steel plant to be built by the Tennessee Coal, Iron and Railroad Co. at Ensley, Ala. 1400 w. Ir Age—June 23, 1898.

**Fox Pressed.**—Pittsburg Works of the Fox Pressed Steel Equipment Co. Illustrated detailed description of new works which are said to be the finest and most complete of their kind in this country. 1500 w. Ry Rev—June 5, 1897.

**Glasgow.**—The Steel Works of the Glasgow Iron and Steel Company. Illustrated detailed description of one of the largest and best known concerns of its kind in Scotland. 3500 w. Ir & Coal Trds Rev—Nov. 19, 1897.

**Illinois Company**—The Illinois Steel Company. Illustrated description and leading facts connected with the works of this company, with a brief historical and statictical statement. 11500 w. Ir Age—July 15, 1897.

The South Works of the Illinois Steel Company. Victor Windett. A full and clear illustrated description of these works, with discussion. 8500 w. Jour W Soc of Engs—Feb., 1898.

The Works of the Illinois Steel Company, U. S. A. Describes the property and plants of the company, its business and resources in a general way, and particularly describes the largest plant, at Chicago. Serial. Engr, Lond—Dec. 23, 1898.

**Japan.**—Japanese Steel Works, Yawatamura. An account of two blast furnaces being erected for the making of rails, rods, sheets, and cast steel. 1200 w. Am Mfr & Ir Wld—Jan. 18, 1900.

The Japanese Imperial Steel Works. Emile Schrödter. Translated from "Stahl und Eisen." An illustrated description of these works, and general remarks concerning the industry. 2500 w. Ir & Coal Trds Rev—Feb. 2, 1900.

**Jones & Laughlin, Pittsburg.**—Jones & Laughlin Co., Ltd., and the Production of Steel. A description of the plants and equipment of a modern metal working establishment near Pittsburg. Serial. Elec Eng, N. Y.—Oct. 20, 1898.

**Krupp.**—The Home of the Krupp Gun. C. E. Carpenter. A general account of the different Krupp works. 1500 w. Sci Am—Sept. 22, 1900.

**Lackawanna, Pa.**—The Lackawanna Steel Works, United States. Brief description, with cut of the rail conveyer and loader. 1700 w. Ir & Coal Trds Rev—April 3, 1896.

**Latrobe, Pa.**—The Latrobe Steel Works. An interesting illustrated general description. 1600 w. Engng—May 1, 1896.

**Lorain, O.**—The Lorain Steel Company's Works, Ohio. Robert W. Hunt. An interesting illustrated account of the selecting of the site, the rapid building of substantial works, the arrangements for attractive homes for employes, etc., with detailed description of the plant. Serial. Engng—Jan. 6, 1899.

**Louvière, Belgium.**—The Works of the Boël Brothers, La Louvière, Belgium. The Bessemer steel is "pooled" with an elm pole and the top of the ingot mold is fastened down with a single bent wedge. There are other novel features not usual in American practice. Ill. 600 w. Ir & Coal Trds Rev—March 6, 1896.

**Maryland Company.**—The Maryland Steel Company. Illustrated detailed description of the interesting plant at Sparrow's Point, Md. 2800 w. Ir Age—Dec. 9, 1897.

**Open Hearth.**—See also **OPEN HEARTH PROCESS; STEEL INDUSTRY.**

**Open-Hearth, Alabama.**—Open-Hearth Steel Plant of the Alabama Steel & Shipbuilding Co., at Ensley, Ala. An illustrated detailed description of this important plant. 3200 w. Ir Trd Rev—Aug. 23, 1900.

**Parkhead, Scotland.**—Parkhead Forge, Rolling Mills and Steel Works. Description of a notable Scottish iron-works. Ill. Serial. Eng, Lond—Feb. 7, 1896.

**Pressed.**—See **Fox; Schoen; STEEL MANUFACTURE.**

**Saarbrück, Germany.**—The Saarbrück Steel Works (Saarbrücker Gusstahlwerke). A general description of the works, with views showing the electric power plant and the electric driving. 1500 w. Stahl und Eisen—Nov. 1, 1899.

**St. Nazaire, France.**—The Steel and Iron Works of Trignac (Les Aciéries, Haut Fourneaux et Forges de Trignac). Hubert Bya. A full description of these important works, near St. Nazaire, France, with plates of details. 9000 w. 4 plates. Revue Universelle des Mines—June, 1898.

**Sandvik.**—The Sandvik Steel Works. Particulars of plant and operation. Ill. 1800 w. Ir & Coal Trds Rev—Aug. 27, 1897.

See also **Domnarfvet, Sweden.**

**Schoen Pressed.**—The Works of the Schoen Pressed Steel Company. Account of these works with illustrations of shops and products. 1600 w. R R Gaz—June 10, 1898.

**Troy Basic Bessemer.**—The Troy Basic Bessemer Steel Plant. An illustrated description of the plant which is being built on a similar plan to the Pottstown, Pa., basic Bessemer plant. 1000 w. Ir Age—Jan. 16, 1896.

**Vandergrift, Pa.**—See **Apollo.**

**Vickers', Sheffield.**—Vickers' Works at Sheffield, England. Historical account and illustrated detailed description. Serial. Engng—Oct. 1, 1897.

**Youngstown, O.**—The Youngstown Bessemer Plant of the Republic Iron & Steel Company. Illustrated detailed description. 1100 w. Ir Age—Oct. 11, 1900.

**STEEPLE.**

See also **BUILDING CONSTRUCTION; DOME; TOWER.**

**Newcastle-on-Tyne.**—The Steeple of St. Nicholas, Newcastle-on-Tyne. From the "Newcastle Daily Leader." Its history and the work of repair. 1500 w. Brit Arch—March 27, 1896.

**Structural Metal.**—The Computation of Octagonal Pyramidal Towers (Die Berechnung Achtseitiger Turmpyramiden). H. Müller-Breslau. A very complete mathematical treatment for the construction of steeples of framed structural metal, with diagrams showing the best methods of framing and bracing. 6000 w. Zeitschr d Ver Deutscher Ing—Sept. 16, 1899.

**STEERING.**

See also **MARINE ENGINEERING; NAVAL ARCHITECTURE; STEERING GEAR.**

Is the Steering of the Modern Screw-Propelled Vessel Defective? Cornelius W. McKay. Discusses the control of twin-screw ships. Serial. Sci Am Sup—March 31 and April 7, 1900.

The Steering of Ships (Ueber das Steuern der Schiffe). C. W. Suppán. An examination into the manner in which the rudder acts upon the water in steering, together with a discussion of modern steering machinery. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 1, 1899.

On the Steering of Ships and the So-Called "Patent Ship Steering Gear." C. W. Suppán. Reprint from "Zeitschrift des Oesterr Ingenieur und Architekten-Vereines." Treats of the rudder and steering gear, giving illustrated description of the mechanical apparatus named. 3000 w. Ir & St Trds Jour—Nov. 11. 1899.

**Compressed Air.**—An Account of the Attempts to Introduce Compressed Air for Steering Vessels. J. C. Walcott. Gives the history of attempts in this line during the last fifteen years, stating the benefits, and the improvements. 700 w. Compressed Air—April, 1899.

**Rudder Action.**—On the Action of the Rudder, with Special Reference to the Motion of the Ship While the Helm is Being Put Over. William F. Durand. Collection of data and account of experimental investigations. Mathematical. 12 plates. 4200 w. Soc of Nav Archts & Marine Engs, No. 14—Nov., 1899.

**Rudder Balanced.**—The Distribution of Pressure Due to Flow Round Submerged Surfaces, with Special Reference to Balanced Rudders. H. S. Hele-Shaw. Read before the Inst. of Nav. Archts., England. On the manner of investigating the relative distribution of the pressure. Ill. Serial. Engng—July 13, 1900.

**"Yashima."**—The Steering Qualities of the "Yashima." Philip Watts. Read at session of Inst. of Naval Archt's, England. Reports a series of turning trials. 1400 w. Engr, Lond—April 15, 1898.

See also **BATTLESHIP.**

### STEERING GEAR.

See also **STEERING.**

**Automobile.**—A Study of Steering Gears With Two Pivots. Mostly taken from some recent contributions to "La Génie Civil" and "Engineering." Ill. 2000 w. Automotor Jour—Nov., 1899.

**Cameron's Self-Regulating.**—The Steering Gear of the Battleship "Fuji." Drawings with explanatory diagrams and description of Cameron's patent self-regulating steering gear with which the ship is fitted. 1000 w. Eng, Lond—April 9, 1897.

**Electric.**—Electrical Steering Gear for Ships. Illustrations and explanation of the machinery and wiring and how it works. Four Russian war ships are to be fitted with the electrical steering gear. 1800 w. Marine Rev—Feb. 8, 1900.

Electric Steering Gear (Elektrische Steuerruder Maschine). Illustrated description of Essberger's electric steering engine, now being applied in the German Navy. Two motors running in opposite directions are geared to an epicyclic train, and one or the other overruns according to the motion of the controlling lever. 2000 w. Elektrotechnische Zeitschrift—Feb. 4, 1897.

**Harfield.**—The Harfield Steering Gear of the Italian Cruiser "Carlo Alberto" (Meccanismo Harfield per il Timone della R. Nave "Carlo Alberto." An illustrated description of a steam steering gear of English origin, especially suited for naval vessels. 1800 w. 2 plates. Rivista Marittima—Dec., 1898.

**Joessel.**—An Improved Form of Equilibrium Steering Gear (Nouveau Type de Gouvernail Equilibré). A description of the Joessel steering gear, in which a geared tumbling bob is used to counteract the lateral pressure upon the rudder. 1200 w. Génie Civil—Feb. 24, 1900.

### STERILIZATION.

See also **DISINFECTION.**

**High Pressure.**—The Sterilization of Liquids in Bulk under High Pressure (Stérilization des Liquides en Grandes Masses sous Hautes Pressions). The Kuhn process, by means of which all decomposition or cooking of the liquid is avoided and fermentation may be arrested at any stage. 1200 w. La Revue Technique—April 10, 1897.

### STILL.

**Laboratory.**—A Convenient Still for the Laboratory. Charles E. Wait. Illustrated detailed description. 500 w. Jour Am Chem Soc—Dec., 1895.

### STOCK-YARDS.

Stock-Yards and Stock-Sheds, Including All Details of Construction. Numerous plans showing the practice of different railways, with brief report of committee. 1200 w. American Assn of Ry Supts of Bridges and Buildings—1897.

### STOKING.

See also **FIRING; SMOKE PREVENTION.**

**Mechanical.**—See **MECHANICAL STOKING.**

### STONE.

See also **BLUESTONE; BROWNSTONE; BUILDING MATERIAL; GRANITE; LIMESTONE; MARBLE; QUARRY; SANDSTONE; SHALE; SLATE.**

A Story of Stone. This is one of a series of articles intended to present many interesting facts regarding stone, reviewed from a scientific standpoint, and with reference to its practical value in construction, etc. 2000 w. In Arch—April, 1896.

Rocks and Building Stone. Dr. A. P. Coleman. From the report of the Ontario Bureau of Mines, 1893. Considers rocks from the geologists as well as the architects point of view, and gives description and analysis of the kinds most used for building, and the tests that should be made to determine the strength and durability. 1600 w. Stone—June, 1896.

**Alabama.**—Limestones and Marbles of Alabama. Information concerning stones for building, paving, curbing, etc. 2500 w. Stone—Oct., 1899.

The Stone Industry of Alabama. Eugene A. Smith. Information concerning the building and ornamental stones of this state. 1400 w. Eng & Min Jour—Oct. 1, 1898.

**American Architecture.**—Stone in American Architecture. Russell Sturgis. Interesting illustrated discussion of the use of various stones as a material, stone-working, etc. 10000 w. Arch Rec—Oct.-Dec., 1899.

**Bedford.**—See **BUILDING MATERIAL—Stone, Cement, etc.**

**Bridge.**—Bridge Stones of the Central States. C. A. Raymond. Calls attention to the magnitude of this industry, and gives information concerning a few of the strata furnishing building or bridge stone. Ill. 3400 w. Bridges—July, 1899.

**Building.**—Building Stones—Elements of Strength in Their Constitution and Structure. Alexis A. Julien. Considers the foundations on which methods of testing should be based to determine their strength. Ill. Serial. Jour Fr Inst—April, 1899.

Building Stones and Stone Cutting. Alexander Marshall. Read before the Toronto Chapter, Ontario Assn. of Archts. Suggestions concerning the choice of building stone, and the kinds most used, with remarks on stone-cutting. 2200 w. Stone—April, 1900.

Building Stones and Stone Cutting. Alexander Marshall. Read before the Toronto Chapter Ontario Assn. of Archts. Gives information relating to the strength and durability of various stones, and the care needed in cutting. 2700 w. Can Archt—Dec., 1899.

Essential Properties of Building Stones. H. Foster Bain. From Monthly Review Iowa Weather and Crop Service. A general article. Serial. Stone—Nov., 1895.

The Return to Stone. W. S. Adams. On the increase in favor recently shown for this material. Ill. 1200 w. Arch Rec—Oct.-Dec., 1899.

**Color and Decay.**—See **Wisconsin.**

**Iowa Building.**—Tests of Iowa Building Stones. Anson Marston. From report of Proceedings Iowa Engng. Soc., Jan. 19, 1898. Tests made under the direction of the writer by students of the Iowa State Agricultural College. Results are given. Ill. 2000 w. Stone—Oct., 1898.

Use of Stone in Building. H. F. Bain, in Annual Report of Iowa Geological Survey for 1897. The selection of stone, the conditions of life which affect stone buildings, etc. 1400 w. Stone—Oct., 1898.

**Kentucky.**—See **CLAY.**

**Lithology.**—The Lithology of Building Stones. T. C. Hopkins. Thirty-eight varieties of stone are examined and the writer aims to give the best interpretation of the terms as an aid to those who have not made a special study of the subject. 4800 w. Arch, Lond—Aug. 21, 1896.

**Machine vs. Hand-Cut.**—Machine vs. Hand-Cut Stone. F. R. Patch. A defense of the machine. 1100 w. Stone—Oct., 1898.

Machine vs. Hand-Cut Stone. Henry Gorse. On the evils due to the use of machinery, and urging that it be abolished on all buildings whose adornment and durability is a matter of importance. 1800 w. Stone—Sept., 1898.

**Massachusetts.**—The Building and Road Stones of Massachusetts. C. L. Whittle. Historical commentary and review of the principal deposits and the character of the output. 3200 w. Eng & Min Jour—Sept. 17, 1898.

See also **ROAD MATERIAL—Tests.**

**Missouri.**—Missouri Building and Ornamental Stones. Charles R. Keyes. This proposes to be a well illustrated and interesting series of articles. Special attention is given to geological characteristics, and this will have weight being written by the state geologist. Serial. Stone—April, 1896.

**New England Building.**—The Building Stones of New England. William Beals, Jr. Illustrated description of the varieties found in each state. Serial. Stone—May, 1897.

**Norway and Sweden.**—Stones from Norway and Sweden. Herr Lund. This interesting article is illustrated by views from various granite quarries and gives one a good idea of the commercial and engineering sides of the industry. Serial. Stone—March, 1896.

Stones from Norway and Sweden. Herr Lund. Description of the soap stone and slate industries, showing their properties and how they are applied. 800 w. Stone—April, 1896.

**Ontario.**—Building Stones of Eastern Ontario. Andrew Bell. Read before the Ontario Assn. of Architects. Notes on the building stones found in Eastern Ontario and lower Ottawa valley, embracing that part of the province and Ottawa valley east of a line from the head of the Bay of Quinte to Mattawa, on the Ottawa. 3000 w. Can Arch—March, 1896.

**Oolitic.**—Use of Oolitic Stone in England. Extract from article published in the "Stone Mason," of Bristol, Eng. Concerning the use of this stone and its weathering properties. 600 w. Stone—Nov., 1899.

**Quarrying and Finishing.**—Quarrying and Finishing Building Stones. W. H. Nichols. Describes the equipment and method of operation in quarrying and working. Ill. 1900 w. Eng & Min Jour—June 11, 1898.

See also **QUARRY; QUARRYING.**

**Roads.**—See **ROAD; ROAD MATERIAL.**

**Sandstone.**—See **SANDSTONE.**

**Tests.**—Crushing Tests of Building Stone. A table compiled from the most authoritative sources, giving the crushing weight in lbs. per sq. in. and tons per sq. ft. of stones from various localities. 600 w. Stone—Nov., 1895.

See also **ROAD MATERIAL.**

**Tests, Berlin.**—Tests of Natural Stone (Prüfung Natürlicher Gesteine). A very full series of tables and data of the compressive strength of various kinds of stone, as well as resistance to wear; includes a variety of granites, sandstones and limestones. 18000 w. Mitt aus d. Konig Tech Versuchsanstalten, Part I.—1897.

The Testing of Natural Stones in the Years 1895-96 and 1897-98 (Prüfung Natürlicher Gesteine in den Betriebsjahren 1895-96 bis 1897-98). M. Gary. A very full report of the important work done by the Berlin Testing Laboratory during the past three years in investigating the properties of many kinds of building stone. An important paper. 15000 w. Mitt aus den Kgl Tech Versuchsanstalt, No. 5—1898.

**Tests, Watertown, Mass.**—Government Tests of Building Stones. Report of J. W. Reilly concerning the scope of the tests made at the U. S. Arsenal of Watertown, Mass. Ill. 1800 w. Stone—Oct., 1896.

**Texas.**—Building and Ornamental Stones of Texas. From late reports of E. T. Dumble. Information concerning valuable deposits. 1800 w. Stone—May, 1900.

**United States Building.**—The Building Stones of the United States. Dr. William C. Day. Distribution, methods of quarrying and general characteristics of the stones produced at present for structural purposes. 6000 w. Jour Fr Inst—Feb., 1892.

**United States, 1894 and 1895.**—Value of Different Kinds of Stone Produced in 1894 and 1895. William C. Day. Part first gives particulars of the marble industry in the various States, with the value of the marble produced. Serial. Stone—Dec., 1896.

**Wisconsin.**—Color and Decay of Stone. First article on "The Building Stones of Wisconsin," reviewing a recently issued volume by Ernest Robinson Buckley. Serial. Stone—Oct., 1899.

### STONE CRUSHER.

See also **CRUSHING MACHINERY; ORE CRUSHER.**

**Ballast.**—Ballast Crushing Plant Illinois Central Railroad. Illustrated description. 350 w. Ry Age—Sept. 25, 1896.

**Gates Iron Co.**—A Large Rock-Crusher and Crushing Plant. Describes a very large machine put upon the market by the Gates Iron Works, of Chicago. It has a capacity of 200 tons per hour. Also gives a record from the president of the Pittsburg Limestone Co. of 14 months work. Ill. 1000 w. Eng News—June 16, 1898.

**Rocky Hill, N. J.**—Plant of the Rocky Hill Stone Storage Company. A model plant in New Jersey, for the crushing of trap rock for ballast, etc. A complete description, illustrated by cut of plant, locomotive and cars is given. 2000 w. R R Gaz—Dec. 27, 1895.

### STONE-CUTTING.

See also **MASONRY; STONE—Building; Machine vs. Hand-Cut.**

Practical Stone-Cutting. Charles H. Fox. Part first is introductory to a description of methods claiming to be superior to those usually employed. Serial. Stone—Dec., 1897.

### STONE PLATES.

**Bending Stresses.**—See **CONCRETE FLOORS—Stresses.**

### STOPE.

See **MINE; MINING; ROCK DRILL—Stoping; SURVEYING—Stope Measuring; TUNNEL.**

### STORAGE BATTERY.

See **ACCUMULATOR; GAS ACCUMULATOR.**

### STORE.

**Department.**—See **DEPARTMENT STORE; WORKS MANAGEMENT.**

### STORE FRONTS.

The Painting and Decorating of Store Fronts. Walter J. Pearce. Suggestions for the use of characteristic details in the ornament of shops. The illustrations given are such as could be used on pilasters. 2400 w. Plumb & Dec—March 1, 1898.

### STOVE.

See also **HEATING.**

**Dangers.**—The Care of Stoves for Household Warming (Beobachtung und Wartung Unserer Zimmeröfen). Erwin Nicolaus. Discussing the dangers attending the use of the porcelain stoves so common on the Continent, especially with regard to the production of suffocating gases. 5000 w. Gesundheits Ingenieur—Dec. 31, 1899.

**Gas.**—See **GAS COOKING; GAS HEATING.**

**Trade.**—Market Price and Competition—Their Origin and Suggestions for Remedying their Evils. Franklin L. Sheppard. An effort to find out the causes of the injurious competition in the stove trade, and to suggest remedies. 3000 w. Ir Age—May 14, 1896.

### STRAY CURRENTS.

See also **ELECTRIC TRAMWAY—Return Current; RAIL BOND.**

A System for the Control of Stray Currents of Electric Tramways (System zur Kontrolle der Vagabondirenden Ströme Elektrischer Bahnen). Dr. M. Kallmann. Mainly devoted to methods of measuring stray currents; comparing German and American practice. 10000 w. Elektrotech Zeitschr—Feb. 23, 1899.

Corrosion Caused by Railway Return Currents. Dugald C. Jackson. Detailed results of experiments to determine the differences in the reactions which occur when lead and iron are respectively the metal of the anode upon which the corrosion takes place. 800 w. Elec Wld—Dec. 5, 1896.

Cure of Electrolysis by Independent Returns. C. A. Newbaker. A discussion of the electrical conditions that cause dangerous electrolysis and the best means to favorably alter these conditions. 4000 w. Am Elect'n—Feb., 1900.

Destructive Effects of Vagrant Electricity. Hubert S. Wynkoop. An explanation of electrolysis and suggestions for overcoming the difficulty. Ill. 2000 w. Ap Pop Sci M—Jan., 1900.

Electrolysis. E. H. Jenkins. Read at meeting of the Southwestern Assn. Reviews briefly the various systems for overcoming the difficulty. 1000 w. St Ry Rev—May 15, 1900.

Electrolysis. E. H. Jenkins. Read before the Southwestern Gas, Electric, and Street Railway Assn. Considers the electrolytic action and the remedies. 3700 w. Am Gas Lgt Jour—April 23, 1900.

Electrolysis. William Brophy. Topic discussed before the National Electric Light Assn. A review of the causes that led to placing wires under ground and the difficulties met with. The causes of electrolysis and the remedy. 3500 w. Elec Rev—May 27, 1896.

Electrolysis from Electric Railway Service. Arthur J. Rowland. A study of the return circuit with a view to overcoming electrolytic troubles, or to so planning a road that they will never begin. 3800 w. Am Elect'n—May, 1897.

Electrolysis from Facts and Figures. E. E. Brownell. Discusses the conditions under which most electric roads are now operated, the defective construction, etc. Illustrations and discussion. 3500 w. Jour N E Waterworks Assn—June, 1900.

Electrolysis from the Ground Return Current of Street Railways. Albert B. Herrick. Read before the N. Y. Elec. Soc. An explanation of the causes and the damage, the methods of testing to discover the flow and points of departure, and the remedies. Ill. 4000 w. St Ry Jour—May 5, 1900.

Some Fallacies Regarding Electrolysis. Albert B. Herrick. Considers the conditions necessary for its existence in railway systems, methods of locating the paths of destructive currents, the methods of prevention, etc. Ill. 4400 w. St Ry Jour—Dec., 1898.

The Ground Current of Electric Railways. Albert B. Herrick. A discussion of the causes and effects of electrolysis, showing why water pipes and other underground conductors are corroded, together with various methods for preventing such action. 3000 w. Eng Mag—June, 1898.

Electrolysis of Cast-Iron Water-Mains. Lucien I. Blake. Calls attention to the dangers to cast-iron mains, even without the so-called electrolytic danger areas, illustrating by examples. 1800 w. Elec Wld & Engr—Dec. 16, 1899.

Electrolytic Trials. William A. Aldrich. Read before the Pacific Coast Gas Assn. An explanation of the action and its destroying effect on iron pipes, giving the troubles in various cities. Discussion. Ill. 7000 w. Am Gas Lgt Jour—Aug. 14, 1899.

On the Electrolytic Corrosion of Water and Gas Pipes by the Return Currents of Electric Tramways. J. A. Fleming. Read before the British Assn., at Bristol. A discussion of the causes and conditions of pipe electrolysis. 5800 w. Elect'n, Lond—Sept. 16, 1898.

Return Circuits of Electric Railways. Charles Hewitt. The cause of electrolysis; the various devices that have been suggested for overcoming the trouble. 3000 w. Jour Fr Inst—July, 1896.

Stray Currents in Electric Tramways (Zur Frage der Vagabundirenden Ströme bei Elektrischen Bahnen). A discussion of various means of reducing the losses due to the return current through the rails. 2500 w. Die Elektrisität—April 10, 1897.

The Electrolytic Action of Return Currents in Electrical Tramways. John Gray. Reference is made to the experiments of Mr. Stuart Smith, and the writings of Mr. Wilkinson, with Mr. Jenkins' discussion on Mr. Wilkinson's paper. Mr. Brown's system is explained and comments are made. 2000 w. Elec Rev, Lond—Jan. 3, 1896.

The Latest Method of Electrolysis Prevention. Harold P. Brown. A comparison of European and American requirements, brief explanation of the cause of electrolysis, describing a method of prevention designed by the writer. Ill. 2200 w. Elec Eng, N. Y.—Oct. 14, 1897.

The Prevention of Electrolysis. Alton D. Adams. Discusses the damage from currents of electric railways, the conditions that produce ground currents and the remedy. 3000 w. Munic Engng—Jan., 1900.

The Problem of Electrolysis. An editorial on the importance of fixing the responsibility of repairs to water mains which are injured by electric currents from street railways. 1600 w. Eng Rec—April 22, 1899.

**American Cities.**—Electrolysis in American Cities. F. A. W. Davis. Read before the Central States Waterworks Assn., at Cincinnati. Illustrations of damaged pipe from various cities are given, with discussion of the remedy. 3400 w. Munic Engng—Dec., 1899.

**Battle Creek, Mich.**—Electrolysis in Battle Creek, Mich. W. W. Brigden. A description, with map, of the injury to water and gas pipes by electric currents wandering from a street railway. 900 w. Eng Rec—April 15, 1899.

**Bristol, Eng.**—Electrolysis in Gas and Water Mains. D. Irving. Read at Bristol meeting of the So. Dist. Assn. of Gas Engs. and Mgrs. Explains the Bristol method for its prevention. 1800 w. Jour Gas Lgt—June 5, 1900.

**Brooklyn.**—An Example of Electrolysis of Water Mains in Brooklyn, N. Y. Illustrates a specimen of the corroded pipe, and quotes from a report by an expert engineer. 1200 w. Eng News—Jan. 28, 1899.

Conditions of Electrolytic Corrosion in Brooklyn. Samuel Sheldon. An account of investigations carried out to determine the cause of the apparent immunity of cast iron in this extensive district. 2200 w. Trans Am Inst of Elec Engs—May, 1900.

Electrolysis. A statement of experience in Brooklyn. 700 w. Eng Rec—Oct. 21, 1899.

Electrolysis as an Unsolved Municipal Problem. H. S. Wynkoop. Extract from a paper read before the Engs.' Club of Brooklyn, N. Y., giving a report of an investigation made of the Brooklyn water mains. 1800 w. Elec Wld & Elec Engr—April 29, 1899.

Electrolysis—From the Standpoint of the Municipal Electrician. H. S. Wynkoop. Read before the Am. Soc. of Munic. Imp. States the conditions in Brooklyn, and the attitude of the municipality. 2000 w. Munic Engng—Nov., 1899.

**Buildings.**—Electricity in Modern Buildings. Considering whether currents leaking from the lighting and power circuits will have any action on the steel framework. 1000 w. Can Elec News—Feb., 1898.

See also **Foundations; Structures.**

**Chicago.**—The Electrolysis Problem in Chicago. Edward B. Ellicott. Describes the conditions, giving illustrations, and discusses the cause of the troubles ,and the remedy. 1800 w. W Elect'n—Feb. 10, 1900.

See also **Salt Lake City and Chicago.**

**Dayton, O.**—Electrolysis of Cast-Iron Pipe. Harold P. Brown. An account of the condition of the pipes at Dayton, O., and the method of testing, with suggestions for protecting the mains. 3400 w. Dom Engng—March, 1899.

Electrolysis of Water Mains in Dayton, Ohio. Describes the state of 46,000 ft. of pipe costing $77,000. 1200 w. Eng Rec—Oct. 22, 1898.

Electrolysis of Water Pipes at Dayton, O. Extracts from the reports of experts, called to thoroughly investigate the extent of damage, and from the report of the secretary of the Dayton Waterworks' Board. 2800 w. Eng News—Oct. 6, 1898.

**Foundations.**—Steel Foundations of Buildings and Electrolysis. Statements of General Sooysmith and Mr. Geraldine, as published in the Chicago "Tribune," calling attention to this danger, and claiming unmistakable evidence that the action of electrolysis has begun. 1000 w. Elec, N. Y.—April 20, 1898.

See also **Buildings; Structures.**

**Glasgow.**—Electrolysis of Gas and Water Mains. Report of W. A. Chamen, Glasgow Electrical Engineer. Describes the system of bonding, and gives his opinion that there will be no trouble with the electrolysis of gas and water mains as long as the limit of current is not exceeded. 1200 w. Jour Gas Lgt—June 7, 1898.

**Jersey City, N. J.**—A Test for Electrolysis of the Jersey City Water Conduits. Gives extracts from report of A. A. Knudson, describing the method of making the test, and giving a sketch showing the course which the current took to return to the power-house. 1200 w. Eng News—Feb. 2, 1899.

Electrolysis in Jersey City. Illustrated report of an unusual instance of injuring the pipes by current from electric railways. 2000 w. Eng Rec—Feb. 11, 1899.

**Joint Resistance.**—The Effect of Joint Resistance on Railway Electrolysis. A. A. Knudson. Facts from experience showing that the independent return is not always a cure for electrolysis, and considering the only reliable remedy to be double overhead or underground construction. 1400 w. Am Elect'n—March, 1900.

See also **RAIL BOND.**

**Kansas City.**—Electrolysis at Kansas City, Kan. Illustrated statement of investigations by L. I. Blake showing internal as well as external corrosion of water pipes. 4200 w. Eng Rec—Aug. 12, 1899.

**Kapp Method.**—Methods for Lessening the Danger of Stray Currents from Electric Tramways, Particularly the Kapp Method of Relieving the Rails of Current (Ueber Methoden zur Verringerung der Gefahren Vagabundirender Ströme bei Elektrischen Bahnen, insbesondere die Kapp'sche Methode der Schienenentlastung). Dr. J. Teichmüller. A description of the Kapp method of making the rails the neutral wire of a 3-wire system, with practical applications. 2000 w. Elektrotech Zeitschr—May 31, 1900.

**Magnetic Observatory.**—See **MAGNETIC OBSERVATORY.**

**Newark, N. J.**—Electrolysis Prevention at Newark, N. J. Harold P. Brown. Description of a method of making a thorough examination of the water and gas pipes. 3800 w. St Ry Rev—Dec. 15, 1895.

**New York.**—An Electrical Survey in the Borough of Manhattan, New York City. A. A. Knudson. Investigations and facts showing results of stray current measurements between electric railways, underground pipes, etc, also results of tests on the Brooklyn Bridge. Ill. 5500 w. Trans Am Inst of Elec Engs—Oct., 1898.

An Electrical Survey of the Borough of Manhattan, New York City. Discussion of A. A. Knudson's paper on this topic. 2400 w. Trans Am Inst of Elec Engs—Nov., 1898.

Are the Water Mains in Danger? Discusses the difficulties from the laying of underground electric trolley tracks on Amsterdam avenue, New York. 900 w. Fire & Water—Oct. 23, 1897.

**Peoria, Ill.**—Electrolysis of Underground Metal Structures. Dabney H. Maury. Condensed paper read before the Am. Waterworks Assn., at Richmond, Va. Gives interesting experiments, and emphasizes the fact that the responsibility rests with the street railway companies. Ill. 5800 w. Eng News—July 19, 1900.

Electrolysis in Peoria. Dabney H. Maury. Abstract of a paper read before the Richmond convention of the Am. Waterworks Assn., on the damage done to pipes and standpipes by current from electric railways. 1700 w. Eng Rec—May 19, 1900.

**Providence, R. I.**—Electrolysis in Providence, R. I. Illustrated description of an investigation by A. A. Knudson, one of the cuts showing the effect of electrolysis on the interior of pipes. 3400 w. Eng Rec—Aug. 4, 1900.

**Richmond, Va.**—An Ordinance to Prevent Electrolysis of Water and Gas Pipes at Richmond, Va. Full text of an ordinance approved Jan. 23, 1896. Will be a guide to similar legislation in other municipalities. 1400 w. Engng News—Feb. 27, 1896.

**St. Louis.**—Investigation of Electrolysis at St. Louis. From the annual report of the supervisor of city lighting, at St. Louis, telling of steps taken to learn the extent and to prevent electrolysis. 450 w. St Ry Rev—Feb. 15, 1896.

**Salt Lake City.**—Electrolysis and Water Mains in Salt Lake City, Utah. Summary of opinions regarding the indications and causes of electrolytic action and methods of determining the location as given in report of F. C. Kelsey, in a paper read before the Denver Convention of the American Waterworks Assn. 5000 w. Eng Rec—Oct. 16, 1897.

**Salt Lake City and Chicago.**—Two Cases of Electrolysis. Very full illustrated account of damage to water pipes in Salt Lake City and in Chicago. 2500 w. St Ry Rev—Dec. 15, 1897.

**Structures.**—Stray Currents and the Stability of Structures. Editorial, discussing the effect upon observatories, the Brooklyn Bridge and other structures. 2300 w. Engng—Dec. 8, 1899.

See also **Buildings; Foundations.**

**Submarine Telegraph.**—See **SUBMARINE TELEGRAPH—Electric Tramway Action.**

**Telephone Disturbances.**—See **TELEPHONE—Disturbances.**

**Yonkers.**—Electrolysis at Yonkers, N. Y. Information from report of A. A. Knudson. Describes the serious condition of the water mains, detected by electric measurements. 500 w. Eng Rec—July 1, 1899.

**STREET.**

See also **MUNICIPAL IMPROVEMENT; PAVEMENT; ROAD; STREET IMPROVEMENT; TRACK—Street.**

**Aesthetics.**—The Positive Value of Quiet and Beautiful Streets. J. W. Howard. Showing the elements that contribute to the value of city thoroughfares. Ill. 2500 w. Eng. Mag—March, 1897.

**Architecture.**—New Streets: Architecturally Considered. Editorial considering the principal difficulties in laying out new streets in old cities; the different methods proposed are discussed, and the relation of the architecture to the street. 3500 w. Builder—March 7, 1896.

Street Architecture. H. H. Statham. The architectural problem arising from the necessity of planting buildings as closely as possible together in cities is considered. A brief discussion follows. 6000 w. Arch, Lond—Dec. 11, 1896.

See also **ARCHITECTURE; MUNICIPAL IMPROVEMENT; STREET IMPROVEMENT.**

**Bangkok, Siam.**—See **SIAM.**

**Breslau, Germany, Laws.**—See **BUILDING LAW—Breslau.**

**Curbing.**—The Proper Curbing of Streets. Horace Andrews. Abstracts of a paper written for "City Government." Considers the disturbing forces that tend to displace the curb and means of guarding against them. Discusses material used, setting, etc. 2400 w. Stone—March, 1899.

**European.**—Cross-Sections of European Streets. Robert Grimshaw. Shows the usage and provision made as regards street width and profile. Ill. 1700 w. Munic Engng—March, 1897.

**Evolution.**—The Evolution of City Streets. Williston Fish. Discusses the importance of roads, with suggestions for street car development in serving cities. 4800 w. St Ry Rev—Aug. 15, 1900.

**Grades.**—Establishing of Street Grades. Charles P. Chase. Discusses present practice, its advantages and disadvantages. Ill. 5500 w. Jour W Soc of Engs—Feb., 1899.

Street Grades. Considers the importance of fixing grades while the territory is not built up, based on the situation now existing in New York. 700 w. Eng Rec—Oct. 28, 1899.

**Grades and Cross-Sections.**—Street Grades and Cross-Sections in Asphalt and Cement. Robert P. Woods. Illustrates and describes the method adopted by the writer in arranging the grades and cross-sections in a part of the business district of Wabash, Ind. 1800 w. Pro Am Soc of Civ Engs—Feb., 1899.

Street Grades and Cross-Sections in Asphalt and Cement. A discussion of the paper by Robert P. Woods. 4400 w. Pro Am Soc of Civ Engs—March, 1899.

Street Grades and Cross-Sections in Asphalt and Cement. J. M. Evans and A. F. Harley. Contributions to the discussion of Robert P. Woods' paper on this subject. 1700 w. Pro Asan Soc of Civ Engs—April, 1899.

See also **ASPHALT PAVEMENT; PAVEMENT.**

**Hygiene.**—The Influence of Beautiful Streets upon Public Health. Considers the questions involved in modern street construction, and the numerous matters that must be provided for, and the importance of securing street engineers of true worth. 1100 w. San Rec—April 16, 1897.

**London.**—Characteristics of Some Great London Thoroughfares. A series of articles enlarging upon the aspects of some of the London roads and streets, and calling attention to beauties and points of interest, with discussion of proposed changes. 2000 w. Arch, Lond—Jan. 1, 1897.

See also **STREET IMPROVEMENT.**

**Noises.**—See also **CITY NOISES.**

**Promenades.**—Streets and Promenades. From "Building News" (England). Brief comparison of the streets of England and the Continent. 1400 w. Ill Car & Build—Sept. 30, 1898.

**Wabash, Ind.**—See **Grades and Cross-Sections.**

**STREET CAR.**

See **CAR—Narrow Gauge; ELECTRIC CAR; GAS TRAMWAY; STREET RAILWAY.**

**STREET CLEANING.**

See also **REFUSE DISPOSAL.**

The Street Cleaning Problem. J. W. Howard. Condensed from an address at the banquet of the Union League Club, of Chicago. Contains much interesting information and discusses the cleaning of various cities, urging a larger appropriation for Chicago. 3500 w. Munic Engng—Nov., 1897.

**American Cities.**—Street Cleaning Statistics for Forty American Cities. Tabulated information compiled by Andrew Rosewater, of Omaha, Neb. 600 w. Eng News—Feb. 22, 1900.

**Asphalt and Wood-Paving.**—Asphalt and Wood-Paving in Relation to Street Cleaning. Notes on the necessity of keeping asphalt clean, and the merits of these two kinds of pavement. Asphalt is considered the best of all pavements when properly cared for. 800 w. San Rec—July 16, 1897.

**Automobiles.**—See **Electric Car; Machinery; AUTOMOBILE—Street Cleaning; STEAM VEHICLE—Dust Cart.**

**Berlin.**—The Street Cleaning of Berlin (Das Städtische Strassenreinigungswesen Berlins). An account of the methods and cost of cleaning the streets of Berlin, in which it is shown that the per capita cost is only one-sixth that of New York. 2000 w. Gesundheits Ingenieur—Feb. 28, 1897.

See also **Paris and Berlin.**

**Dresden.**—Street Cleaning in Dresden (Die Strassenreinigung Dresdens). A general account of methods and results. 2500 w. Gesundheits Ingenieur—April 15, 1900.

**Electric Car.**—Electricity in Cleaning City Streets. Illustrated description of the latest development in the art of street cleaning. A self-loading car removes the surface accumulations and is driven by electricity taken from the trolley wires. 600 w. W Elec—Oct. 3, 1896.

**Europe.**—Observations on Street Cleaning Methods in European Cities. George E. Waring, Jr. Report of observations made in the summer of 1896, based on an examination of the street cleaning methods of Vienna, Budapest, Münich, Berlin, Cologne, Brussels, London, Birmingham, Paris, Turin and Genoa. 25500 w. Munic Affairs Sup—June, 1898.

Street Commissioner Waring's Tour of Observation in Europe. George E. Waring, Jr. Part first deals with street cleaning in Vienna. Serial. Harper's Wk—Dec. 5, 1896.

**European vs. American.**—Clean Streets and Their Benefits. La Salle A. Maynard. Advantages of clean streets ,and a comparison of European and American systems of street cleaning. 1000 w. Am Mag of Civ—Oct., 1896.

**Garbage Disposal.**—See **REFUSE DISPOSAL—Street Cleaning.**

**Great Britain.**—Municipal Cleansing in Great Britain. Reviews interesting details of English practice as set forth in a recent report of the Assn. of Cleansing Supts., of Gt. Britain. 2600 w. Eng News—April 26, 1900.

**London.**—Street Cleaning in London. Describes methods, used in St. Pancras vestry, which cost one-sixth of those in New York. 1300 w. Eng Rec—March 10, 1900.

**Machinery.**—Street Cleaning Machinery (Ueber Strassenwaschmaschinen). Th. Weyl. A discussion of the importance of washing from the surface of streets all dust and slime, and a description of machines for the purpose. 2000 w. Gesundheits Ingenieur—Aug. 31, 1899.

See also **Electric Car; New York; Paris; Snow; Washing; Washington; AUTOMOBILE—Street Cleaning; STEAM VEHICLE—Dust Cart.**

**New York.**—Review of the General Work of the Department of Street Cleaning of New York. Reports of the mechanical department; final disposition, waste disposal, and the principal factors which make up the cost. Ill. 35000 w. Munic Affairs Sup—June, 1898.

Street Cleaning in New York. Describes some of Col. Waring's methods of keeping the city clean. 3500 w. Eng Rec—Jan. 8, 1898.

The Cleaning of a Great City. George E. Waring, Jr. Describes the former condition of New York streets, and their improved present condition. The reorganization of the department, disposing of refuse, etc. 6000 w. McClure's Mag—Sept., 1897.

Hitch Your Wagon to a Star. Editorial remarks on the street cleaners' parade and the work of that department, with remarks on other subjects of municipal interest. 1200 w. Gar & For—June 24, 1896.

See also **Snow.**

**New York Charter.**—Street Cleaning. From the "Brooklyn Eagle," commenting upon the section on street cleaning in the proposed charter for Greater New York. 2800 w. San—Sept., 1896.

**New York Labor.**—The Labor Question in the Department of Street Cleaning of New York. George E. Waring, Jr. Explains the features of the scheme which has proved a most gratifying success in the management of this department. 3500 w. Munic Affairs—Sept., 1897.

The Labor Question in the Department of Street Cleaning. Deals with the adjustment of labor questions by the "Committee of 41" and the Board of Conference in New York. 3500 w. Munic Affairs Sup—June, 1898.

**Oakland, Cal.**—See **Salt Water Sprinkling.**

**Oldenburg.**—See **Washing, Oldenburg.**

**Paris.**—Cleaning and Watering of Streets in Paris. Alfred Perkins Rockwell. Extract from "Roads and Pavements in France," just published by John Wiley & Sons, New York. Subject is discussed under these heads: (1) The removal of mud and household refuse, which is done by contract. (2) Sweeping and watering, done exclusively by the street cleaning department, except that sand and the use of some sweeping machines are obtained by contract. (3) Removal of snow and ice. Description of means and methods are given. 1800 w. Pav & Mun Eng—March, 1896.

How the Streets of Paris are Cleaned. The work of the street cleaning department is described. 2000 w. San Rec—April 30, 1897.

**Paris and Berlin.**—Street Cleaning in Paris and Berlin. Robert Grimshaw. Describing plants, personnel and methods of European street cleaning department. 3800 w. Eng Mag—April, 1897.

**Paving.**—Relations of Street Cleaning to Good Paving. George E. Waring, Jr. Showing that imperfect paving greatly increases and sometimes doubles the cost of street cleaning, and comparing the qualities of different types of pavement from the cleaner's point of view. 2200 w. Eng Mag—Feb., 1897.

See also **PAVEMENT; STREET.**

**Refuse Carts.**—See **REFUSE CART.**

**Refuse Disposal.**—See **REFUSE DISPOSAL—Street Cleaning.**

**Salt Water Sprinkling.**—Proposed Salt Water Sprinkling Plant at Oakland, Cal. Plan submitted by M. K. Miller, Supt. of Streets, is presented, with the advantages claimed. 1500 w. Eng News—Sept. 7, 1899.

**San Francisco.**—Street Cleaning in San Francisco. A statement of the methods employed at the recommendation of the local Merchants' Assn. Hand-cleaning is preferred and the contractor is required to treat his men in a specified manner. 2000 w. Eng Rec—May 6, 1899.

**Snow Melting Machine.**—A Snow Melting Machine. Illustrated description of a machine recently tested in New York. It is naphtha burning, and can be drawn by horses or propel itself. The melting capacity is estimated at about a cubic yard per minute. 900 w. Sci Am—Feb. 27, 1897.

**Snow, New York.**—The Problem of Snow Removal in New York. Gives historical sketch relating to this work from 1881 to 1895 comparing with results since that date. 12500 w. Munic Affairs Sup—June, 1898.

**Snow Removal.**—Experiments and Notes on the Removal of Snow (Experimentelles and Kritisches über Schneebeseitigung). Dr. Th. Weyl. A discussion of the various methods of disposal of snow in continental cities; also of the impurities contained in snow. 2500 w. Gesundheits Ingenieur—Dec. 15, 1898.

See also **Machinery; SNOW; SNOW PLOW.**

**Sweepings.**—Value of Street Sweepings. Edward A. Oldham. Reports results of investigations made to determine the fertilizing value of street sweepings. 1400 w. Munic Engng—Feb., 1899.

See also **REFUSE DISPOSAL.**

**Vienna.**—See also **SEWERAGE.**

**Waring System.**—See **New York.**

**Washing, Oldenburg.**—The Street Washing Plant at Oldenburg (Wasserleitung zur Spülung von Strassengossen in Oldenburg). Fr. Noack. Describing the special system of mains and hydrants for flushing and washing the streets. 2000 w. Gesundheits Ingenieur—July 15, 1897.

**Washington.**—Street Cleaning in Washington. An account of the methods followed in the city named, where both hand and machine cleaning is in vogue. 1400 w. Eng Rec—April 22, 1899.

**STREET IMPROVEMENT.**

See also **MUNICIPAL IMPROVEMENT; STREET.**

**Bangkok, Siam.**—See **SIAM.**

**Edinburgh.**—The Premiated Designs for the Edinburgh Street Reconstruction Scheme. Descriptions by the authors of premiated designs for the reconstruction of North Bridge Street, as given in their reports accompanying the designs. 4500 w. Brit Arch—Sept. 18, 1896.

**Finance.**—Methods of Paying for Street Improvements. Charles Carroll Brown. The numerous methods are classified and brief reference made to certain cities. 2000 w. Munic Engng—Feb., 1897.

**Florence.**—Rebuilding of Central Florence. From report of British Consul-General Chapman. Brief account of the project to clear out the more central part of the town and trace larger and more regular streets, and otherwise improve the locality. 1200 w. Arch, Lond—July 8, 1898.

**Illinois University.**—Street Improvements at the University of Illinois. John C. Quade. Illustrated description of work done in improving the grounds of the institution. 1000 w. Tech—May, 1896.

**London.**—Inaugural Address of Sir J. Wolfe Barry. Discusses London traffic with reference to the proposed and suggested new streets and improvements. Map. 10000 w. Jour Soc of Arts—Nov. 18, 1898.

London Streets and the Traffic. Editorial discussion of the address of Sir J. Wolfe Barry. 1500 w. Engng—Nov. 18, 1898.

London Street Improvements. G. Shaw Lefevre. Describes what has been done of late years and what it is possible to do in the future, with a criticism of the views of Sir J. Wolfe Barry. 7000 w. Contemporary Rev—Feb., 1899.

Address of Sir John Wolfe Barry. Discusses street improvements and their estimated cost, and the results attained. Maps. 6000 w. Jour Soc of Arts—Nov. 17, 1899.

London Street Traffic. Editorial discussion of paper by Sir John Wolfe Barry. 2000 w. Engng—Nov. 17, 1899.

The Financial Loss Caused by Narrow Streets. Reviews some figures recently given by Sir J. W. Barry, of the delay in traffic on four London streets due to congestion. 800 w. Eng Rec—Dec. 2, 1899.

London Improvements. Discusses the schemes for the widening of the Strand and other street improvements. 1600 w. Ill Car & Build—July 1, 1898.

The Strand Improvement. Illustrations of the proposed new route from Holborn to the Strand, with official description. 600 w. Engr, Lond—July 7, 1899.

Westminster Improvement Scheme. Discusses the proposal for rebuilding a portion of the Westminster neighborhood on a large scale, the conditions of which are embodied in a Bill under the title of "The Victoria Embankment and Certain Street Improvements," etc. 3500 w. Builder—Jan. 29, 1898.

**New York.**—Proposed Widening of New York Streets. N. J. Vander Weyde. Map with explanation of needed changes. 450 w. Sci Am Sup—May 6, 1899.

**San Francisco.**—A Plan to Beautify Market Street. B. J. S. Cahill. An illustrated account of a plan to greatly beautify the city, with opinions of the scheme. Serial. Cal Arch—Oct., 1899.

**Strand, London.**—See **London.**

**Vegetation.**—Vegetation a Remedy for the Summer Heat of Cities. Stephen Smith. A plea for the cultivation of trees, shrubs, plants, vines, and grasses in the streets of New York, for the improvement of the public health, for the comfort of summer residents, and for ornamentation. 7000 w. Ap Pop Sci M—Feb., 1899.

**Vienna.**—Street Improvements in the City of Vienna (Ueber die Reguliring der innern Stadt von Wien). A plan submitted by Architect Lotz for the improvement of the central portion of Vienna by cutting new streets and widening old ones. An excellent study in municipal improvement. 1500 w. and map. Zeitschr d Oesterr Ing u Arch Ver—Feb. 19, 1897.

See also **CITY PLAN; SURVEYING.**

**STREET LIGHTING.**

See **ARC LIGHTING; ELECTRIC LIGHTING; GAS LIGHTING; INCANDESCENT GAS LIGHTING; INCANDESCENT LIGHTING; LIGHTING—Street.**

**STREET RAILWAY.**

See also **ACCUMULATOR TRAMWAY; CABLE RAILWAY; CITY RAILWAY; COMPRESSED AIR TRAMWAY, ELECTRIC CONDUIT TRAMWAY; ELECTRIC TRAMWAY; GAS TRAMWAY; LIGHT RAILWAY; STEAM TRAMWAY; SURFACE CONTACT TRAMWAY; TRACK—Street; TRANSPORTATION.**

**Accident.**—How Can We Prevent Accidents and Increase the General Efficiency of Employés? W. W. Cole. Read before the N. Y. State Street Ry. Assn. Discusses as means of safety, principally the qualifications of employés, inspection of equipment, careful examination of schedule, and high standard of construction. 1200 w. St Ry Rev—Sept. 15, 1896.

Street Railway Accidents. Henry A. Robinson. Abstract of paper read before the Metropolitan St. Ry. Employés' Assn., of New York. Gives a short synopsis of the claim and investigating department of Metropolitan St. Ry., of New York, classifies the accidents and examines the causes, and gives brief advice to conductors. 3300 w. St Ry Jour—Feb., 1898.

See also **Claim Department.**

**Accident Blanks.**—Accident Blanks in New Orleans. G. H. Davis. Copy of blank form used by the Canal and Claivborne Railroad Company, with explanatory notes. 1200 w. St Ry Jour—Feb., 1898.

**Accountants.**—Papers Read at the Convention of Street Railway Accountants at Cleveland, March 23-24. Papers by H. L. Wilson, P. V. Burington, J. P. E. Clark, W. B. Brockway, Frank R. Greene, Dana Stevens, and C. N. Duffy, on subjects of interest to accountants. 11500 w. St Ry Jour—April, 1897.

**Accounting.**—An Ideal System of Street Railway Accounts. A. O. Kittredge. Gives a chart of analysis and classification, with description of a system proved successful in many enterprises. 3000 w. St Ry Jour—Jan., 1899.

Theory of Reserve and Suspense Accounts. A. O. Kittredge. A discussion showing the necessity of these accounts and illustrating by example. Also considers the objections usually urged. 2500 w. St Ry Jour—Dec., 1898.

Open Questions before the Committee on a Standard System of Street Railway Accounting. A. O. Kittredge. A report of the discussion by the committee appointed by the Assn. of St. Ry. Accountants at Niagara Falls. 3000 w. St Ry Jour—Feb., 1898.

Report on Standard System of Street Railway Accounting. Report of the committee appointed at the Niagara Falls convention. 18600 w. St Ry Rev—Sept. 15, 1898.

Standard Distribution of Street Railway Receipts and Expenses. Discusses the system adopted in the State of New York and recommends its adoption, with slight changes, as a standard to be used generally. 1200 w. St Ry Jour—Aug., 1897.

**Accounting, Lynn & Boston.**—Trip and Mileage Accounts on the Lynn & Boston. F. E. Smith. Explains the details of the system used in keeping an account of the trips run from which the mileage is computed. 1300 w. St Ry Rev—Jan. 15, 1899.

**Accumulator.**—See **ACCUMULATOR TRAMWAY.**

**American.**—An Informal Talk on Financial Practice and Engineering Methods of American Street Railways. E. E. Higgins. Delivered before the New York Electrical Soc., at Columbia College. Part first explains why the street railway section of the country is necessarily in the east, gives a brief historical review, and discusses franchises and burdens. Serial. Elec—April 14, 1897.

Some British Impressions of American Street Railways. Alexander McCallum. The comments are generally favorable. 2500 w. St Ry Jour—Jan., 1897.

**American Statistics.**—American Street Railway Investments. The combined operating statistics of 241 properties. The companies are divided into three groups, giving figures for four years, three years, two years and one year respectively. 1800 w. St. Ry Jour—July, 1896.

Distribution of Street Railway Mileage and Capitalization in America. Tables of interesting statistics with remarks on the great expansion in mileage and capital investment since 1880. 1500 w. St Ry Jour—Oct., 1897.

Statistics of Mileage, Cars and Capitalization of American Street Railway Properties. The statistics are given in very clear tabulated form, with brief comment. 1000 w. St Ry Jour—Aug., 1896.

Street Railway Mileage, Cars and Capitalization in America. Tabulated statement, giving a compilation of the electric, cable and horse railways of the United States and Canada. St Ry Jour—Feb., 1899.

The Great Street Railway Properties of America. A tabulation of mileage, capitalization, liabilities, receipts and charges of twenty-nine important systems, with descriptive comment. 7000 w. St Ry Jour—Oct., 1896.

**American vs. British.**—A Comparison of British and American Local Transportation Practice. A table giving the population, tramway mileage, and passengers carried in 19 principal cities in America and England, indicates that in America there is 1500 population to every mile of tramway, while in England there are 7000 per mile in the cities quoted. 1200 w. St Ry Jour—Dec., 1895.

Some Differences Between American and British City Transportation Methods. Edward E. Higgins. A statement of facts relating to street railway development in the two countries, with interesting comparison of results. 2800 w. St Ry Jour—April 7, 1900.

**Austria.**—See also RAILWAY STATISTICS—Austria Local.

**Berlin.**—Discussion of the Berlin Tramway (Mittheilungen über die bei der Grossen Berliner Pferdeeisenbahn gemachten Erfahrungen, etc.). An energetic discussion before the German Railway Society as to the merits of various systems of propulsion; electric overhead and underground, also compressed air. 1 plate of rail joints. 6000 w. Glaser's Annalen—March 1, 1897.

See also ELECTRIC CONDUIT TRAMWAY; ELECTRIC TRAMWAY.

**Bombay.**—Tramways in Bombay. A short report of the street car system. 500 w. U S Cons Reps, No. 548—Oct. 9, 1899.

**British.**—Horseless Tramways. An excellent article abstracted from the "Pall Mall Gazette," comparing the mileage, receipts, expenses and profits in steam, horse, cable and electric lines in Gt. Britain. In Birmingham the cable road gave far the largest profits. 800 w. Prac Engr—Nov. 15, 1895.

Street Railways in British Towns. Robert Donald. Compares municipal systems with company enterprises. 2700 w. Munic Affairs—March, 1900.

The Tramways of the United Kingdom. Statistical tables devoted to mileage, capital investments, equipment, power and operating receipts and expenditures. 850 w. Trans—April 24, 1896.

See also American vs. British; Comparative Systems; Electric vs. Cable; London; Sheffield; ELECTRIC TRAMWAY.

**British Reports.**—Tramway Companies' Reports. Compilation of financial and traffic returns of a large number of British roads. 1500 w. Ry Wld—Aug., 1896.

**Budapest.**—See also UNDERGROUND RAILWAY.

**Buenos Ayres.**—The Street Railway System of Buenos Ayres. Illustrated account of the system, which has until recently been operated by horses. Electric lines are being rapidly constructed. 1700 w. St Ry Jour—July, 1897.

**Cable.**—See Electric vs. Cable; CABLE RAILWAY.

**Car-Mile Efficiency.**—The Relation between Receipts and Car Efficiency in Street Tramways (Beziehungen Zwischen Einnahmen und Wagen-Kilometerleistung bei Strassenbahnbetrieb). W. Mattersdorff. Giving a number of diagrams plotted from German tramways, showing the commercial advantages of high car-mile efficiency. 2000 w. Elektrotech Zeitschr—Dec. 21, 1899.

**Chicago.**—Chicago's First Street Cars. From the "Chicago Tribune." Historical review of the introduction of the street railway system in Chicago. 1000 w. W Elec—Sept. 5, 1896.

Council Report on the Street Railways of Chicago. Discusses the report of the committee appointed by the city council to investigate the street railways, their franchises, financial operations, traffic conditions, and the wages paid to employees. 2700 w. Eng News—Oct. 20, 1898.

The Street Railways of Chicago. Illustrated detailed account. 19500 w. St Ry Rev—Oct. 15, 1899.

**Claim Department.**—The Organization of a Claim Department. J. W. Uppercu. Experiences and suggestions concerning this branch of street railway service. 3000 w. St Ry Jour—Feb. 3, 1900.

**Commission.**—See Massachusetts Commission; RAILWAY COMMISSION.

See also ACCIDENTS.

**Comparative Cost.**—See Comparative Systems; Electric vs. Cable; New York Finance.

**Comparative Systems.**—A Glance at the Situation. Keppele Hall. Reviewing the various methods of street railway propulsion, and commenting on points for improvement, etc. 1700 w. Elec Ry Gaz—Jan. 4, 1896.

Application of Mechanical Motors to Tramway Traction (Application des Moteurs Mécaniques à la Traction des Tramways). Abstract of M. Ziffer's report on the subject to the Union Internationale des Tramways. It discusses all sorts of motors, electric, gas, steam, cables, compressed air, etc., with conclusions. 2800 w. Génie Civil—Oct. 22, 1898.

Comparative Utility of Mechanical Tramway Systems. Summary of a paper by E. A. Ziffer, which was read before the International Tramways Union. Conclusions are based on investigations of contemporary tramway activity in Europe and America. 1000 w. Ry Wld—Dec., 1896.

Profits on Tramway Undertakings. C. H. Gadsby. Read before the Tramways and Light Railways Assn., at Islington. Favors the electric equipment of tramways, showing that it increases the difference between gross receipts and working expenses. 2500 w. Elec Rev, Lond—July 13, 1900.

Tramway Haulage. E. J. Silcock. Read at the annual meeting of the Incorporated Assn. of Municipal and County Engs. Part first begins the discussion of the relative merits and demerits of the various systems, briefly reviewing horse and steam traction, oil, gas and compressed air. Serial. Ind & Ir—July 23, 1897.

The Application of Mechanical Traction Upon Tramways (Application des Moteur Mécaniques a la Traction des Tramways). A general discussion of the subject, taking up seriatim steam, fireless locomotives and compressed air. Two articles of a series. 5000 w. La Rev Tech—Feb. 25 and March 10, 1897.

The Battle of the Motive Powers. Editorial presenting a brief résumé of the relative advantages and disadvantages of different forms of motive power so far as developed in actual practice up to the present time. 4000 w. St Ry Jour—Oct., 1897.

See also Electric vs. Cable; Electric vs. Compressed Air; Sheffield, Eng.; Speeds.

**Compressed Air.**—See Electric vs. Compressed Air; COMPRESSED AIR TRAMWAY.

**Conductorless.**—Conductorless Roads. A list of roads operated wholly or partly without conductors. Editorial comment calls attention to the smallness of the number and the generally poor economy of the practice. 900 w. St Ry Rev—April 15, 1896.

**Conduit Electric.**—See ELECTRIC CONDUIT TRAMWAY.

**Connecticut, 1896.**—Operating Expenses of Connecticut Roads in 1896. Information from the annual report of the Railroad Commissioners of Connecticut regarding the earnings and expenses of the street railways. 1500 w. St Ry Rev—Feb. 15, 1897.

**Demerbe System.**—See TRACK.

**Dynagraph Car.**—A Dynagraph Car for Street Railways. Illustrated description of the principal features of a dynagraph car for recording defects in street railway track, which has been in successful use in Chicago. 1300 w. Eng News—Oct. 14, 1897.

See also CAR-INSPECTION; TRACK INSPECTION.

**Earnings.**—How Can the Revenue of Street Railways Be Increased? C. Densmore Wyman. Read before the Am. St. Ry. Assn. Offers suggestions, advises advertising, making service attractive, discusses the transfer system. 3800 w. Elec Eng—Oct. 28, 1896.

**Electric.**—See Electric vs. Cable; ACCUMULATOR TRAMWAY; ELECTRIC CONDUIT TRAMWAY; ELECTRIC TRAMWAY; SURFACE CONTACT TRAMWAY.

**Electric vs. Cable.**—Working Expense of Electric and Cable Railways. Tables of working expenses, receipts, etc., of the electric and cable railways of Great Britain. 1400 w. Tram & Ry Wld—April 5, 1900.

See also **CABLE RAILWAY—Electric Compared; ELECTRIC TRAMWAY—Cable Compared.**

**Electric vs. Cable, Newcastle.**—Cable versus Electric Traction in Newcastle. Important estimates prepared by W. N. Colan and Dr. John Hopkinson on the cost of installing and working cable and electric tramways in Newcastle. 10000 w. Ry Wld—Nov. 10, 1898.

**Electric vs. Compressed Air.**—The Efficiency of Railway Motors. William Baxter, Jr. An article aiming to show the superiority of electricity to compressed air for traction purposes. 2000 w. Elec Wld—Sept. 26, 1896.

See also **Comparative Systems; New York State.**

**Employees.**—Discipline of Employees. George H. Davis. Discussion of this subject with suggestions. Read before the American Street Railway Assn. 4400 w. St Ry Rev—Nov. 15, 1897.

How Can We Increase the Efficiency of Employees? F. D. Rounds. Read before the N. Y. St. Ry. convention. Discusses wages, selection of applicants, education, treatment, and chances of promotion. Discussion follows. 3300 w. St Ry Rev—Sept. 15, 1899.

How Can We Increase the Efficiency of Our Employees? W. W. Wheatley. Read before the N. Y. State Street Railway Convention. Discusses the standard of service desirable for conductors, motormen or gripmen. 3500 w. St Ry Rev—Sept. 15, 1897.

The Selection and Management of Employees. W. F. Kelly. Suggestions offered from large experience, observation and inspection. Read at St. Louis Convention. 3000 w. St Ry Rev—Nov., 1896.

See also **MOTORMAN.**

**European vs. United States.**—Comparison of Street Railway Conditions and Methods in Europe and in the United States. P. F. Sullivan. Glasgow and Berlin are selected as typical cities, and comparison made, showing fares to be actually higher, distance rates not advisable, and street railway investments more desirable. 9500 w. St Ry Rev—April 15, 1897.

**Exhibition.**—See **STREET RAILWAY EXHIBITION.**

**Fare Reduction.**—The Reduction in Street Car Fares. It is asserted that not only have carfares been reduced, but that no other article in common use has been as greatly reduced in price. Specific cases show a surprising increase of service, without increase of compensation. Diagrams show the extension since 1887. 2800 w. St Ry Rev—Feb. 15, 1897.

**Finance.**—See also **Accounting; Car-Mile Efficiency; Comparative Systems; Earnings; Fare Reduction; German Operating Expenses; New York Finance; Receipts; Transfers.**

**Fixed Stops.**—See **ELECTRIC TRAMWAY.**

**France.**—Street Traction in France. From the "N. Y. Evening Post," Sept. 5. Reviews the situation and the causes favoring and opposing electric, compressed air, and cable traction respectively. 1200 w. Elec—Sept. 16, 1896.

The Development of the Tramways of France (L'Exploitation des Tramways en France). Charles Jean. A tabulated view, showing the costs of installation and operation for the various kinds of tramway traction now in operation in France. Serial. Génie Civil—Nov. 4, 1899.

**Franchise.**—Powers Over Street Railways. R. D. Fisher. A discussion of franchise limitations and municipal rights of control, and a plea for the simplification of street railway law. 800 w. Elec Wld—July 25, 1896.

See also **Highway Rights; Municipal Relations.**

**Franchise, Europe.**—Street Railways in Foreign Cities and Their Franchise Requirements. From a pamphlet issued by the Royal Trust Co. Bank, of Chicago. Ill. 2200 w. Eng News—Nov. 30, 1899.

**Franchise, Paving.**—Street Paving an Improper Basis of Compensation for Street Railway Franchises. Editorial discussing the objections to street paving as a compensation for street railway franchises. 2500 w. Eng News—June 17, 1897.

**Gas.**—See **GAS TRAMWAY.**

**Gasoline - Electric.**—See **GASOLINE-ELECTRIC TRAMWAY.**

**Geneva Convention.**—See **STREET RAILWAY ASSOCIATION—International.**

**German, Operating Expenses.**—The Operating Expenses of Miner Railways (Ueber Betriebs-Kosten von Bahnen, Insbesondere Solcher Niederer Ordnung). E. Rindl. A methodical investigation into the details of the operating expenses of the German tramways, and minor local roads, with formulas and diagrams. Two plates. 12000 w. Mitt d Ver f d Förd d Local u Strassenbahnwesens—June, 1897.

**Greece.**—Street and Other Railways in Greece. Nicholas D. Sourmely. Thinks it a good field for American contractors, locomotive, and rolling-stock builders to transact business. 1200 w. St Ry Jour—April, 1897.

**Highway Rights.**—Some of the Rights of Street Railways in the Highway. A tabulated summary of decisions in questions of franchise, liability for accidents, etc. 2000 w. St Ry Jour—Aug., 1896.

See also **Franchise; Municipal Relations.**

**Horse vs. Steam.**—See **Comparative Systems; Paris.**

**Illinois.**—Street Railways of Illinois and Their Franchise Conditions. Abstract of statement made by the presidents of several of the principal Chicago street railway lines, in reference to the growth of the street railways in this country, their relation to the growth of cities, and on the demand for lower fares. 6000 w. St Ry Jour—May, 1897.

**International Association.**—See **STREET RAILWAY ASSOCIATION.**

**Investments.**—Investments in Street Railways. Charles T. Yerkes. Discussion how they can be made secure and remunerative. Discussion. 9000 w. St Ry Rev—Oct. 18, 1899.

**Ireland.**—See **LIGHT RAILWAY.**

**Italy.**—See **RAILWAY.**

**Kansas City.**—System of the Metropolitan Street Railway Company of Kansas City. Illustrated detailed description of a system which embraces nearly all the cable and electric lines of Kansas City, Kan., and Kansas City, Mo. 3700 w. St Ry Jour—Feb., 1898.

**Kinetic Motor.**—See **KINETIC MOTOR.**

**London.**—The Consolidation of the London Tramways. Editorial argument in favor of a lease to a syndicate, with criticisms of an adverse county council committee report. The conduit system of electric transmission is alluded to as practicable and successful. 2400 w. Engng—May 8, 1896.

**London County Council.**—The Tramway Policy of the London County Council. Clarence E. Ady. A sketch showing the importance of the operations and their far-reaching effect. 3500 w. Tram & Ry Wld—Dec. 7, 1899.

**London Exhibition.**—See **STREET RAILWAY EXHIBITION.**

**London Mechanical.**—Mechanical Tramway Traction. Part first discusses the report of J. Allen Baker to the London county council, on this subject, and considers briefly the gas power tram car. Serial. Jour Gas Lgt—Nov. 1, 1898.

Dr. Kennedy on Mechanical Traction for the London Tramways. Review of report of Dr. A. B. W. Kennedy furnished for the guidance of the London County Council. 2000 w. Jour Gas Lgt—Aug. 29, 1899.

**London Southern.**—London Southern Tramways. Gives description and illustrations of double-deck and water cars, map of territory served, and data of fares, earnings, etc. 900 w. Ry Wld—May, 1896.

**Massachusetts Commission.**—The Massachusetts Theory of Street Railway Rights and Privileges. From the "N. Y. Evening Post." Discussion of the principle which should govern legislation regarding street railways, as stated by Charles Francis Adams, chairman of the committee of investigation on the part of the State. 1400 w. Elec Eng, N. Y.—Nov. 25, 1897.

The Relations Between Municipalities and Street Railway Companies. Editorial on the report of the committee appointed by the governor of Massachusetts to consider these relations. 3000 w. Ry & Engng Rev—March 12, 1898.

The Report of the Massachusetts Special Commission on Street Railways. Editorial discussion of this report and points suggested by it. 2500 w. Eng News—April 7, 1898.

The Report on the Relations of Street Railways and Municipal Corporations in Massachusetts. Text of report of the special committee. 12000 w. St Ry Rev—Feb. 15, 1898.

Relations of Street Railways and Municipal Corporations. Everett W. Burdett. Portion of argument in closing the investigations by special committee in Massachusetts, giving the points of widest interest. 10000 w. St Ry Rev—Jan. 15, 1898.

Municipal Ownership of Street Railways in Massachusetts. A report against it by a special investigation committee. 2000 w. Elec Eng, N. Y.—Feb. 10, 1898.

**Massachusetts Laws.**—Proposed Massachusetts Street Railroad Laws. A synopsis of the two bills embodying new laws and amendments to the old ones. 1700 w. R R Gaz—Feb. 25, 1898.

**Materials.**—Purchase, Inspection and Distribution of Street Railway Material and Supplies. H. W. Brooks. Review of a paper and discussion presented at the meeting of the New York Railroad Club, Oct. 20, 1898, with application to street railway practice. 8700 w. St Ry Rev—Feb. 15, 1899.

See also **RAILWAY MATERIAL.**

**Mechanical.**—See also **Comparative Systems; London; Paris.**

**Moscow.**—Important Changes Proposed in the Tramways of Moscow. Extracts from the report of A. Lineff, a Russian engineer, discussing points to be considered in changing all the system to electric lines and for the construction of new lines. Ill. 1500 w. St Ry Jour—May 5, 1900.

**Municipal Ownership.**—See **MUNICIPAL OWNERSHIP—Street Railways.**

**Municipal Relations.**—The Relations of Municipalities and Their Street Railways. John W. Boyle. Considers the benefits, the liability for paving from the company's point of view, etc. 8500 w. St Ry Rev—April 15, 1899.

See also **Franchise; Highway Rights; Massachusetts; Public Relations; Service Regulations; MUNICIPAL CONTROL; MUNICIPAL OWNERSHIP.**

**Newcastle, Eng.**—See **Electric vs. Cable.**

**New South Wales Government.**—See **RAILWAY.**

**New York.**—A Three-Year Comparison of Cable, Electric, and Horse Traction in New York City. 2500 w. St Ry Jour—Oct. 18, 1900.

Competitive Systems of Traction in New York City. Editorial review of the various systems and facts explanatory of the choice determined upon. 900 w. Sci Am—Jan. 16, 1897.

Organization and Operating Methods of the Metropolitan Street Railway Company of New York. A general review of the operating system, illustrated by map and charts. 4500 w. St Ry Jour—Sept., 1896.

**New York, Finance.**—Comparative Costs and Profits of Cable, Electric and Horse Traction in New York City. Receipts and expenses of the Metropolitan Street Railway Co., of New York City, for the year ending June 30, 1899, as compared with the previous year. 1800 w. St Ry Jour—Sept., 1899.

Comparative Costs and Profits of Cable, Electric and Horse Railway Operation in New York City. A transcript of the private cost sheets and other records of the Metropolitan Street Railway Co., giving a true comparison of the relative cost of operation of cable, electric and horse railways. A very important paper. 8500 w. St Ry Jour—Nov., 1898.

**New York State.**—Compressed Air and Electric Traction on New York Street Railways. Extract from the report of the Board of Railroad Commissioners of New York State for 1896, concerning the experimental trials on various lines. 600 w. Eng News—Jan. 14, 1897.

Street Railways in the Empire State. G. Tracy Rogers. Address before the Street Railway Assn., reviewing notable features of the New York lines. 3000 w. W Elec—Sept. 19, 1896.

See also **RAILWAY COMMISSION; STREET RAILWAY ASSOCIATION.**

**Noise Prevention.**—The Noise of Street Railways (Das Geräusch der Strassenbahn). A discussion of the causes of street railway noises and the methods of moderation, especially in the direction of smoother roadway and better rail joints. 2500 w. Deutsche Zeitschr f Elektrotech—July 15, 1897.

See also **CITY NOISES.**

**Paris.**—Horse and Automobile Vehicles for Tramways (Les Voitures Tramways à Chevaux et les Voitures Automotrices). G. Mancière. A detailed description, with drawings, of the present standard horse tramway cars of Paris, and of the Serpollet steam tramway vehicle. 7500 w. 4 plates. Rev Gen des Chemins de Fer—Nov., 1899.

Mechanically Operated Tramways in Paris (Die Bahnen mit Mechanischem Betrieb in Paris). An illustrated account of the different systems in use. Ill. Serial. 8 parts. 6000 w. Zeitschr f Klein u Strassenbahnen—June 1, 16, July 1, 1900.

Paris Tramways, Past and Present. A brief review of their extent and operating policy. 600 w. Eng News—Sept. 8, 1896.

Paris Street Railway Notes. Charles N. King. The notes are concerned chiefly with the working of compressed air and steam (Serpollet) motors. 1500 w. St Ry Rev—July 15, 1896.

Street Traction in France. From "N. Y. Evening Post." A brief account of systems tried in Paris. 1300 w. Sci Am Sup—Feb. 6, 1897.

The Street Railway System of Paris. M. Lavalard. Part first briefly reviews the history and growth and the progress of mechanical traction. Serial. St Ry Jour—Jan., 1897.

See also **TRANSPORTATION; UNDERGROUND RAILWAY.**

**Pennsylvania Legislation.**—Street Railway Legislation in Pennsylvania. Dallos Sanders. Read before the Pennsylvania Street Railway Assn. Reviews the legislation from omnibus days to the present, and records the improvements made. 8000 w. St Ry Rev—Sept. 15, 1897.

**Permanent Way.**—See **TRACK—Street.**

**Primitive Appliances.**—Primitive Railway Appliances. C. B. Fairchild. Historical account of some of the early appliances, some of which have been successful and others failures, but showing the evolutionary process of development. Ill. Serial. St Ry Rev—June 15, 1897.

**Public Relations.**—The Relation between the Public and Street Railway Companies. J. T. Little, Jr. Read before the Street Ry. Assn., of the State of N. Y. An article showing in a rather amusing way the demands of the people, and the efforts of the company to meet these demands. 8000 w. St Ry Rev—Oct. 15, 1898.

The Relation of the Street Railway to the Public. James F. Lardner. Extract from a paper read before the Contemporary Club. The extract given refers to the price of a ride, and the giving more for the money, the value of franchises, etc. 1500 w. St Ry Rev—Jan. 15, 1899.

The Street Railway as a Public Institution and Its Relation to the Public. H. H. Windsor. Extracts from an address before the Political Economy Club, Univ. of Chicago. 8000 w. St Ry Rev—Feb. 15, 1899.

See also **Franchise; Massachusetts; Municipal Relations; MUNICIPAL CONTROL; MUNICIPAL OWNERSHIP.**

**Rapid Transit.**—Rapid Transit Street Railways. R. D. Fisher. A brief summary of all laws enacted by the legislatures of the respective States in 1895 pertaining to rapid transit on street railways, together with the book references. 600 w. Elec Ry Gaz—May 10, 1896.

See also **Speed.**

**Receipts, American Companies.**—Comparative Gross Receipts of American Street Railway Companies. A table of comparative gross receipts of 222 American street railway companies for financial years ending in 1897 and 1898. 2000 w. St Ry Jour—Aug., 1899.

**St. Louis.**—Street Railways of St. Louis. A review of the system and of characteristic and important features. 8800 w. St Ry Rev—Oct. 15, 1896.

The City of St. Louis and Its Transportation System. A full discussion of the St. Louis street railways with respect to relation to distribution of population, finance, equipment, power, track, etc., with illustrations, diagrams and tables. 20000 w. St Ry Jour—Oct., 1896.

**Salt.**—The Use of Salt. The question as to whether street railways may be permitted to use salt, as brought forward in Binghamton, N. Y. 1800 w. St. Ry Rev—March 15, 1898.

**Sand.**—The Misuse of Sand. H. S. Cooper. Discussing how it shall be applied to the rails. 1800 w. St Ry Rev—Dec. 15, 1896.

**Serpollet.**—See **Paris; CAR—Steam Motor; STEAM TRAMWAY; STEAM VEHICLE.**

**Service Regulations.**—Street Railroad Service Required by the Municipality. Deals principally with the service which city regulations prescribe, such as the regulation of the headway, the hours during which cars must run and the rate of speed. 2500 w. St Ry Rev—Sept. 15, 1897.

See also **Municipal Relations.**

**Shanghai.**—See **TELEPHONE.**

**Sheffield, Eng.**—Tramway Traction. A review and criticism of the report of committee of the Corporation Tramways of Sheffield, Eng., after a trip including the principal towns of England and the Continent where different systems of tramway traction were in operation. 3500 w. Eng, Lond—May 14, 1897.

**Signal.**—See also **ELECTRIC TRAMWAY—Signal.**

**Signals, New York.**—The Signalling System of the Broadway and Seventh Avenue Railroad. Illustrated description. 900 w. Sci Am—Jan. 2, 1897.

**Snow Removal.**—See **ELECTRIC TRAMWAY—Express Service; SNOW; SNOW PLOW; STREET CLEANING.**

**Speeds.**—Tramway Speeds. M. H. Geron. A report presented to the Union Internationale Permanent de Tramways. Data from various countries operating lines either by steam, horses, compressed air, electricity, and a combination of these methods. 3800 w. Ry Wld—Aug. 4, 1898.

See also **Rapid Transit; Service Regulations.**

**Steam.**—See **Comparative Systems; Paris; LIGHT RAILWAY; STEAM TRAMWAY.**

**Storage Battery.**—See **ACCUMULATOR TRAMWAY.**

**Superheated Water.**—See **KINETIC MOTOR.**

**Surface Contact.**—See **SURFACE CONTACT TRAMWAY.**

**Ticket Machine.**—See **TICKET MACHINE—Electric Tramway.**

**Tickets, Europe.**—More European Street Railway Tickets. Robert Grimshaw. Descriptive of tickets used in various places in Europe. Ill. Serial. Elec Ry Gaz—Feb. 29, 1896.

**Transfers.**—Mileage, Long Distance Riding and Transfer Systems in American Cities. A summary of the situation in thirty-eight important cities, with editorial. 2200 w. St Ry Jour—July, 1896.

The Matter of Transfers. J. H. Stedman. Abstract from a paper read before the N. Y. State Street Ry. Assn. A discussion of the expediency of a liberal transfer system. 1200 w. St Ry Rev—Sept. 15, 1896.

**United States.**—See **American; European vs. United States.**

### STREET RAILWAY ASSOCIATION.

**International.**—The International Permanent Street-Railway Society (Internationaler Permanenter Strassenbahn-Verein). An account of the general convention in Geneva, with a condensed abstract of the subjects and discussions. 3000 w. Glaser's Annalen—May 15, 1898.

Tenth Convention of the International Street Railway Association. E. A. Ziffer. An account of the meeting in Aug., 1898, at Geneva, Switzerland. Gives brief description of Geneva, its tramways, and the proceedings of the convention. Ill. 7000 w. St Ry Jour—Nov., 1898.

Permanent International Tramway Union (Union Internationale Permanents des Tramways). Brief account of the meeting of this association at Geneva, and conclusions reached after discussion of several points of interest concerning electric traction. 1500 w. L'Electricien—Nov. 12, 1898.

**New York.**—New York Street Railway Association. Announcement and programme of the September Binghamton meeting. 1000 w. W Elec—Aug. 22, 1896.

New York Street Railway Association. A report of the annual meeting, with abstracts of communications and discussions. 2300 w. R R Gaz—Sept. 18, 1896.

The New York State Street Railway Association. Brief report of annual meeting, with papers and reports presented. 12400 w. St Ry Jour—Oct., 1896.

President's Address to the Street Railway Association of the State of New York, at Ithaca. G. Tracy Rogers. Touching many subjects of interest, showing the great advancement of the past year in street railway development. 5500 w. St Ry Rev—Sept. 15, 1899.

See also **STREET RAILWAY—New York State.**

### STREET RAILWAY EXHIBITION.

**London, 1900.**—The International Tramways and Light Railways Exhibition. Complete illustrated description of the exhibition held at the Royal Agricultural Hall, Islington, London, N., from June 22 to July 4. 25000 w. Tram & Ry Wld—Aug. 9, 1900.

The International Tramways and Light Railways Exhibition, 1900. Concerning the large display of electric traction plant now on view at the exposition at Islington, England. 5500 w. Engng—June 29, 1900.

### STREET RAILWAY SHOP.

See **ELECTRIC RAILWAY SHOP; RAILWAY SHOP—Cincinnati.**

### STREET RAILWAY SIGNAL.

See **ELECTRIC TRAMWAY—Signal; STREET RAILWAY—Signal.**

### STREET REGULATIONS.

See **BUILDING LAW; MUNICIPAL IMPROVEMENT; STREET; STREET IMPROVEMENT.**

### STREET SPRINKLING.

See **AUTOMOBILE—Sweeper and Sprinkler; STREET CLEANING—Salt Water Sprinkling; Washing.**

### STREET SWEEPINGS.

See **AUTOMOBILE—Sweeper and Sprinkler; REFUSE DISPOSAL; STEAM VEHICLE—Dust Cart; STREET CLEANING—Sweepings.**

### STREMMATOGRAPH.

See **RAIL DEFLECTION; TRACK DEFORMATION.**

### STRENGTH OF MATERIALS.

See **MATERIALS' STRENGTH; TESTING;** and under specific materials.

### STRENGTH RECORDER.

A Spring Ergograph (Sur un Ergographe à Ressort). MM. Binet and Vaschide. An improved apparatus for recording physical efforts, so arranged as to register the maximum strength of the subject. 1000 w. Comptes Rendus—Dec. 27, 1897..

### STRESS.

See **MATERIALS' STRENGTH; TESTING;** and under specific materials.

### STRIKE.

See also **LABOR; MINER; TRADE UNION; WAGES; WORKS MANAGEMENT—Labor Questions.**

**Arbitrator.**—Bishop Potter as an Arbitrator. Editorial review of Bishop Potter's action as arbitrator in the recent strike of lithographers in New York City. In the main, commendatory. 2000 w. Gunton's Mag—June, 1896.

**Austria.**—Strikes in Austria in Recent Years. Tabulated summaries and statements compiled from Vol. XI. of the Foreign Reports of the British Royal Commission on Labor, with explanations and comments. 500 w. Bull of Dept of Labor—Nov., 1895.

**Austria Coal.**—Coal Strikes and Miners' Wages in Austria. An account of a determined contest between capital and labor, now going on in the northern provinces. 800 w. U S Cons Repts, No. 704—April 14, 1900.

**Belfast Shipbuilders.**—See **Shipbuilders, Belfast.**

**British.**—The Effect of Labor Disputes on Foreign Trade. Mr. Ritchie's talk to a committee from the Trade Union Congress, on the desirability of an industrial peace, and the loss to labor and capital because of strikes in England. 1400 w. Col Guard—Dec. 23, 1898.

Strikes and Lockouts in Great Britain and Ireland in Recent Years. Tabulated statements compiled from annual reports of the British Board of Trade, with comment, explanation and deductions. 2000 w. Bull of Dept of Labor—Nov., 1895.

**British, 1897.**—**Board of Trade Report on Strikes.** Editorial discussion of this report on strikes and lockouts in Great Britain, for 1897. 2800 w. Builder—Nov. 26, 1898.

**Strikes and Lockouts in 1897.** Statistics from the latest annual report of the British Board of Trade, with comments. 1600 w. Col Guard—Nov. 11, 1898.

**British Engineering.**—**An Industrial Lesson,** S. N. D. North. An examination of the causes of the English engineering strike and lockout, and a discussion of the strike and its outcome. 4500 w. Ap Pop Sci M—April, 1898.

**Lessons of the Great Engineering Strike in England.** J. Stephen Jeans. Criticising the trade union attitude toward piece-work, apprentices, and machine tools. 4700 w. Eng Mag—Sept., 1897.

**London Engineers' Dispute. The Strike for a Forty-Eight Hours' Week.** Address of Sir Benjamin Dobson, of Dobson & Barlow, on the question at issue, discussing various points claimed by the employers. 5500 w. Bos Jour of Com—Jan. 8, 1898.

**One Aspect of the English Engineers' Strike.** From the "Newcastle Herald," England. Gives an account of the routine of life and methods of boarding the men on an old passenger steamer moored in the river near the Yarrow works. 1300 w. Engr, N. Y.—Nov. 1, 1897.

**Some Lessons of the Great Strike.** Considers that the men should be taught the need of moderation, of wise leadership, of a wider outlook, of securing public sympathy; that the employers should be taught the need of up-to-date systems of working, of moderation, and of better relationships with their workers. 2800 w. Elec, Lond—Feb. 4, 1898.

**Steam Engine Makers' Society.** The first report of the trade-union societies involved in the late strike, and containing much of interest on this subject, is discussed. 2500 w. Engr, Lond—March 25, 1898.

**The Approaching Conference.** Editorial comment on the present condition of affairs and the influence on the engineering interests of England. 4000 w. Engng—Nov. 19, 1897.

**The Cost of the Engineers' Strike.** Summary of the Report of George Barnes, Secretary of the Amalgamated Society of Engineers (Br.), giving the financial statement of the strike, its cause and conclusion. 2300 w. Steamship—Sept., 1898.

**The Crisis in the Engineering Dispute.** Editorial on the apparent approaching end of this labor struggle, showing the present attitude of masters and men. 3000 w. Engng—Jan. 21, 1898.

**The Dispute in the Engineering Industry.** Editorial comment on the present aspect of the strike in the engineering trade in England, to enforce the eight-hours day. 2900 w. Engng—July 16, 1897.

**The End of the Conference.** Editorial discussion of the situation, and the rejection of the employers' second proposals. 2000 w. Engng—Dec. 31, 1897.

**The End of the War.** Remarks on the apparent defeat of the Amalgamated Society of Engineers, and on the mistakes made and changes required. 3000 w. Engr, Lond—Jan. 28, 1898.

**The Engineering Trades Dispute.** Editorial discussion of the position as it affects both employers and employed. Serial. Prac Eng—Aug. 27, 1897.

**The Engineers' Conference.** Report of the points of dispute, giving the respective positions taken by the employers' federation and by the workmen's representatives. 1800 w. Prac Eng—Dec. 10, 1897.

**The Engineers' Dispute.** Reports a discussion of the recent strike and lockout in England, at a gathering of the members of the United Club, held at the Criterion. 4500 w. Engr, Lond—Feb. 11, 1898.

**The Late Strike in England.** W. H. Booth. Reviewing this labor trouble, its causes and lessons. 3500 w. Am Mach—March 17, 1898.

**The Plevna of Labor.** Anon. Reviews the various points under dispute in this struggle, and the changes that have developed in its progress. Generally in sympathy with the employees. 5300 w. Contemporary Rev—Jan., 1898.

**The Proposed Armistice.** Editorial discussion of the present state of affairs in regard to the engineering strike in England. 2000 w. Engng—Oct. 29, 1897.

**The Resumption of Work.** Editorial on the conditions the workmen must meet on their return to work. 1800 w. Engng—Feb. 4, 1898.

**The Strike and the Lockout.** The present condition of the strike in England, especially the importance of Birmingham, and the policy adopted there, with its bearing on engineering troubles. Also editorial. 6800 w. Engr, Lond—Oct. 15, 1897.

**The Struggle in the Engineering Industries.** An appeal of the English employers to the general engineering industries of the country. 1200 w. Ir & Coal Trds Rev—July 30, 1897.

See also **TRADE UNION—History; WAGES; WORKS MANAGEMENT—Labor Questions.**

**Coal.**—See **Austria; Wales; COAL MINER.**

**France.**—**Strikes in France in Recent Years.** Tabulated statements compiled from the French Office du Travail, Statistiques des Grèves et des Recours à la Conciliation et à l'Arbitrage Survenus Pendant l'Année 1864, with explanations, comments and deductions. 1000 w. Bull of Dept of Labor—Nov., 1895.

**Insurance.**—**Insurance Against Strikes.** Editorial on a proposed scheme to indemnify manufacturers and others against loss through oppression from trades unions. 1600 w. Engr, Lond—Nov. 5, 1897.

**Italy.**—**Strikes in Italy in Recent Years.** Tabulated Statements derived from the Statistica degli Scioperi avvenuti nell' Industria e nell' Agricoltura durante gli anni 1892 e 1893, with explanations, deductions and comments. 500 w. Bull of Dept of Labor—Nov., 1895.

**Japan.**—**The First Railway Strike in Japan.** Eli West. A brief account of the labor trouble and its outcome. 1000 w. Ry Age—April 22, 1898.

**Railway.**—**Retrospective Lessons on Railway Strikes.** Review of work by E. J. O'B. Croker, with extracts. Ill. 1500 w. Transport—Sept. 16, 1898.

**Shipbuilders', Belfast.**—**Shipbuilders' Strike in Belfast.** The full account of this noted strike from its commencement, Oct. 11, 1895, to its termination, Jan. 27, 1896. The strike resulted in an advance in wages of about four cents per day of nine hours. Twelve thousand workmen were thrown out of employment in the Belfast district for over four months, at the approach of winter, and many families were reduced to the starvation point. 3300 w. Consular Repts—April, 1896.

**Switzerland.**—**Strikes in Switzerland in Recent Years.** Statistics compiled from the eighth annual report of the Comite Directeur de la Fédération Ouvrière Suisse, 1894. A historical review. 700 w. Bull Dept of Labor—Jan., 1896.

**United States, 1881-94.**—**Strikes and Lockouts in the United States from January 1, 1881, to June 30, 1894.** Tabulated statements compiled from the third and tenth annual reports of the U. S. Commission of Labor, with deductions and comments. 6500 w. Bull of Dept of Labor—Nov., 1895.

**United States Machinists.**—**Settlement of the Machinists' Strike in the United States.** Full text of the agreement reached by the arbitrators, with editorial pointing out its influence for lasting harmony, and explanation of variations between the official document and one put forth by the men. 2300 w. Eng Mag—July, 1900.

**The Official Agreement of the Arbitration Board.** Text of the resolutions adopted. 1500 w. Am Mach—June 28, 1900.

See also **WORKS MANAGEMENT—Labor Questions.**

**Wales Coal.**—**The Coal Strike.** Discussing some phases of the South Wales coal strike. 2500 w. Engr, Lond—April 15, 1898.

**South Wales Colliers' Strike.** A statement conveying the views of the employers in the Monmouthshire and South Wales Coal-Owners' Assn., on the strike of colliery workmen. 2700 w. Engng—April 29, 1898.

**The Coal Strike.** Statement of affairs relating to the coal strike in Wales, reporting disorganization amongst the colliers, and the lack of effective leaders. 2300 w. Engr, Lond—April 22, 1898.

**STRONG LOCOMOTIVE.**

**Counterbalance Tests.**—Counterbalance Tests of the Strong Engine at Purdue University. Report of recent tests, with conclusions, and editorial comment. 1500 w. R R Gaz—Aug. 6, 1897.

See also **LOCOMOTIVE TEST—Strong Balanced; VALVE—Locomotive Tests.**

**STRUCTURAL DESIGN.**

See **BRIDGE DESIGN; FRAMEWORK; SKELETON CONSTRUCTION; STRUCTURE.**

**STRUCTURAL MATERIAL.**

See also **BRIDGE MATERIAL; BUILDING MATERIAL; IRON; STEEL—Structural.**

**Railway Transportation.**—See **RAILWAY TRANSPORTATION—Structural Material.**

**STRUCTURAL SHAPES.**

See **STEEL—Structural Shapes.**

**STRUCTURAL STEEL.**

See also **SKELETON CONSTRUCTION; STEEL—Structural; STEEL CONSTRUCTION.**

**Specifications.**—See **STEEL SPECIFICATIONS.**

**STRUCTURE.**

See also **STRUCTURAL DESIGN.**

**Statically Indeterminate.**—Statically Indeterminate Structures. An editorial on the need of members which make a structure statically indeterminate. 1100 w. Eng Rec—Nov. 4, 1899.

**STRUT.**

See also **BRIDGE DESIGN; FRAMEWORK.**

**Lateral Loads.**—The Problem of Struts with Lateral Loads. B. W. Head. A mathematical study. 2200 w. Engr, Lond—Sept. 22, 1899.

**STUD.**

See also **BOLT.**

Some Practical Hints on the Making of Studs. F. F. Hemenway. Illustrates and describes a method used by the writer. 1200 w. Prac Eng —July 1, 1898.

**SUBMARINE BOAT.**

The Demonstrated Success of the Submarine Boat. Admiral Philip Hichborn. A review of the history of submarine navigation, of the present state of the art, and of the mechanical and tactical efficiency of the newest craft and their effect on naval construction policy and naval strategy. 5000 w. Eng Mag—June, 1900.

Submarine Boats—From the Earliest Records Down to the Present. Carl Busley. Translated from the "Pro. of the German Soc. of Nav. Archts. and Marine Engs." Illustrated historical review. Serial. Marine Engng—Oct., 1900.

Submarine Boats. George N. Crouse. Reviews the history of the attempts at submarine navigation, and the degree of success recently attained. 3000 w. Yale Sci M—Oct., 1898.

Submarine Boats. W. A. Dobson. An illustrated account of progress in submarine navigation from Bushnell's boat (1776) to the present. 3600 w. Cos—Jan., 1896.

Submarine Boats. Editorial comment on the steps taken by France and the United States toward providing for the construction of these boats. Also gives a historical review of experiments made in this field. 2000 w. Engng—April 27, 1900.

The Submarine Boat and Its Future. Waldon Fawcett. An outline of the recent tests of the "Holland," and review of boats tried in France, with some of the views concerning the utility of such boats in warfare. Ill. 1700 w. Sci Am—Dec. 9, 1899.

Submarine Boats. Lawrence Irwell. A summary of the efforts that have been made during three centuries to build ships for service. 3000 w. Marine Rev—June 1, 1899.

Submarine Torpedo-Boats. William J. Jaques. Read before the Inst. of Naval Arch'ts. Refers to the defects in torpedo-boats made evident in the China-Japan war, and emphasizes the fact that submarine navigation is now an accomplished fact, discussing the influence it will have on torpedo-boat architecture and naval warfare. Ill. 4400 w. Engng—April 29, 1898.

Submarine Torpedo-Boats: Their Influence on Torpedo Boat Architecture and Value in Warfare. William H. Jaques. Read at meeting of the Inst. of Naval Arch'ts. General remarks on needed improvements, with description of the "Plunger" and the "Holland." Ill. 3000 w. Ind & Ir—April 7, 1898.

Submarine Torpedo Boats: Their Influence on Torpedo Boat Architecture and Value in Warfare. William H. Jaques. Read at session of the Inst. of Naval Archt's., London. Reviews the history of past experience, describing the boats built under Mr. Holland's direction, also the "Plunger" and "Holland." Ill. 3300 w. Marine Engng—Dec., 1898.

Submarine Navigation (La Navigation Sous-Marine). H. Noalhat. This part contains a review and discussion of various methods of directing the course of a submarine vessel. Serial. Revue Technique—May 10, 1900.

Submarine Navigation (La Navigation Sous-Marine). H. Noalhat. A discussion of the space required for motors operated by steam, electricity, compressed air, and petroleum, respectively, for use in submarine boats. 1500 w. Revue Technique—Oct. 10, 1900.

The Problem of Submarine Navigation (Le Problème de la Navigation Sous-Marine). H. Noalhat. A discussion of the problems of immersion and orientation of submerged vessels, treated from a theoretical point of view. Serial. Revue Technique—Dec. 10, 1899.

The Question of Submarine Boats. Edmund Robertson. Discusses England's attitude toward the vessels of this type, questioning its wisdom. 5000 w. Nineteenth Cent—May, 1900.

The Progress of Submarine Navigation. Illustrated historical review of all notable plans of submarine boats that have been designed. Serial. Sci Am Sup—June 3, 1899.

**"Argonaut."**—A New Submarine Boat. Illustrated description of an invention of Mr. Simon Lake. The Columbia Iron Works, of Baltimore, are to build the boat for experimental work. Compressed air and electricity enter largely into its operation. 1000 w. Mfrs Rec—Jan. 8, 1897.

Construction and Operation of the Submarine Boat "Argonaut." Photographs and scale drawing with description of construction and operation. 2200 w. Marine Engng—Feb., 1898.

Lake Submarine Boat "Argonaut." Illustrated detailed description of this vessel. 1600 w. Elec Eng, N. Y.—Dec. 29, 1898.

The Lake Submarine Boat. Illustrated description of the "Argonaut," invented by Simon Lake, with a statement of the principal facts claimed to be established. 2000 w. Engr, Lond—Oct. 6, 1899.

I. Voyaging Under the Sea. Simon Lake. Illustrated account of the submarine boat "Argonaut" and her achievements. II. A Voyage on the Bottom of the Sea. Ray. Stannard Baker. An illustrated account of an excursion in the "Argonaut." 7500 w. McClure's Mag—Jan., 1899.

**Balloon.**—See **AERONAUTICS—Submarine Boat Visibility.**

**Compressed Air.**—See **Holland; COMPRESSED AIR —Submarine Boat.**

**Electric Equipment.**—See **ELECTRIC EQUIPMENT —Submarine Boat.**

**Goubet.**—A Visit to the Goubet No. 2 (Une Visite au Goubet No. 2). E. Duboc. An interesting description of this small submarine boat at Saint-Ouen, and a comparison with the Gustave Zédé. 2500 w. Le Yacht—Feb. 18, 1899.

The "Goubet No. 2" at Toulon (Le "Goubet No. 2" à Toulon). Emile Duboc. A discussion of the merits of this submarine boat, as shown by its trip from St. Ouen to Toulon. A view of the boat in dry-dock is given. 1800 w. Le Yacht —Nov. 18, 1899.

The Submarine Boat "Le Goubet." From "La Nature." G. E. Illustrated description of a torpedo boat, named for the inventor. 2000 w. Elec Rev, Lond—Jan. 10, 1896.

**Gustave Zédé.**—French Submarine Torpedo Boats. Illustrates and describes the vessels built by Gustave Zédé, and their trials. 1800 w. Sci Am —April 8, 1899.

Submarine Boats. Editorial discussion of the invention of Gustave Zédé, stating its special features, and her performance as compared with other submarine boats. 1800 w. Engr, Lond—Jan. 20, 1899.

**Holland.**—Holland's Submarine Torpedo Boat. Illustrated description including a short biographical sketch of the inventor and designer—John P. Holland, of Newark, N. J. 1800 w. Am Ship—April 9, 1898.

Holland Submarine Boat. An illustrated descriptive article dealing with the main features of the boat which was invented by John P. Holland. 1800 w. Engr, N. Y.—March 15, 1898.

Successful Trials of the Holland Submarine Boat. Illustrated description of this interesting vessel, with report of tests, and editorial. 2300 w. Sci Am—April 9, 1898.

Tests of the Holland Submarine Boat. Brief notice of recent tests, with description of the electrical equipment. Ill. 800 w. Elec Wld & Engr—Nov. 4, 1899.

Submarine Navigation. John P. Holland. Abstract from a lecture delivered before students of Sibley College. An able and exhaustive discussion of the principles of submarine navigation and construction, showing very plainly the differences between these principles and those applicable to floating vessels, whence arise many difficulties which have been gradually surmounted in the progress of the art. An exceedingly interesting paper. 6500 w. Sib Jour of Engng—Jan., 1896.

See also "Plunger"; COMPRESSED AIR—Submarine Boat; ELECTRIC EQUIPMENT—Submarine Boat.

**Lake.**—See "Argonaut."

**"Plunger."**—Submarine Vessels. A description of the "Plunger" recently launched at Baltimore, as given in the "Baltimore Sun." 2300 w. Eng—Aug. 21, 1897.

The Submarine Torpedo Boat "Plunger." J. Alvah Scott. Illustrated description of the boat and its equipment. 3000 w. Jour of Am Soc of Naval Engs—May, 1898.

**SUBMARINE CABLE.**

See also CABLE SHIP; ELECTRIC CABLE; SUBMARINE CABLE LAYING; SUBMARINE TELEGRAPH.

The Construction, Laying, and Repairing of Submarine Telegraphs. Charles Bright. Reports steady improvements in materials and details. 3800 w. Elec Rev, Lond—Nov. 12, 1897.

**Africa.**—News from South Africa. Explaining how the war news from Natal reaches New York. 700 w. Elec Rev, N. Y.—Nov. 29, 1899.

Cable Communications with South Africa. The connections are given, and an explanation of the recent delays. 1000 w. Elect'n—Jan. 10, 1896.

**Amazon River.**—Cable Laying in the Amazon River. Alexander Siemens. Abstract of a lecture delivered before the Royal Inst. of Gt. Britain. An interesting account of the experiences and adventures during the voyage of the cable-ship "Faraday" up the Amazon River, last Jan. and Feb. 3500 w. Elec Rev, Lond—May 22, 1896.

The Amazon Cable. An account of the work, about to be commenced, of laying a cable in the bed of the river, as the rapid growth of vegetation in tropical countries renders the maintenance of overhead wires very costly. Map. 500 w. Elec Eng, Lond—Dec. 13, 1895.

**Australasia.**—Australasian Telegraphy. The British telegraph interests as affected by the Pacific cable question. Urging a reduction of the Eastern Extension Co. in its Australasian tariff. 900 w. Engng—July 10, 1896.

**Break Localization.**—See also Fault Localization; Loop Test; ELECTRIC MEASUREMENT—Earth Currents; Faults Submarine.

**Breaks.**—Breaks in Submarine Cables Close to Repairs. Andrew Gray. Read before the Inst. of Civ. Engs. Considers that, in general, excessive dragging of old cable is the principal cause. 1000 w. Prac Engr—Jan. 12, 1900.

See also Repairs.

**British Empire.**—A Great Telegraph Scheme. Editorial discussion of the scheme to establish a complete system of cables around the globe, to be owned by the British government, maintaining that it would be best for the work to be carried out by private enterprise. 1500 w. Engr, Lond—Dec. 23, 1898.

An All-British Cable System. Archibald S. Hurd. Considers the importance of connecting England directly with her colonies, outlines the scheme, and estimates the cost. 3800 w. Nineteenth Cent—Feb., 1899.

Imperial Telegraphic Communication. Sir Edward A. Sassoon. Reviews the history of cable communication between England and her colonies, and presents the present situation. Also discussion. 12500 w. Jour Soc of Arts—June 15, 1900.

Ocean Cables. A short summary of a communication from Sir Sanford Fleming, of Ottawa, on the subject of a state-owned system of electric cables for the British empire, to circle the earth. 600 w. Bos Jour of Com—Dec. 24, 1898.

Our Telegraphic Isolation. Percy A. Hurd. The need of a system of telegraphic communication completely under British control. South Africa, India, Australasia and the West Indies are considered and a solution of the difficulty presented. 3200 w. Contemporary Rev—June, 1896.

Side Lights on Cable Routes. Part first discusses proposals made by the Eastern, Eastern Extension, and Eastern and South African telegraph companies, to the Imperial Government. Serial. Elec Rev, Lond—Sept. 23, 1898.

Sir George S. Robertson's Presidential Address to the Geographical Section of the British Association at Bradford. Abstract of this address, treating of the British Empire and its means of intercommunication by telegraph cable, ships, etc. 8000 w. Electrician—Sept. 14, 1900.

The Empire and the Telegraph Cables. Discussing the subject of a system of submarine cables starting from England, and carried to various British possessions. Serial. Elec Rev, Lond—March 4, 1898.

See also Australasia; Pacific; South Africa; TELEGRAPH.

**Capacity Measurements.**—Capacity Measurements of Long Submarine Cables. J. Elton Young. Read before the Brit. Inst. of Elec. Engs. A critical comparison of Gott's, Thompson's and Muirhead's methods. Serial. Ind & Ir—May 5, 1899.

The Electrostatic Capacity of Long Cables. Walter J. Murphy. Letter to the editor criticising the Muirhead-Gott method, and describing method used by the writer. 800 w. Elect'n—Nov. 5, 1897.

See also ELECTRIC MEASUREMENT—Cable Capacity; ELECTROSTATIC CAPACITY.

**Commerce.**—Ocean Cables and International Commerce (Die Seekabel im Weltverkehr). A review of the present extent and importance of ocean cables, and a special description of the new German cable-laying steamer "Von Podbielski." 4000 w. 1 plate. Stahl und Eisen—Feb. 15, 1900.

**Current Determination Tables.**—A Graphical Method of Determining the Current in Submarine Cables (Ueber eine Graphische Methode um den Stromverlauf in Unterseeischen Kabeln Darzustellen). F. Roessel. The impulses are plotted graphically and the combination of the successive diagrams enables the entire current to be shown. 2000 w. Elektrotech Zeitschr—March 3, 1898.

**Cutting.**—Cable Cutting in War. George Ethelbert Walsh. Discusses the effect produced by cutting the cables and the means of protecting them in time of war. 2000 w. N Am Rev—Oct., 1898.

Cable Cutting Operations of U. S. S. "St. Louis" during the Spanish War. Caspar F. Goodrich. An illustrated account of the work. 3400 w. Marine Engng—June, 1900.

See also War Times.

**Disturbances Electrical.**—Electrical Disturbances in Submarine Cables. W. H. Preece. Read before the British Assn. A study of the causes of disturbance and a discussion of the best form of cable. 2500 w. Elec Eng, Lond—Sept. 25, 1896.

See also SUBMARINE TELEGRAPH—Electric Tramway Action.

**Fault Localization.**—A New Method of Localising Total Breaks in Submarine Cables. C. W. Schafer. Interesting study of the problem, with description of the method the writer has found best. 5500 w. Elect'n, Lond—Oct. 15, 1897.

See also Loop Test; Testing; ELECTRIC MEASUREMENT—Faults, Submarine.

**French.**—French Cable Projects. From the report of the commission appointed to examine the question of a system of submarine telegraph lines to connect certain colonies with the mother country. A map showing the proposed lines is given. 1600 w. Elect'n, Lond—Aug. 10, 1900.

French Submarine Telegraphy (La Télégraphie Sous-Marine en France). H. Casevitz. A general review of the subject, including cables, ships, laying and grappling for cables; with tables of comparative statistics, and maps showing cables of world. 10000 w. 1 plate. Mem d l Soc d Ing Civils de France, No. 7—1900.

The New French Submarine Cables (Les Nouveaux Câbles Sous-Marins Français). With sections of the various portions of the cables recently laid between Brest and New York, and between New York and Cape Haytien. 1000 w. Génie Civil—Aug. 27, 1898.

A New French Trans-Atlantic Cable. From "L'Electricien." The text of the report made by Mr. Boudenvot, in the name of the Budget Commission. Considering the establishment of direct and reliable communication between France, the United States, and the West Indies. Serial. Elec Rev, Lond—April 10, 1896.

**French Atlantic.**—Submarine Telegraphy—A New French Transatlantic Cable. Henry Haynie. A cable being laid from Orleans, Mass., in Cape Cod, to the city of Brest, in ancient Brittany, paralleling the route of the old French cable, with information of submarine work. 2800 w. Sci Am Sup—Sept. 25, 1897.

The New French Atlantic Cable. An abstract of the agreement in connection with the proposed new cable from Brest to Cape Cod. 1300 w. Elect'n—Dec. 18, 1896.

The New French Atlantic Cable. An account of the construction and laying of this cable which connects Brest with Cape Cod. It is the longest submarine cable in existence, and is remarkable in having a heavier core than any other section. 1000 w. Elec Eng, N. Y.—Nov. 10, 1898.

See also **SUBMARINE TELEGRAPH.**

**Germany-Norway.**—See **SUBMARINE TELEGRAPH.**

**Guilleaume.**—Improving the Speed of Submarine Cables. An illustrated description of a method invented by T. Guilleaume for lessening the capacity and increasing the self-induction of cables by the arrangement, shape and material of the conductors. 400 w. Elec Wld & Engr—Sept. 15, 1900.

See also **Inductance.**

**Gutta Percha.**—See **GUTTA PERCHA.**

**Hayti.**—The New Cable to Hayti. Map showing course of the new cable, with connections. Also brief account of rates and matters of interest. 600 w. Elec Eng—Dec. 16, 1896.

See also **French.**

**High Speed.**—See **Rapid Working.**

**History.**—The Extension of Submarine Telegraphy in a Quarter Century. Charles Bright. A very interesting description of the extension of submarine cables since the early days. Illustrated with a large map of the world showing all cable routes. Historical notes of interest concerning numerous cable projects. The capital invested to-day in cables is larger than that in any other branch of electrical industry, amounting to 55,000,000 pounds sterling. 4000 w. Eng Mag—Dec., 1898.

The Submarine Cable. History, with map showing the position of cables now existing, and a section of the Steamship "Niagara," arranged for laying the cable of 1858. 1700 w. Sci Am—July 25, 1896.

See also **Ohio River; SUBMARINE TELEGRAPH.**

**Inductance.**—Inductance as a Negative Capacity in Submarine Cables. A. Davidson. Experiments to exhibit the value of inductance as a negative capacity, made on a length of submarine cable of modern type, armored with steel wires and coiled in an iron tank. 850 w. Elec Eng—July 8, 1896.

Measurements of the Self-Induction of Submarine Cables. Dr. F. Breisig. From the "Elektrotechnische Zeitschrift." A communication from the Testing Office of the German Government Telegraphs. Describes the method of measurement, the conductors tested, results, etc. 2500 w. Elect'n, Lond—Feb. 2, 1900.

Measurements of Self-Induction of Various Kinds of Submarine Cables (Messungen über die Selbstinduktion Verschiedener Muster für Seekabel). Dr. F. Breisig. With sections of cables of various arrangements of cores and a description of the method of measurement of self-induction to be employed for each. 3500 w. Elektrotech Zeitschr—Nov. 30, 1899.

**Leak Circuits.**—The "Rapid" Cable. Arthur Dearlove. Gives details of some observations made on two sections of a laid cable to determine the value of leak circuits. The results are not favorable. 900 w. Elect'n—Feb. 26, 1897.

**Lighthouses and Lightships.**—See also **TELEGRAPH—Lighthouses and Lightships.**

**Loop Test.**—Novel Application of the Loop Test. J. Rymer-Jones. Describes an expedient to meet a special emergency of interest to electricians engaged in submarine repairs. 600 w. Elec Rev, Lond—Oct. 28, 1896.

**Making and Laying.**—The Making and Laying of an Atlantic Cable. Henry Muir. Illustrated description of the work of constructing, laying and repairing cables. 5000 w. McClure's Mag—Jan., 1896.

**Manufacture.**—Machinery for Cable Making. Illustrated description of sheathing machine, with reference to other machines used in the manufacture of submarine cables. 700 w. Ind Rub Wld—Jan. 10, 1897.

See also **ELECTRIC CABLE.**

**Neutrality.**—See **War.**

**Ohio River.**—The First Submarine Cable. W. F. Bradshaw, Jr. An account of the cable laid across the Ohio River by John Boyd Sleeth. Ill. 800 w. Sci Am—June 23, 1900.

**Pacific.**—The Proposed Pacific Cable Routes. Harrington Emerson. A masterly comparison of the practicability, cost, working expense, commercial and political value and financial expectations of all the proposed lines. Urges that broad economic wisdom, not narrow nationalism, be followed in choosing a route. 6000 w. Eng Mag—Nov., 1899.

The Projected Cable Line to the Philippines. Chandler Hale. Discusses the feasibility of a trans-Pacific cable owned by the government, and the Alaskan route from San Francisco to Manila. 2700 w. N Am Rev—July, 1900.

The Coming Pacific Cable. Considers the chief physical and mechanical difficulties of the undertaking, with comments on the possibility of the enterprise being put through by the United States rather than by Great Britain. 1700 w. Ind and Ir—March 24, 1899.

An American Pacific Cable. George Owen Squier. Discusses the urgent need of this cable, the routes, practicability, cost, maintenance, operation, etc., giving maps. 7500 w. Trans Am Inst of Elec Engs—Nov., 1899.

A United States Government Pacific Cable. George Owen Squier. Discusses the need, practicability, routes, stations and various subjects relating to the enterprise, giving plates, maps, etc. 10000 w. Jour U S Art—March-April, 1900.

Construction of a Trans-Pacific Cable. Presents the arguments against a government-owned cable, and favorable to private ownership; also arguments against private control. 2800 w. Marine Rev—May 3, 1900.

Some Aspects of the Pacific Cables Question. Frederick Trimmer. Presents some features of interest from the American point of view, and others from foreign standpoints, mostly of the business aspects. 1500 w. Elec Wld & Engr—May 26, 1900.

An All-British, or Anglo-American, Pacific Cable. Charles Bright. Discusses the question of spanning the Pacific ocean, connecting with the British colonies, giving reasons in favor of All British lines, and also considering an alliance with the United States. Map. 3000 w. Fortnightly Rev—Sept., 1898.

Colonial Cable Communication and the Projected Pacific Cable. A discussion of this important subject. The first part is mostly a review of what has already been done toward finding best route, etc. Serial. Elec Rev, Lond—April 3, 1896.

Ocean Depths. Difficulties to be met in laying the Pacific cable are reviewed, and statements appearing in other papers criticised. 1700 w. Elec Rev, Lond—April 30, 1897.

On the Pacific Cable. Charles Bright. Read before the British Assn. for the Adv. of Science. A discussion of the main features of interest and importance, including the survey, type of cable, laying, repairing, electrical working. 4000 w. Elec Rev, Lond—Sept. 23, 1898.

The All-British Cable. Full text of the report by the Postmaster-General of South Australia. 4500 w. Elect'n, Lond—Oct. 20, 1899.

The Pacific Cable. A criticism of the specifications for the proposed British Pacific cable from Vancouver to Australia and New Zealand. 1100 w. Elec Rev, Lond—Sept. 14, 1900.

The Pacific Cable. From the London "Times." Discusses the importance of this work to Canada, and the renewed interest in the subject. 1500 w. Elec Eng, Lond—Jan. 21, 1898.

The Pacific Cable. Opinions in the Canadian House of Commons. 4500 w. Elec Rev, Lond—March 30, 1900.

See also **Australasia; British Empire; War Times; TELEGRAPH—Alaska-Siberia.**

**Persian Gulf.**—See **SUBMARINE CABLE LAYING.**

**Protection.**—Protection of Ocean Cables. Alexander Porter Moore. Abstract of communication to New York "Herald." Reviews the efforts of the government to secure protection of the cables, and the need of wise legislation. 1500 w. W Elec—July 24, 1897.

**Rapid Working.**—See **Guilleaume; Inductance; Leak Circuits; Thompson; SUBMARINE TELEGRAPH—Speed; SYNCHRONOGRAPH; TELEPHONE—Pupin Long Distance.**

**Repair.**—Repairing Submarine Cable. H. Benest. On some repairs to the South American Company's cable off Cape Verdi in 1893 and 1895. A brief résumé of the establishment of the submarine telegraph between the coasts of Africa and Brazil, with some novel features affecting the cables. Serial. Engng—March 12, 1897.

See also **SUBMARINE CABLE LAYING.**

**Schaefer's Break Test.**—See **ELECTRIC MEASUREMENT—Earth Currents.**

**Self-Induction.**—See **Inductance.**

**South Africa.**—See **Africa.**

**Splice Phenomenon.**—An Explanation of a Common Phenomenon Noticed in Cable Work. H. G. Barwell. An explanation of the sharp kicks noticed on the galvanometer while a splice is being made. Ill. 1300 w. Elect'n, Lond—Sept. 21, 1900.

**Tank Testing.**—Sullivan's Method of Determining the Relative Positions and the Top and Bottom Ends of Several Cables in a Tank. Alex. Taylor describes the method of H. W. Sullivan, treating the two tests separately. The relative positions are determined by the strength of the current induced in each one, and the order of their ends by the direction of this current. 2000 w. Elect'n—May 14, 1897.

**Telephone.**—Submarine Telephone Work in New York Bay. Brief account of the recent connection of quarantine islands with the mainland, with map showing route taken. 500 w. Elec Rev—Oct. 7, 1896.

See also **ELECTRIC CABLE; SUBMARINE CABLE LAYING.**

**Testing.**—A Forgotten Method of Cable Testing. A. Tobler. Describes a method recalled by the perusal of a pamphlet published twenty-two years ago. The insulation resistance is tested by loss of charge. 900 w. Elec Rev, Lond—Oct. 8, 1897.

The Interpretation and Correction for Leakage of Conductor-Resistance Tests on Submarine Cables. Walter J. Murphy. Gives simple rules and formulae that have been in constant application for a number of years with most satisfactory results, and proved sufficiently accurate for all practical purposes. 2500 w. Elect'n, Lond—Aug. 12, 1898.

See also **Current Determination; Fault Localization; Loop Test; Tank Testing; ELECTRIC MEASUREMENT; ELECTRIC TESTING.**

**Thompson.**—The "Rapid Cable." Comments on an article in the "Pall Mall Gazette," in which the construction of the cable as recommended by Silvanus P. Thompson is discussed. 2000 w. Elec Rev, Lond—Jan. 29, 1897.

**War Times.**—Ocean Cables in War Times. Alexander Porter Morse, in the "Albany Law Journal." Gives the number and extent of ocean cables, and shows that the United States would be at a great and embarrassing disadvantage in the event of war. 800 w. W Elect'n—Jan. 8, 1898.

Submarine Cables in War Times. Discusses the need of neutralizing submarine cables, and gives extract from report of the Congress of the Chamber of Commerce of the Empire, showing the necessity of adding to and amending the present cable system of the British Empire. 5800 w. Elec Rev, Lond—July 3, 1896.

Telegraph Cables in War and Two Cables Across the Pacific Ocean (Die Telegraphen Kabel im Kriege und Zwei Kabel durch den Stillen Ocean). A discussion of the question of neutrality of ocean cables in time of war, also a comparison of British and American routes across the Pacific. 5000 w. 1 plate. Stahl und Eisen—Sept. 15, 1900.

See also **Cutting; SUBMARINE CABLE LAYING—Rapid.**

**SUBMARINE CABLE LAYING.**

See also **CABLE SHIP; SUBMARINE CABLE.**

A Novel Method of Lifting a Buoyed Cable End. F. Alex Taylor. Brief description of the usual method as given by H. D. Wilkinson, with description also of a novel plan suggested and applied by a French telegraph engineer. 500 w. Elect'n—Feb. 26, 1897.

Submarine Cable Laying (La Pose des Cables Sous-Marins). L. Moreval. A well illustrated general description of methods employed. 5000 w. 2 parts. Génie Civil—Dec. 17 and 24, 1898.

**Fire Island.**—A Submarine Cable Successfully Laid Under Difficulties. Illustrated account of the laying of the Fire Island cable of the Postal Telegraph Co.'s Marine-News Service. 1400 w. Elec Rev, N. Y.—Feb. 16, 1898.

The Great South Bay Postal Submarine Cable Successfully Laid by the Okonite Company. An illustrated account of the carrying out of the work. The cable is laid between Fire Island and Conklin's Point, and was one of the most difficult pieces of work recently laid on this side of the globe. 1200 w. Elec Eng, N. Y.—Feb. 17, 1898.

**Grapnel.**—See **GRAPNEL.**

**Martha's Vineyard.**—Laying a Telephone Cable Under Difficulties. A brief illustrated account of the laying of a cable to Martha's Vineyard. 1300 w. Elec Rev, N. Y.—March 14, 1900.

**Persian Gulf.**—Old Cable Stories Retold. F. C. Webb. A sketch of the laying of the Persian Gulf Cable of 1864. 5000 w. Elect'n—Oct. 9, 1896.

The Persian Gulf Cable of 1864. F. C. Webb. A sketch of the laying of the Persian Gulf Cable of 1864. Serial. First part. W Elec—Jan. 9, 1897.

**Rapid.**—Rapid Cable Laying for War Purposes. Lieut. Crutchley and C. Scott Snell. Describes an apparatus which it is claimed can safely lay a submarine cable at any rate of speed within the compass of the fastest cruiser, and sketches a plan showing how this might be of value in war time. Ill. Serial. Elec Rev, Lond—May 14, 1897.

**SUBMARINE MINES.**

Submarine Mines. George N. Crouse. Describes their construction and operation and their effects. The best methods for harbor protection and the requirements. Ill. 2000 w. Yale Sci M—June, 1898.

**Baltimore.**—Explosion of Submarine Mines in Baltimore Harbor. Some account of the various kinds of mines with photographs showing their terrific energy. 1200 w. Sci Am—Oct. 1, 1898.

**Electric Fuses.**—Electric Fuses and Exploders for Submarine Mines. J. Wright. Describes the principal fuses and exploders employed in the submarine mines of the American navy during the last few years, with their behavior under trial. Serial. Ind & East Engr—March, 1899.

**Telautograph Location.**—See **TELAUTOGRAPH—Submarine Mines.**

See also **BLASTING.**

**SUBMARINE NAVIGATION.**

See **SUBMARINE BOAT.**

**SUBMARINE RAILWAY.**

**Brighton-Rottingdean.**—See **ELECTRIC TRAMWAY.**

**English Channel.**—A New Scheme for Crossing the Channel (Un Nouveau Mode de Traversée du Pas de Calais). The plan involves the construction of a submarine railway bridge similar to that used at St. Malo, carrying rolling "ferry-boats," with chain haulage. 2500 w. Le Génie Moderne—Dec. 1, 1897.

**SUBMARINE TELEGRAPH.**

See also **CABLE SHIP; SUBMARINE CABLE; SUBMARINE CABLE LAYING.**

The Development and Present Status of Submarine Telegraphy and Cables. Herbert Laws Webb. Based upon "Submarine Telegraphs," by

Charles Bright. A review of this book with favorable comment. 6500 w. Elec Eng, N. Y.—Nov. 10, 1898.

Submarine Telegraphs. Remarks on the submarine telegraphs of the world, and the practicability of a line across the Pacific. 1600 w. Bos Jour of Com—March 11, 1899.

Submarine Telegraphy. A description of the cable lines of the world. 2300 w. Elec Rev, N. Y.—June 8, 1898.

**Africa.**—See **SUBMARINE CABLE.**

**Burke System.**—A New System of Submarine Telegraphy. Describes the principal features of an apparatus for the sending and receiving of telegraphic signals on long lines of cable, presented by Charles G. Burke. Ill. 1100 w. Eng News—July 22, 1897.

The Burke System of Cable Telegraphy. Mr. Charles G. Burke's invention is an adaptation of Morse work to long submarine cables and other telegraph lines where large static capacity is an obstacle to the use of ordinary Morse signals. Ill. 1200 w. Elec Eng—June 23, 1897.

**Company Consolidation.**—See **TELEGRAPH.**

**Electric Tramway Action.**—Disturbance of Submarine Cable Working by Electric Tramways. A. P. Trotter. Paper read before the Inst. of Elec. Engs. An account of troubles at Cape Town, caused by the electric tramway service, and the experiments made to remedy the trouble. 4000 w. Elect'n—May 14, 1897.

The Action of Electric Tramway Currents on Submarine Cables and Other Electric Circuits. Andrew Jamieson. An explanation of the causes of delay in the transmission of telegrams from Cape Town to England. Also discussion. Ill. 7500 w. Trans Inst of Engs & Shipbuilders in Scotland—Feb., March and April, 1900.

The Action of Electric Tramway Currents on Submarine Telegraph Cables and Other Electric Circuits. Andrew Jamieson. Read before the Inst. of Engs. and Shipbuilders of Scotland. Deals with one of the causes of delay in the transmission of telegrams between England and Cape Town. Also editorial. Ill. 5400 w. Elect'n, Lond—March 2, 1900.

**French-Atlantic.**—Submarine Telegraphy. From "La Nature." The new cable from Brest to New York. Also some of the difficulties in transatlantic telegraphing. 1400 w. Sci Am Sup—Jan. 9, 1897.

See also **SUBMARINE CABLE.**

**Germany-Norway.**—The German-Norwegian Cable. Alb. Petersen. Describes changes which improved the telegraphic connections between Germany and Norway to such an extent, that the cable, by means of well regulated instruments, is now able to transmit about 2½ times more traffic than before. Diagram. 1500 w. Elec Rev, Lond—March 26, 1897.

The Working of the Telegraphic Cable from Germany to Norway. Albert Petersen. Abstract of an article in the "Elektrotechnische Zeitschrift" translated from the "Telegrafbladet." A statement of difficulties and method devised to remedy them. 800 w. Elect'n—June 11, 1897.

**Globe Company.**—Submarine Telegraph Property. Some account of the past year's working of the Globe Telegraph and Trust Co., Limited. 600 w. Engng—Aug. 12, 1898.

**History.**—Fifteen Years' Advance in Submarine Cablegraphy. George G. Ward. Review of improvements and advances as observed in the North Atlantic. The points noted are the increase in facilities, rapidity, legibility, accuracy and cheapness of service. 1300 w. Elec Eng—Jan. 6, 1897.

Sixty Years of Submarine Telegraphy. W. E. Ayrton. Abstract of a lecture delivered at the Imperial Inst. Historical review. 5000 w. Elect'n—Feb. 19, 1897.

Submarine Telegraphy. Presidential address of Sir Henry Mance to the Inst. of Elec. Engs., with biographical sketch of the speaker. Many interesting points connected with this work are brought out, with notes from persoual experience. 7500 w. Elect'n—Jan. 15, 1897.

The Archaeology of Submarine Telegraphy. J. J. Fahre. A historical résumé of the early work with submarine cables from the earliest experiments down to 1840. Two articles. 5000 w. Elec Engr, Lond—Aug. 26, Sept. 2, 1898.

The Commencement of Submarine Telegraphy. J. H. Jackson, in the "Nauticul Magazine." Account of early attempts, giving the palm to a Russian scientist, Prof. Soemmering. 1100 w. Sci Am Sup—April 24, 1897.

The Developments of the Submarine Telegraph. From a statement prepared by the Treasury Bureau of Statistics, giving an outline of the history and the part America has had in the development. 1800 w. Arch & Build—March 11, 1899.

The History of the Submarine Telegraph. A compilation giving the history of submarine telegraphy in chronological order. 3000 w. Elec Rev, N. Y.—April 26, 1899.

See also **SUBMARINE CABLE.**

**India and Far East.**—The Exorbitant Charges for Telegrams to India and the Far East. Discusses the reasons for the unreasonable charges for telegrams between England and the Far East. 1200 w. Elec Rev, Lond—April 28, 1899.

**Kelvin.**—Lord Kelvin and Submarine Telegraphy. Arthur Dearlove. A review of his work in this field showing the range of his influence on the working, testing and laying of submarine cables. 1700 w. Elect'n—June 19, 1896.

**Long Cable Working.**—The Working of Long Submarine Cables. R. M. Sayers and S. S. Grant. Read before a students' meeting of the Inst. of Elec. Engs. The difficulties in the working of cables exceeding 400 or 500 nautical miles in length. Serial. Elec Rev, Lond—July 9, 1897.

**Recording Apparatus.**—A New Recording Apparatus for Submarine Cables (Sur un Nouvel Appareil Enregistreur pour Câbles Sous-Marins). M. Ader. The oscillations of a fine wire in a permanent magnetic field are photographically recorded. On the Marseilles-Algiers cable. 1600 signals per minute were recorded. 1200 w. Comptes Rendus—June 21, 1897.

**Relay.**—Vibrating Cable Relay. K. Gulstad. Describes a cable relay for automatic working, or a special arrangement of interest. Ill. Serial. Elec Rev, Lond—June 3, 1898.

**Siphon Recorder.**—See also **TELEGRAPH—Duplex.**

**Siphon Recorder Signals.**—Siphon Recorder Signals. J. Rymer-Jones. Gives a series of illustrated experiments conveying information of value concerning the working of the recorder under widely different conditions, on cables differing in length. Serial. Elec Rev, Lond—Jan. 13, 1899.

**Speed.**—The Function of the Element in Cable Speeds. E. Raymond-Barker. Investigations of the writer, intended to give some light on this subject. A suggestion of a standard method for conducting really satisfactory trials of speed on laid cables, with the view to the data being adopted as basis for future calculations in the design of cable cores. 2500 w. Elec Rev, Lond—April 16, 1897.

The Limits of Speed in Working Submarine Cables as Affected by Faults or Leaks, and by the Proportions of the Materials. W. A. Price. Determines, by calculation, the effect of such faults on the signalling. 2200 w. Elec Rev, Lond—Aug. 6, 1897.

See also **Burke System; Recording Apparatus; SUBMARINE CABLE—Rapid Working; SYNCHRONOGRAPH.**

**Sullivan Galvanometer.**—See **GALVANOMETER—Sullivan.**

**Survey.**—Submarine Survey. Charles Bright. Part first considers the methods and appliances used in this work. Ill. Serial. Engng—Jan. 13, 1899.

**Synchronograph.**—See **SYNCHRONOGRAPH.**

### SUB-PRESS.

See **DIE—Compound; PRESS—Sub.**

### SUBWAY.

See also **ELECTRIC CONDUIT; TUNNEL; UNDERGROUND RAILWAY.**

**Boston.**—See **TUNNEL—Shield; UNDERGROUND RAILWAY.**

**Gas Pipes, London.**—See **GAS PIPE—London Subway.**

**Kingston, N. Y.**—See **GRADE CROSSING.**

**London.**—See **GAS PIPE—London Subway; UNDERGROUND RAILWAY.**

**Montreal.**—Construction of the Ontario and Berri Street Subways, Brock Street Tunnel, and Notre Dame Street Viaduct. Stuart Howard. General description of the works named, with ten plates.

of drawings. 4800 w. Can Soc of Civ Engs Adv. Proof)—Feb. 15, 1900.

**Paris.**—The Passy Subway (Le Souterrain de Passy). A. da Cunha. With illustrations of the progress of the work, and a map showing the line, as well as the covered and uncovered parts of the subway now under construction in Paris. 2500 w. La Nature—Jan. 28, 1899.

The Passy Tunnel (Le Tunnel de Passy). A description of the tunnel works on the new railway between Courcelles and Passy, with plate showing timbering and masonry, and a plan of the route. 2000 w. 1 plate. Rev Tech—May 10, 1899.

See also **RAILWAY CONSTRUCTION.**

**Philadelphia.**—History of Pennsylvania Avenue Subway, Philadelphia, and Sewer Construction, Connected Therewith. George S. Webster and Samuel Tobias Wagner. Presents interesting features of the history of the work of abolishing grade crossings, and the construction of connected sewers. Ill. 7500 w. Pro Am Soc of Civ Engs—Feb., 1900.

Pennsylvania Avenue Subway and Tunnel. George S. Webster. A description of the work of abolishing seventeen grade-crossing of the Phila. & Reading Ry., on the line of Pennsylvania Ave., in the city of Philadelphia. Ill. 4800 w. Pro of Engs' Club of Phila—Jan., 1899.

Philadelphia and Reading Tunnel and Subway in Philadelphia. Description, bird's-eye view and sectional drawings of an important work for elimination of grade crossings. 1600 w. Ry Rev—May 23, 1896.

The Pennsylvania Avenue Subway and Tunnel in Philadelphia, Pa. The engineering work involved in removing grade crossings is well illustrated and described. A bird's-eye view with sections of overhead street crossings, tunnels, drains, profiles, etc., explain the construction fully. 1600 w. Eng News—April 16, 1896.

The Philadelphia and Reading Railroad Subway and Tunnel in Philadelphia. Walter Atlee. A brief description of the great project for separating the street grades and the grades of the Phila. & Read. R. R. 900 w. R R Gaz—April 17, 1896.

The Philadelphia & Reading Railroad Subway and Tunnel in Philadelphia. Walter Atlee. Illustrated description of the reconstruction of the sewer system in the portion of the city necessitated by the change of grade. New sewers were required in the heart of the city, almost entirely built up, and it was decided wherever practicable to build them in the tunnel. 63¼ per cent. of the whole work was carried on in tunnel. 1400 w. R R Gaz—Dec. 18, 1896.

The Philadelphia Subway and Tunnel. An illustrated account of the work on the Pennsylvania avenue subway and tunnel, and the engineering problems met. 2800 w. Sci Am—Oct. 21, 1899.

**Pipes and Wires.**—A Lesson on the Necessity of Systematic Work in Subsurface Street Constructions. Editorial presenting facts regarding the Fifth Avenue work in New York, and the lessons to be learned from them. 3200 w. Eng News—Oct. 21, 1897.

City Subways for Pipes and Wires. Henry F. Bryant. A discussion of present practice and its inconvenience and disadvantages, with an account of the Paris sewers, and suggestions for an improved system in American cities. Ill. 3400 w. Cosmopolitan—Feb., 1899.

Subways for Street Pipes and Wires. Editorial on the need of such subways in New York, giving information concerning foreign cities, and suggesting the advisability of constructing them in connection with the rapid transit railway. Ill. 2500 w. Eng News—March 15, 1900.

See also **ELECTRIC CONDUIT; GAS PIPE—London Subway.**

**Sidewalk.**—Subways for Street Pipes. Abstract of a paper by H. C. Hodgkins before the Am. Waterworks Assn., advocating subways under sidewalks. 1400 w. Eng Rec—June 3, 1899.

The Economic Arrangement and Construction of Sub-Structures in Streets. H. C. Hodgkins. Read at Columbus, Ohio, convention of the Am. Waterworks Assn. Advocating the building of subways under the sidewalks, showing that the plan has much in its favor. 3200 w. Fire & Water—June 24, 1899.

**SUEZ CANAL.**

**Tides.**—See **TIDE—Suez Canal.**

**SUGAR INDUSTRY.**

**Beet.**—Recent Improvements in the Sugar Industry. M. L. Lindet. Reprinted from "Jour. of the Soc. of Chem. Ind." Describes improvements in beet sugar industry, which appear to have extended to nearly every operation comprised in the manufacture. 2000 w. Sci Am Sup—Dec. 7, 1895.

The Beet Sugar Industry and Its Prospects. Herbert Myrick. The present prosperous condition of the industry, its possible large extension in the United States and essentials to its success are pointed out. 2000 w. Bradstreet's—Oct. 24, 1896.

**Beet, France.**—Beet Sugar Industry of France. The present state of the industry, with tabulated statistics. Possibilities of beet culture in the United tSates. 2500 w. U S Cons Repts—Oct., 1896.

**United States.**—Should the United States Produce Its Sugar? James Wilson. Discussing whether it is a wise policy for the people of the United States to produce their own sugar; concluding in its favor. 3000 w. Forum—March, 1898.

See also **Beet.**

**SUGAR MACHINERY.**

Sugar Machinery. Illustrated description of an installation of sugar machinery, with the crystallization in motion plant. 3500 w. Engng—Dec. 8, 1899.

**SUGAR REFINING.**

The Purification and Bleaching of Sugar Solutions (Reinigung und Entfärbung Zuckerhaltiger Flüssigkeiten). Frans Peters. A comparison of methods of purification of sugar by ozone, by electricity, and by both combined; results of experiments are given. 2000 w. Zeitschr f Elektrochemie—Dec. 1, 1898.

**Electrolysis.**—Report upon Work with Electrolysis (Bericht über die Arbeit mit Elektrolyse). An account of the commercial results of electrolysis in the Stepanowka sugar refinery and the chemical and mechanical economies obtained. 6000 w. Elektrochemische Zeitschr—April, 1897.

See also **ELECTRO-CHEMISTRY—Sugar.**

**Vacuum Pan.**—Apparatus for Boiling Syrup (Appareil pour Cuire les Sirops). Illustrated description of the Ehrenstein evaporating pans and sugar filters. The evaporation is effected by high pressure steam coils in vacuum pans. 1000 w. 1 plate. Génie Civil—Nov. 13, 1897.

**SULPHIDE.**

See **LEAD METALLURGY; SILVER METALLURGY; SMELTING; STEEL.**

**SULPHUR.**

**Analysis.**—See **IRON ANALYSIS; IRON ORE ANALYSIS; METAL ANALYSIS; STEEL ANALYSIS, etc.**

**England, Production.**—The Production of Sulphur in England. An editorial explaining why the Anglo-Sicilian Sulphur Co. was formed, the process of recovery used, the product, etc. 2700 w. Engng—June 15, 1900.

**Extraction from Brimstone.**—The Extraction of Sulphur from Brimstone Ore. Edward F. White. The methods in use for the mechanical separation are stated, and White's apparatus for the extraction of sulphur from ore is described. 1000 w. Eng & Min Jour—Dec. 5, 1896.

**Louisiana Well.**—The Louisiana Sulphur Wells. J. B. Frauckhauser. Illustrated description of the wells and of Frasch's method of pumping up sulphur liquefied by heat. 1000 w. Sci Am—Oct. 10, 1896.

**Metal Analysis.**—See **METAL ANALYSIS—Sulphur.**

**Metallurgy.**—See **LEAD METALLURGY; PYRITES WORKS; SILVER METALLURGY; SMELTING.**

**SULPHURIC ACID.**

**Auriferous Pyrites.**—The Manufacture of Sulphuric Acid from Auriferous Pyrites. Walter J. Studds. A suggestion for working up concentrated tailings. 1500 w. Aust Min Stand—Dec. 28, 1896.

**Iron Pyrites.**—Sulphuric Acid and the By-Products from Iron Pyrites. R. G. Ewer. Reviews the early history, the various improvements, and present mode of manufacture. 4800 w. Jour Assn of Engng Socs—Oct., 1898.

**SUNDAY SCHOOL.**

See also **SCHOOL.**

Sunday School Planning. A. F. Wickson. Points out the requirements of these buildings and gives plans. Read before the Toronto Chapter of Architects. 1600 w. Can Arch—March, 1897.

**SUN DIAL.**

See **CLOCK—Japanese.**

**SUPERHEATED STEAM.**

See also **STEAM ENGINEERING.**

Economy in the Use of Superheated Steam. R. S. Hale. A conservative examination of the economy to be anticipated from the use of superheated steam, showing the conditions under which it should be practically successful. 2500 w. Eng Mag—Sept., 1899.

The Production and Utilization of Superheated Steam. R. S. Hale. A study of the modern devices for superheating steam, and the best methods of applying it in order to realise the highest economy. 3000 w. Eng Mag—Feb., 1900.

Saving by Superheated Steam. R. S. Hale, in "The Boiler." Considers the value of superheating steam in reducing waste and describes three types of superheaters. 1600 w. Ir & Coal Trds Rev—July 27, 1900.

Notes on Steam Superheating. William H. Patchell. Paper read before the Inst. of Mech. Engs. Historical. Describes a great variety of devices for superheating, from Trevithick's time up to date, and gives in tabulated form the data obtained from the most modern practice in superheating. An excellent paper. 6000 w. Engr, Lond—Feb. 21, 1896.

Notes on Steam Superheating. William H. Patchell. A paper read before the Inst. of Mech. Engs. Historical, theoretical, and practical, with tabulated data of tests of boilers with and without superheaters. 4000 w. Col Guard—Feb. 7, 1896.

Recent Practice in Steam Superheating. Illustrates and describes a new apparatus for superheating steam, giving records of tests and editorial on progress made in Europe, and the interest aroused in the United States. 4200 w. Eng News—April 6, 1899.

Superheated Steam. R. H. Thurston. Read before the A. S. M. E. Facts, data, and principles relating to the subject, which is broadly treated in all its aspects, with formulae and diagrams, and illustrations of some forms of superheaters. 22000 w. Trans Am Inst of Mech Engs—Vol. XVII., 1896.

Superheated Steam. W. E. Burgess. The writer proposes in the following articles to show in what way the use of superheated steam increases the economy in the engine, to give the best methods of investigating and comparing the performance of engines using both saturated and superheated steam, by means of heat charts; to examine the actual efficiencies of engines using superheated steam and discuss the influence of the superheater on the general economy of a power station. Serial. Elec Engng—Nov., 1896.

Superheating. W. H. Booth. A historical, theoretical, and practical paper. 1600 w. Am Mach—March 19, 1896.

Superheating. Michael Longridge. Explains how superheated steam differs from saturated steam, its action and the benefits to be derived. 2500 w. Eng's Gaz—Nov., 1896.

Superheating Steam. J. H. Ashby. Abstract of paper read before the Cleveland Inst. of Engs. Aiming to show the advantages of superheating, especially in the Cleveland district. Discussion. 3500 w. Col Guard—Dec. 15, 1899.

The Application of Superheated Steam to the Driving of Steam Engines (Die Anwendung Ueberhitzten Dampfes zum Betriebe von Dampfmaschinen). R. Doerfel. The beginning of an exhaustive study of the use of superheated steam; collecting and discussing tests. Serial. Zeitschr d Ver Deutscher Ing—May 27, 1899.

The Application of Superheating to Steam Engines (Application de la Surchauffe aux Machines à Vapeur). F. Sinigaglia. A fundamental investigation of superheating from a theoretical and practical point of view, with many descriptions of apparatus and reports of tests. Six articles. 20000 w. Rev de Mécanique—March, April, June, Aug., Oct., Dec., 1897.

The Application of Superheated Steam (Die Anwendung des Ueberhitzten Wasserdampfes). H. Hoff. Especially discussing the mechanical arrangements of superheaters of modern types. 1200 w. Zeitschr d Ver Deutscher Ing—Oct. 14, 1899.

The Production and Application of Superheated Steam (Der Ueberhitzte Wasserdampf, seine Erzeugung und Verwendung). H. Hoff. With many illustrations of the latest designs of successful superheaters and engines for use, with superheated steam. 4000 w. Stahl und Eisen—April 15, 1899.

The Renaissance of Superheating. Editorial. Discussing the increasing practice of superheating steam, states the advantages gained by the practice, expresses the opinion that it is now on a more permanent basis than at any other time since Trevithick invented and used it. 2200 w. Elect'n—Feb. 21, 1896.

**Experiments.**—Superheated Steam Engine Trials. William Ripper. Read before the Inst. of Civil Engs. Describes experiments made to determine the steam consumption, dryness, nature of the heat exchange, and conclusions that may assist in the future development of superheating. Ill. Serial. Prac Eng—July 30, 1897.

**Hering.**—Improvements in the Use of Steam (Veredelung des Wasserdampfes). A. Hering. A discussion of the economy effected by superheating, with illustrations of superheaters and data of tests. 5000 w. Zeitschr d Ver Deutscher Ing—June 10, 1899.

Superheated Steam—Its Use and Advantages. Ernst Prochaska. Remarks on the results obtained by the use of highly superheated steam, with description of Hering's steam superheater, and report of trials. Ill. 1300 w. Am Mfr & Ir Wld—Aug. 3, 1899.

The Hering Steam Superheater (Die Hering'schen Dampfüberhitzer). Illustrated description of an improved apparatus giving better control over the temperature, and avoiding overheating. 2000 w. Oesterr Zeitscher f Berg u Hüttenwesen—Feb. 27, 1897.

**Liege University.**—The Advantages of Superheating and the Superheater of the University of Liege. Georges Duchesne. Considers the advantages and inconveniences of superheating and describes the superheater at Liege, giving some results obtained. 1700 w. Am Elect'n—Feb., 1900.

**Schmidt System.**—Engines for Superheated Steam (Ueber Heissdampfmaschinen). A. Seemann. With a full account of the remarkable performances of the Schmidt superheated steam engine, which used only 9.8 lbs. of steam per h. p. hour. Three articles. 12000 w. Zeitschr d Ver Deutscher Ing—Dec. 11, 18, 25, 1897.

Superheated Steam and Its Application on Steam Engines. Paul Schou. Abstract from a paper read before the Northern Soc. of Elec. Engs., England. Describes the Schmidt tandem compound engine and the superheater. 2200 w. Ind & Ir—Dec. 9, 1898.

The Application of Superheated Steam (Die Anwendung Ueberhitzten Dampfes). M. F. Gutermuth. A theoretical discussion, accompanied by extensive tables of tests as well as illustrations of the Schmidt boiler and superheater. 6000 w. Zeitschr d Ver Deutscher Ing—Feb. 5, 1898.

The Schmidt Superheated Steam Motor and Boiler. Illustrated detailed description. 1200 w. Eng, Lond—Jan. 31, 1896.

The Schmidt Superheating System. Translated from "Portefeuille Economique des Machines." Illustrated description. 1300 w. Am Eng & R R Jour—May, 1898.

The Schmidt Superheating System. Translated from "Portefeuille Economique des Machines." Illustrates and describes a construction that ensures perfect circulation of the firebox gases, thus avoiding troubles from burned tubes, separated joints, leakage, etc. 1400 w. Mech Wld—July 29, 1898.

See also **STEAM ENGINE—Brussels Exposition.**

**Schwoerer.**—Experiments on Superheated and Saturated Steam. From Inst. C. E.; Foreign Abstracts. Reports experiments on a Sulzer compound condensing steam engine at a cotton mill in Bavaria, undertaken to test the economy with the separately-fired Schwoerer superheater. 1300 w. Eng—July 10, 1897.

Experiments with Superheated and Saturated Steam in a 500 Indicated Horse-Power Sulzer Compound Engine. B. Donkin. Summary of experiments undertaken at a cotton mill in Bavaria to test a separately fired Schwoerer superheater supplying steam to a compound condensing Sulzer engine. 1600 w. Eng Lond—Dec. 11, 1896.

Superheated Steam. An account of the experiments carried out on a Sulzer compound-condensing steam engine in Bavaria. 1100 w. Bos Jour of Com—Sept. 11, 1897.

The Schwoerer Steam Superheater (Der Dampfüberhitzer von Schwörer). A general discussion of superheating with data of tests showing an economy of about 20 per cent. 2500 w. Zeitschr d Ver Deutscher Ing—Jan. 29, 1898.

**Sulzer Engine Tests.**—See **Schwoerer.**

**Thermodynamics.**—An Experimental Investigation of the Thermodynamical Properties of Superheated Steam. John H. Grindley. Investigates the law of flow of saturated steam through small orifices, and the cooling by free expansion, and other properties. 2500 w. Engr, Lond—March 16, 1900.

Thermodynamic Action of "Steam-Gas." R. H. Thurston. On the valuable paper by Prof. Sinigaglia, published in the "Revue de Mécanique." 1100 w. Sib Jour of Engng—June, 1899.

**SUPERHEATED-WATER MOTOR.**

See **KINETIC MOTOR.**

**SURFACE.**

**Optical Verification.**—The Optical Verification of Lines and Surfaces (Vérificateurs Optiques des Lignes et Surfaces). Ch. Dévé. An elaborate discussion of the optical methods which may be employed in mechanical operations for verifying the accuracy of planes. A long and valuable paper. 1500 w. Bull de la Soc d'Encour—July, 1899.

**SURFACE-CONTACT TRAMWAY.**

See also **ELECTRIC CONDUIT TRAMWAY; ELECTRIC TRAMWAY.**

Underground Arrangements of Electric Tramways (Dispositif Electrique Souterrain pour la Traction des Tramways). Ch. Gruet. Describes an improved underground trolley system on the separate contact principle. 2000 w. La Rev Tech—Sept. 10, 1898.

A Simple Closed-Conduit Traction System. An illustrated description of a simple device for making contact between a feeder and sectional conductor as the car passes over the latter. 600 w. Elec Rev, N. Y.—Sept. 19, 1900.

Sectional Conductor Electric Railways. George T. Hanchett. Illustrated description of systems aiming at moderate cost, and a permanent way free from unsightly and dangerous devices. Serial. Elec Wld—April 23, 1898.

Surface Contact Electric Railways. Edward H. Johnson. Read before the New York Elec. Soc. Discusses the causes that have retarded the development of this idea, and notes briefly the salient features of the most ambitious efforts in this field. Ill. 4700 w. Elec, N. Y.—Nov. 30, 1898.

**Anderson.**—Anderson's Surface Contact Tramway System. Illustrated description of the apparatus and statement of the operation. 2200 w. Tram & Ry Wld—Nov. 2, 1899.

Anderson's Tramway. An illustrated detailed description of this system as shown in the experimental line built at Leeds, Eng. 1300 w. Elec Eng, Lond—Nov. 4, 1898.

**Brand System.**—See **ELECTRIC RAILWAY.**

**Campbell.**—Campbell Surface Contact System of Electric Traction. Illustrates and describes this system and states its advantages. 1100 w. Elec Eng, N. Y.—Jan. 5, 1899.

**Cirla.**—Underground Trolley, Cirla System (System Circla für unterirdische Strömzuführung bei elektrischen Strassenbahnen). Illustrated description of an Italian electric tramway system with underground conductor and successive surface contacts. 1000 w. Elektrotechnische Zeitschrift—Jan. 14, 1897.

**Claret-Vuilleumier.**—The Claret-Vuilleumier Electric Traction System. From "Lightning," London. Brief description of a system recently adopted in Paris, including the successful use of underground conductors. 1600 w. Elec Rev—Jan. 20, 1897.

Claret-Vuilleumier Tramway of Paris. Illustrated description of an electric line with underground connections, of peculiar construction. 900 w. W Elec—March 13, 1897.

**Crocker Third Rail.**—The Crocker Safety Sectional Third Rail System. Describes the system and the test made in the yards of the American Ordnance Company, at Bridgeport, Conn. Ill. 1000 w. Elec Eng—Sept. 28, 1897.

**Diatto.**—The "Diatto" Surface-Contact System on Tramways at Tours. Illustrated detailed description. 2000 w. Ry Wld—Aug. 10, 1899.

The Diatto System at Tours (Das Diatto-System in Tours). Giving a section of the conduit and showing how the contact is made with the moving car. 1500 w. Elektrotech Zeitschr—June 8, 1899.

The Diatto System of Electric Traction. From "La Vie Scientifique." Illustrates and describes the system as operated at Tours, France. 1700 w. Engr, Lond—May 26, 1899.

Underground Conduit System. An illustrated abstract from the "Elektrotechnische Zeitschrift." Seems to be a combination of the Lineff and the Westinghouse systems. It is similar to the Lineff in that it carries the electro-magnet on the car, but it approximates to the Westinghouse in carrying a collecting bar, which collects current from metal studs. 600 w. Elec Rev, Lond—Nov. 1, 1895.

The Electric Tramways of Tours (Tramways Electriques de Tours). E. Dieudonne. An illustrated description of the Diatto system, as installed at Tours, France. The current is conveyed to the cars by a pin-contact system, from an underground conductor, there being no slot in the street. 2000 w. Rev Tech—April 25, 1899.

The Tramways of Tours (Les Tramways de Tours). J. A. Montpellier. A fully illustrated account of the installation of the Diatto contact system of electric traction at Tours, with map of the tramway system. 2500 w. L'Electricien—April 29, 1899.

**Dolter.**—The Dolter Surface Contact System for Tramways (Contact Superficial pour Tramways, Système Dolter). A. Bainville. Detailed description of a system similar to the Diatto, now in operation in Paris. 1800 w. Electricien—Aug. 25, 1900.

**General Electric Co.**—Surface-Contact Street Railway System. Illustrated description of experiments carried on at Schenectady, N. Y., upon a stretch of track forming a part of the tramway system of the General Electric Co.'s Works. 1600 w. Ir Age—Oct. 21, 1897.

The Surface Contact System of the Union-Elektricitätsgesellschaft (Das Oberflächenkontaktsystem der Union-Elektricitätsgesellschaft). M. Kubierschky. A general description of the General Electric Company's system as applied in Germany. 4500 w. Elektrotech Zeitschr—April 27, 1899.

**Johnson-Lundell.**—A Surface-Contact Street Railway System. Illustrated description of an interesting system now in course of experimental test on 84th St., N. Y. The latest Johnson-Lundell system. 900 w. Elec Wld—March 28, 1896.

The Johnson-Lundell Railway System. Describes a short surface-contact line, with description of the operation of the system, photographs and diagrams. Gives little information as to practical success. 1800 w. Elec Eng—June 24, 1896.

**Kingsland.**—Kingsland Electric Tramway System. Illustrates and describes an improved surface-rail system. 2000 w. Engng—Aug. 26, 1898.

Kingsland's Surface Contact System of Electric Traction. Illustrated description of the apparatus and method of working of this system. 1600 w. Elec Rev, Lond—March 18, 1898.

The Kingsland Contact System. Illustrated description of a system to be soon tried at Wolverhampton. 800 w. Elec Eng, Lond—Nov. 24, 1899.

**Leeds, Eng.**—See **Anderson.**

**Lineff.**—See **Westinghouse.**

**Monaco.**—Electric Tramways of Monaco. Illustrates and describes this surface-contact system of electric traction, with the location and equipment. 2000 w. Ry Wld—Nov. 10, 1898.

Surface-Contact System at Monaco. Brief illustrated account of the most successful surface-contact electric railway in the world. 900 w. St Ry Jour—May 5, 1900.

The Electric Tramway at Monaco (Die Elektrische Strassenbahn in Monaco). An interesting installation of the point-contact system, with illustrations of the work in construction and after completion. 1500 w. Ill. Zeitschr f Klein u Strassenbahnen—Feb. 1, 1899.

**Murphy.**—A Sectional Third-Rail Electric Street Railway System. Describes the 2000-ft. experimental section of track at Manhattan Beach, of the Murphy Safety Third-Rail System, stating the advantages claimed and the defects. Ill. 1600 w. Eng News—April 27, 1899.

The Murphy Third-Rail Street Railway System.

Describes the most recent attempt of avoiding overhead construction without excessive cost. Ill. 2000 w. Elec Eng, N. Y.—April 7, 1898.

**Pringle and Kent.**—Pringle and Kent's Surface Rail Electric Railway. Describing an English system proposed to replace the trolley, at a moderate increase of cost. 2000 w. Elec Rev, Lond—July 3, 1896.

**Steudebach.**—A New Surface-Contact System for Electric Tramways (Ueber ein Neues Unterleitungs-System für Elektrische Strassenbahnen). H. Zacharias. A paper before the Verein für Eisenbahnkunde giving a well illustrated description of the Steudebach system, in which contact is made with the working conductor by means of a simple mechanical arrangement. 5500 w. Glaser's Annalen—June 15, 1900.

**Thompson-Walker.**—Electric Traction by Surface-Contacts. Miles Walker. Read before the Brit. Inst. of Elec. Engs. Discusses whether a surface-contact system can be laid so as to cause no obstruction to traffic; whether picking up current from studs by means of a skate is feasible under practical working conditions, and whether the studs can be made perfectly safe. Ill. Serial. Ind & Ir—Feb. 17, 1899.

Electric Traction by Surface Contacts. S. P. Thompson and Miles Walker. Paper read before the British Assn. Reviews the systems based upon this principle and describes some of the methods of operation, giving illustrations. Also describes an experimental line constructed by the writers in England. 3600 w. Elect'n, Lond—Sept. 30, 1898.

The Thompson-Walker System of Electric Traction. A brief illustrated sketch of this system taken from a pamphlet published by the inventors. 1100 w. Elec, Lond—Dec. 9, 1898.

**Tours, France.**—See **Diatto.**

**Walker System.**—See **Thompson-Walker; ELECTRIC CONDUIT TRAMWAY.**

**Westinghouse.**—An Electro-Magnetic Railway System. Illustrated description of the system introduced into England by the Westinghouse Company, with reference to the Lineff system. 1400 w. Elec Rev, Lond—Nov. 1, 1895.

The Westinghouse Electro-Magnetic Traction System for Tramways. Illustrated description of this surface-contact system, recently designed. 1500 w. Engr, Lond—April 27, 1900.

Westinghouse Enclosed Conduit System for Electric Traction. An illustrated description. The car takes the current from spaced contact pins in road-bed. 1600 w. Ry Wld—Feb., 1896.

## SURFUSION.

See **ALLOY; IRON—Solution Theory; METAL—Diffusion; METALLOGRAPHY; SOLUTION THEORY; STEEL.**

## SURVEYING.

See also **GEOLOGICAL SURVEYING; HYDROGRAPHIC SURVEYING; MAGNETIC SURVEYING; MINE SURVEYING; SURVEYING INSTRUMENT; TOPOGRAPHY.**

**Alaska.**—Surveys of the Gateways to Alaska. An account of the work done in mapping the delta of the Yukon and other operations of the coast survey. 900 w. Science—Nov. 18, 1898.

**Base Line.**—A New Apparatus for Measuring Geodetic Base Lines (Nouveau Dispositif d'Appareils Sewaul à la Mesure des Bases Géodésiques). A. Bergel. Advocating the use of flat iron bars floating in a bath of mercury, for making the measurement. 1000 w. Comptes Rendus—Aug. 13, 1900.

The Remeasurement of the Mackinaw Base Line. Description of the measurement of a 4-mile base line by means of wires of steel and bronze 1 kilometer long. 3500 w. Eng Rec—Aug. 13, 1898.

**Bicycle.**—See **Military Bicycle.**

**Biltmore.**—See **Topographical.**

**Boston.**—Co-ordinate Survey of the City of Boston. Frank O. Whitney. Describes the work of the Board of Survey appointed to devise a scheme of streets for the entire city, as a basis for future street improvements. 8500 w. Jour Assn of Engng Socs—June, 1898.

See also **Topographical, Boston Parks.**

**Boundaries, New England.**—State Boundaries. Abstract from a paper by Henry B. Wood, read before the Boston Soc. of Civ. Engs. Description of township and state boundary surveys in Massachusetts. 2500 w. Eng Rec—May 14, 1898.

State, City and Town Boundaries. Henry B. Wood. Reviews the history of boundaries in Massachusetts and contemplated work in this field. 8000 w. Jour Assn of Engng Socs—Nov., 1898.

**Bronx Borough, N. Y.**—The Triangulation of Bronx Borough, New York City. William S. Dalrymple. Description of the work, with map. 2000 w. Eng News—May 19, 1898.

**Butte, Montana.**—A Topographical Map of Butte, Montana. R. H. Chapman. Showing the great economy of the plane-table and stadia method with reference to time, accuracy and actual cost where the scale is sufficiently large to warrant it. 650 w. Eng & Min Jour—May 9, 1896.

**Cadastral, France.**—See **France, Cadastral.**

**California, Geological.**—See **MINERAL REGION—California.**

**Canal.**—See **New York Canals; Stadia; CANAL.**

**Chaining Slopes.**—A New Method of Chaining Slopes. J. C. Isaac Leskard. A method of measuring horizontal distances on a slope without subsequent reduction, by the use of a protractor attachment to the chain. 700 w. Eng News—Jan. 23, 1896.

**City.**—See **Vienna; CITY PLAN; MUNICIPAL ENGINEERING.**

**Coal Mine.**—Laying Out Pit Bottoms. W. Stewart. The importance of the subject in the laying out of a new colliery is presented, with discussion of main points and a brief description of the laying out of the Vivian Pit, Abertillery. 3300 w. Col Guard—Nov. 13, 1896.

See also **MAP; MINE SURVEYING.**

**Croton Aqueduct.**—The Preliminary Alinement of the New Croton Aqueduct. E. Sherman Gould. Gives details of some of the preliminary instrumental work connected with the location of the center line of the New Croton Aqueduct. 2200 w. Eng News—May 31, 1900.

See also **AQUEDUCT; WATERWORKS.**

**Equipment.**—The Equipment of Camps and Expeditions. Charles H. Snow. Presented at New York meeting of the Am. Inst. of Min. Engs. Useful hints relating to transportation, food, packing, shelter, clothing, etc. 9000 w. Trans Am Inst of Min Engs—Feb., 1899.

**Farm.**—A Method of Making a Farm Survey. G. B. Zahniser. Describes a method of land survey, and states its advantages. 1100 w. Eng News—March 29, 1900.

**France, Cadastral.**—A Great Cadastral Survey. A brief outline of the character and extent of the work which will be necessary in revising and renewing the cadastral survey of France, which is under consideration. 1600 w. Engr, Lond—April 7, 1899.

A Trial at the Revision of the Survey System of France (Un Essai de Réfection Intégrale du Cadastre). Gérard Lavergne. A very full illustrated description of methods and instruments used in the survey of the commune of Neuilly-Plaisance, with reference to their application to a general resurvey of France. 3600 w. Génie Civil—Nov. 5, 1898.

**Geodetic.**—See **Base Line; France; Picard's Toise; Transcontinental Arc; United States Coast.**

**Geological.**—See **GEOLOGICAL SURVEY; GEOLOGY; MINERAL REGION.**

**Gold and Silver Mines.**—See **MINE SURVEYING.**

**Hydrographic.**—See **HYDROGRAPHIC SURVEY.**

**Illinois State.**—A Topographical Survey of the State of Illinois. John W. Alvord. Some of the advantages of such a survey and its probable cost, with discussion. 4000 w. Ill Soc of Engs & Surv—11 An Rept, 1896.

**Index.**—See **INDEX—Surveyor's Office.**

**Indiana.**—See **Topographical.**

**Instruments.**—See **SURVEYING INSTRUMENT.**

**Jurisprudence.**—A Case of Jurisprudence in Land Surveying. Ambrose E. Lehman. Gives a description of the work, with a discussion of the questions of jurisprudence involved in the case. Discussion. 8000 w. Pro Engs' Club of Phila—July, 1898.

**Latitude and Longitude.**—Methods of Determination of Latitude, Longitude and Solar Time in Reconnoissance Surveys. William S. Post. A compilation of methods, formulas, and references found useful in this work. 4500 w. Eng News—March 1, 1900.

**Least Squares.**—The Comparison of Measurements by Least Squares (Ueber Ausgleichung von Linienverbindungen bei Kleinmessungen). Giving working examples of the determination of the probable error in a system of measurements by the method of least squares, without the necessity of geometrical construction. 7500 w. Oesterr Monatschr f d Oeffent Baudienst—May, 1897.

**Leveling.**—Spirit Leveling of the United States Geological Survey. Herbert M. Wilson. A statement of the work of the field parties engaged in the topographic mapping of the United States Geological Survey, in the careful spirit-leveling conducted by them. 15000 w. Pro Am Soc of Civ Engs—Jan., 1898.

The Theory and Practice of Precise Spirit Leveling. David A. Molitor. An elaborate paper before the Am. Soc. C. E., with illustrations, tables and curves. 32000 w. Pro Am Soc Civ Engs—Sept., 1900.

**Magnetic.**—See **MAGNETIC SURVEYING.**

**Map Protractor.**—See **PROTRACTOR.**

**Massachusetts Boundaries.**—See **Boundaries, New England.**

**Military Bicycle.**—A Military Survey Made with a Bicycle. An account of use made of a bicycle fitted with a cyclometer, to obtain distances, and of a military pocket compass, for directions, in very rapid surveying. 500 w. Eng News—Nov. 4, 1897.

**Mine.**—See **Coal Mine; Stope Measuring; Tunnel; MINE SURVEYING; SURVEYING INSTRUMENT.**

**Municipal.**—See **City.**

**New York Canals.**—Instructions for Surveying New York State Canals. A review of the rules formulated by the State engineer with the assistance of a board of consulting engineers. 3500 w. Eng Rec—June 16, 1900.

See also **Stadia.**

**One Hundred-Foot Standard.**—The 100-Foot Standard of Length of the Boston Waterworks at Chestnut Hill Reservoir. Charles W. Sherman. A brief description with some of the problems which came up, in graduation and testing. Ill. 5000 w. Jour Assn of Engng Soc—April, 1897.

**Photographic.**—The Application of Photography to the Production of Topographical Maps in Canada (Sur de Nouvelles et Importantes Applications Faites au Canada de la Methode du Lever des Plans à l'Aide de la Photographie). A. Laussedat. A communication to the French Academy upon the recent applications of photography to topographical surveying in Canada. 1800 w. Comptes Rendus—Feb. 17, 1899.

The Application of Photography to Surveying. John S. Dennis. Facts about results that have been obtained in Canada by the application of photography to surveying. 2500 w. Am Soc of Ir Engs—April, 1895.

The Application of Photography to Surveying. Abstract from a paper by John S. Dennis, of Ottawa, Can., read before the Denver meeting of the Am. Soc. of Irrigation Engs. The principle of the method. 1000 w. Eng News—Nov. 19, 1896.

Vertical and Horizontal Angles in Photo-Surveying. Fred Morley. Directions for platting a topographical map by means of the photographic surveying camera. 2500 w. Pro of Purdue Soc of Civ Engs—1897.

See also **PHOTOGRAPHY—Engineering.**

**Picard's Toise.**—The Restoration of the Toise of Picard (Restitution de la Toise de Picard). An interesting note giving the remeasurements of some ancient data in the Paris observatory, restoring the length of the toise of Picard, and making his geodetical measurements comparable with later work. 2500 w. Comptes Rendus—July 26, 1897.

**Railway.**—See also **RAILWAY LOCATION.**

**Sewer.**—See **SEWER—Surveying.**

**Solar Work.**—See **SURVEYING INSTRUMENT.**

**Stadia.**—Methods and Results of Stadia Surveying. F. B. Maltby. Notes on the practical use of the stadia as gained principally from the writer's own practice. Methods employed, with examples of results attained. 10000 w. Jour Assn of Eng Soc—Sept., 1896.

Railroad Preliminary Survey by Stadia. John H. Lary. Description of work, with statement of the difficulties encountered. Discussion. 1800 w. Jour W Soc of Engs—Feb., 1900.

Recent Stadia Topographic Surveys. Notes Relating to Methods and Cost. Discussion of paper by William B. Landreth. 7000 w. Pro Am Soc of Civ Engs—May, 1900.

Recent Stadia Topographic Surveys: Notes Relating to Methods and Cost. William B. Landreth. The work reported was in connection with the proposed deep waterway on the Oswego-Mohawk-Hudson route, through New York State. Maps. 1500 w. Pro Am Soc of Civ Engs—March, 1900.

See also **SURVEYING INSTRUMENT.**

**Stadia Diagram.**—A New Stadia Diagram. M. A. Knapp. Sketch and description of a diagram by the use of which stadia readings may be reduced to true horizontal and vertical distances much more quickly and with a satisfactory degree of accuracy. 1300 w. Eng & Min Jour—Aug. 20, 1898.

A Stadia Diagram. Morris K. Trumbull. Gives a stadia diagram designed with a view to lessening the time required for the reduction of the notes, with a brief description of the methods used in its construction. 4400 w. Jour W Soc of Engs—Dec., 1898.

**Stope Measuring.**—A New Method of Measuring Stopes. Fred T. Greene. Illustrated description. 600 w. Eng & Min Jour—Jan. 27, 1900.

**Submarine.**—See **HYDROGRAPHIC SURVEY; SUBMARINE TELEGRAPH—Survey.**

**Topographical.**—Topographical Surveys, Their Methods and Value. J. L. Van Ornum. A lecture before the students of the College of Mechanics and Engineering, University of Wisconsin. Presents the value and utility of the topographical survey, with methods and variations in cost, scale and character of the work. Also notes showing how large a territory has been covered. 10700 w. Bull of Univ of Wis—Vol. 1, No. 10.

**Topographical, Biltmore.**—Topographical Surveys—Methods Used on the Vanderbilt Estate at Biltmore N. C. John L. Howard. The problem to be solved is stated, and the method used described. 2300 w. Jour Assn of Engng Soc—April, 1897.

**Topographical, Boston Parks.**—Topographical Surveys of the Metropolitan Park Reservations of Massachusetts. Henry F. Bryant. Interesting description of the work, with maps. 4800 w. Jour Assn of Engng Soc—April, 1897.

**Topographical, Indiana.**—Description of a Topographical Survey of a Four-Thousand-Acre Tract. Edwin Duryea. A detailed description of a survey in Indiana that needed very accurate maps in order to dispose and arrange many industries. 12800 w. Trans Assn of Civ Engs of Cornell Univ—1898.

**Transcontinental Arc.**—The Transcontinental Arc from Cape May to San Francisco. E. D. Preston. Considers the determination, accuracy and usefulness. 5800 w. Trans Assn of Civ Engs of Cornell Univ—June, 1897.

**Transit.**—Hints Upon Transit Surveys, and the Avoidance and Checking of Errors. E. Sherman Gould. Recommends methods tested by practical experience for the avoidance of errors in instrumental work. 3000 w. Eng News—Jan. 4, 1900.

**Tree Marks.**—The Value of Marked Trees in Fixing of Survey, etc. I. H. Serviss. Showing that marked trees are the best witnesses as to the location, and how the date of survey may be determined by cutting out the mark and counting the rings of growth. 400 w. 10th An Rept of Ill Soc of Eng & Surv—1895.

**Triangulation.**—The Invention of Triangulation (Die Erfindung der Triangulirung). S. Wellisch. An examination into the history of modern surveying, showing the earliest use of triangulation to have been by Augustin Hirschvogel, in 1574, at Vienna. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—May 19, 1899.

**Tropical Forests.**—Surveys in Tropical Forests. From a paper by Frederic Shelford, recently contributed to the Institution of Civil Engs. Describes methods employed in Africa and Central and South America. 2000 w. Eng Rec—June 3, 1899.

See also **ENGINEER.**

**Tunnel.**—Triangulation Preparatory to Alignment of a Tunnel. William W. Redfield. The article is accompanied by a diagram and profile with full description of method employed in connecting two shafts at Minneapolis by a tunnel for the water supply. 1000 w. Jour Assn of Eng Soc—Feb., 1896.

**United States.**—See also **Transcontinental Arc.**

**U. S. Coast.**—The Geographic Work of the Coast and Geodetic Survey. John F. Hayford. Describes the work carried on, and the value of the information furnished. Plate. 3700 w. Eng News—Dec. 1, 1898.

The United States Coast and Geodetic Survey. Herbert C. Graves. A brief review of the history of this work, its systems and importance, with information relating to it. Ill. 3800 w. Marine Rev—Oct. 5, 1899.

The Work of the United States Coast and Geodetic Survey. From the 67th Annual Report of the Survey, giving a brief historical summary of the work. 800 w. Eng News—June 7, 1900.

**U. S. Coast Signals.**—See also **BEACON.**

**U. S. Public Land.**—The Rectangular System of United States Public Land Surveying. Charles L. Du Bois. An exposition of the system used, rates, methods, etc. Ill. 6000 w. Tech Quar—Dec., 1899.

**Vienna.**—Plans of the City of Vienna at the Time of the First Turkish Siege (Die Wiener Stadtpläne zur Zeit der Ersten Türkenbelagerung). S. Wellisch. An account of the two maps of the city made by Hirschvogel and Wolmuet from surveys in 1547. The probable errors are determined by comparison with existing landmarks and the old methods described and illustrated. An interesting contribution to the history of surveying. Three articles. 10000 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 16, 23, 30, 1898.

The Oldest Plan of Vienna (Der Aelteste Plan von Wien). Siegmund Wellisch. A description of the so-called Albertin map of Vienna made in 1438, valuable both for historical reasons, and also as the earliest known example of municipal surveying. Comparisons with succeeding surveys are given. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 30, 1898.

See also **CITY PLAN.**

**SURVEYING INSTRUMENT.**

See also **SURVEYING.**

Early History of Instruments and the Art of Observing in Astronomy and Civil Engineering. Charles S. Howe. Briefly traces the history from the time of the gnomon and the astrolabe to that of the transit circle and the altazimuth, etc., closing with the beginning of modern instruments. 4000 w. Jour Assn of Engng Soc—March, 1897.

**Base Line.**—See **SURVEYING.**

**Cyclotomic Transit.**—The Cyclotomic Transit. Otto von Geldern. A paper read before the Technical Society of the Pacific Coast, on a transit with a fixed lower plate and a floating exterior ring, thus not interfering with rigidity of the central spindle. The arrangement is illustrated in section and plan. 2400 w. Eng News—March 19, 1896.

The Cyclotomic Transit. Illustrated description of a new transit with only one central spindle, turning within the leveling head, and in which the azimuth circle plate is made a part of the rigid substructure. Correlated with this is a floating ring upon which the degrees are marked, so that instead of turning the whole plate, only the floating ring is in use, turned around the central vertical axis. 900 w. Eng & Min Jour —May 9, 1896.

**Kings Co., N. Y.**—Measuring Apparatus, Kings County Survey, N. Y. Samuel McElroy. Describes methods and apparatus used in making this survey. Discussion. 4500 w. Jour W Soc of Engs—June, 1898.

**Level.**—A Level of Ye Olden Time. Otto von Geldern. Historical review of the earliest contrivances for this use, and a memoir published with the papers of the Royal Acad., of Paris, for the year 1704, by M. de la Hire, describing a level on the principle of fastening an iron rule at its center of gravity to an upright support canting on its base. Discussion. 7500 w. Jour Assn of Engng Soc—Dec., 1897.

**Leveling Rod.**—A Compensated Rod for Precise Leveling (Ueber eine Kompensationslatte beim Präcisions-nivellement). Dr. J. Hilfiker. An illustrated description of a wood, brass and iron leveling rod, compensated for temperature changes. Serial. 2 parts. 3000 w. Schweizer Bauzeit—June 16, 23, 1900.

**Mine.**—The Evolution of Mine Surveying Instruments. Dunbar D. Scott. Historical review of the development of mine-surveying instruments, with numerous illustrations. 16500 w. Trans Am Inst of Min Engs—Dec., 1898.

The Evolution of Mine-Surveying Instruments. Discussion of this paper by Dunbar D. Scott. Ill. 7300 w. Trans Am Inst of Min Engs—Oct., 1898.

See also **MINE SURVEYING.**

**Slide Rule.**—See **SLIDE RULE—Railway Surveying.**

**Solar.**—Solar Work in Land Surveying. J. D. Varney. A statement of the principles involved and an exhibition of a new solar device. Ill. 5400 w. Jun Assn of Engng Soc—Nov., 1896.

**Solar Transit.**—A New Solar Transit. Illustrates and describes the operation of an instrument invented by J. B. Davis, which removes the difficulties usually met with in extending its use to land surveys. 1100 w. Eng News—April 28, 1898.

**Stadia-Micrometer.**—A New Optical Distance-Measuring Device (Ein Neuer Optischer Distanzmesser). A. Tichy. A description of the quadruple micrometer of Tichy and Starke, a form of micrometer for use in the telescope for measuring distances on the principle of the stadia system. 6000 w. Zeitschr d Oesterr Ing u Arch Ver—July 21, 1899.

**Stadia-Rods.**—The Conditions of Accuracy of Stadia-Rods (Die Bedingungen der Schätzungsgenauigkeit an Massstäben). Anton Tichy. A very full investigation of the methods of calibrating graduated rods for use in stadia surveying and the computation of the probable error. Two articles. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—March 4, 11, 1898.

See also **SURVEYING.**

**Tacheograph.**—The Ziegler-Hager Tacheograph. Illustrated description of a surveying instrument, the chief merits being that horizontal distances and vertical heights are read off at the same time, that there are no calculations, that the instrument checks itself, and that the operations require very little time and skill. 800 w. Engng —May 6, 1898.

**Tachymeter, Cleps.**—The Cleps-Tachymeters. From "Guide pratique du Géomètre Moderne," by A. Salmoiraghi. Translated by C. McK. Lewis. Illustrated description of instrument and methods of use. Ill. 9500 w. Sch of Mines Quar—Jan., 1898.

**Tachymeter, Richer.**—The Richer Tachymeter. F. D. Lyphart. The history, description and theory of a surveying instrument. 900 w. Eng News—Aug. 20, 1896.

**Tape Tension Equalizer.**—A Surveying Tape Tension Equalizer (Der Messband-Spanner. Ein Markscheiderisches Hilfsinstrumentchen). M. Pryborski. An illustrated description of a spring hook for holding the end of a surveying tape so as to stretch it equally whenever in use. 400 w. Oesterr Zeitschr f Berg u Hüttenwesen—June 16, 1900.

**Telemeter.**—See **TELEMETER.**

**Terrameter.**—The "Terrameter." G. D. Description of a rapid distance measurer, resembling a transit. Results are accurate to a foot, within 300-ft. of distance. 1400 w. Ind Engng—Nov. 16, 1895.

**Theodolite.**—A New Mining Theodolite. From "Berg- und Hüttenmännische Zeitung." The Cséti theodolite is hung from the roof. Advantages claimed are great speed and ease in working in inclined headways. 1700 w. Col Guard—Dec. 27, 1895.

**Transit.**—See **Cyclotomic; Solar; SURVEYING.**

**SURVEYOR.**

County Surveyors and Surveyors-General. J. L. Van Ornum. Reviews the laws of the different states governing the election of these officers, and shows that changed conditions have made necessary a revision of past practice. Points out the duties required and qualifications needed. 3000 w. Eng News—March 3, 1898.

**Equipment.**—See **SURVEYING.**

**Index.**—See **INDEX—Surveyor's Office.**

**SUSPENDED RAILWAY.**

See also **ELECTRIC RAILWAY—High Speed; SINGLE TRACK.**

Single Track Elevated Railroads (Einschienige Hochbahnsysteme). With illustrations of a number of actual installations of roads in which the cars are suspended from a single rail. Serial. Schweizer Bauzeit—Dec. 11, 1897.

**Barmen-Elberfeld.**—The Barmen-Elberfeld-Vohwinkel Suspended Railway (Die Schwebebahn Barmen-Elberfeld-Vohwinkel). A very complete and fully illustrated account of this successful overhead electric railway, with details of construction. 15000 w. Zeitschr d Ver Deutscher Ing—Oct. 13, 1900.

The Single-Rail Suspended Railway Between Barmen, Elberfeld, and Vohwinkel (Die Einschienige Schwebebahn Barmen-Elberfeld-Vohwinkel). A general description of this unique overhead electric railway, with an effective view of a portion of the completed work. 1800 w. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 27, 1900.

The Langen Suspended Railway. Translated description from the "Zeitschr. d. Ver. Deutscher Ing.," of a remarkable railway system being built in Germany. Ill. 900 w. Eng News—April 5, 1900.

The Langen Mono-Rail Suspended Railway at Elberfeld-Barmen. Editorial review of this system. Part first notes briefly the previous attempts. Serial. Engng—March 30, 1900.

The Mono-Rail Suspended Railway of Barmen-Elberfeld. Full illustrated description of this novel railway, and the immense increase in speed that will be possible. 2300 w. Tram & Ry Wld—May 10, 1900.

The Suspended Railway between Barmen, Elberfeld, and Vohwinkel (Die Schwebebahn Barmen-Elberfeld-Vohwinkel). Illustrated account of the curious railway connecting Barmen and Elberfeld, with their suburbs. The cars are hung from single overhead rails, and propelled by electricity. 1200 w. Deutscher Bauzeitung—Dec. 23, 1899.

The Single-Rail Suspended Railway Between Barmen, Elberfeld and Vohwinkel (Einschienige Schwebebahn Vohwinkel-Elberfeld-Barmen). Mainly abstracted from a publication of the "Continentale Gesellschaft für Elektrische Unternehmungen" of Nuremberg. A well illustrated description of this interesting railway. 3200 w. Stahl und Eisen—March 15, 1900.

The Single-Rail Suspended Electric Railway between Barmen, Elberfeld and Vohwinkel (Die Elektrisch Betriebene Einschienige Schwebebahn Barmen-Elberfeld-Vohwinkel im Wupperthale). A description of this interesting overhead railway, with illustrations and plans. 800 w. Mitt d Ver f d Förd d Loc u Strassenbahnwesens—March, 1900.

The Suspended Railway Between Barmen, Elberfeld, and Vohwinkel (Le Chemin de Fer Suspendu de Barmen-Elberfeld-Vohwinkel). Alfred Boudon. A very fully illustrated account of this overhead electric railway. The carriages are suspended from a single overhead rail, and the road follows in great part the river Wupper. 3000 w. Génie Civil—March 10, 1900.

An Electric Suspension Railroad. Brief illustrated description of a road in process of construction in Prussia. 800 w. Sci Am Sup—Oct. 15, 1898.

Barmen Electric Suspension Railway. Illustrated description of single-rail line 8.3 miles in length, with 18 stations. 700 w. U S Cons Repts, No. 704—April 14, 1900.

Single Rail Suspension Railway at Barmen. Brief description with illustrations. 400 w. St Ry Rev—April 15, 1900.

**Truss.**—Framework of Overhead Railways (Charpente pour Chemins de Fer Aériens). Design for overhead truss for cars suspended beneath the rails. 1000 w. La Revue Technique—March 10, 1897.

**SUSPENSION BRIDGE.**

See **BRIDGE—Suspension.**

**SUTRO TUNNEL.**

See **MINE DRAINAGE—Sutro Tunnel.**

**SWAGING MACHINE.**

**Pneumatic.**—Pneumatic Fine-Swaging Machine—Pennsylvania Railroad. Illustrated description of the machine and its operation. 900 w. Ry Mas Mech—Nov., 1897.

**SWELLING EARTH.**

**Los Angeles.**—Swelling Earth. Letter from Frank Olmstead, describing difficulties experienced from swelling earth during construction of street tunnel in Los Angeles. 700 w. Eng Rec—Oct. 6, 1900.

**SWING BRIDGE.**

See **BRIDGE—Drawbridge.**

**SWITCH.**

**Electric.**—See **ELECTRIC SWITCH; SWITCHBOARD; TELEPHONE SWITCHBOARD.**

**Railway.**—See **INTERLOCKING; RAILWAY SWITCH.**

**Telephone.**—See **TELEPHONE—Switch; TELEPHONE EXCHANGE; TELEPHONE SWITCHBOARD.**

**SWITCHBACK.**

See also **MOUNTAIN RAILWAY.**

**Cascade Range, Washington.**—The Cascade Switchback and Tunnel of the Great Northern. Map and profile of the tunnel and switchback, with account of the manner of handling the trains over the switchback, the distance saved by the tunnel, and other matters of interest. 700 w. R R Gaz—Oct. 15, 1897.

The Switchback Lines of the Great Northern and Northern Pacific Railways over the Cascade Range. Illustrated description of switchbacks built to avoid delay in the construction of tunnels, and afterwards superseded by tunnel lines. 2000 w. Eng News—May 3, 1900.

See also **TUNNEL.**

**SWITCHBOARD.**

See also **ELECTRIC PLANT; ELECTRIC POWER STATION; ELECTRIC STATION; ELECTRIC SWITCH; TELEPHONE EXCHANGE; TELEPHONE SWITCHBOARD.**

Central Station Switchboards. F. A. C. Perrine. Extracts from a paper read before the San Francisco convention of the Pacific Coast Elec. Trans. Assn. Considers the material for the board, the circuits and the insulation employed, instruments installed and location. 2200 w. Elec Wld—March 26, 1898.

Central Station Switchboard Construction. Albert B. Herrick. Discusses designs and devices used in switchboard operation, and the working of the various systems. Ill. 3000 w. Elec Wld—June 26, 1897.

Electric Switchboards and Their Use. William Baxter, Jr. Illustrates and describes the various devices and explains their use. 2200 w. Am Mach—July 20, 1899.

Modern Switchboard Practice. Frank C. Perkins. Part first discusses polyphase high-tension switchboards. Ill. Serial. W Elect'n—Aug. 18, 1900.

Switchboards and Switches of the Modern Central Station. E. W. Rice, Jr. Extract from a paper read before the Gen. Elec. Engng. Soc. of Schenectady. A discussion of methods, with suggestions. 2400 w. Elec Wld & Engr—June 30, 1900.

The Electric Light and Power Switchboard. S. H. Sharpstein. Presents points of importance in relation to switchboard construction. 2000 w. Am Elect'n—Jan., 1899.

Switchboard Apparatus. J. R. Blaikie. Read at annual meeting of the Municipal Electrical Assn., London. Considers the duties and characteristics of the details, the disposition of the component parts, and shows the necessity of standard work. Also editorial. 8500 w. Elec Rev, Lond—June 10, 1898.

The General Arrangement and Connection of Apparatus on Switchboards. William Baxter, Jr. Explains the general arrangement of the switches, instruments and other apparatus, showing how they are connected with each other and with the generators and the external circuits. Ill. Serial. Am Mach—Aug. 10, 1899.

The Construction of Switchboards. William Baxter, Jr. Discusses the arrangements of switchboards designed for plants of large capacity. Ill. Serial. Am Mach—Aug. 24, 1899.

**Arc Circuits.**—Switchboards and Station Instruments for Arc Circuits. Alex. Dow. Discusses switchboard construction and details, giving illustrations. 2300 w. Elec Engng—July 15, 1897.

**Duocusso Telephone.**—See **TELEPHONE SWITCHBOARD.**

**Electric Conduit Railway.**—Grounds on Underground Trolley Railway Systems. An unusual arrangement of the circuits is necessary to prevent short circuits, and the article describes the connections and operation of the switchboard. Ill. 3000 w. St Ry Jour—April 7, 1900.

**Electric Railways.**—Stationary Switches for Electric Railways (Stationäre Schaltanlagen für Elektrische Bahnen). A description of the application of the switchboard system to the distribution of currents for motor purposes. 2500 w. Deutsche Zeitschr f Elektrotech—Jan. 15, 1897.

The Erection of Power Station Switchboards. George Moffat. Discusses the construction and the essentials to meet the requirements. Ill. 1800 w. St Ry Jour—July, 1897.

See also **ELECTRIC POWER STATION.**

**Electrolytic Laboratory.**—A Switchboard for the Electrolytic Laboratory (Schalttafeln für Elektrolytische Laboratorien). Fr. Klingelfuss. A convenient design of switchboard for use with continuous lighting current in connection with a small accumulator system. 1200 w. Zeitschr f Elektrochemie—Jan. 18, 1900.

**Paris Exposition.**—The Service Switchboards of the Paris Exposition, Electricity Building. Illustrates and describes the two switchboards, one used for continuous currents and the other for alternating currents. 2500 w. Elec Wld & Engr—Aug. 18, 1900.

See also **ELECTRICITY BUILDING; ELECTRIC STATION.**

**Polyphase.**—Switchboard Connections and Synchronizing Arrangements for Polyphase Generators. Illustrates and describes several arrangements used by the Westinghouse Elec. & Mfr. Co. 2500 w. Am Elect'n—Nov., 1839.

Three-Phase Switchboards, Apparatus and Synchronizing Methods. H. E. Raymond. Detailed description of a few cases which cover most of the ordinary requirements. 2000 w. Am Elect'n Oct., 1897.

**Reconstruction.**—Switchboard Reconstruction. Albert B. Herrick. A review of the modern methods adopted in switchboard construction. Ill. 2500 w. Am Elect'n—June, 1898.

**Stage Lighting.**—See **ELECTRIC LIGHTING—Stage.**

**Telegraph.**—See **TELEGRAPH—Test Switch; TELEGRAPHER—Switchboard Instruction.**

**Telephone.**—See **TELEPHONE EXCHANGE; TELEPHONE SWITCHBOARD.**

**Westinghouse.**—See **Polyphase.**

**SWORD.**

**Japanese.**—See **STEEL—Japanese Sword.**

**SYNAGOGUE.**

See also **CHURCH; ROOF TRUSS; TEMPLE.**

**St. Louis, Mo.**—An Iron Synagogue Roof and Dome. Illustrated brief description of the new Temple Shaare Emeth in course of construction in St. Louis, Mo. 500 w. Eng Rec—June 20, 1896.

**SYNCHRONOGRAPH.**

See also **PHOTO-CHRONOGRAPH.**

The Synchronograph—A New Method of Rapidly Transmitting Intelligence by the Alternating Current. Albert C. Crehore and George O. Squier. Experiments upon a new electrical system of rapid intelligence-transmission and its possibilities. Ill. 12500 w. Trans Am Inst of Elec Engs—April, 1897.

The Synchronograph. Discussion of paper on this subject, by A. C. Crehore and G. O. Squier. 16000 w. Trans Am Inst of Elec Engs—May, 1897.

High Speed Telegraphy. Editorial on the system of Messrs. Crehore & Squier. 1000 w. Elec Eng—April 28, 1897.

High Speed Telegraph Transmission by Means of Alternators. Describes the system suggested by A. C. Crehore and G. O. Squier, called the "synchronograph" system, which has been found to produce a distinct increase of speed. 2000 w. Nature—June 30, 1898.

A Practical Transmitter Using the Sine Wave for Cable Telegraphy; and Measurements with Alternating Currents upon an Atlantic Cable. Albert C. Crehore and George O. Squier. Full paper. Describes a method of utilizing the sine wave for cable signaling, and a practical cable transmitter employing these principles. Ill. 8000 w. Trans Am Inst of Elec Engs—May, 1900.

A Practical Transmitter Using the Sine Wave for Cable Telegraphy; and Measurements with Alternating Currents Upon an Atlantic Cable. A. C. Crehore and G. O. Squier. Extracts from a paper read before the Am. Inst. of Elec. Engs.; also editorial. 5300 w. Elec Rev, N. Y.—June 20, 1900.

A Practical Telegraph Transmitter Using the Sine-Wave for Operating the Wheatstone Receiver. A. C. Crehore and G. O. Squier. Abstract of a paper before the International Electrical Congress, Paris, giving a description of the synchronograph and accounts of latest practice with it. 600 w. Elect'n, Lond—Sept. 7, 1900.

**British Tests.**—Tests of the Synchronograph on the Telegraph Lines of the British Government. Albert Cushing Crehore and George Owen Squier. Abstract of a report to the Postmaster-General of the United States, read before the Franklin Inst. A description of these trials and remarks on the results especially in connection with the Wheatstone receiver. 3800 w. Elec Wld—Jan. 29, 1898.

Tests of the Synchronograph on the Telegraph Lines of the British Government. Albert Cushing Crehore and George Owen Squier. Gives a brief description of the Wheatstone instruments, and of the experiments made. Ill. Serial. Jour Fr Inst—March, 1898.

**SYPHON.**

See **SIPHON.**

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**TABERNACLE.**

See also **CHURCH; TEMPLE.**

**Salt Lake City.**—The Mormon Tabernacle, Salt Lake City, Utah. W. P. Hardesty. Illustrated description of this unique structure, its large timber arches, methods of erection, and its heating and cooling system. 2200 w. Eng Rec—Jan. 27, 1900.

**TACHEOGRAPH.**

See **SURVEYING INSTRUMENT—Tacheograph.**

**TACHOMETER.**

See **SPEED INDICATOR.**

**TACHYMETER.**

See **SURVEYING INSTRUMENT—Tachymeter.**

**TACK.**

**Blanchard Machine.**—Tacks and Tack Dies. J. L. Lucas. Illustrated description of the Blanchard tack machine, and the method of cutting tacks from sheet metal. 700 w. Am Mach—Oct. 1, 1896.

**Manufacture.**—The Manufacture of Tacks. Sketchy, illustrated description of machines and processes. 700 w. Sci Am—Feb. 22, 1896.

**TAHITI.**

See **NEW CALEDONIA.**

**TAIL RACE.**

See also **CANAL; HYDRO-ELECTRIC STATION; WATER POWER.**

**Chicago Canal.**—Tail Race of the Chicago Drainage Canal. Gives the original plan for the tail race, and also the present plan, explaining why the change was made. Ill. 1100 w. Eng News—July 6, 1899.

**TALC.**

**New York.**—Fibrous Talc in St. Lawrence County, New York. J. Nelson Nevius. Illustrates and describes the deposits as far as explored, and the manner of mining and working. 3000 w. Eng & Min Jour—Feb. 25, 1899.

**TALL BUILDING.**

See also **BUILDING CONSTRUCTION; FIREPROOF CONSTRUCTION: FOUNDATION: OFFICE BUILDING; SKELETON CONSTRUCTION; STEEL CONSTRUCTION; UNDERPINNING.**

Arguments For and Against Tall Buildings. Two letters, published in the New York "Sun," from George Martin Huss and Ernest Flagg. 2300 w. Arch & Build—Jan. 18, 1896.

High Buildings. C. H. Blackall. A defense of tall buildings by one who believes in them. 3500 w. Br Build—Feb., 1896.

High Buildings. A. L. A. Himmelwright. An interesting discussion favoring high buildings and considering the arguments against them. 2400 w. N Am Rev—Nov., 1896.

The City of the Future. Theodore Waters, in "Star Sayings," St. Louis. On the engineering skill needed by architects of the present, in constructing the tall buildings of cities, especially in foundation work. The testing of grounds, weighing of buildings, etc., is considered. 2200 w. Stone—Jan., 1898.

The Modern Business Building. J. Lincoln Steffens. The fifth paper in the series entitled "The Conduct of Great Businesses." Discusses the causes that produced the high building, its dependence on the elevator, its construction, and matters relating. Ill. 11500 w. Scribner's Mag —July, 1897.

The Modern Tall Building. Owen Brainard. Reasons for this class of architecture, its development, design, and novel features. Ill. 3000 w. Chau—Nov., 1897.

The American Tall Building from a European Point of View. S. Henbest Capper. From an artistic standpoint the tall building is condemned when considered merely as a striving for "tallness." For a flat city like New York the sky line is improved. Lavish decoration is deemed inappropriate. Illustrations of notable European buildings are given for comparison. 3500 w. Eng Mag—Nov., 1897.

The Tall Building from an American Point of View. A. D. F. Hamlin. A rejoinder to a previous paper by Prof. Capper, defending the tall building and showing the practicability of treating it in a satisfactory manner architecturally. The tall building is bound to remain in use; it is for the architect to meet the conditions which confront him. 3500 w. Eng Mag—Dec., 1897.

**Am. Soc. Civ. Eng. Discussion.**—Height of Buildings. An informal discussion by Corydon T. Purdy and Reginald Pelham Bolton. Ill. 2500 w. Pro Am Soc of Civ Engs—Aug., 1900.

Height of Buildings. Continuation of an informal discussion on this subject. 7000 w. Pro Am Soc of Civ Engs—Oct., 1900.

**Ancients.**—The High Buildings of the Ancients. From the St. Louis "Globe Democrat." Interesting account of laws, regulating the height of Roman buildings, long before the Christian era. 3500 w. Am Arch—April 30, 1898.

**Artistically Considered.**—The Tall Office Building Artistically Considered. Louis H. Sullivan. An examination of the elements, confining the attention to those conditions that, in the main, are constant in all tall office buildings. 3500 w. Lippincott's Mag—March, 1896.

The Tall Office Building Artistically Considered. Louis H. Sullivan, in "Lippincott's Mag." for March. A study of the problem, and a support of the three part division as natural and significant. 3500 w. In Arch—May, 1896.

**Chicago, Fisher.**—The Fisher Building, Chicago—A Building without Walls. Illustrated description of this fireproof building. 4500 w. In Arch—May, 1896.

**Dayton, O.**—The Reibold Building, Dayton, O. First part gives general plan, elevations and sections; wind bracing in walls; diagram of floor beams; details of columns and general description of design and construction. 1400 w. Eng Rec—Oct. 10, 1896.

**Elevator Safety.**—See also **ELEVATOR ACCIDENT.**

**Engineering Problems.**—Engineering Problems of the Tall Building. Charles O. Brown. Reviewing the leading features adopted in the erection of "sky-scrapers." Ill. 3800 w. Eng Mag—June, 1897.

**Equipment.**—The Equipment of Tall Office Buildings in New York City. Reginald Pelham Bolton. The construction of so many buildings of this character has brought about a competition that makes the economical equipment and operation of importance. This subject is discussed and some of the problems presented. Ill. 4800 w. Trans Am Soc of Mech Eng—May, 1899.

See also **MECHANICAL PLANT.**

**Fireproof Construction.**—See **FIREPROOF CONSTRUCTION; FIRE PROTECTION.**

**Fire Protection.**—See **FIREPROOF CONSTRUCTION; FIRE PROTECTION.**

**Foundation.**—See also **FOUNDATION—Tall Buildings; UNDERPINNING.**

**Foundation Girder.**—Handling a Heavy Foundation Girder in a Tall Building. Describes the handling of a triple-webbed plate girder 52 ft. 6 in. in length, 61½ in. in height, 2 ft. 6 in. in width and of a weight of about 37 tons, in the Queen Insurance Co.'s Building, at Cedar and William streets, New York. 1300 w. Eng Rec—Oct. 17, 1896.

**Legislation.**—Against High Buildings. Regarding proposed legislation on the subject, with expressions of opinions from several insurance and real estate men. 1400 w. Fire and Water—Dec. 5, 1896.

Discussion of the High-Building Bill. General discussion by the New York Chapter A. I. A. 2500 w. Arch & Build—May 23, 1896.

See also **New York; BUILDING LAW.**

**Limiting Height.**—Tall Buildings and the Speed of Elevators. George Hill. Letter to the editor placing the economical limit of height at sixteen stories, and giving suggestions for safety from fire and wind pressure. 900 w. Eng Rec—Feb. 6, 1897.

The Restriction of the Height of Buildings in Cities. Editorial approving the action being taken in this direction, and calling attention to some of the evils arising from very tall buildings in narrow streets. 1000 w. Eng Rec—Jan. 18, 1896.

**Limiting Height, Europe.**—The Regulation of Tall Building Construction. Summary of the regulations in force in the cities of Continental Europe regarding the limitation of the height of buildings, as submitted by President Wilson to the Board of Trade and Transportation of New York City. 1200 w. Eng Rec—Jan. 2, 1897.

**New York.**—High Office Buildings in New York. Brief comments on legislation regarding high buildings, with some reference to appearance, etc. Ill. 1000 w. Sci Am Sup—March 7, 1896.

Shipping and Transit Needs of New York. Effects of a probable law, limiting the height of buildings in New York City, upon the future needs of transportation to outlying districts is discussed. 1100 w. Arch & Build—June 6, 1896.

The Highest Building in the World. Illustration and interesting information in regard to a fine office building about to be erected at the southeast corner of 33d st. and Broadway, New York City. 1000 w. Fire & Water—Oct. 13, 1900.

The Lofty Buildings of New York City. Illustrated review of the changes wrought by this style of architecture, with some reference to the advantages and disadvantages. 2000 w. Sci Am—Oct. 10, 1896.

The Sky-Line of New York, 1881-1897. Montgomery Schuyler. Comments on the changes wrought in the appearance of the city as viewed from the harbor, with illustrations giving the view in 1881 and again in 1897. 1300 w. Harper's Wk—March 20, 1897.

The "Sky-Scraper" Up to Date. Montgomery Schuyler. A critical review of many prominent buildings in New York, with fine illustrations. 6800 w. Arch Rec—Jan.-March, 1899.

See also **Legislation.**

**New York, American Surety.**—The American Surety Building. Barr Ferree. An illustrated description giving much interesting information. The highest praise is given the architect for the beauty of the design, and the building is counted among the chief ornaments of Broadway, and among the most notable commercial buildings of the day. A beautiful type of stone construction. 2500 w. Stone—Aug., 1896.

The American Surety Building. Illustrated description of foundation piers, column footings, cantilever girders and anchorages. 1000 w. Eng Rec—June 13, 1896.

**New York, Atlantic Mutual.**—The Atlantic Mutual Insurance Company's Building. Illustrated description of the special pneumatic caisson foundations, cantilever column seats, and special steel work details in an 18-story office building on Wall st., New York. 3100 w. Eng Rec—Aug. 18, 1900.

**New York, Buck.**—The Buck Building, New York City. Illustrates a very narrow tall building for light manufacturing having unusual features in the foundations and columns. 700 w. Eng Rec —June 25, 1898.

**New York, Buttenweiser.**—The Buttenweiser Building, New York. Illustrated description of the special foundations and steel work details in an 11-story office building. 1100. Eng Rec—Aug. 4, 1900.

**New York, Gerken.**—A Modern Office Building. Illustrated description of the roofing and cornice, plumbing and gas fitting, steam and hot water fitting, kitchen equipment, etc., of the Gerken Building, New York. 7800 w. Met Work—Sept. 5, 1896.

**New York, Home Life.**—See **BUILDING CONSTRUCTION; FIREPROOF CONSTRUCTION.**

**New York, Lord's Court.**—Lord's Court Building. General illustrated description and supplement to specification. 1600 w. Arch & Build—Oct. 1, 1898.

**New York, Park Row.**—Park Row Building, New York. Brief description with illustrations. 1400 w. Engng—July 8, 1898.

The Highest Office Building in the World. Interesting features in the equipment of the Park Row Syndicate Building, in New York, are noted and illustrated. 2500 w. Engng—Sept. 22, 1899.

The Ivins Building, New York. Illustrated description of foundations and metal work in a 424-ft. building, the highest yet constructed. 3000 w. Eng Rec—July 16, 1898.

The Park Row Building, 30 Stories High: New York City. Illustrated detailed description of the highest building thus far designed in New York city. 3800. Eng News—Oct. 8, 1896.

The Tallest of the Modern Office Buildings. Illustrated description of the Park Row Building, New York, with comments on the changes in the lower part of the city, and comparison with the Great Pyramid in height and bulk. 2500 w. Sci Am—Dec. 24, 1898.

**New York, St. Paul.**—The St. Paul Building, New York City. Illustrated description. 3000 w. Eng News—May 7, 1896.

**New York, Standard.**—The Standard Building, New York City. Illustrated description of the method followed in building around and over a large office structure in New York, with details of the steel work. 3000 w. Eng. Rec—Feb. 25, 1899.

The Standard Block, New York City. Illustrated description of foundations, plan, location of piers, details of caissons, derrick, and general elevation of a building which will be constructed and equipped in conformity with advanced practice for fire-proof steel-cage office buildings. Serial. Eng Rec—July 11, 1896.

**New York, Wolfe.**—A Picturesque Sky-Scraper. A complimentary illustrated description of the John Wolfe Building, New York. 1700 w. Arch Rec—Jan.-March, 1896.

**Objections.**—High Buildings. Objections as presented in discussion before the Board of Trade. 1800 w. Fire & Water—Dec. 26, 1896.

**Philadelphia.**—The Harrison Building, Philadelphia. Illustrated description of constructive details. Part first contains general description, foundations, roof and beam plans, general sections and elevations. Serial. Eng Rec—Aug. 22, 1896.

**Rapid Construction.**—The Financial Importance of Rapid Building. Describes the erection of an 18-story office building in less than fourteen months, and gives reasons for the importance of such rapid construction. 1800 w. Eng Rec—June 30, 1900.

**Regulations.**—See **Legislation; Limiting Height.**

**Rome.**—The Sky-Scrapers of Rome. Rodolfo Lanciani. Historical account of the causes that led to increasing the height of buildings in Rome and of restrictions recorded, with many interesting facts connected with the height of buildings in ancient cities. 3800 w. N Am Rev—June, 1896.

**Weight.**—Weighing of Tall Buildings. Theodore Waters. Finding the exact gravity of huge masses of iron and stone, every bolt, bar, and pane of glass carefully considered; the weight of tenants and casual visitors and even paint and carpets determined. 1800 w. So Arch—May, 1897.

### TANK.

See also **COAL BIN; GASHOLDER; GRAIN ELEVATOR; RAILWAY WATER STATION; RESERVOIR; STAND PIPE; TRACK TANK; WATER TOWER; WATERWORKS.**

**Cast Iron.**—Cast-Iron Tanks. P. Hutchison. Information aiming to enable any draughtsman to design a cast-iron tank without having any previous knowledge of the subject. Ill. 700 w. Prac Engr—Dec 30, 1898.

**Cement Reinforced.**—Experimental Water Filter Tank at Pittsburg, Pa. Illustrated detailed description. The tank is built of "Cementine," a combination of metal lath and cement. 1500 w. Eng News—Dec. 12, 1895.

**Construction.**—Some Examples of Tank Construction. F. W. Stevenson. Read before the Inst. of Gas Engs. Relates experiences in the construction of gasholders and similar tanks. Ill. 2800 w. Gas Wld—May 5, 1900.

Tank and Cistern Construction. Information intended to facilitate the designing of tanks and cisterns suitable for the positions they are to occupy. Considers the strains they are subject to, leakage, etc. 3300 w. Builder—Nov. 5, 1898.

**Grain.**—Lateral and Vertical Stresses in Grain Tanks. Max Toltz. Mathematical study, with report of experiments made by Mr. Prante, of Hamburg, Germany. 1000 w. Eng News—April 7, 1898.

Steel Storage Tanks for Grain. Illustrates and describes structures of this kind in use at the Manhattan mill, Toledo, Ohio. 1100 w. Am Miller—May 1, 1896.

See also **GRAIN ELEVATOR; WAREHOUSE.**

**Iowa College.**—The Elevated Water Tank of the Iowa State Agricultural College. A. Marston. A design of the writer, including some novel features. Ill. 1800 w. Eng News—June 9, 1898.

**Lead, Madison Square Garden, N. Y.**—A Notable Piece of Lead Tank Work. An illustrated account of the lining of the immense tanks in Madison Sq. Garden, New York, arranged for the presentation of imitation battles for public entertainment. 700 w. Met Work—Aug. 13, 1898.

**Manhattan Company, N. Y.**—A Curious Historical Water Tank. Illustrated description of a cast-iron tank of 140,000 gallons capacity, built a century ago by the Manhattan Company, of New York, to hold its banking franchise, which it obtained under the guise of a water company. 1000 w. Eng Rec—April 23, 1898.

**Overflow Pipe.**—See **OVERFLOW PIPE.**

**Plates.**—Making Tank Plates. Joseph Horner. Illustrated description of English practice. Serial. Am Mach—May 12, 1898.

See also **PLATE.**

**Railway.**—Self-feeding Railroad Tanks. Julien A. Hall. Gives some important points in connection with gravity water supply, and shows the advantages of this system. 1400 w. Ry & Eng Rev—June 11, 1898.

Tanks, Size, Style and Details of Construction, Including Frost-Proof Protection to Tank and Pipes. Report of committee to Convention of Ry. Supts. of Bridges and Buildings, with discussion. 2800 w. Pro Assn of Ry Supts—Oct., 1896.

See also **RAILWAY WATER STATION; TRACK TANK; WATER SUPPLY—Railway.**

**Sheet-Iron.**—Calculations for Sheet-Iron Tanks (Calculs de Réservoirs en Tôle). Maurice Koechlin. A mathematical discussion of the computation of the forms of tanks, so that the stresses in the bottom shall neutralize each other. The method of Professor Intze is employed. 2500 w. Génie Civil—March 3, 1900.

**Steel vs. Wood.**—Steel vs. Wood Tanks. Theodore W. Snow. Considers the class and durability of material and the cost, considering the wood tank better able to withstand neglect than the iron tank. Discussion, correspondence and illustrations. 7500 w. Jour W Soc of Engs—June, 1899.

**Water Storage.**—See **RAILWAY WATER STATION; RESERVOIR; WATER STORAGE.**

### TANK STEAMSHIP.

See **STEAMSHIP—Tank.**

### TANNING.

See also **LEATHER.**

**Electric.**—Electric Tanning. Concerning a process, devised by Dr. L. A. Groth, which he claims shortens the period to about one-fifth the previous time and effects a saving of about 80 per cent. 900 w. Ind & Ir—Aug. 4, 1899.

Tanning by Electricity. Describes and illustrates an important device of a Boston inventor which gives promise of causing great changes in this business. 1600 w. Bos Jour of Com—Oct. 22, 1898.

### TAPE.

**Steel.**—Measuring a Steel Tape. Walter Gribben. A good illustrated description of a job quite out of the usual run of machine shop work. 1000 w. Am Mach—March 19, 1896.

See also **MEASUREMENT; SURVEYING INSTRUMENT.**

### TAPER.

See **TOOL.**

### TAPESTRY.

See also **TEXTILE INDUSTRY.**

**Gobelins.**—The Gobelins Tapestry Manufacture. Robert Grimshaw. Interesting history of a great art industry. Illustrations of noted works by the Gobelins. 2800 w. Sci Am Sup—Feb. 15, 1896.

### TAPPING TOOL.

See **TOOL.**

### TARGET.

See also **ARMOR PLATE; ARTILLERY; GUN.**

**Moving.**—Moving Targets in Use in the Light Artillery of England, Germany, France, Italy, and Some Forms Recently Tried by the Light Artillery Battalion at Fort Riley, Kansas. C. G. Treat. Illustrated description of moving targets for gunner's practice. 8400 w. Jour of U S Artillery—May-June, 1898.

### TAR.

See **COAL TAR; GAS MANUFACTURE—By-Products; Tar; OIL TAR.**

### TAR OIL.

See **OIL TAR.**

### TAR STILL.

**Lennard.**—Lennard's Continuous Tar Still. From "The Chemical Trade Journal." Illustrated description of an arrangement intended to do away with the odors. 800 w. Pro Age—Feb. 15, 1898.

### TAXATION.

**England.**—Rating of Engineering Undertakings. P. Michael Faraday. Read at meeting of the Soc. of Engs. Discusses the methods by which these undertakings are assessed—with some details in the application to particular hereditaments. 3800 w. Arch, Lond—April 9, 1897.

### TEA INDUSTRY.

**India.**—India as a Field for Investment—Tea. The purpose of this article is to show that with modern improvements in appliances for cultivating, harvesting and curing tea, the East India tea industry offers a remunerative investment to those who may wish to engage in it. 2800 w. Ind & East Eng—Aug. 1, 1896.

### TEAK.

**Siam.**—The Teak Trade of Siam. Report to the Colonial Office of Acting Vice-Consul Black, of Bangkok. Interesting description of the teak timber industry in its details from cutting to marketing. 3200 w. Ind & East Eng—June 27, 1896.

### TECHNICAL SCHOOL.

See **COLLEGE; EDUCATION; ENGINEERING BUILDING; LABORATORY; SCHOOL; UNIVERSITY.**

### TECHNICAL SOCIETY.

See **ENGINEERING SOCIETY; SCIENTIFIC SOCIETY—Technical.**

### TELAUTOGRAPH.

Professor Elisha Gray's Telautograph. Illustrated description. 1600 w. Eng, Lond—June 5, 1896.

**Submarine Mines.**—Locating Submarine Mines by Means of the Telautograph. Editorial on an article in the Chicago "Times-Herald," in which Prof. Elisha Gray describes an ingenious arrangement by which the telautograph could be adapted for locating the exact position of an enemy's vessel. 1200 w. Elec, N. Y.—April 13, 1898.

### TELECTROSCOPE.

See also **TELEDIAGRAPH; TELEPHOTE.**

Electric Vision at a Distance (Der Elektrische Fernseher). A description of the apparatus of the Pole, Szczepanik, which is claimed to enable the electrical transmission of visual images to be accomplished. 2000 w. Die Elektrizität—April 16, 1898.

The Szczepanik Telelectroscope. An account of this invention, with diagrams, as given in the "N. Y. Herald." An apparatus for the transmission of scenes and pictures over a wire. 1700 w. Elec Eng, N. Y.—July 7, 1898.

The Telectroscope (Das Telektroskop). A description of the invention of Jan Szczepanik, by which it is claimed that visual images may be telegraphically transmitted. 1800 w. Zeitschr d Ver Deutscher Ing—Sept. 16, 1899.

The "Telelectroscope" and the Problem of Electrical Vision. Gives the facts made public in regard to the invention of Jan Szczepanik. Ill. 2000 w. Sci Am Sup—July 30, 1898.

### TELEDIAGRAPH.

See also **TELECTROSCOPE; TELEPHOTE.**

Pictures by Telegraph. Describes the new system, called the telediagraph, for sending drawings by means of electricity. Ill. 1200 w. Elec Rev, N. Y.—May 3, 1899.

### TELEGRAPH.

Present Day Telegraphy. J. Wright. Notes the various systems in use, and describes the Wheatstone Automatic system. 4200 w. Ind & East Engr—Dec., 1899.

Notes on Telegraphy and Telephony. W. H. Freedman. The present paper is devoted to telegraphy, giving its history, systems of codes, generators used, etc. 5800 w. Sch of Mines Qr—Nov., 1898.

**Abuse.**—Abuse of the Telegraph. W. W. Ryder. Extracts from a paper read before the St. Louis Ry. Club. Calls attention to the overcrowding and unnecessary use of the telegraph. Also discussion. 8500 w. Ry & Engng Rev—Nov. 4, 1899.

**Accumulator.—See Dynamo and Storage Battery; ACCUMULATOR—Telegraph Work.**

**Africa.—See also Cape to Cairo; Uganda; West Africa.**

**African Trans-Continental.**—The African Trans-Continental Telegraph Company. Details of the construction and working of the line to Nyassaland. Ill. 1700 w. Elec, Lond—July 7, 1899.

**Alaska-Siberia.**—High-Speed Telegraphy in Connection with an Alaska-Russian Telegraph Line. Reginald A. Fessenden. Discusses the value of a telegraph line through Alaska, stating the circumstances which, in the writer's opinion, favor the construction. 1800 w. Elec Wld—Aug. 7, 1897.

Transpacific Telegraphy: An Alternative Route. F. R. G. S. Describes a route north through British Columbia and Alaska to Behring Straits, and connecting with a line to Siberia, discussing the commercial aspect and physical difficulties, and comparing costs. 1200 w. Elec Wld & Engr—Jan. 20, 1900.

See also **British Columbia.**

**Ancient.—See History; Semaphore.**

**Argentine Republic.—See Morse Receiver.**

**Artillery Experiments.—See Essick Page Printing.**

**Ashanti Expedition.**—The Telegraph in the Ashanti Expedition (1895-96). Particulars culled from official sources, with regard to the construction, maintenance and method of working of the telegraph during the recent Ashanti Expedition. 1800 w. Elect'n—Sept. 11, 1896.

**Automatic.**—Automatic Telegraphy. Patrick B. Delany. Part first discusses the best speed obtainable with the Morse and with the Wheatstone system. 2200 w. Elec Eng—June 23, 1897.

See also **High Speed.**

**Auxiliary.—See Kitsee System.**

**Bandot Printing.**—The Bandot System of Telegraphy. E. Bernard. Illustrates and describes this printing telegraph system which has been adopted by the French Government, and is used also in other countries of Europe. 1600 w. Elec Rev, N. Y.—April 12, 1899.

**Belgian Jubilee.**—The Celebration of the Jubilee of the Electric Telegraph. M. J. Banneux. Address at the meeting of the Palais des Academies, in celebration of the establishment of the electric telegraph in Belgium. Historical review. 4800 w. Elec Rev, Lond—Oct. 30, 1896.

History of the Telegraph in Belgium. V. B. Brief account of the progress of the telegraph in this country, which has just celebrated the 50th anniversary of its introduction. 600 w. Elec Rev—Oct. 7, 1896.

**Berlin Fire Department.—See Simultaneous Telephony.**

**Block System.**—The Block Telegraph System. J.

Pigg. An examination of some of the weak points of the system. 2000 w. Elec Eng, Lond—Jan. 3, 1896.

**British.**—See also **History, British.**

**Britist Coast.**—Coast Telegraphic Communication. Charles Bright. Part first gives a review of the operations thus far carried out. Serial. Engr, Lond—Feb. 17, 1899.

See also **Lighthouses and Lightships.**

**British Columbia.**—The Pioneer Telegraph Survey of British Columbia. P. J. Leech. An interesting illustrated account of the work in connection with the line that was planned to extend through British Columbia and Alaska to Behring Strait, and continuing to St. Petersburg, Russia. 6800 w. B C Min Rec—Aug., 1899.

The Telegraph in British Columbia. R. B. McMicking. Historical account of the introduction of the telegraph into this province, in connection with the undertaking to connect the old and new world by way of Behring Strait. 1000 w. Can Elec News—July, 1898.

See also **Alaska-Siberia.**

**British Empire.**—An Imperial Telegraph System. J. Henniker Heaton. Considers the high charges for telegrams to all parts of the British Empire, proposes a remedy, and discusses the scheme. 8500 w. Nineteenth Cent—June, 1899.

See also **SUBMARINE CABLE.**

**British Law.**—The Telegraph Act, 1899. Editorial discussion of the act passed in England, Aug. 9, 1899, explaining the nature of the alterations it is likely to effect. 3000 w. Engng—Sept. 22, 1899.

**British Railways.**—See **Railway, British.**

**British Service.**—Six Penny Telegrams—Why They Do Not Pay. J. Henniker Heaton. Discusses the British telegraph service. 4200 w. Nineteenth Cent—July, 1900.

**Budapest Conference.**—See **Conference, Budapest.**

**Cailho System.**—See **Simultaneous Telephony.**

**Calling Apparatus.**—A Synchronous Calling Apparatus for Telegraph Stations. Illustrates and describes an apparatus invented by H. Wetzer, by which each station may be called independently. 400 w. Elec Eng, Lond—Sept. 24, 1897.

**Cape to Cairo.**—The Cairo-Cape Telegraph. An illustrated account of the building of the lines of the African Trans-Continental Telegraph Company. 1500 w. Elec Rev, N. Y.—Aug. 16, 1899.

**Cars.**—See **Postal Co.'s Caravan.**

**China.**—The Telegraph in China. From the "San Francisco Chronicle." Explaining the difficulties in telegraphing in the Chinese language. 500 w. W Elec—Aug. 8, 1896.

**Company Consolidation.**—Proposed Consolidation of the Commercial Cable and Postal Telegraph-Cable Companies. An outline of the history of the two companies, and statement of the conditions on which a consolidation is proposed. 1000 w. W Elec—Dec. 12, 1896.

**Conference, Budapest.**—International Telegraph Conference at Budapest. Translated from the "Journal Télégraphique." An account of the work done during six plenary meetings. Serial. Elec Rev, Lond—Sept. 4, 1896.

The International Telegraph Conference of 1896. Translation of a circular, written in the French language, and signed "F. Gd." On the necessity of unification of international telegraph rates, with the obstacles. The movements already made to attain this end are reviewed, and a plan suggested. 2000 w. Elec Rev, Lond—May 22, 1896.

**Delany System.**—A New System of Machine Telegraphy. Patrick B. Delany, with discussion. Touching upon the obstacles in the way of practical high-speed telegraphy, and explaining how, in the writer's opinion, these difficulties can be surmounted. 3800 w. Jour Fr Inst—Jan., 1896.

Mr. Delany on Government Telegraphy. Abstract of argument before the United States Senate Committee, with editorial favoring the machine transmission. 2300 w. Elec Eng—July 17, 1896.

The Delany System of Machine Telegraphy. Report of the Committee on Science and the Arts, on the invention of Patrick B. Delany. Accompanied by an illustrated description of the details of the apparatus and mode of operation. 2800 w. Jour Fr Inst—Aug., 1896.

See also **Automatic.**

**Diplex.**—See **Duplex; Multiplex; Quadruplex.**

**Duplex.**—A New Duplex Telegraph System (Neues Zweifach Telegraphensystem). A simple system which has worked well without condensers over a line 230 miles long, for over three years. 2000 w. Elektrotech Zeitschr—May 13, 1897.

Duplex and Diplex Transmission by Means of Electric Waves (Transmissions Duplex et Diplex par Ondes Electriques). Albert Turpain. A short account of a system using both continuous currents and electric waves. 500 w. Comptes Rendus—May 14, 1900.

The Recording Duplex Instrument (Das Recorder-Gegensprechen). A. Luers. A description of the application of the Kelvin siphon recorder as a receiver in duplex telegraphy. 3500 w. Elektrotech Zeitschr—Feb. 2, 1899.

See also **Hughes.**

**Duplex Telephony System.**—See **TELEPHONE—Duplex Telegraphy System.**

**Dynamo.**—Dynamos for Telegraph Working. W. Slingo and A. Brooker. A suggestion for economising space. In the Chicago office of the Western Union Telegraph Co., an installation of dynamos has recently been put in to replace 60,000 primary cells, with every indication of success. 2400 w. Elec Rev, Lond—May 1, 1896.

Improvement in Dynamo-Telegraphy. F. P. Medina. The equipment of the Pacific Postal Telegraph Co., in San Francisco, is described in part first, and an improvement by which the dynamo quadruplex is being worked with greater efficiency than was attained with chemical batteries. Serial. Elec, Lond—Nov. 13, 1896.

Improvement in Dynamo-Telegraphy. F. P. Medina. Illustrated description of plant installed by the Pacific Postal Telegraph Co., in San Francisco. 2800 w. Jour of Elec—Aug., 1896.

**Dynamo and Storage Battery.**—The Use of the Dynamo and Storage Battery in Telegraph Offices. W. J. Camp. Paper before the Canadian Electrical Association, describing different systems in use, with diagrams. 2000 w. Canadian Elec News—Sept., 1900.

**Eaton Printing.**—The Eaton Photographic Printing Telegraph. C. F. Eaton, Jr. Describes an automatic instrument in which the printing is done by the aid of light and instantaneous photography. 1000 w. Elec Eng—July 8, 1897.

**1896.**—See **TELEPHONE—1896.**

**Essick Page Printing.**—Experimental Use of the Essick Page Printing Telegraph for Transmitting Information in Sea-Coast Artillery Firing. 1895. H. C. Carbaugh. Abstract from the "Journal of the U. S. Artillery." Description of the test, with illustrations of the transmitter and receiver. 700 w. Elec Eng—Dec. 18, 1895.

**Fire Department, Berlin.**—See **Simultaneous Telephony.**

**Gilgit, India.**—An Incident in the Working of the Gilgit Telegraph Line. Extract from the "Electrician." An interesting account of adventure and heroism on the part of Indian telegraph department officials and native staff. 1600 w. Ind & East Eng—July 24, 1897.

**Government Control.**—Should the Government Control the Telegraph? I. Why the Government Should Own the Telegraph. Richard T. Ely. II. The Legal Aspect of the Telegraph and Telephone Services—Essential Parts of an Efficient Postal Service. Justice Walter Clark. Both articles favor government ownership, and set forth the advantages. Reference is made to other countries showing good results of such ownership. 3800 w. Arena—Dec., 1895.

Should the Government Control the Telegraph? A continuation of the symposium on this subject. I. Postal Telegraph. Lyman Abbott. II. Why I Oppose Government Control of the Telegraph. William L. Wilson. III. Why the Government Should Control the Telegraph. Frank Parsons. 7000 w. Arena—Jan., 1896.

See also **STATE OWNERSHIP.**

**Higgins Printing.**—The Higgins Type-Printing Telegraph Apparatus. Illustrated detailed description of improved apparatus possessing points of novelty. 1300 w. Elect'n, Lond—Dec. 9, 1898.

**High-Speed.**—See **Alaska-Siberia; Automatic; Delany; Kitsee; Mercadier; Pollak-Virag; Rowland; Wheatstone; SYNCHRONOGRAPH.**

**History.**—Ancient Methods of Telegraphy. Lawrence Irwell. Describes the kinds of telegraphy used before the invention of the electrical apparatus. 2200 w. Elec Engng—Nov., 1898.

Fifteen Years of Telegraphy. William Maver, Jr. A review of changes some of them very important, and of improvements in submarine telegraphy, of the increase in mileage and other interesting points. 8000 w. Elec Eng—Jan. 6, 1897.

Methods of Transmitting Intelligence. George D. Shepardson. Interesting account of the development of methods for near or remote points. 5500 w. Elec Rev, N. Y.—Aug. 2, 1899.

The Electric Telegraph. J. Warren. Historical account of the efforts to communicate by telegraph, dating from the sixteenth century. 2400 w. Elec, Lond—Oct. 15, 1897.

The Infancy of the Telegraph. From the "Dundee Advertizer." Gives account of efforts for establishing communication at a distance, dating from the 15th century. 600 w. Elec, Lond—Oct. 29, 1897.

The Telegraph. A review of the history, with a short biographical sketch of S. F. B. Morse. 2500 w. Sci Am—July 25, 1896.

Twenty-Five Years of Telegraphic Progress. W. H. Preece. Considers instruments, apparatus, line construction, extent of plant, etc. 2000 w. Elec Rev, Lond—Nov. 12, 1897.

See also **Belgian Jubilee; Inventor; Morse Recorder; Semaphore.**

**History, American.**—Progress in American Telegraphy. F. W. Jones. Historical review. 2500 w. Elec Wld—Jan. 2, 1897.

**History, British.**—The Telegraphs of the United Kingdom. Charles Knight. Notes reviewing the history of the telegraph in the United Kingdom. Serial. Elec Rev, Lond—Sept. 3, 1897.

**Horton Repeater.**—See **Repeater, Horton.**

**Hughes Duplex.**—Duplex Telegraphy in Switzerland with the Hughes Apparatus (Duplex Telegraphie mit dem Hughes-Apparat in der Schweiz). Describing the performance of the first Hughes duplex line in Switzerland, between Bern and Basle. 2000 w. Elektrotech Zeitschr—May 20, 1897.

**Hughes Printing.**—Improvement in the Efficiency of the Hughes Instrument (Erhöhung der Leistungsfähigkeit des Hughes-Apparates). G. Conradt. Discussing an improved arrangement of keyboard, claimed to possess material advantages. 4000 w. Elektrotech Zeitschr—Sept. 13, 1900.

**International.**—International Telegraphs. Particulars from official and other sources relating to the International Bureau of the Telegraphic Administrations. 3000 w. Elect'n—Jan. 15, 1897.

See also **Conference, Budapest.**

**Inventor.**—The True Inventor of the Telegraph. Heileman Wilson. Claims the inventor was the writer of an article published in the "Scots Magazine," Glasgow, 1753, signed C. M. 1000 w. Sci Am—Dec. 30, 1899.

**Kite Wire.**—See **TELEPHONE—Kite Wire.**

**Kitsee System.**—A New System of Telegraphy. Illustrated description of patents granted Dr. Isidor Kitsee for two systems of signalling, in which high-frequency, but comparatively low-pressure alternating current is used for transmission, and vacuum globes are employed as receivers. 500 w. Elec Wld—Feb. 15, 1896.

Auxiliary Telegraphy. Dr. I. Kitsee. Illustrates and describes a device for overcoming the difficulty in transmitting messages from and to intervening stations while the line is in use at the terminal offices. 1800 w. Jour Fr Inst—Jan., 1897.

**"K R" Law.**—See **Quadruplex; TELEPHONE LINE—Limiting Distance.**

**Kübler Printing.**—The Kübler Printing Telegraph (Typendrucker von Kübler). An illustrated description of a step-by-step printing telegraph apparatus with a very simple transmitter. 800 w. Elektrotech Zeitschr—July 19, 1900.

**Lighthouses and Lightships.**—Electrical Communication with Lighthouses and Light Vessels. Review of the reports of the Royal Commission on the work accomplished, with references to recent papers bearing upon this subject. 3800 w. Elec Rev, Lond—June 19, 1896.

Electrical Communication with Lighthouses and Light Vessels. Fifth and final report of the Royal Commission appointed to inquire what lighthouses and light vessels it is desirable to connect with the telegraphic system of the United Kingdom by electrical communication. Abstract. 5000 w. Elect'n, Lond—Oct. 22, 1897.

Lighthouses and Light Vessels. Discussion of the fifth and final report of the Royal Commission on Electrical Communication with lighthouses. Serial. Elec Rev, Lond—Dec. 5, 1897.

See also **British Coast; Lightship; SPACE TELEGRAPHY.**

**Lightships.**—Communication Between Coast and Lightships. Editorial comment on the failure in the attempts to establish electrical communication. 2500 w. Elec Rev, Lond—Dec. 25, 1896.

See also **LIGHTSHIP—Veering Drums.**

**Long Distance Transmission.**—Remarkable Feat in Telegraphy. An account of the feat at the N. E. L. A. Exposition, whereby special dispatches over telegraphic circuits, arranged as nearly as possible around the earth, and their receipt at the same place was accomplished within an hour. 1800 w. Elec Wld—May 23, 1896.

**Machine.**—See **Automatic; High-Speed.**

**Mercadier.**—A Tele-Microphone Differential Relay in a Multiplex-Telegraphy System (Sur la Télégraphie Multiplex Relai Telemicrophonique Différentiel). E. Mercadier. An illustrated description. 600 w. Comptes Rendus—March 19, 1900.

The Mercadier Harmonic Telegraph System (Télégraphe Harmonique de M. Mercadier). A. Fleury. An illustrated description of the system, which is based on the harmonic vibration of tuning forks, with an account of a telephonic relay. 2200 w. Electricien—June 9, 1900.

The Mercadier Multiplex Telegraph System (Télégraphie Multiple Réversible ou Multiplex Système E. Mercadier). G. Briand. An illustrated description of a system which works by the inductive action of undulatory currents. 1400 w. Génie Civil—June 16, 1900.

See also **TELEPHONE.**

**Military.**—Twenty-Five Years' Progress of Military Telegraphy. R. von Fischer-Treuenfeld. Historical review. 2700 w. Elec Rev, Lond—Nov. 12, 1897.

See also **Ashanti Expedition; ELECTRIC APPARATUS; ELECTRIC EQUIPMENT; ELECTRICITY—Warfare; TELEPHONE.**

**Military, Arizona.**—Military Telegraph Line from Bisbee to San Bernardino, Arizona. W. A. Glassford. An account of the erection of this line, the difficulties met and the purpose which these lines serve. 2000 w. Elec Eng—Dec. 30, 1896.

**Mont Blanc.**—The Work on Mont Blanc in 1899 (Note sur les Travaux au Mont Blanc en 1899). A communication, by Prof. Janssen to the French Academy, describing the successful use of uncovered wires laid directly on the ice for the telegraphic communication. 1200 w. Comptes Rendus—Dec. 11, 1899.

**Morse Receiver.**—Morse Receiver for the Argentine Telegraph System (Morse Farbschreiber der Argentinischen Telegraphenverwaltung). Describing the Tribelhorn receiver with automatic release, as used in Argentina. 1500 w. Elektrotech Zeitschr—April 28, 1898.

**Morse Recorder.**—The First Telegraph Recording Register. Illustration and statement concerning the first telegraph recording register on which was received the first message, with copy of agreement between S. F. B. Morse and Alfred Vail. 1200 w. Elec Rev, N. Y.—April 27, 1898.

**Müller-Wilke.**—See **Simultaneous Telephony.**

**Multiplex.**—Multiplex Telegraphs. Editorial on the value of multiplex principle to railroad service. Does not think it likely to be generally used for some time to come. 800 w. R R Gaz—March 17, 1899.

See also **High-Speed; Mercadier; Quadruplex; Rowland.**

**Office.**—See **TELEGRAPH OFFICE.**

**Omaha Exposition.**—The Telegraph at the Trans-Mississippi and International Exposition. Illustrates and describes the exhibit which shows the present state of perfection attained, and gives much of historical interest. 1400 w. W Elect'n—Aug. 13, 1898.

**Persia.**—Telegraphs and Telephones in Persia. Interesting consular report giving history of these lines. 1500 w. W Elec—Nov. 20, 1897.

Telegraphs and Telephones in Persia. An account of the construction, systems in use, and progress. 800 w. Jour Soc of Arts—Oct. 14, 1898.

**Philippines.**—Telegraphy in the Philippines. G. D. Rice. An illustrated description of crude methods of Filipino mechanics, and rough-and-ready devices which are used. 1800 w. W Elect'n—Sept. 22, 1900.

**Phonoplex.**—See PHONOPLEX.

**Pictures.**—See TELECTROSCOPE; TELEDIAGRAPH; TELEPHOTE.

**Pollak-Virag.**—High-Speed Telegraph of Pollak and Virág (Schnelltelegraph von Pollak und Virág). A description of the system, and reproductions of messages sent at the rate of 100,000 words per hour. 3000 w. Elektrotech Zeitschr—July 6, 1899.

The Pollak and Virág Rapid Telegraph (Der Schnelltelegraph von Pollak und Virág). An illustrated description of the latest improvements in the system. A legible script message is transmitted, instead of equivalents of the Morse characters. 2500 w. Elektrotech Zeitschr—Oct. 11, 1900.

Pollak-Virág Machine Telegraph System. An illustrated description of a new invention remarkable for its extraordinary speed performance. 1400 w. Elec Wld & Elec Engr—July 15, 1899.

**Police.**—A New Electrical Police Signalling System. Illustrated description of the Davis system and statement of the advantages claimed. 1000 w. Fire & Water—Feb. 10, 1900.

See also **FIRE ALARM—Los Angeles.**

**Postal Co.'s Caravan.**—The Postal Telegraph Company's Caravan. Description and illustration of the cars and equipment to be used while working in desolate regions. 1200 w. Elec Eng, N. Y.—Dec. 1, 1898.

**Printing.**—See **Baudot; Eaton; Essick; Higgins; Kübler; Rowland; Siemens-Halske; Stock Reporting; Zerograph.**

**Quadruplex.**—The "K R" Law as Applied to Quauruplex Circuits. W. Finn. Data affording an approximate idea of the efficiency limitations imposed by the "K R" law as applied to quadruplex working in at least one particular case. 1500 w. Elec Eng—Jan. 29, 1896.

The Roberson Quadruplex Telegraph. Brief description with illustration, of a system which has given favorable results so far as tested. 600 w. Elec Eng—Sept. 30, 1897.

**Railway.**—Delivery of Commercial Telegrams at Railway Stations. L. H. Korty. Read before the Assn. of Ry. Telegraph Supts., Niagara Falls, N. Y. Discusses irregularities of delivery, and how best to accomplish an improvement. 1300 w. Elec Rev—July 7, 1897.

Maintenance and Operation of Telegraph Departments. W. S. Glover. Extracts from a paper read at the July meeting of the Central Assn. of Railroad Officers. Suggestions for construction and repair of lines. 1100 w. Ry Age—Sept. 1, 1899.

On Railway Telegraphs with Special Reference to Recent Improvements. W. Langdon. Read before the British Inst. of Elec. Engs. The advances are to be found more in minor details than in any radical change. The subject is treated in detail. Serial. Elec Eng, Lond—May 1, 1896.

The Railway Telegraph. G. C. Kinsman. History of the inception of the telegraph, and of its application to train movements. Reminiscences of De Wilmot Smith. 3000 w. Ry Mag—April, 1897.

See also **Multiplex; Simultaneous Telephony; Trains; TELEPHONE.**

**Railway, British.**—Telegraph Construction on English Railroads. Abstract of a paper by W. Langdon, read before the Inst. of Elec. Engs., summarizing English practice, and of the ensuing discussion. 1500 w. R R Gaz—Oct. 2, 1896.

**Relay.**—See also **Mercadier.**

**Relay Resistance.**—Reduction of Relay Resistance. U. J. Fry. Read before the Assn. of Ry. Telegraph Supts. The experience of the writer. 1200 w. Elec Rev—June 24, 1896.

**Repeater, Horton.**—Horton's Telegraph Repeater. Illustrated description. 1000 w. Elec Eng—April 1, 1896.

**Resonance.**—See **TELEPHONE—Resonance.**

**Roberson Quadruplex.**—See **Quadruplex.**

**Rowland Multiplex Printing.**—Successful Trial of the Rowland Multiplex Printing Telegraph. Between Philadelphia and Jersey City. Illustrates this apparatus, stating the advantages of the system. 1000 w. Elec Eng, N. Y.—March 2, 1899.

**Rysselberghe.**—See **Simultaneous Telephony.**

**Semaphore.**—Semaphore Telegraph. Reviews the history of this system, now nearly out of use. 1200 w. Engr, Lond—June 3, 1898.

**Ship.**—See **SHIP TELEGRAPH.**

**Siemens-Halske Printing.**—Printing Telegraphs (Ueber Ferndrucker). Dr. Raps. An address delivered before the Electrotechnical Society, of Berlin, giving a particular description of the Siemens and Halske apparatus, with a general historical sketch of the subject; with illustrations. 3000 w. Elektrotech Zeitschr—April 12, 1900.

**Simultaneous Telephony.**—Cailho's System of Simultaneous Telegraphy and Telephony. Description, illustrated by diagrams. 800 w. Elec Eng—Dec. 2, 1896.

Simultaneous Telegraphy and Telephony and the Construction of Apparatus Therefor. H. S. Webb. Considers the fundamental principles involved and describes the methods of arranging the apparatus. Ill. 3300 w. Am Elect'n—Sept., 1899.

Simultaneous Telegraphy and Telephony. F. Walloch, in "Elektrotechnische Zeitschrift." Illustrated description of a system used in the Berlin Fire Department. 1800 w. Tel Mag—May, 1900.

Simultaneous Telegraphy and Telephony on One Wire; with Special Reference to the Operation of the Berlin Fire Department (Gleichzeitiges Telegraphiren und Telephoniren auf einer Leitung, besonders im Betriebe der Berliner Feuerwehr). F. Walloch. An address delivered before the Hanover Electrotechnical Society, describing the system used in the Berlin Fire Department, with illustrations. 2000 w. Elektrotech Zeitschr—March 22, 1900.

Simultaneous Telephony and Telegraphy. Charles Selden. Read before the Railway Telegraph Supts.' Assn. Reports experimental investigations of the method of Francois Van Rysselberghe. 2000 w. Elec Rev, N. Y.—May 24, 1899.

Telephony and Telegraphy. N. Amzan in "L'Eclairage Electrique." Discussing the possibility of utilizing the secondary telegraph lines for telephonic conversations. The first part considers alternate telegraphic and telephonic communications, and simultaneous telegraphic and telephonic communications. Serial. Elec Rev, Lond—April 24, 1896.

The Müller-Wilke Telegraph-Telephone Duplex (Müller-Wilke's Telegraphen-Fernsprecher). A system of simultaneous telegraphing and telephoning over a single wire, especially adapted for railway service. 2500 w. Deutsche Zeitschr f Elektrotech—Jan. 15, 1897.

The Use of Telegraph Wires for Telephoning (Ausschaltung von Fernsprechsystemen an Morseleitungen). O. Canter. Describes a method for the application of telephones to wires which are at the same time used for Morse telegraphing, in such a manner that neither interferes with the other even when used simultaneously. 1000 w. Elektrotech Zeitschr—Dec. 15, 1898.

See also **TELEPHONE—Composite Transmission.**

**Space.**—See **SPACE TELEGRAPHY.**

**Statistics.**—Telegraphic Statistics. A translation from the "Journal Télégraphique," relative to the progress of the various countries in telegraphic developments. 3000 w. Elec Eng, Lond—Dec. 3, 1897.

**State Ownership.**—See **Government Control.**

**Stock Reporting.**—The Rise of the Stock Reporting Telegraph. Ralph W. Pope. Gives the history of the gold indicator, and stock reporting; the instruments used and by whom invented, and facts of interest in this connection. 3000 w. Elec Wld—March 2, 1899.

**Submarine.**—See **SUBMARINE CABLE; SUBMARINE TELEGRAPH.**

**Switzerland.**—See also **Hughes Duplex.**

**Switzerland, 1899.**—Telegraphy and Telephony in Switzerland in 1899 (Telegraphen und Fernsprechwesen in der Schweiz im Jahre 1899). A full abstract of the official government report, with tables. Serial. 2 parts. 5000 w. Elektrotech Zeitschr—May 10, 17, 1900.

**Symbols.**—The Telegraphic Transmission of Symbols (Verfahren zur Telegraphischen Uebertragung von

Zeichnungen). Dr. J. Walter. A system of symbolical telegraphing by the use of a diagram of squares containing letters or syllables, the squares being indicated by numbers and letters. 8000 w. Electrotech Zeitschr—Jan. 18, 1899.

**Synchronograph.**—See **SYNCHRONOGRAPH.**

**Telephone Combined.**—See **Simultaneous Telephony.**

**Telescriptor.**—See **Zerograph.**

**Test Switch.**—Postal Telegraphs—New Form of Morning Test Switch Tablet. Illustrated description of arrangement. 1100 w. Elec, Lond—Dec. 4, 1896.

**Trains.**—Electrical Communication between Moving Trains. Descriptive of means of communication between passing trains. 400 w. Elec Rev—Dec. 13, 1895.

**Tribelhorn Receiver.**—See **Morse Receiver.**

**Uganda.**—Uganda State Railway Telegraphs. Brief description of the materials used and the lines constructed. 2000 w. Elec Rev, Lond—Nov. 24, 1899.

**United States.**—See **Government Control; History.**

**Wave Transmission.**—See **Duplex; SYNCHRONOGRAPH.**

**West Africa.**—The Telegraphic System of French West Africa. From "L'Illustration." An account of the difficulties in establishing the system. 1400 w. Sci Am Sup—Sept. 18, 1897.

**Wetzer Calling Apparatus.**—See **Calling Apparatus.**

**Wheatstone Automatic.**—Improvements in Wheatstone Automatic Telegraph Apparatus. Illustrated description of the improved apparatus. 800 w. Elec Rev, Lond—March 2, 1900.

See also **Automatic.**

**Wireless.**—See **SPACE TELEGRAPHY.**

**Zerograph.**—The Telescriptor and the Zerograph (Teleskriptor und Zerograph). Describes two new forms of "long-distance typewriters" recently brought out in Germany. The Zerograph can be operated readily with alternating or polyphase currents. 1800 w. Die Elektrizität—Dec. 4, 1897.

The Zerograph. Illustrated detailed description of a new instrument for doing the work of a type-printing telegraph. 1100 w. Elect'n—Nov. 19, 1897.

The Zerograph. Illustrated description of this improved instrument—an office type-printing telegraph. 1300 w. Elect'n, Lond—Nov. 24, 1899.

### TELEGRAPH CABLE.

See **ELECTRIC CABLE; SUBMARINE CABLE.**

### TELEGRAPHER.

**Health.**—The Effect of Telegraph Work on the Health. From the "Lancet," London. Extract from address of J. T. Hull, president of the Ry. Telegraph Clerks' Assn., claiming very deleterious effects. 400 w. Elec Rev, N. Y.—Aug. 24, 1898.

**Switchboard Instruction.**—Educating Operators in the Handling of the Switchboard. W. E. Packard. Read before the Assn. of Ry. Telegraph Supts. Commenting on the inefficiency of operators and suggesting improvements. 1100 w. Elec Rev—July 1, 1896.

### TELEGRAPH LINE.

See **ELECTRIC CABLE; ELECTRIC CONDUCTOR; ELECTRIC LINE; POLE.**

Construction and Reconstruction of Telegraph Lines. C. H. Bristol. Condensed paper, read before the Assn. of Ry. Telegraph Supts. at Wilmington, N. C. Reviews recent improvements in this work. describing the most approved construction. 1800 w. R R Gaz—June 2, 1899.

### TELEGRAPH OFFICE.

**Buffalo, N. Y.**—New Western Union Telegraph Offices at Buffalo. A. C. Terry. Illustrated description of the offices in the new Ellicott Square Building, which are considered among the finest in the United States. 1200 w. W Elec—Oct. 24, 1896.

**Chicago, Postal Co.**—The New Home of the Postal Company at Chicago. E. J. Nally. Brief history of the progress of the Postal Telegraph-Cable Company, with description of their new building in Chicago. 5400 w. W Elec—Dec. 14, 1895.

**Oelwein, Ia.**—A Model Telegraph Plant. G. H. Page. Brief illustrated description of a plant at Oelwein, Ia. 600 w. Elec Rev, N. Y.—April 18, 1900.

### TELEGRAPHONE.

The Poulsen Telegraphone or Magneto-Telephonograph (Rundschau). A description of this apparatus, in which a steel wire. or ribbon travels before the magnet of a telephone receiver and has its permanent magnetism altered, so that when the wire is moved past another telephone the sounds will be reproduced. 1000 w. Elektrotech Zeitschr —May 17, 1900.

The Poulsen Telegraphone (Le Télégraphone de M. Poulsen). M. Aliamet. An illustrated description of this apparatus, in which a magnetic record is made on a steel wire or tape. 1000 w. Electricien—June 2, 1900.

The Poulsen Telephonograph (Der Telephonograph von Poulsen). An illustrated description of this apparatus for making a magnetic record of telephone messages on a steel wire or ribbon, which record can reproduce the messages at will. 1200 w. Elektrizität—June 23, 1900.

The Telegraphone (Das Telegraphon). Dr. Thomae. A short illustrated description of the Paulsen magneto-telephonograph, in which an electromagnet, in circuit with a microphone, makes a magnetic record on a steel wire or tape. 1200 w. Zeitschr d Ver Deutscher Ing—June 30, 1900.

The Telephonograph (Die Weltausstellung in Paris 1900. Der Telephonograph). Hans Zopke. An illustrated description of Poulsen's "telegraphon," for recording telephonic messages magnetically on steel wire or tape, with its many applications. 1600 w. Glaser's Annalen—Aug. 1, 1900.

Recording Telephones. Describes the "Telephonograph" and the "Telegraphone," two recent inventions of a recording telephone. Ill. 2000 w. Nature—Aug. 16, 1900.

The Telegraphone. From "La Nature." Illustrated description of the instrument and its applications. 1200 w. Sci Am Sup—Aug. 25, 1900.

Poulsen Telegraphone. An illustrated description of this apparatus for making a magnetic record of telephone messages on steel wire or ribbon. 1000 w. Sci Am—Sept. 22, 1900.

The Poulsen Telegraphone (Le Télégraphone Poulsen). G. Briad. A description of this combination of telephone and phonograph, successfully used for recording telephone messages. 1000 w. Génie Civil—Sept. 29, 1900.

### TELELECTROSCOPE.

See **TELECTROSCOPE.**

### TELEMETER.

See also **RANGE FINDER; SURVEYING; SURVEYING INSTRUMENT.**

Telemeters and Range-Finders. Profs. Barr and Stroud. Paper read before the Inst. of Mech. Engs. Confined to a description of the range finder now used in the navies of Britain and other countries, and to another smaller hand instrument which is much more portable and much simpler than the former, the object apparently being to exploit the latter. Serial. Engng—Feb. 14, 1896.

The Opera Glass Telemeter (La Jumelle Stéréoscopique Stadia-Télémètre). The relative displacement of the images by means of a combination of prisms enables the distance to be determined directly. Especially intended for military use. 1500 w. La Revue Technique—April 25, 1897.

**Diagram.**—A Diagram for the Reduction of Telemeter Readings. Neville B. Craig. States facts showing the difficulty and labor of all methods of obtaining accurate results in topographical work, and explains the use of a diagram, constructed by the writer, which has given more satisfactory results than any device he has tried. It is simple, rapid and comparatively inexpensive. 2000 w. Eng News—Feb. 3, 1898.

**Zeiss.**—The New Zeiss Telemeter (Le Nouveau Télémètre Zeiss). The instrument is based on the exaggerated stereoscopic effect produced by separating the objectives of a field glass by the use of prisms. The method is fully described, and the instrument tested is said to have measured distances of 2000 metres with an error of about 3 per cent. 3000 w. La Revue Technique —Sept. 10, 1898.

### TELEPHONE.

See also **TELEPHONE COMPANY; TELEPHONE EXCHANGE; TELEPHONE LINE; TELEPHONE PATENT; TELEPHONE SWITCHBOARD.**

Telephones. John Gavey. A detailed account

The Telephone Situation. J. J. Nate. Presents the various phases of the work, discussing the organization methods, equipment and exchange operation in part first. Serial. W Elect'n—March 12, 1898.

**Amsterdam Municipal.**—Municipal Telephone in Amsterdam. Ph. Falkenburg and J. H. van Zanten. An account of a successful example. 1800 w. Munic Af—March, 1900.

**Apostoloff Automatic.**—The Apostoloff Automatic Telephone. General description of an invention designed to supersede the special telephone operator and permit the subscriber to control cross connections at the central exchange. 1200 w. Elec Eng, Lond—Aug. 14, 1896.

**Apparatus.**—Art of Constructing Telephone Apparatus. H. P. Clausen. A general review of what is being done by builders of telephone appliances. Ill. 3800 w. W Elect'n—Feb. 26, 1898.

**Arc.**—See ARC—Telephone.

**Automatic.**—Automatic System for Telephone Exchange (Schaltung für Gemeinschaftliche Fernsprechleitung). A method of using a number of telephones upon a single wire; all but the one in use being automatically disconnected. Suitable for small systems. 1500 w. Elektrotechnische Zeitschr—Nov. 18, 1897.

Telephone System Without Calling Device for Subscribers (Fernsprechanlage ohne Rufstromquellen bei den Theilnehmerstellen). Description of an automatic system by means of which the unhooking and hooking up of the receiver gives the call or rings off. Three articles. 5000 w. Elektrotechnische Zeitschrift—Feb. 18 and 25, and March 4, 1897.

See also Apostoloff; Blut Cut-Out; Dardeau; Improvements; Individual Calls; Selective Signals; TELEPHONE EXCHANGE.

**Automatic Call.**—The Automatic Pendulum Telephone Call (Les Postes Télephoniques à Appel Pendulaire). L. Montillot. A description of the system installed by the Omnibus Company of Paris. A pendulum and dial system is used, by means of which any station can call any other, without interrupting communication. Two articles. 3000 w. L'Electricien—Aug. 20, 27, 1896.

**Automatic Call-Boxes.**—The Copenhagen "Automatic" Telephone Call-Boxes. Illustrated description of telephones on the "penny-in-the-slot" principle. 400 w. Elect'n, Lond—Dec. 1, 1899.

**Automatic, Germany.**—Automatic Telephones of the German Post Office (Die Fernsprechautomaten der Reichs-Postverwaltung). A description with details of the slot-controlled telephones used by the German post-office. 2000 w. Elektrotech Zeitschr—Aug. 3, 1899.

**Auxiliary Circuits.**—Auxiliary Circuits as Applied to the Commercial Telephone. H. P. Clausen. Illustrates and describes circuits and apparatus that may be applied with advantage, particularly to business house telephones. 2400 w. Elec Engng—May, 1899.

**Barrett Automatic.**—See Selective Signals.

**Batteries.**—Batteries for Exchange and Toll-Line Use from the Point of Economy and Excellence of Service. S. A. Dinsmore. Discusses dry and wet batteries and their use. 2000 w. Elec Engng—Dec., 1898.

See also Central Battery.

**Berliner Patent.**—See TELEPHONE PATENT.

**Blake Submarine.**—See Submarine.

**Blut Cut-Out.**—The Use of the Blut Automatic Cut-out Apparatus in Connecting Local Stations with the Main Lines of the German Telephone System (Einrichtung von Nebenstellen im Anschluss an die Fernsprechapparate der Reichspost unter Verwendung von Automatischen Sperrvorrichtungen, System Blut). H. Blut. Paper read before the Elektrotechnischer Verein, giving an account of this semiautomatic apparatus, with illustrations. 4500 w. Elektrotech Zeitschr—April 19, 1900.

**British.**—The Development of the Telephone System. Editorial discussing the attitude of the government to the telephone interests in England. 1500 w. Ind & Ir—April 10, 1896.

Treasury Minute Upon the Proposals for the Development of the Telephone System in the United Kingdom. Full text setting forth the proposals of the British Government with regard to

F. Charles Raphael. Part first gives the early history with illustrated description of the instruments used. Serial. Elect'n—July 2, 1897.

**British Parliament.**—The State and the Telephones; the Story of a Betrayal of Public Interests. Robert Donald. Discusses matters brought to light by investigations of a select committee of the British House of Commons, and the solution of the difficulties. 7500 w. Contemporary Rev—Oct., 1898.

**British Post-Office.**—The Post-Office and Telephony. S. Alfred Varley. On the evil consequences of the policy adopted in England, in making telephony a Post-Office monopoly. Serial. Elec Rev, Lond—March 31, 1899.

**British Report.**—Report from the Select Committee on Telephones. Authorized text of the report of committee appointed to consider questions relating to the municipalization of the telephone service in England, with editorial. 7500 w. Elect'n, Lond—Aug. 19, 1898.

**Burgunder System.**—Burgunder Telephone System (Transmetteurs et Recépteurs Telephoniques Système Burgunder). L. Montillot. An illustrated description of transmitter and receiver and other details of the system. 1000 w. Electricien—June 23, 1900.

**Canada.**—Telephones in Canada. An account of the service rendered by the Bell Telephone Co., which practically controls the business. 1000 w. U S Cons Repts, No. 408—April 8, 1899.

**Central Battery.**—A Central Battery Telephone System (Fernsprechanlage ohne Rufstromquellen bei den Theilnehmerstellen). G. Ritter. An illustrated account of an improved system in which batteries are required at the central station only. Three papers. 12000 w. Elektrotech Zeitschr—April 6, 13, 20, 1899.

Central Battery Telephone System. A description, with diagrams, of a system invented by W. W. Dean, whereby separate batteries at substations may be dispensed with. 1200 w. Elec Wld & Engr—Sept. 15, 1900.

Centralization of Transmitter Batteries in Telephone Exchanges. Kempster B. Miller. The advantages derived from such a centralization are set forth and the methods explained and illustrated. 2500 w. Elec Wld—Jan. 11, 1896.

Centralized Sources of Energy in Telephone Exchanges. Kempster B. Miller. Shows the great development that has taken place in this line of work. The scope of the article includes the centralization of both calling and talking batteries. Ill. Serial. Elec Wld—Dec. 24, 1898.

See also TELEPHONE EXCHANGE.

**Charollois.**—See Military.

**Colorado.**—Telephone Construction in the Rocky Mountains. J. W. Dickerson. Illustrated description of the system of the Colorado Telephone Co. 1200 w. Elec Wld—March 21, 1896.

See also Cripple Creek.

**Companies.**—See TELEPHONE COMPANY.

**Composite Transmission.**—Some Instances of Composite Transmission and Compound Telephony. Thomas D. Lockwood. Read at the Wilmington meeting of the Assn. of Ry. Telegraph Supts. Illustrates and describes various arrangements for the simultaneous transmission of two or more telephonic messages over the same wires, or for sending telegraphic and telephonic messages over the same lines at the same time. 3500 w. Elec Rev, N. Y.—Oct. 4, 1899.

See also Duplex; TELEGRAPH—Simultaneous Telephony.

**Construction.**—Essentials of Telephone Construction. Maxime Reber. Read before the Independent Telephone Assn., Chicago. Discusses things required if the system is to give efficient service under all conditions. 3800 w. W Elect'n—July 1, 1899.

How to Make a Telephone. E. E. Clement. Directions with illustrations. 2000 w. Am Elect'n—March, 1897.

**Cripple Creek.**—Telephony at Cripple Creek. J. W. Dickerson. A brief historical account. 2700 w. Elec Wld—March 7, 1896.

**Current Energy.**—The Energy of Telephone Currents. Eugene W. Caldwell. Illustrates and describes experiments made to determine under what conditions a transmitter would give the best results and also to measure the energy. 1700 w. Elec Rev, N. Y.—Jan. 3, 1900.

**Dardeau System.**—The Dardeau Telephone System (Le Système Téléphonique Dardeau). A special system for use in connection with railway signalling, for multiple circuits, the telephone replacing the Morse telegraph instruments. Two articles. 2000 w. L'Electricien—Dec. 23, 30, 1899.

The Dardeau Direct-Call Telephone. Describes the system, illustrating the instrument. 1600 w. Engng—July 27, 1900.

**Disturbances.**—On Telephonic Disturbances Caused by High-Voltage Currents. V. Wietlisbach Translated by C. S. du Riche Preller. The paper is a report just published at Berne—"Blätter für Electrotechnik." 4500 w. Elect'n—March 27, 1896.

**Disturbances, Generators.**—Some Telephone Disturbances from Electrical Generators. George D. Shepardson. Reports a study of troubles in a western city, describing experiments made and conclusions reached. 6400 w. Trans Am Inst of Elec Engs—Aug. and Sept., 1898.

**Disturbances, Tramways.**—Electric Tramways and Telephone Disturbances. C. S. Du Riche Preller. Investigations of the effects of the working of electric tramways on telephones, with a view to determining (1) which of the overhead contact systems is most liable to cause telephonic disturbances, and (2) whether the disturbances, if any, are due to induction, leakage, or to other causes. 2700 w. Elect'n—Jan. 10, 1896.

**Ducousso System.**—Ducousso Telephone Transmitters and Receivers (Transmitteurs et Recepteurs Téléphoniques Système Ducousso). L. Montillot. An illustrated description of the system. The transmitters are granular carbon microphones; the receiver magnet is circular. 800 w. Electricien—June 2, 1900.

See also **TELEPHONE SWITCHBOARD.**

**Duplex.**—Duplex Telephony. Abstract of an article in the "Elektrotechnische Zeitschrift," by Post-Inspector Schwensky. Reviews the progress of duplex working, illustrating various applications and giving a list of places where it is employed. 3000 w. Elect'n, Lond—July 14, 1899.

The Duplexing of Telephone Conductors (Doppelbenutsung von Fernsprech-Verbindungsleitungen). A paper by Inspector Schwensky, discussing the various methods which have been used for sending telephonic communications simultaneously over one wire, with especial reference to the method used by the German government. 7500 w. Elektrotech Zeitschr—Dec. 22, 1898.

See also **Composite Transmission; Multiplex; TELEGRAPH—Simultaneous Telephony.**

**1897.**—The Past Year's Advance in the Art of Telephony. Kempster B. Miller. In the United States, 250 patents for alleged improvements were granted. Reviews some of the more important. 2500 w. Elec Wld—Jan. 1, 1898.

**1898.**—The Past Year's Advance in the Art of Telephony. Kempster B. Miller. A review of improvements during 1898, which consist mainly in the line of the perfection of details. Ill. 2800 w. Elec Wld—Feb. 18, 1899.

The Year's Progress in Telephony and Telegraphy. Edward E. Clement. Review of the year 1898, noting the improvements, the part taken in the Spanish-American war, etc. Ill. 14500 w. Elec Engng—Feb., 1899.

**Election Returns.**—Casual Notes on the Use of Telephone Election Returns. George Heli Guy. The good work done all over the country, with curious and amusing features. 1400 w. Elec Eng—Nov. 25, 1896.

**Electric Lighting Combined.**—Operating Telephone and Electric-Lighting Systems in Conjunction. H. P. Clausen. Some valuable suggestions on the construction, operation and management of telephone systems of this character. Ill. 2000 w. W Elect'n—June 4, 1898.

**Electric Tramway.**—Telephone Service on Electric Railways. H. G. T. The system installed by the National Telephone Manufacturing Company, of Boston, on the line of the Braintree and Weymouth road—its construction and operation. 900 w. Elec Rev—Jan. 8, 1896.

The Successful Handling of Street Railways with the Dispatcher's Telephonic System. J. L. McLean. An exposition of the method, with map of route, forms for reports, etc. 3000 w. St Ry Rev—Aug. 15, 1896.

**Electrophone.**—See **ELECTROPHONE.**

**Elevated Railway, Chicago.**—The Telephone in Railway Operation. An illustrated description of the telephone as used by the extensive system of the Metropolitan West Side Elevated Railway Co., of Chicago. 1800 w. W Elec—Sept. 19, 1896.

**European.**—Through Telephone Eyes. Views on European methods as given by general manager Angus S. Hibbard, of the Chicago Telephone Co. 1300 w. Elec Rev—Dec. 16, 1896.

**European Statistics, 1894.**—European Telephone Statistics for the Year 1894. Frans J. Dommerque. Table calculated from data furnished by the "Journal Telegraphique." 350 w. Elec Engng—Dec., 1896.

**Exchange.**—See **TELEPHONE EXCHANGE.**

**Field Compensating.**—Field's Compensating Telephone. Patent of Stephen D. Field. A mechanical device in the telephone which acts to accentuate or magnify the more rapid and feebler vibrations while diminishing the amplitude of the heavier vibrations. Ill. 1400 w. Elec Eng—Jan. 15, 1896.

**Fire Department, Berlin.**—See **TELEGRAPH.**

**Galvanoscope.**—See **GALVANOSCOPE—Telephone.**

**Germain's Loud-Speaking.**—Germain's Loud-Speaking Telephone. L. Leroy, in "La Nature." Illustrated description of the instrument. 800 w. Sci Am Sup—June 3, 1899.

**Germany.**—The Development of Telephony in the German Empire (Entwickelung der Allegemeinen Fernsprechanlagen im Reichs-Telegraphengebiet). A very complete tabulated account of the entire German telephone system, including Bavaria and Würtemberg. 12000 w. Elektrotech Zeitschr—Aug. 9, 1900.

The Development of the Telephone System of the Imperial Postal Jurisdiction, including Bavaria and Würtemburg (Entwickelung der Allgemeinen Fernsprechanlagen im Reichs-Postgebiet sowie in Bayern und Würtemberg). A very complete tabulated account of the German telephone system, with map of the empire, showing the extent and nature of the connections very clearly. 6000 w. Elektrotech Zeitschr—June 9, 1898.

The Future Developments of Telephony (Die Gegenwärtige Entwickelung des Fernsprechwesens). An elaborate paper read before the Electrotechnic Society, in Berlin, by Jul. H. West. Proposes to cover the country with a network system of long-distance wires to be worked in connection with central stations. Two articles. 15000 w. Elektrotech Zeitschrift—Feb. 4 and 11, 1897.

**Glasgow.**—The Glasgow Telephone Inquiry. An account of the recent inquiry into the causes of dissatisfaction with the service. 3800 w. Elec Eng, N. Y.—Dec. 16, 1897.

**History.**—Reminiscences. F. A. Hamilton. Read before the Maritime Elec. Assn., at Halifax. On the uses and applications of the telephone, containing valuable suggestions. 1800 w. Can Elec News—May, 1899.

The History of the Telephone. George C. Maynard. Review of the pioneer work with Bell's great invention. 1600 w. Elec Rev, N. Y. —Jan. 5, 1898.

Telephone Development. Ed. L. Barber. Read before the Ind. Tel. Assn. A review of progress. 1400 w. W Elect'n—June 16, 1900.

The Telephone. Illustrated historical review. 1200 w. Sci Am—July 25, 1896.

Twenty Years' Progress in Telephony. John C. McMynn. Abstract of paper read before the Chicago Elec. Assn. Historical account. 2800 w. Elec—April 1, 1896.

Twenty-Five Years' Developments in Telephony. J. E. Kingsbury. A review of the progress from its beginning. 3800 w. Elec Rev, Lond—Nov. 12, 1897.

See also **TELEPHONE EXCHANGE—Chicago.**

**Hospital, Birmingham.**—The Telephone at the Springhill Infirmary, Birmingham, Eng. Illustrated description of a system laid down to prevent loss of time in calling medical aid to any part of the institution. 500 w. Elect'n—June 26, 1896.

**Hunnings Transmitter.**—See **Transmitter, Hunnings.**

**Improvements.**—Improvements in Telephone Systems.

Kempster B. Miller. Part first gives an illustrated description of a recent patent of G. K. Thompson for connecting lines of old and new systems, or with each other, without any special attention on the part of the operator. Serial. Elec Wld & Elec Engr—April 15, 1899.

**Independent Companies.**—See **TELEPHONE COMPANY.**

**Independent Systems.**—The Merits of Independent and Industrial Telephone Systems. Kempster B. Miller. Reviewing the progress made since the expiration of the fundamental patents, especially in the introduction of private systems in mines, workshops, and other industrial establishments. 3500 w. Eng Mag—Jan., 1900.

**Individual Calls.**—General Telephoning System with Individual Calls (Einrictung für Gemeinschaftliche Fernsprechleitungen mit Getrenntem Anruf der Einzelnen Theilnehmer). A system by which a number of individuals may use the same telephone wires and call each other or the central station. 4500 w. Elektrotech Zeitschr—June 16, 1898.

**Inductance.**—A Practical Method of Impedance Testing for Telephone Men. Sewall Cabot. Describes a method of determining the inductance of apparatus or circuits. 400 w. Elec Wld & Engr—Oct. 20, 1900.

Inductance in Telephony. W. Moon. Deals with inductance effects apart from capacity. Serial. Elec Rev, Lond—April 15, 1898.

See also **Pupin Long Distance.**

**Induction Coil.**—The Induction Coil of the Würtemberg Telephone System (Der Fernsprechübertrager der Würtembergischen Telegraphenverwaltung). A flat coil is used with core of stamped iron, the design enabling a coil injured by lighting to be readily replaced. 500 w. Elektrotech Zeitschr—Dec. 23, 1897.

**Interior Systems.**—Interior Telephone Systems. W. S. Henry. Illustrates and describes systems that may be used for house, office, or factory buildings. Serial. Am Elect'n—May, 1900.

Interior Telephone Systems. W. S. Henry. Describes the working of intercommunicating systems. Ill. 2500 w. Am Elect'n—Aug., 1900.
See also **Independent; Manufacturing Plants; Private; Private Branch.**

**Italy.**—The Telephone in Italy (La Telefonia in Italia). Giacinto Motta. An address showing the extensive use of the telephone in various countries and comparing the progress made by Italy with other parts of the world. The formation of one general organization for the whole of Italy is urged. Two articles. 7500 w. L'Elettricita—April 1, 8, 1899.

**Kite Wire.**—Telephoning and Telegraphing with a Kite Wire. William A. Eddy. An account of an interesting and successful experiment. 550 w. Elec Rev—Dec. 30, 1896.

The Use of a Mid-Air Telephone Wire with Kites. Wm. A. Eddy. An illustrated account of a successful experiment. 1200 w. Elec Eng—Jan. 6, 1897.

**Life Saving Service.**—The Telephone in the Life-Saving Service. William Bolton. A letter from the superintendent of United States Telephone Lines Life-Saving Service, explaining the value of the instrument in the saving of life and property. 1400 w. Elec Rev, N. Y.—Oct. 6, 1897.

**Lighthouses and Lightships.**—See also **TELEGRAPH.**

**Line Signals.**—The Evolution of the Line Signal. Arthur Vaughn Abbott. An illustrated account of the progress on lines of telephonic communication, discussing the devices used, and the value of luminous signals. 4500 w. Trans Am Inst of Engs—May, 1898.

**L. M. & B. H. System.**—See **Toll Line.**

**London.**—The Telephoning of London by the Post-Office. Particulars of the areas to be served and the exchanges to be established, the cables, conduits, manholes, switchboards, and method of working to be adopted. Ill. Serial. Elec Rev, Lond—May 11, 1900.

**Long Distance.**—Long Distance Work. Dr. V. Wietlisbach. A careful discussion of all phases of long distance work and the methods and devices used. Ill. 25900 w. Elec Engng—April 1, 1897.

The Long Distance Transmission of Speech. J. H. Winfield. Read before the Maritime Elec. Assn., at Halifax. Notes some of the difficulties encountered in the design, construction and operation of long lines. 1600 w. Can Elec News—May, 1899.

See also **Switch, Long Distance; TELEPHONE LINE.**

**Magneto Telephones.**—American Telephone Practice. Kempster B. Miller. History and principles of the magneto telephone. 1800 w. Am Elect'n—Oct., 1896.

**Manufacturing Plants.**—Telephone Systems for Large Manufacturing Plant. H. P. Clausen. Illustrated description of a simple manually operated system, wherein all calls are transmitted by the caller. 1800 w. W Elect'n—May 28, 1898.

**Martin Portable.**—See **Portable.**

**Mercadier.**—The Mercadier Multiple Telephone System (Mercadier's Vielfach-Gegensprech System). Describing improvements in the monotelephone system by means of which multiplex messages can be sent in opposite directions. Three articles. 7000 w. Electrotech Zeitschr—April 27, May 4, 11, 1899.

See also **TELEGRAPH.**

**Microphone Action.**—Microphonic Telephonic Action. R. A. Fessenden. An article expressing disagreement with Dr. Berliner's theory. 2400 w. Am Elect'n—May, 1897.

**Military.**—Military Telephony. Illustrated description of the P. Charollois system. 2000 w. Elec Rev, Lonu—Feb. 14, 1896.

The Telephone in War. Arthur R. Pardington. Describes the long distance equipment at Camp Black, and its valuable services. 700 w. Elec Rev, N. Y.—June 15, 1898.

See also **1898; ELECTRIC APPARATUS; ELECTRIC EQUIPMENT; ELECTRICITY—Warfare.**

**Mobile, Ala.**—See **TELEPHONE COMPANY—Home.**

**Modern.**—The Modern Telephone Instrument. Francis G. Hall, Jr. Describes the long distance instrument. Ill. 2400 w. Yale Sci M—Feb., 1898.

**Multiplex.**—Multiplex Telephony. Kempster B. Miller. A brief account of what has been done in this field. 1200 w. Sib Jour of Engng—Dec., 1895.

See also **Composite Transmission; Duplex; Mercadier.**

**Municipal Ownership.**—The Municipalisation of the Telephone. A. B. Mountain. Read at the convention of the Municipal Electrical Assn., Bristol, England. Reviews efforts made to improve the telephone service in England, and endeavors to prove that if controlled by local authorities the rates can be reduced and the system developed. Discussion. 3300 w. Elec Eng, Lond—June 23, 1899.

Municipal Telephony. A. B. Bennett. A summary of the present position of telephones in the United Kingdom, and an account of what has been dine in Norway are given in the present number. Serial. Elec Rev—Nov. 15, 1895.

See also **Amsterdam; British; Glasgow; Norway; MUNICIPAL OWNERSHIP; STATE OWNERSHIP.**

**New York.**—Changes in the New York Telephone System. A review of the changes and the causes making it necessery to extend the capacity. 2000 w. Elec Eng—Oct. 21, 1896.

Largest Telephone System in the World. On the development of the use of the telephone in the City of New York, and the reduction in rates. 1300 w. Elec Rev, N. Y.—Dec. 27, 1899.

The New York Telephone Company. A new organization with sixteen million dollars capital. 400 w. Elec Rev—June 24, 1896.

See also **Private Branch.**

**Niagara Falls at New York.**—The Roar of Niagara. Official report on the roar of Niagara Falls at the recent Elec. Ex. in New York. 1000 w. Elec Rev—July 22, 1896.

**Norway.**—The Government of Norway and the Telephones. Alfred R. Bennett. Considerations which led to the decision against state acquisition of telephones. 1800 w. Elect'n—Dec. 27, 1895.

**Party Lines.**—A New Telephone System for Party Lines. Jul. H. West. Illustrates and describes a system allowing the telephones of several subscribers to be connected to the exchange by one common party line. It contains a device for locking all stations on the line except the one in use. 1800 w. Elect'n, Lond—Feb. 2, 1900.

Locking and Unlocking Devices on Party Telephone Lines. H. S. Webb. Illustrated description of the mechanism for locking all the telephone switches except the one called up by the exchange operator, and then for unlocking them all when the line is free. 900 w. Elec Wld—April 16, 1898.

Party Lines. Kempster B. Miller. Discussion of this problem. Part first explains the term as applied to telephone work, and gives illustrated description of some of the systems in use. 2300 w. Elec Engng—Aug., 1898.

Recent Improvements in Party Line Telephone Systems. Description of a system brought out by the American Telephone and Telegraph Co. Illustration of instrument. 1000 w. Elec Eng—Jan. 27, 1897.

**Persia.**—See **TELEGRAPH.**

**Philippines.**—Telephone Work and Prospects in the Philippines. The first part tells of the natives' opposition, the system adopted, etc. 1600 w. W Elect'n—Sept. 8, 1900.

**Polarizing Receivers.**—See **Receiver Polarizing.**

**Police Service.**—An Important System of Police Telephone Service for New York City. The McCullagh Plan. Brief detail of plan suggested by Chief John McCullagh for establishing permanent ports and police intercommunication, to increase the efficiency of the police force. 2000 w. Elec Eng, N. Y.—Dec. 16, 1897.

**Portable.**—Portable Telephones. From "N. Y. World." The system to be installed on the Brooklyn Bridge cars. The invention of Kingsley L. Martin. 2300 w. Lord's Mag—Feb., 1896.

**Practical Features.**—Practical Features of Telephone Work. A. E. Dobbs. Suggestions for starting a new exchange, and the importance of having the advice of a competent superintendent who has had practical experience, are given in part first. Serial. Elec Eng. N. Y.—March 17, 1898.

**Private.**—Private Telephone Construction. F. H. Smith. Confined to the systems where no switchboard is used, together with the system with two or more instruments on one circuit. Serial. Elec Eng—July 8, 1897.

**Private-Branch, N. Y.**—The Growth of the "Private-Branch Telephone Exchange" Service in New York City—An Interesting Evolution. Explanation of a change that has been made in the past year which is reported as highly satisfactory. Ill. 1500 w. Elec Eng, N. Y.—Nov. 25, 1897.

**Problems.**—Some Problems in Telephone Engineering. Theodore Spencer. Briefly outlines the general system of telephone lines as now used, discussing a few prominent details, and stating the problem as it appears at present, and some possible methods of solving the difficulties. Ill. 3800 w. Pro Engs' Club of Phila—May, 1899.

**Public Interests.**—The Interests of the Public in the Telephone Situation. F. W. Dunbar. History of the telephone development and of the contract that divided the interests of telephony and telegraphy is given in part first, with statement of the requirements of the combined system. 2800 w. Elec Wld—Jan. 2, 1897.

**Pupin Long Distance.**—See **TELEPHONE LINE.**

**Railway.**—See **Electric Tramway; Elevated Railway; RAILWAY OPERATION—Telephone Dispatching System; TELEGRAPH—Simultaneous Telephony.**

**Rates.**—Regulation of Telephone Rates. J. E. Keelyn. A discussion of telephone rates. The writer holds that a combination "flat" and "sliding scale" rate should be applied to the public exchanges. The abuse of free telephones is also discussed. 2000 w. Elec—April 8, 1896.

The Basis of Telephone Charges. Fred De Land. A table is given showing the possible combinations as based on the number of subscribers, and how expenses increase. 900 w. Elec Engng—Dec., 1896.

**Rates, New York.**—Telephone Rates in New York. Argument against the Brush bill to regulate telephone charges. 1100 w. Elec Rev—April 14, 1897.

**Receiver Polarizing.**—The Polarizing Telephone Receiver (Das Polarisiren Telephonischer Empfänger). J. W. Giltay. Describing the author's form of receiver in which the feeble tone is reinforced by use of a condenser. 3000 w. Electrotech Zeitschr—June 10, 1897.

The Polarizing of Telephone Receivers. J. W. Giltay. Translated from the "Elektrotechnische Zeitschrift." An account of experiments and their results, with explanation of observed phenomena. 3300 w. Elect'n—July 23, 1897.

**Relay.**—Telephone Relays or Repeaters. William J. Hammer. Describes experiments, giving an analysis of the scientific phenomena connected with them. Ill. 2800 w. Elec Wld & Elec Engr—June 3, 1899.

Telephone Repeaters or Relays, and Repeating Systems. Thomas D. Lockwood. Long running comment on newspaper electrical news is followed by the personal views of the writer on the subject given. Serial. Elec Wld—Nov. 14, 1896.

The Future of the Telephone. F. Jarvis Patten. Reviews the development of the telegraph, and compares the history of the telephone, predicting that the next step will be the perfecting of the telephone repeater, thus making possible telephonic communication at any distance. 1700 w. Elec Wld—Jan. 1, 1898.

See also **Repeater.**

**Repairs.**—Minor Telephone Troubles and How to Correct Them. H. P. Clausen. A general discussion of telephone repairs. 2000 w. W Elect'n—June 24, 1899.

**Repeater.**—New Telephone Repeater. James Asher. Describes the writer's method of combining Edison's loud-speaker with a carbon or other transmitter to produce loud speech at the end of a second circuit, or of an indefinite number of circuits. 1800 w. Elec Rev, N. Y.—March 15, 1899.

The Telephone Repeater. F. Jarvis Patten. Describes and illustrates a few of the types, showing how difficult it is to determine from a sketch what will work and what will not. The writer has never found a repeater that worked satisfactorily. Ill. 1800 w. Elec Wld—May 22, 1897.

See also **Relay.**

**Rysselberghe.**—See **TELEGRAPH — Simultaneous Telephony.**

**Safety Devices.**—Protection of Telephone Apparatus. H. P. Clausen. Discussion of the false notions held as to the proper conditions under which telephone apparatus should be provided with protective devices. Ill. Serial. Elec Engng—Aug., 1899.

Safety Devices for Telephone Circuits. F. Mertsching. Abstract from the "Elektrotechnische Zeitschrift." An account of some instructive experiments made in Germany, with a device for putting broken telephone wires, when they break in the vicinity of trolley lines, immediately into good contact with the earth. 2000 w. Elect'n—April 17, 1896.

See also **LIGHTNING ARRESTER.**

**Selection.**—How to Select a Telephone. H. P. Clausen. Discussion of this subject and of the work intended to be done by the apparatus. 2200 w. W Elect'n—April 9, 1898.

**Selective Signals.**—Selective Telephone Signals. H. S. Webb. Describes and illustrates a new selective signalling system recently patented by J. A. Barrett. 2500 w. Am Elect'n—Feb., 1900.

**Service.**—Telephone Service. Dr. V. Wietlisbach. To form a chapter in the writer's work on "Telephony." Suggestions that may be utilized as a basis for rules meeting local conditions. 1600 w. Elec Engng—July, 1898.

Telephone Service—Its Proper Use. Fred De Land. The relation of the telephone to business is the theme. 1000 w. Elec Engng—April, 1896.

The Telephone Service in Foreign Countries. Information obtained by British Consuls is summarized. 4000 w. Elect'n, Lond—March 24, 1899.

**Shanghai.**—Telephone and Tramway Systems in Shanghai. A statement of the conditions existing and the necessity of exercising care in bidding for tramway or other franchises. 1000 w. U S Cons Repts, No. 823—Jan. 13, 1899.

**Signals.**—Evolution of the Telephone Signal. H. P. Clausen. Gives the history of signalling apparatus as used in telephone work. Ill. 2500 w. W Elect'n—Nov. 19, 1898.

See also **Selective Signals; TELEPHONE SWITCHBOARD.**

**Simultaneous Telegraphy.**—See **TELEGRAPH—Simultaneous Telephony.**

**Smith-Vassar System.**—The Smith-Vassar Telephone System. Illustrated description of a new system about to be offered to the public, claiming to afford economical service for local telephony. 800 w. Elec Rev, N. Y.—Oct. 6, 1897.

**State Ownership.**—See **Municipal Ownership; Norway; STATE OWNERSHIP; TELEGRAPH—Government Control.**

**Statistics.**—See also **European Statistics.**

**Stromberg-Carlson.**—The Stromberg-Carlson Telephone Apparatus. Illustrated detailed description. 1500 w. Elec Rev—June 30, 1897.

**Strowger System.**—See **TELEPHONE EXCHANGE—Automatic, Strowger.**

**Submarine.**—Telephonic Communication Between Light Vessels and the Shore. Charles A. Stevenson. General description and remarks upon Prof. Blake's apparatus and system, declared to be efficient. 1000 w. Elec Rev, Lond—Aug. 14, 1896.

**Sweden.**—The Telephone in Sweden. A short account of how the universal use of the telephone has been brought about, and the high degree of development. 1500 w. Engng—Dec. 29, 1899.

**Switchboard.**—See **TELEPHONE EXCHANGE; TELEPHONE SWITCHBOARD.**

**Switch, Long Distance.**—Connector for Long-Distance Telephone (Neue Schaltung für den Sprechverkehr auf Grosse Entfernung). M. Schwensky. An improved switch connector is used to cut out alternately the receiver or transmitter, with the result of greatly improving the distinctness. Successful tests have been made over distances of 1800 miles. 1200 w. Elektrotech Zeitschr—July 28, 1898.

**Switch, Watson.**—See **TELEPHONE PATENT.**

**Switzerland, 1898.**—See **TELEGRAPH.**

**Telegraphy, Simultaneous.**—See **TELEGRAPH—Simultaneous Telephony.**

**Testing Sets.**—Inspectors' Portable Testing Sets. H. P. Clausen. Considers the requirements of a properly designed inspector's telephone test set and gives illustrated descriptions of commercial forms. 2500 w. Elec Engng—April, 1899.

**Theory.**—Experiments on the Theory of Telephonic Sound. Riugi Nakayama. Investigations from the point of electricity and from the point of acoustics—principally from the latter—and to find the requisites of a good transmitter. Serial. Elec Wld—Nov. 7, 1896.

**Toll-Lines.**—Design of the L. M. and B. H. System. H. P. Clausen. Illustrated detailed description of this special toll-line system between a number of scattered towns with several branch lines, discussing particularly the signalling service. 3200 w. Tel Mag—April, 1900.

The Construction of Toll-Lines. Illustrated detailed description of this branch of telephone work, discussing some of the difficulties to be overcome. 5500 w. Tel Mag—Feb., 1900.

Toll-Lines, Their Construction, Equipment and Operation. W. T. Heddon. Discussion of the best practice. Ill. 2200 w. Tel Mag—May, 1900.

Toll-Line Traffic. J. B. Ware. Read at Cleveland meeting of the Ind. Tel. Assn. Considers toll rates and the division of the fees. 2500 w. W Elect'n—June 16, 1900.

See also **TELEPHONE SWITCHBOARD—Home.**

**Transmitter.**—American Telephone Practice. Kempster B. Miller. Illustrated description of battery transmitters. 1500 w. Am Elect'n—Feb., 1897.

Telephone Transmitters. Dr. V. Wietlisbach. Illustrated description of the construction and working of transmitters based on the two fundamental types—contact, and powder or grain transmitters. 4000 w. Elec Engng—March, 1897.

See also **Ducousso System; Germain; Microphone Action; TELEPHONE PATENT.**

**Transmitter Experiments.**—See also **Current Energy.**

**Transmitter, Hunnings.**—The Hunnings' Transmitter. Statement by the Rev. Henry Hunnings. 1000 w. Elec—Jan. 1, 1896.

**Trunk Circuits.**—See **TELEPHONE LINE.**

**Volta Contact Effect.**—A Curious Telephone Experiment (Une Curieuse Expérience Téléphonique). Em. Pièrard. An illustrated description of experiments in which sounds were produced by currents due to the volta contact effect of metals. 1400 w. Electricien—May 19, 1900.

**Wietlisbach.**—Telephony. Dr. V. Wietlisbach. A republished revised edition of the first 110 pages of this work which the writer is contributing to "Electrical Engineering." It is said to be the most thorough and complete work on telephony ever written. 3000 w. Elec Eng—Jan., 1897.

See also **Disturbances; Long Distance; Service; Transmitter; TELEPHONE EXCHANGE; TELEPHONE LINE—Measurement.**

**Wireless.**—See **SPACE TELEGRAPHY.**

**Würtemberg.**—See **Induction Coil.**

## TELEPHONE CABLE.

See **ELECTRIC CABLE—Telephone; SUBMARINE CABLE; SUBMARINE CABLE LAYING.**

## TELEPHONE CIRCUIT.

See **TELEPHONE LINE.**

## TELEPHONE COMPANY.

See also **TELEPHONE; TELEPHONE EXCHANGE.**

**Baltimore, Md.**—The Chesapeake and Potomac Telephone Company, Baltimore, Md. C. B. Fairchild. History of this company, description of equipment, with rules for governing operators. 2500 w. Elec Eng, N. Y.—July 14, 1896.

**Battle Creek, Mich.**—Some of the Latest Practice in "Independent" Telephony, at Battle Creek, Mich. Describes one of the latest, most convenient and economical systems in the independent field. Ill. 1000 w. Elec Eng, N. Y.—Jan. 5, 1899.

**Bell Report, 1897.**—The American Bell Annual Report. The extent of the service and amount of yearly business. 2000 w. Elec Rev—April 28, 1897.

**Competition.**—Benefits Derived from Opposition Telephone Exchanges. C. E. Cory. Presentation of the benefits that telephone subscribers in Fort Scott have derived from competition; with editorial comment. 2400 w. Elec Engng—April 1, 1897.

**Delmarvia.**—See **TELEPHONE EXCHANGE—Wilmington, Del.**

**Detroit.**—The Detroit Telephone Company. S. P. Grace. Illustrated detailed description of the plant with brief history of the company organization. 2500 w. Elec Eng, N. Y.—Feb. 3, 1898.

See also **St. Louis.**

**Harrison.**—See **TELEPHONE EXCHANGE—Lafayette, Ind.**

**Home.**—The Home Telephone Companies. Gives the history of the Home Companies in Baltimore, Newark, Jersey City, Atlanta, Trenton, Wilmington, etc. 8800 w. Elec Engng—Feb. 15, 1898.

**Home, Richmond, Ind.**—See **TELEPHONE EXCHANGE—Richmond, Ind.**

**Home, Trenton, N. J.**—See **TELEPHONE EXCHANGE—Trenton, N. J.**

**Home, Mobile, Ala.**—The Home Telephone Company's System, Mobile, Ala. Illustrated description of an independent company, whose equipment is radically different from those generally seen. The instruments and appliances used are described in detail. 4000 w. Elec Eng—July 1, 1896.

**Independent.**—Independent Telephone Development of 1899. H. D. Critchfield. Reports unprecedented progress. 1300 w. W Elect'n—Jan. 6, 1900.

See also **TELEPHONE; TELEPHONE EXCHANGE.**

**New York.**—See **TELEPHONE.**

**St. Louis.**—Large Opposition Telephone Exchanges. Considers the situation at St. Louis, Mo., as it existed before the entrance of the opposition company, and contrasts its financial features with the record of Detroit's exchange. 4800 w. Elec Engng—May 15, 1898.

## TELEPHONE EXCHANGE.

See also **TELEPHONE; TELEPHONE COMPANY; TELEPHONE SWITCHBOARD.**

Telephone Exchanges and their Working. Dane Sinclair. Illustrated paper read before the Inst. of Elec. Engs., Lon. Serial. Elec Eng, Lond—March 27, 1896.

The Central Office. Dr. V. Wietlisbach. A chapter from the writer's work on "Telephony." Illustrates and describes the apparatus used, in a system which has successfully stood the test of service and is in general use for small offices. 2200 w. Elec Engng—July, 1898.

**Accumulators.**—See **Central Battery; Christiania; ACCUMULATOR—Telephone Exchange.**

**Accumulator Charging.**—A Method of Working Telephone Exchanges from the Electric Light Supply. C. A. Smith. Suggests an efficient and economical method of charging secondary cells. Ill. 400 w. Elec Rev, Lond—Aug. 27, 1897.

**Amsterdam, N. Y.**—See **Automatic, Strowger.**

**Augusta, Ga.**—See **Automatic, Strowger.**

**Automatic.**—A New Automatic Telephone Exchange System. Illustrated description of the system devised by Mr. Romaine Callender, which is intended to do away with the employment of operators. 1300 w. Eng News—Jan. 23, 1896.

A Practical Automatic Telephone Exchange System. Charles K. Munns and Fred De Land. Description, well illustrated. 3300 w. Elec Engng—Feb., 1896.

Automatic Telephone Exchanges. Describes briefly the system as applied to a small exchange of one hundred subscribers. Ill. 1300 w. Builder—April 15, 1899.

Automatic Telephone Exchange Systems. Edward P. Thompson, and Ward Decker. The object of this article is to show, in as brief a manner as possible, the operation of each system; but the relative merits of each are not alluded to further than necessary for a correct description of the same. 4400 w. Elec Pow—Jan., 1896.

See also **TELEPHONE.**

**Automatic, Strowger.**—Automatic Telephone Exchange at Augusta, Ga. Lee Campbell. An illustrated description of the Augusta system. 1500 w. Elec Wld—Aug. 26, 1899.

The Strowger Automatic Telephone Exchange, Augusta, Ga. Illustrated description of what is said to be the largest automatic telephone exchange in the world. 1500 w. Elec Eng—Aug. 5, 1897.

The Strowger Automatic Telephone Exchange, at Amsterdam, N. Y. Illustrated description of a plant of the latest type. 1700 w. Elec Eng—Aug. 12, 1897.

**Berlin.**—A New Telephone Exchange No. 1, in Berlin (Das Neue Fernsprech-Vermittelungsamt I. in Berlin). H. Lindow. A well illustrated description of switchboards, wiring and many other details. 3200 w. Elektrotech Zeitschr—July 26, 1900.

**Binghamton, N. Y.**—The Binghamton, N. Y., Telephone Exchange. Harry A. Gardner. Illustrates and describes this plant, calling attention to the novel arrangement of many old and some new features in the equipment. 2700 w. Elec Eng—Sept. 23, 1897.

**British.**—The Construction and Working of a Typical Telephone Exchange. J. Wright. The object is to explain as simply and explicitly as possible the construction and mode of working of a small exchange on the English National Telephone Company's system as equipped at the present time. Ill. Serial. Elec Eng, Lond—Oct. 1, 1897.

**Brooklyn.**—The "Bedford" Telephone Exchange, Brooklyn. Illustrated description. 500 w. Elec Wld & Engr—Jan. 20, 1900.

The New Common Battery Bell Telephone Exchange, Brooklyn, N. Y. Illustrated detailed description of the latest Bell practice, with map showing the distribution of exchange in Brooklyn. 3200 w. Elec Wld & Engr—Dec. 23, 1899.

**Calculagraph.**—See **Timing Calls; CALCULAGRAPH.**

**Central Battery.**—See **Accumulators; Brooklyn; Christiania; Parkersburg; ACCUMULATOR—Telephone Exchange; TELEPHONE.**

**Chicago.**—A Modern Telephone Station. C. E. Kammeyer. Illustrated description of the station at the corner of 47th St. and Kedzie Avenue, Chicago. 1800 w. Elec Rev—April 28, 1897.

The Starting of the Telephone Exchange at Chicago. H. H. Eldred. The first of a series of articles on early telephone history. In succeeding articles much unpublished history bearing upon the Berliner patents will be given. 1800 w. Elec—Feb. 12, 1896.

**Christiania, Norway.**—The New Telephone Exchange in Christiania (Das neue Fernsprechamt in Christiania). A fully illustrated description of one of the most recent modern exchanges in Europe, with full details including the application of dynamos and storage batteries. 8000 w. Elektrotech Zeitschr—April 1, 1897.

**Cincinnati, O.**—Cincinnati Walnut Hills Telephone Exchange. H. E. Hall. Illustrated detailed description of this exchange, given as an example of improvements now under way in Cincinnati. 1800 w. Elec Wld & Engr—March 10, 1900.

**Cleveland, O.**—The Cleveland Telephone Company. Illustrates and describes a modern exchange and its apparatus. 1500 w. Elec Rev, N. Y.—Aug. 31, 1898.

The New Exchange of the Cleveland Telephone Co. Illustrated detailed description of the equipment of the new building. 1800 w. Elec Eng, N. Y.—Feb. 17, 1898.

**Conversation Counter.**—An Arrangement for Counting the Conversations of Telephone Subscribers. Jul. H. West. A brief description of a device by which a conversation is counted to the two subscribers using the instruments and the cost divided between them. 700 w. Elec Wld—Sept. 12, 1896.

Scribner's Connection-Counting Mechanism for Telephone Lines. Illustrated description. 800 w. Elec Eng, N. Y.—Jan. 26, 1899.

See also **Timing Calls; CALCULAGRAPH.**

**Cost.**—The Cost of Constructing, Operating and Maintaining a Telephone Plant for 2600 Subscribers. Investigations of a committee showing investment and cost of operation and maintenance, with detailed statement of cost of repairs, etc. 1400 w. Elec Engng—May 15, 1897.

**Fort Wayne, Ind.**—Fort Wayne Telephone Exchange. Illustrated description. 700 w. W Elect'n—Feb. 26, 1898.

**Hartford, Conn.**—The Hartford, Conn., Exchange of the Southern New England Telephone Co. Illustrated detailed description. 1700 w. Elec Eng—Sept. 9, 1897.

**Hess-Roverot-West.**—See **Naglo Equipment.**

**Independent.**—See **La Crosse; Richmond, Ind.; Parkersburg; St. Louis; Trenton; Wilmington.**

**La Crosse, Wis.**—The Independent Telephone Exchange at La Crosse, Wis. J. R. Cravath. Illustrated description. 1100 w. Elec Eng, N. Y.—April 14, 1898.

**LaFayette, Ind.**—The Independent Telephone Exchange of the LaFayette Telephone Company. Illustrated description of the equipment. 1600 w. Am Elect'n—Sept., 1899.

**London.**—Building a Telephone Exchange in London. H. H. Eldred. An account of the difficulties in securing rights from property owners for the running of telephone exchange lines. 700 w. Elec—Feb. 26, 1896.

**Montreal.**—New Building and Equipment of the Bell Telephone Company, Montreal. Illustrated detailed description. 1800 w. Can Elec News—Sept., 1897.

**Munich.**—The New Equipment of the Munich Telephone Exchange (Die Neuen Münchener Telephon-Centraleinrichtungen). Abstract from the official report of the Bavarian Post and Telegraph Department, describing the new exchange switchboards with incandescent lamp signals. Serial. Elektrotech Zeitschr—Aug. 23, 1900.

**Naglo Equipment.**—The Gebrueder Naglo Equipment of Telephone Exchanges—System Hess-Roverot-West. Jul. H. West. Illustrated detailed description of this system of connections for central stations on the principle of arithmetical combinations. From advance proof sheets of the "Elektrotechnische Zeitschrift." 4800 w. Elec Wld—Aug. 22, 1896.

The Naglo Equipment for Telephone Exchanges. Hess-Roverot-West System. Julius West. Illustrated description of this system as applied to the experimental exchange at the Berlin Industrial Exhibition. Serial. Elec Eng—July 31, 1896.

**Newark, N. J.**—Central-Office System of the Newark Telephone Co. Illustrates and describes the stations and operation of the system. 900 w. W Elect'n—March 11, 1899.

**Newport, R. I.**—New Telephone Exchange at Newport, R. I. An illustrated description of the new building and its equipment. 700 w. Elec Eng, N. Y.—Nov. 10, 1898.

**New York, Dey St.**—The New Dey Street Telephone Building, New York City. Herbert Laws Webb. Illustrated detailed description of what is practically an enlargement of the present building. 5500 w. Elec Eng—March 17, 1897.

**New York, John St.**—The John Street Exchange of the New York Telephone Company. Information concerning an exchange recently put in service in New York. 1600 w. Elec Wld—April 16, 1898.

arrangement of connections and switchboards, and methods of operating, with numerous illustrations. Two articles. 4500 w. Génie Civil—Jan. 20, 27, 1900.

**Parkersburg. W. Va.**—The "Central Energy," Multiple Switchboard Independent Telephone Exchange, Parkersburg, W. Va. Illustrated description of the installation of one of the most modern and complete systems. 700 w. Elec Wld & Engr—Jan. 27, 1900.

**Power Plant.**—Power Plants in Modern Telephone Exchanges. H. P. Clausen. Discusses the requirements of a plant, and the construction. Ill. 2000 w. Elec Engng & Tel Mag—Dec., 1899.

**Richmond, Ind.**—Richmond Home Telephone Company. A. E. Dobbs. An illustrated description of the fine construction at Richmond, Ind. The system adopted is that of complete metallic service to each subscriber. 1800 w. Elec Engng—Aug., 1899.

**Richmond, Va.**—The Richmond Telephone System. Illustrated description. 2300 w. Elec Wld—Jan. 16, 1897.

**Saginaw, Mich.**—The Exchanges of the Valley Telephone Company, Saginaw, Michigan. History of the formation of the company, with illustrated description of the exchanges, the underground work, cables, line construction and accessories. 8000 w. Elec Engng—Sept., 1898.

**St. Louis, Mo.**—The Kinloch Telephone Exchange, of St. Louis, Mo. Illustrated detailed description. Two articles, by Frederick E. Bausch and Frank Clark Cosby, describing the exchange and its operation, and the terminal system and underground and aerial lines. Fully illustrated. 6800 w. Elec Wld & Engr—Jan. 6, 1900.

The New Bell Telephone Plant in St. Louis, Mo. Fred. E. Bausch. Describes and illustrates a complete modern conduit system and underground service, with building and plant. 4400 w. Elec Eng, N. Y.—April 21, 1898.

See also **TELEPHONE COMPANY.**

**Savannah, Ga.**—New Southern Bell Telephone Exchange at Savannah, Ga. Illustrated description. 500 w. Elec Eng—Jan. 13, 1897.

**Syracuse, N. Y.**—The New Exchange of the Central New York Telephone and Telegraph Co., at Syracuse, N. Y. Max Loewenthal. An illustrated detailed description of the plant, with historical review of the company. 4000 w. Elec Eng, N. Y.—Feb. 2, 1899.

**Timing Calls.**—Timing Calls in Telephone Exchanges. Henry Abbott. Considers the relative merits of the different methods and appliances employed in timing calls in telephone exchanges in the United States. Showing the adaptability of the calculagraph for telephoning service. Ill. 5800 w. Elec Eng, N. Y.—Aug. 25, 1898.

See also **Conversation Counter; CALCULAGRAPH.**

**Trenton, N. J.**—The New Exchange of the Home Telephone Company, Trenton, N. J. Illustrated description. 1200 w. Elec Wld—Dec. 24, 1898.

**Vienna.**—The New Telephone Exchange at Vienna (Die Neue Telephonanlage in Wien). K. B. von Wehrenalp. With interior and exterior views and plans of the new building, showing the completeness of its arrangements. Serial. Zeitschr d Oesterr Ing u Arch Ver—Dec. 8, 1899.

The Vienna Telephone Stations (Die Wiener Fernsprechämter). H. Dreisbach. Describing especially the underground conductors, and methods of making connections. Serial. Elektrotech Zeitschr—Oct. 18, 1900.

**Wilmington, Del.**—The Central-Office Equipment of a Successful Independent Telephone Company. H. P. Clausen. Brief illustrated description of a complete exchange system at Wilmington, Del. 2400 w. W Elect'n—July 2, 1898.

The Delmarvia Telephone Co.'s Exchange, Wilmington, Del. Illustrated description. 900 w. Elec Eng, N. Y.—Feb. 17, 1898.

**Worcester, Mass.**—The New Telephone Exchange at Worcester, Mass. Describes a building built expressly for this purpose and equipped with the latest and most approved appliances. Ill. 1000 w. Elec Eng, N. Y.—Oct. 13, 1898.

**Zürich Fire.**—Fire at the Central Telephone Station of Zürich. C. Du Riche Preller. Gives an account of unusual and very remarkable circumstances which caused the fire, and the destruction

See also **ELECTRIC CABLE—Telephone; ELECTRIC CONDUCTOR; ELECTRIC LINE; POLE; TELEPHONE; TELEPHONE EXCHANGE.**

Telephone Lines. Considers the troubles arising from earth's magnetic disturbances, leakage currents, and inductive effects of neighboring conductors. 1300 w. Am Elect'n—June, 1897.

**Copper Wire.**—The Introduction of Hard-Drawn Copper Wire. Thomas B. Doolittle. Statement regarding the researches of the writer leading to the use of this wire in the telephone srvice and the advantages. 800 w. Elec Eng, N. Y.—Sept. 29, 1898.

**Disturbances.**—See **TELEPHONE.**

**Faults.**—Some Interesting Faults on Telephone Circuits. Illustrated explanation of the cause of various disturbances. 1200 w. Elec Rev, Lond—July 27, 1900.

Some Interesting Faults on Telephone Circuits. Describes some interesting faults due to storms, electric light or power circuits, faulty construction and ordinary wear and tear. Ill. 1400 w. Elec Rev, Lond—Jan. 19, 1900.

**Kites.**—See **TELEPHONE—Kite Wire.**

**Limiting Distance.**—Limiting Distance of Telephone Speech and the K. R. Law. A. E. Dobbs. Discusses some points affecting the capacity of a line, showing that the limiting distance has not yet been found. 1600 w. Elec Eng, N. Y.—Oct. 27, 1898.

**Measurement.**—The Measurement of the Electrical Properties of Telephone Lines. Dr. V. Wietlisbach. Mathematical investigations. 900 w. Elec Engng—March 1, 1898.

**Party Line.**—See **TELEPHONE.**

**Problems.**—See **TELEPHONE.**

**Pupin Long-Distance.**—Dr. Pupin's Improvements in Long-Distance Telephony. Herbert T. Wade. Illustrated description of investigations made, and their application to long-distance telephony. 2600 w. Sci Am—June 2, 1900.

Prof. Pupin's Proposed System for Long-Distance Telephoning. H. T. Wade. Discusses the results attained in long-distance telephoning and increase in rate of speed in the operation of ocean cables. 2300 w. Eng News—Aug. 23, 1900.

The Possibility of Trans-Atlantic Telephony. An account of an interview with Dr. M. I. Pupin on his new system of cable construction. 800 w. Elec Rev, N. Y.—June 6, 1900.

Wave Transmission Over Non-Uniform Cables and Long-Distance Air Lines. M. I. Pupin. Describes experimental investigation of a method of constructing cables and long-distance air lines, particularly for long-distance telephony and telegraphy. 14000 w. Trans Am Inst of Elec Engs—April, 1900.

See also **ELECTRO-PHYSICS—Wave Propagation.**

**Resonance.**—Some Practical Aspects of Electrical Resonance. Kempster B. Miller. Read before the Chicago Elec. Assn. Briefly outlines the underlying principles of resonance, and its relation to telegraphy and telephony. 3700 w. W Elec—March 13, 1897.

**Toll-Line.**—See **TELEPHONE.**

**Trunk.**—Telephone Trunk Circuit. A description, with diagram, of an invention by D. S. Hulfish, which provides means to automatically give and remove the busy-test condition to and from the operator's telephone at the switching plug terminal. 1000 w. Elec Wld & Engr—Sept. 15, 1900.

Trunk Line Connections for Independent Telephone Exchanges. Some remarks concerning the proper methods for the establishment and maintenance of trunk lines between various exchanges. 1700 w. Elec Wld—June 19, 1897.

**Trunk, Great Britain.**—The Telephone Trunk Line System in Great Britain. J. Gavey. A review of the theoretical principles involved in the erection of balanced telephone circuits. Serial. Elec Eng, Lond—Nov. 13, 1896.

**Underground. Stockholm.**—See **ELECTRIC CONDUIT—Stockholm.**

**Westchester County, N. Y.**—Reconstruction of the Telephone Lines in Westchester County, N. Y. Details of improvements to be made, with schedule of charges obtaining in this district. 1000 w. Elec Eng—April 21, 1897.

**TELEPHONE PATENT.**

See also **ELECTRIC PATENT; TELEPHONE.**

**Berliner.**—Decision in Favor of American Bell Telephone Company Sustaining Legality of the Issuance of the Berliner Patent. Brief statement of the case with conclusions. 2000 w. Elec Eng—May 12, 1897.

Has the Berliner Patent Expired? In the opinion of Geo. H. Benjamin, an eminent patent attorney, it expired in 1894, through the expiration of a prior English patent to Berliner. 500 w. Elec Rev—May 26, 1897.

"Independent" Telephone Companies and the Berliner Microphone Patent. Full text of a letter issued Jan. 1, 1898, by the Independent Telephone Assn., of America. 1600 w. Elec Eng, N. Y.—Jan. 27, 1898.

The Berliner Controversy. W. Clyde Jones. A statement and discussion of the case. 3800 w. Elec Engng—July, 1896.

The Berliner Microphone Patent before the U. S. Supreme Court. Important arguments, on both sides, with editorial comment. 4000 w. Elec Eng—Nov. 18, 1896.

The Berliner Microphone Case. E. F. Frost. Believing that there is a misconception of the Berliner case, the writer gives a statement explanatory of the question. 1700 w. Elec Wld—Feb. 27, 1897.

The Berliner Microphone Patent Suit. The bill of complaint—Berliner's first application and disclaimer. Ill. 2200 w. Elec—March 11, 1896.

The Berliner Patent. Morgan Brooks. A suggestion regarding the legal status of this telephone patent, not previously brought out. 1100 w. Elec—March 10, 1897.

The Berliner Patent and the Government Suit. R. S. Taylor. Address of the chief counsel for the government in the Berliner case, at the Convention of Independent Telephone Assn. 4000 w. Elec Wld—June 26, 1897.

The Effect of the Berliner Decision. A summary of opinions from various telephone companies and telephone men. 3000 w. Elec Wld—May 15, 1897.

The Berliner Patent Situation. Gives the more important portions of the Patent Office records which bear directly upon the invention of the microphone. 4700 w. Elec Wld—Jan. 30, 1897.

The Full Text of the Opinion in the Berliner Case. 13800 w. Elec Wld—May 22, 1897.

The History of the Berliner Patent. The complete history of the patent is briefly given. Ill. 1200 w. Elec Wld—May 15, 1897.

The Law and the Microphone. A résumé of the proceedings leading to the present situation of the suit of the American Bell Telephone Company vs. National Telephone Company. 4200 w. Elec Engng—Nov. 15, 1897.

The Probable Decision in the Berliner Case. E. F. Frost. An attempt to forecast the outcome of this case, predicting that the Government will win its suit to annul the Berliner patent on every count. 1200 w. Elec Wld—April 17, 1897.

**Drawbaugh.**—The Drawbaugh Telephone Case. The Senate Patent Committee favors authorizing the Commissioner of Patents to issue patents to Daniel Drawbaugh. With editorial. 1700 w. Elec Rev—June 10, 1896.

**Field Compensating.**—See **TELEPHONE.**

**Improvements.**—See **TELEPHONE.**

**Infringing.**—Infringing Telephone Patents. G. S. Maxwell. Calling attention to the difficulty of securing the apparatus needed to equip telephone-exchange systems without infringing. 1000 w. Elec Engng—Oct. 1, 1897.

**Keelyn.**—Complaint in the Suit Against the Bell Company for Patent Infringement. Complaint brought by the Western Telephone Construction Company, of Chicago, alleging infringement of the Keelyn patent. Gives the bill of complaint. 1200 w. W Elec—July 3, 1897.

**Watson Switch.**—Watson Telephone Switch Patent Held to Be Invalid for Want of Novelty. The text of Judge Showalter's opinion, with reproductions of drawings in the patent. 2800 w. W Elec—Feb. 20, 1897.

**TELEPHONE PLANT.**

See **TELEPHONE; TELEPHONE EXCHANGE; TELEPHONE LINE; TELEPHONE SWITCHBOARD.**

**TELEPHONE SIGNAL.**

See **TELEPHONE — Signal; TELEPHONE SWITCHBOARD—Signal.**

**TELEPHONE SWITCHBOARD.**

See also **TELEPHONE; TELEPHONE EXCHANGE.**

**Ducousso.**—Ducousso Telephone Switchboards (Tableaux Téléphoniques Ducousso). L. Montillot. An illustrated description of a switchboard designed to prevent the operator from hearing the conversation. Also, of another switchboard, without this feature. 1700 w. L'lectricien—March 24, 1900.

**Fournaire.**—Telephone Switchboard with Levers for Metallic Circuits (Tableau Téléphonique à Leviers pours Lignes Doubles). L. Montillot. Illustrating the Fournaire system, in which lever switches are used instead of the customary jacks. 1200 w. L'Electricien—Jan. 13, 1900.

**French.**—Improved Telephone Switchboard. Illustrated description of invention of Edward L. French. 275 w. Elec Wld—Aug. 22, 1896.

**Harlem.**—The Novel Switchboard at the Harlem Exchange of the New York Telephone Company. Describes a new switchboard in which the miniature incandescent lamp signals so distinctly that the operators work is reduced to the simplest operations. 1000 w. Elec Eng, N. Y.—Nov. 24, 1898.

**Home Toll-Line.**—Home Station Switchboard for Toll-Line Systems. H. P. Clausen. Illustrated description. 1100 w. W Elect'n—July 23, 1898.

**Interconnecting.**—Switchboard Operator's Interconnecting Equipments. H. P. Clausen. Discusses the means that may be devised for connecting together and controlling the switchboard terminals of two or more centralized telephone circuits. Ill. 3000 w. Elec Engng—June, 1899.

**Listening and Ringing Equipment.**—Listening and Ringing Equipment for Switchboards. H. P. Clausen. Considers the various systems and devices in use. Ill. 2000 w. W Elect'n—Dec. 31, 1898.

**Multiple.**—Multiple Telephone Switchboard (Commutateur Multiple Téléphonique). Dubreuil. General illustrated description of the principle of the multiple exchange switchboard. 1200 w. L'Electricien—Nov. 7 and 12, 1898.

**Signal.**—Telephone Jack and Rolling Indicator. An illustrated description of a telephone switchboard signal in which the indicating member is a ball, ring or disk. 800 w. Elec Wld & Engr—Sept. 22, 1900.

See also **TELEPHONE.**

**Swarts.**—The Swarts "Multiple Rival" Telephone Switchboard. Illustrated description. 500 w. Elec Eng—March 18, 1896.

**TELEPHONOGRAPH.**

See **TELEGRAPHONE.**

**TELEPHOTE.**

See also **TELECTROSCOPE; TELEDIAGRAPH.**

The Telephote. J. Warren. An instrument devoted to picture telegraphy. Its essential feature is a selenium cell, and the article considers mainly the nature and properties of this substance. 1400 w. Elec, Lond—Feb. 25, 1898.

**TELEPHOTOS.**

**Boughton.**—The Boughton Telephotos for Long Distance Visual Signalling. Illustrated description of apparatus devised by C. V. Boughton. Designed for use on ships and consisting of incandescent lamps worked from a switchboard, in somewhat the same way as the Ardois system. 600 w. Elec Eng—Nov. 20, 1895.

**TELESCOPE.**

**Astronomical, 1846-1896.**—Development of the Astronomical Telescope in Fifty Years. Historical, principally dealing with what American genius has accomplished toward perfecting these instruments. 2400 w. Sci Am—July 25, 1896.

**Paris Exposition.**—The Great Telescope of the Paris Exposition of 1900. Gives views showing the construction, with description. 1800 w. Sci Am—Nov. 4, 1899.

**Yerkes.**—The 40-inch Telescope of the Yerkes Observatory. William E. Reed. Illustrated detailed

The Newest Telescope. C. A. Young. The Yerkes Telescope. The difficulties in obtaining achromatism in the object glasses of large refracting telescope are explained, and reference is made to the German experiments now in progress, and directed to securing this quality in a higher degree. A detailed description of this great instrument, and of the observatory in which it is placed is very interesting and shows in some degree, how even astronomical progress is linked with the mechanical and engineering progress of the age. 3800 w. N Amer Rev—Feb., 1896.

**TELLURIUM.**

See also **GOLD GEOLOGY; GOLD MINE; GOLD REGION; METAL—Rare; RARE METALS.**

Tellurium and Tellurides. Describes the character of these ores and the importance of their occurrence, in connection with a recent discovery in South Australia. 2000 w. Aust Min Stand—July 27, 1899.

The Purification of Crude Tellurium (Ueber die Reinigung des Rohtellurs). A review of past and present methods by the director of the Vieuna Assay Office. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—April 24, 1897.

**Cripple Creek.**—Tellurium and the Telluride Ores of Cripple Creek, Colorado, as illustrated by specimens in the State Mining Bureau, Denver. Arthur Lakes. Information concerning these ores, their appearance and detection. 3800 w. Mines & Min—July, 1898.

See also **GOLD GEOLOGY; GOLD MINE; GOLD REGION.**

**Gold Ores.**—See **Cripple Creek; GOLD GEOLOGY—Black Hills; GOLD MINE—Telluride.**

**TELPHERAGE.**

See also **CABLEWAY—Electric.**

Electrically Driven Carrier System (Elektrisch Betriebene Aktentransportbahn). Illustrating a neatly designed carrier for use in business establishments, department stores, post-offices, etc. 1000 w. Elektrotech Zeitschr—Sept. 21, 1899.

**Romanow, St. Petersburg.**—A New Suspended Electric Railway (Un Nouveau Chemin de Fer Electrique Suspendu). Description of the Romanow suspended road for the rapid transmission of small parcels, now on exhibition at St. Petersburg. 800 w. Moniteur Industriel—Oct. 16, 1897.

**TEMPERATURE.**

See also **THERMOMETRY.**

**Flame.**—See **FLAME—Temperature.**

**Gas.**—See **GAS—Temperature.**

**High.**—See **ALUMINOTHERMY; ELECTRIC FURNACE; HIGH TEMPERATURE; PYROMETRY.**

**Incandescent Lamps.**—See **INCANDESCENT LAMP—Temperature.**

**Low.**—See **ELECTRO-PHYSICS—Low Temperatures; LIQUEFACTION; LIQUID AIR; REFRIGERATION; TESTING—Bending; THERMOMETRY.**

**Mine.**—See **MINE—Temperature.**

**Recorder.**—See **THERMOMETER—Recording Beraneck.**

**Steam and Water.**—See **ENTROPY.**

**Subterranean.**—Subterranean Temperatures at Wheeling, W. Va., and Pittsburg, Pa. W. Hallock. Observations taken from two remarkable wells of 4500 feet and 5386 feet in depth. Ill. 1500 w. Sch of Mines Quar—Jan., 1897.

See also **MINE—Temperature.**

**TEMPERING.**

See **HARDENING; IRON MANUFACTURE; STEEL; STEEL MANUFACTURE.**

**TEMPLE.**

See also **CHURCH; SYNAGOGUE; TABERNACLE.**

**Japan.**—The Temple of Iyemitsu. C. T. Mathews. Illustrated description of this temple with remarks on Japanese architecture, and the difficulty of foreigners in understanding the art of this nation, because of a difference in the habit of mind. 2700 w. Am Arch—May 30, 1896.

**TENDER.**

See also **LOCOMOTIVE TENDER; ROLLING STOCK.**

Locomotive Tenders. William Forsyth. Illus-

**Japan.**—American Tenders for the Imperial Government Railways of Japan. Illustrates and describes a novel style of six-wheel tender to be used with eight-wheel passenger locomotives. 700 w. Eng News—June 9, 1898.

**TENEMENT HOUSE.**

See also **WORKMEN'S DWELLING.**

Improved Tenements. George W. Da Cunha. A discussion of the general principles upon which tenements should be constructed. 2600 w. Am Arch—June 27, 1896.

Low Rental Block Dwellings. A statement from several papers before the R. I. B. A., on the theoretically best arrangement of tenements, with notes on model buildings in several cities. 1600 w. Eng Rec—Aug. 11, 1900.

**British Model.**—Model "Model Tenements." William Howe Tolman. Presents some of the results attained by English and Scotch cities. 3000 w. Arena—Sept., 1896.

**New York.**—New York's Great Movement for Housing Reform. An account of the project for improving the dwellings of the poor, with illustrations of the noted men who are supporting the movement and plans of the model dwellings. 6500 w. Rev of Rev—Dec., 1896.

Tenement House Requirements in New York. Plan of required and recommended construction to secure better ventilation and light, with editorial note. 200 w. Eng Rec—Sept. 30, 1899.

The Tenement House Reform in New York City. S. Parks Cadman. Treats of recent legislation resulting in the improvement of the tenement districts of the city. 3000 w. Chau—Sept., 1897.

**New York Competition.**—Model Tenements. Illustrated description of the plans which received the first prize in a competition held by the Charity Organization Society of New York. 1200 w. Eng Rec—March 3, 1900.

The Tenement-House Competition. The award made by the appointed committee is announced, with statement of conditions, and an abstract from an analysis of the plans as published in the "Tribune." 900 w. Eng Rec—June 6, 1896.

**United States.**—Improved Tenement Homes for American Cities. Gustavus A. Weber. Considers the needs of this class, discussing the conditions in various cities, and giving suggestions for general application. 6500 w. Munic Affairs—Dec., 1897.

**TERMINAL.**

See **RAILWAY TERMINAL.**

**TERRA-COTTA.**

See also **BRICK—Architectural; BUILDING MATERIAL—Hollow Blocks; CLAY—Vitrified; FIREPROOF CONSTRUCTION.**

Architectural Terra-Cotta. Thomas Cusack. Considers the importance of coöperation between architect, engineer and clay worker, illustrating by example the defective work resulting from the lack of coöperation. Ill. 2000 w. Br Build—March, 1898.

Note on Terra Cotta for Exterior Polychrome Decoration. Elmer Ellsworth Garnsey. Urging the study of color for exterior and interior decoration, and the possibilities of terra-cotta as a material in the façades of large buildings. 3500 w. Br Build—June, 1898.

Practical Lessons Derived from the Modern Use of Terra-Cotta. J. Miller Carr. Read before the Manchester Society. The use by the present generation, and chiefly in England. 4300 w. Jour Roy Inst of Brit Arch—March 19, 1896.

Terra-Cotta. William F. Jelke. History of the industry and its successful application for architectural purposes. 1900 w. Yale Sci M—Dec., 1896.

Terra-Cotta. M. J. Hynes. Read before the Ontario Assn. of Architects. The utility and beauty of the material and its possibilities. Also discussion. 5000 w. Can Arch—Feb., 1899.

Terra-Cotta. Roger Smith. An interesting review of the use of terra-cotta both for purposes of ornament and building, with information concerning its manufacture, quality, etc. 7000 w. Builder—March 4, 1899.

The Independence of Burned Clay as a Decorative Building Material. Herman C. Mueller. Read before the Am. Ceramic Soc. Also discussion. Considers its treatment and advantages. 2400 w Brick—June, 1900.

The Manufacture of Terra-Cotta and Its Use as a Building Material. H. A. Webber. Follows the work through the factory, step by step, discussing its durability, cost, etc. 5500 w. Tech, No. 14—1899-1900.

**Arch.**—See **ARCH—Terra-Cotta.**

**Churches.**—Church Architecture in Materials of Clay. Thomas Cusack. Discusses the artistic work and enduring qualities of these materials, and describes some excellent English work in structural terra-cotta, referring also to its extensive use from the twelfth to the sixteenth century in Italy. Ill. 2200 w. Br Build—Jan., 1899.

**Cornices.**—Terra-Cotta Cornices for Steel-Skeleton Buildings. W. L. B. Jenney. Examples, with description of types from office buildings. 1300 w. Br Build—June, 1897.

**Hollow Blocks.**—Suggestions for the Manufacture of Hollow Building Blocks. Robert Kunstman. Considers the selection of raw material, preparing the clay, machinery for making the blocks, drying and burning, and general arrangement of the factory. Ill. 2200 w. Brick—June, 1897.

See also **BUILDING MATERIAL; FIREPROOF CONSTRUCTION.**

**Manufacture.**—How Terra Cotta is Made. From the New York "Times." Interesting description of process, with remarks on the durability, extensive use, raw material, etc. 2700 w. Clay Rec—May 14, 1896.

Making Terra-Cotta—Enamled Terra Cotta Fronts for the Steel Sky-Scraper Buildings. Describes the making of terra-cotta, and refers to its rapid growing use as an architectural material, predicting its future popularity. 1500 w. Clay Rec—March 28, 1896.

The Manufacture of Terra Cotta. Walter P. Rix. The object of the article is to point out some of the causes of failure and to suggest the best method of overcoming the obstacles. 3300 w. Brick—June 1, 1899.

**Sewer Pipe.**—See **SEWER—Joints.**

**TESLA.**

See **ELECTRIC CONDENSER; ELECTRIC INVENTION; ELECTRIC OSCILLATOR; ELECTRIC TRANSMISSION; ELECTRO-PHYSICS; INDUCTION COIL; INTERRUPTER; ROENTGEN RAYS.**

**TEST BAR.**

See **FOUNDRY IRON—Test Bar.**

**TESTING.**

See also **BEAM; BUCKLING; COLUMN; ELASTICITY; MATERIALS' STRENGTH; TESTING MACHINE**; and under heads of specific materials and machines.

Permanent Deformation and Rupture of Metals (Déformations Permanentes et Rupture des Métaux). G. Faurie. A general description of tension tests of metals, with illustrations of machines employed, specifications of test pieces, physical phenomena in metals under tension, and a discussion of Tresca's laws. 7500 w. Revue de Mécanique—Nov., 1898.

Testing the Strength of Materials. Edward F. Miller. Part first deals with tension and transverse tests. Ill. 2500 w. Mach, N. Y.—Feb., 1900.

The Mechanical Testing of Metals (Essais Mécaniques des Métaux). Georges Charpy. The beginning of a treatise on testing of materials. The first portion consists of a description of the principal varieties of testing machines. Serial. Revue de Mécanique—Jan., 1899.

Univalence of Transposed Tests. N. P. Gladis. Arguing that the most satisfactory method of investigation is to submit the piece to the specific kind of stress it is designed to resist in its legitimate service. 2500 w. Ag of St—July 10, 1897.

**Bach.**—Determination of the Elasticity of the Same Specimen under Tension and Compression (Ermittlung der Zug-und Druckelastizität an dem gleichen Versuchskörper). C. Bach. The improved indicators for showing the variations in length of a test specimen enable accurate measurements to be made both under tensile and compressive stresses. Photographs of the apparatus in use are given, together with data of a series of tests on cast iron. 4000 w. Zeitschr d Ver Deutscher Ing—Jan. 8, 1898.

See also **ELASTICITY.**

**Balancing Apparatus.**—Balancing Armature and Other Rotating Parts of Machinery. William Baxter, Jr. Describes and illustrates apparatus devised by the writer to obtain greater accuracy in the balancing of armatures and also to reduce the cost of operation. 1400 w. Am Mach—Feb. 4, 1897.

See also **ARMATURE—Balancing.**

**Bending.**—New Method of Testing Metals (Nouvelle Méthode d'Essai des Métaux). M. Fremont. An improved bending test, the ends of the specimen being supported on roller bearings. The data are obtained by measuring the deformations of lines upon the surface of the test piece. 1500 w. Comptes Rendus—Oct. 4, 1897.

The Influence of Method of Testing Upon the Results of Bending Tests at Low Temperatures (Einfluss des Prüfungsverfahrens auf das Ergebniss der Biegeproben bei Niederen Wärmegraden). Prof. Rudeloff. A graphical and analytical discussion of the results which are secured by the employment of various methods of testing at low temperatures, on various grades of steel. 16000 w. 1 plate. Mitt a d Kgl Tech Versuchsanstalt—Part II., 1897.

The Influence of the Testing Method Upon the Result of Bending Tests at Low Temperatures. From "Stahl und Eisen." Results of bending tests by M. Rudeloff, director of the Imperial German Testing Station. 700 w. Am Mfr & Ir Wld—Sept. 24, 1897.

**Berlin Laboratory.**—See **Bending; LABORATORY—Berlin.**

**Bolted Joints.**—Tests on Bolted Joints. Illustrated description of eight test made in the laboratory of the Massachusetts Institute of Technology, with tabulated data. 1800 w. Tech Quar—June-Sept., 1896.

**Bracing for Wooden Bents.**—See **TIMBERING.**

**Cast Iron.**—Standard Methods of Testing Cast Iron (Einheitliche Prüfungsverfahren für Gusseisen). Prof. A. Martens. A general discussion of the methods suggested at the conferences of the International Association, with tables, diagrams and valuable data. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—Nov. 26, Dec. 3, 1898.

Prof. Martens on Testing Cast Iron. Dr. R. Moldenke. Presents the views of Prof. Martens with comments. 2500 w. Ir Trds Rev—Jan. 19, 1899.

**Cast Iron Cylinders.**—Experiments in Cast Iron Cylinders. C. H. Benjamin. Results of a series of experiments made to determine the bursting strength of cast iron cylinders under water pressure. Ill. 3300 w. Am Soc of Mech Engs, No. 778—June, 1898.

See also **International Association; Iron and Steel; CAST IRON; FOUNDRY IRON: IRON; MATERIALS' STRENGTH; PIG IRON.**

**Comparative.**—The Error of Comparative Tests. W. H. Booth. Advising engineers to be on their guard against reasoning based on comparisons, and showing that the conclusions drawn are often incorrect. 1500 w. Am Mach—Jan. 21, 1897.

On Comparative Tests. W. H. Booth. On the unreliability of such tests. 1500 w. Am Mach—July 28, 1898.

**Elastic Limit.**—Elastic Limit or Yield Point? P. Kreuzpointner. The meaning of elastic limit is discussed; subsequent parts will give a study of the elasticity of steel. Serial. Ir Age—Jan. 21, 1897.

See also **ELASTICITY; MATERIALS' STRENGTH.**

**Extensimeter.**—See **TESTING MACHINE.**

**Flat Heads.**—See **FLAT HEAD.**

**Flaw Detection.**—See **SCHISEOPHONE.**

**Foundry Practice.**—See **Cast Iron; CAST IRON; FOUNDRY—Testing; FOUNDRY IRON—Test Bar.**

**German Bureau.**—See **LABORATORY—Berlin.**

**Hardness of Metals.**—Testing Metals for Hardness. A. Föppl, in "Centralblatt für Bauverwaltung." From "Iron and Coal Trades' Review." A method of ascertaining the hardness. 600 w. Am Mach—Sept. 17, 1896.

See also **HARDNESS; STEEL.**

**Impact.**—Experience with a New Machine for Testing Materials by Impact. S. Bent Russell. Defines resilience and studies its measurement, and modern methods of determining its value. Gives illustrated description of impact machine devised by the writer, and tests made with it, giving

Impact Tests of Structural Steel. S. Bent Russell. Illustrates and describes tests made by a new method under which the specimens were broken by tensile stress, giving results. 4500 w. Pro Am Soc of Civ Engs—Aug., 1899.

Impact Tensile Tests of Steel. Extracts from the paper of S. Bent Russell, with comments and editorial. 3300 w. Eng News—Nov. 16, 1899.

Impact. W. J. Keep. Showing the influence of impact upon test bars of various sizes. 3000 w. Trans Am Soc of Mech Engs, No. 847—Dec., 1899.

Preliminary Report on the Present State of Knowledge Concerning Impact Tests. W. Kendrick Hatt and Edgar Marburg. Presented at the annual meeting of the Am. Soc. of the Inter. Assn. for Test. Materials. 7000 w. Assn Bull, No. 5—Oct., 1899.

See also Rods; MATERIALS' STRENGTH—Shock; TESTING MACHINE.

**International Association.**—International Association for Testing Materials of Construction (Internationaler Verband für die Materialprüfung der Technik). A report of the meeting of the International Association held at Stockholm in August, with discussion of papers. 8000 w. Stahl und Eisen—Sept. 15, 1897.

The International Congress for Testing Materials, held at Stockholm, 1897 (Ueber den Congress des Internationalen Verbandes für Materialprüfung in Stockholm). Prof. F. Kick. Devoted mainly to a discussion of the work of internal friction in materials subjected to deformation, with a review of the theories of Prof. Rejto. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—Feb. 18, 1898.

International Association for Testing Materials. Notice of the first meeting of the American Section, with announcement of the appointments of the American members on the international committees. 800 w. Eng Rec—Sept. 10, 1898.

The International Association for Testing Materials. Gus. C. Henning. A review of the origin and work of this important organization, showing its important relation, both to the manufacturing and the export engineering trades. 4000 w. Eng Mag—April, 1899.

The Work of the International Association for Testing Materials. An address by Prof. Mansfield Merriman, chairman of the American section of the Assn., at the Pittsburg meeting. A review of the progress in ascertaining the properties of materials of construction, and establishing rules for testing. 8000 w. Eng News—Aug. 17, 1899.

Work of the International Association for Testing Metals. Mansfield Merriman. Address of the Chairman of the American section of the Assn. at the Pittsburg meeting. Reviews briefly the progress of knowledge concerning the properties of materials of construction, and the formation of the International Association for Testing Materials. Serial. Mod Mach—Sept., 1899.

The International Congress of Testing Materials of Construction. Briefly reviews papers of A. L. Colby, Henry M. Howe, and W. R. Webster. 6200 w. Ir Age—Aug. 9, 1900.

**Iron and Steel.**—The Practical Aspect of Present Commercial Methods of Testing Iron and Steel. P. Kreuzpointner. Explains the economic necessities that have made the testing, inspecting and analyzing of materials so important, and discusses the methods used. Discussion. 7800 w. Jour Fr Inst—June, 1898.

The Mechanical Testing of Iron and Steel. Professor Hudson Beare, in "Science Progress." A scientific paper. 4800 w. Col Guard—Jan. 3, 1896.

The Testing of Iron and Steel. Introduction to paper by Prof. J. B. Johnson presented at meeting of the St. Louis Ry. Club, with conclusions based on actual tests. 1900 w. R R Gas—Dec. 25, 1896.

Uniform Methods of Testing Iron and Steel. Summary prepared by Henry B. Seaman, of the recommendations of the committee of Am. Soc. of Civ. Engs. as given in their general report. 1800 w. Eng News—July 16, 1896.

See also Cast Iron; International Association; Section Size; Specifications; Standardization; Thermal Conditions; BRIDGE MATERIAL; BRIDGE SPECIFICATIONS; IRON; MATERIALS' STRENGTH; STEEL.

**Low Temperatures.**—See Bending; TEMPERATURE—Low.

**Marine Engine Steel.**—See Steel for Marine Engines.

**Portable Recorder.**—See TESTING MACHINE—Recorder.

**Railway Laboratory.**—See LABORATORY—Railway Testing.

**Railway Material.**—See LABORATORY—Railway Testing; RAILWAY MATERIAL—Testing.

**Recording Devices.**—See TESTING MACHINE.

**Rejto Theories.**—See International Association.

**Rivets.**—See RIVET—Shearing Strength.

**Rods.**—The Resistance of Tension Rods of Given Sections to Shock (Einiges über die Stossfestigkeit von Zugstangen Abgesetzten Querschnittes). G. Stockhammer. Showing how the resistance to shock may, under certain conditions, be increased by a reduction of section. 200 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 27, 1899.

**Rubber.**—See RUBBER—Stress-Strain.

**Section Size.**—About Test Sections. P. Kreuzpointner. An argument in favor of using as large size test pieces of metal as is practicable. 2200 w. Ir Age—July 23, 1896.

See also Iron and Steel; Standardization.

**Specifications.**—Standard Specifications for Materials. The first of a series of articles publishing important tables and giving synopses of proposed specifications of the Am. Sec. of the International Assn. for Testing Materials. 2000 w. R R Gaz—May 11, 1900.

Standard Specifications for Steel and Iron. A set of specifications for steel for bridges, buildings, and ships, and for wrought iron; with an editorial discussion of the value of the work done by the Am. Soc. of the International Assn. for Testing Materials in preparing them. 2500 w. Eng Rec—May 19, 1900.

The Proposed American Standard Specifications for Steel. A review of these important specifications. 6500 w. Ir Age—May 17, 1900.

See also International Association; Standardization; BRIDGE MATERIAL; BRIDGE SPECIFICATIONS; STEEL SPECIFICATIONS.

**Standardization.**—Standardizing the Testing of Iron and Steel. P. Kreuzpointner. Showing that a test piece should be as large as practicable and geometrically proportionate. Ill. 4800 w. Eng Mag—Feb., 1897.

Standardizing the Testing of Iron and Steel. P. Kreuzpointner. Showing graphically the effects of tension upon steel. Ill. 1800 w. Second paper. Eng Mag—March, 1897.

Standardizing Methods of Testing Metals (Uniformisation des Méthodes d'Essais des Métaux). Short abstract of a paper read before the Société Industrielle de l'Est by M. Baclé. An argument for international standards in sizes and proportions of test pieces and methods of testing. 1000 w. Génie Civil—Dec. 17, 1898.

See also International Association; Iron and Steel; Specifications; STEEL SPECIFICATIONS.

**Steel.**—See also International Association; Iron and Steel; Section Size; Specifications; Standardization; BRIDGE MATERIAL; BRIDGE SPECIFICATION; IRON; MATERIALS' STRENGTH; STEEL; STEEL SPECIFICATIONS.

**Steel for Marine Engines.**—Testing Steel for Marine Engine Construction. Extract from Foreign Abstracts of Civil Engineers. Methods. 1000 w. Ry Rev—Aug. 15, 1896.

Testing Steel for Marine Engine Construction. From Inst. of Civ. Engs., Foreign Abstract. An account of the tests made at the French Government Engine Works, at Indret. 1200 w. Engr, Cleveland, O.—Nov. 21, 1896.

**Stone.**—See ROAD MATERIAL; STONE.

**Thermal Conditions.**—Thermal Condition of Iron and Steel under Stress, and Measurement of Stress by Means of Thermo-Electricity. C. A. P. Turner. A discussion of the method of determining the stress in metal by measurement of the heat gained or lost when the stress is applied. 4800 w. Pro Engs Soc of W Penna—Sept., 1897.

**Timber.**—See TIMBER.

**Torsion.**—See TESTING MACHINE.

**Yield Point.**—See Elastic Limit; ELASTICITY; MATERIALS' STRENGTH.

### TESTING LABORATORY.

See **LABORATORY; MATERIALS' STRENGTH; TESTING MACHINE.**

### TESTING MACHINE.

See also **LABORATORY; MATERIALS' STRENGTH; TESTING.**

**Accuracy.**—The Accuracy of Testing Machines and the Results of Rupture Tests (Ueber die Genauigkeit der Festigkeitsmaschinen und der Ergebnisse von Zerreissversuchen). Prof. B. Kirsch. A comparison of tests made upon identical specimens of various machines, showing the probable error due to the apparatus. 3000 w. Stahl und Eisen—June 15, 1898.

**Car Axles.**—Revolution-Testing Machine for Axle Material—Pennsylvania Railroad. Describes and illustrates an interesting device for testing the effect of reversal of stress upon metals designed for the purpose of determining the behavior of material used for axles, when subjected to rapidly repeated alternating strains. 8000 w. Ry Mas Mech—March, 1897.

**Cardiff University College.**—The Laboratory Testing Machine at University College, Cardiff. Extracts from a lecture delivered to the Inst. of Junior Engs., England, by A. C. Elliott. Illustrated detailed description of the machine and its operation. 4400 w. Engng—July 1, 1898.

**Dynamograph.**—A Metal Dynamograph. Paul Mellen Chamberlain. Describes this machine for testing cast-iron specimens. Ill. 700 w. Trans Am Soc of Mech Engs, No. 846—Dec., 1899.

**Elasticimeter Klein.**—See **MATERIALS' STRENGTH—Compression Tests.**

**Extensimeter.**—A New Extensimeter. William H. Kenerson. Illustrates and describes an instrument designed by the writer, used in the testing laboratory of Brown Univ., Providence, R. I. 700 w. Eng News—Jan. 25, 1900.

See also **Mirror Apparatus.**

**Hydraulic Dynamometer.**—See **DYNAMOMETER—Hydraulic.**

**Impact.**—A Photographic Impact Testing Machine for Measuring the Varying Intensity of an Impulsive Force. B. W. Dunn. Describes investigations made, tracing the development of the time and distance-measuring parts of the apparatus and showing their combination for simultaneous use. 6500 w. Jour Fr Inst—Nov., 1897.

A Photographic Impact Testing Machine for Measuring the Varying Intensity of an Impulsive Force. B. W. Dunn. Discussion of this paper. 4800 w. Jour Fr Inst—Jan., 1898.

See also **TESTING.**

**Mirror Apparatus.**—A Mirror Extensimeter. Gus C. Henning. Illustrated description of a form of this apparatus designed by the writer to simplify and facilitate its use. Ill. 1800 w. Trans Am Soc of Mech Engs, Vol. XVIII—May, 1897.

Mirror Apparatus for Testing. Gus C. Henning. Explains what a mirror apparatus really is, and gives illustrated description of design by the writer. 1500 w. Am Mach—Feb. 11, 1897.

**Portable Recorder.**—See **Recorder.**

**Pressures.**—An Apparatus for Accurately Measuring Pressures of Ten Thousand Pounds per Square Inch and Over. D. S. Jacobus. Brief illustrated description. 300 w. Trans Am Soc of Mech Engs, Vol. XVIII—May, 1897.

See also **TESTING—Cast Iron Cylinders.**

**Recorder.**—A Pocket Recorder for Tests of Materials. Gus C. Henning. Describes an instrument designed to be used on any and all machines which have a running poise weight, without causing delay for adjustment, the results at the same time being reliable, and such that they can be at once interpreted. Ill. 2500 w. Trans Am Soc of Mech Engs, Vol. XVIII—May, 1897.

A Portable Recorder for Tests of Metals. Gustavus Charles Henning. Read before the Iron and Steel Inst., Cardiff. Illustrated description of instrument designed by the author, its application and general utility. 2000 w. Ind & Ir—Aug. 6, 1897.

A Portable Recorder for Tests of Metals. Gustavus Charles Henning. Illustrated description of instrument designed by the writer, with report of tests. 3000 w. Stevens Ind—Jan., 1898.

**Recording Device.**—An Autographic Testing Machine Attachment. Thomas Gray. Description of a device whereby automatic and autographic records of the relation between the force applied and change of dimensions are obtained. 2700 w. Digest of Phys Tests—Jan., 1896.

Improved Devices for Testing Metals (Appareils Nouveaux pour l'Essai des Métaux). Ch. Fremont. Describing the application of recording devices to machines for testing the resistance to tension, punching and shearing, as well as drop tests. Photo-micrography is also discussed. 3000 w. Soc Ing Civ de France—Dec., 1898.

Recording Device for Testing Machine. G. W. Bissell. Describes and illustrates a new device for making an autographic record, as attached to an Olsen testing machine. 600 w. Trans Am Soc of Mech Engs—Dec., 1895.

**Riehle.**—Testing Machines. F. A. Riehle. Read before the Foundrymen's Assn., at Philadelphia. Information concerning the extent to which testing of materials is now carried, and the use of testing machines. 3300 w. Ir Trd Rev—March 9, 1899.

**Torsion.**—An Inexpensive Autographic Torsion Testing Apparatus. Robert A. Bruce. Illustrates and describes a design and the method of operating it. 1200 w. Am Mach—July 20, 1899.

Instruments for Measuring Small Torsional Strains. E. G. Coker. Read at Bristol meeting of the British Assn. for the Adv. of Science. Describes two arrangements of apparatus intended for use in engineering laboratories and testing-houses for measuring such strains, and for the determination of the modulus of rigidity. Ill. 2000 w. Engng—Oct. 14, 1898.

Instruments for Measuring Small Torsional Strains. E. G. Coker. Read before the British Assn. for the Adv. of Science. Illustrates and describes two arrangements of apparatus intended for use in engineering laboratories and testing houses for measuring such strains, and for the determination of the modulus of rigidity. 1700 w. Can Engr—May, 1899.

Torsion Machine, and Tests of Torsion. Description of a new measuring apparatus applied to the torsion machine of the Mass. Inst. of Tech., and tabulated torsion data for a variety of materials. 3500 w. Tech Quar—June-Sept., 1896.

**Wire.**—See **WIRE—Testing Machine.**

### TEXTILE FACTORY.

**Humidity.**—See **HUMIDITY.**

**Valuation.**—The Valuation of Textile Manufacturing Property. Charles T. Main. A discussion of the methods of determining value. 13000 w. Trans Am Soc of Mech Engs—Dec., 1897.

### TEXTILE INDUSTRY.

See also **COTTON INDUSTRY; FABRICS; FIBRE.**

**United States, 1846-1896.**—The Textile Industries in the United States Since 1846. Review of American progress in the textile arts, with statistics. 2000 w. Sci Am—July 25, 1896.

### TEXTILE MACHINERY.

**Berlin Exposition, 1896.**—The Textile Machinery in the Exposition of 1896 (Die Maschinen der Textilindustrie auf den Ausstellungen des Jahres 1896). Giving an illustrated account of the textile machinery shown at the Berlin exposition. Serial. Zeitschr d Ver Deutscher Ing—June 5, 1897.

**Electric Driving.**—See **ELECTRIC DRIVING.**

**Jacquard Photographic Cards.**—A New Method of Making Jacquard Cards by Photography (Nouveau Procédé pour la Mise en Carte des Lissus Jacquard au Moyen de la Photographie). A description of the Szczepanik process. The design is photographed through a perforated screen. 2500 w. Génie Civil—Sept. 30, 1899.

**Jacquard-Verdol.**—The Verdol Jacquard Machine (Piquage Mécanique Verdol). A report upon the improved apparatus of M. Verdol in which perforated paper is substituted for the original form of Jacquard cards. The machine for piercing the cards is fully described and illustrated. 7500 w. Bulletin de la Société d'Encour—Jan., 1898.

**Joubert Loom and Warp Beam.**—The Joubert Loom and Warp Beam (Le Métier Mécanique et l'Ourdissoir, Système Joubert). The improved Joubert loom. for weaving ribbons, velvets and other fine fabrics is able by reason of its positive movements, and mechanical perfection to produce the highest grade of work at a rate of 40 to 50 per cent. faster than ordinary looms, and is coming into extensive use in Lyons. 2500 w. 1 plate. La Revue Technique—Nov. 25, 1897.

**Leipsig Exhibition, 1897.**—The Textile Machinery at the Leipsig Exhibition, 1897 (Die Maschinen für chinery in Saxony, as exhibited at Leipzig. Serial. Zeitschr d Ver Deutscher Ing—July 10, 1897.

**Paris Exposition.**—Machines for Textile Industries at the Paris Exposition (Die Weltausstellung in Paris, 1900. Die Arbeitsmaschinen für die Textilindustrie). G. Rohn. An extended review of the machines used in textile industries, exhibited at Paris. Serial. Zeitschr d Ver Deutscher Ing—July 28, 1900.

**Saxony.**—Improved Textile Machinery (Neuerungen an Arbeitsmaschinen für die Textilindustrie). G. Rohn. Illustrating and describing recent improved cotton spinning machinery used in the mills in Saxony. 3000 w. Zeitschr d Ver Deutscher Ing—Oct. 8, 1898.

**Verdol.**—See **Jacquard-Verdol.**

**TEXTILE MANUFACTURE.**

See also **TEXTILE INDUSTRY; TEXTILE MACHINERY.**

**Humidity.**—See **HUMIDITY.**

**THAWING.**

See **GAS PIPE—Freezing; ICE MELTING; PLUMBING—Frozen Pipes; WATER PIPE—Thawing by Electricity.**

**THEATRE.**

See also **OPERA HOUSE.**

Opera Houses and Theatres. Review of work by Edwin O. Sachs and Ernest A. E. Woodrow, with illustrations. A work for architects. 2800 w. Arch, Lond—May 22, 1896.

Modern Opera Houses and Theatres. Editorial review of a book by Edwin O. Sachs and Ernest A. E. Woodrow, with comments. 3000 w. Builder—June 27, 1896.

Modern Opera Houses and Theatres. Edwin O. Sachs. Review of the third volume of Mr. Sach's work on theatrical construction and stage equipment. It treats of the planning of various parts, the provision for service, the construction, lighting, warming, ventilation, water-supply, telegraphy, etc. Ill. 2000 w. Arch, Lond—Nov. 25, 1898.

The Housing of the Drama. Edwin O. Sachs. Treats of the aspects under which a playhouse devoted to the drama can be constructed, with special reference to subscription and endowed theatres. Also discussion. Ill. 10000 w. Jour Roy Inst of Brit Archs—Feb. 12, 1898.

The Housing of the Drama. Edwin O. Sachs. Read at meeting of the Royal Institute of British Architects. Abstract. Treats of the aspects under which a playhouse devoted to the production of the drama could be constructed. Discussion. Ill. 3300 w. Builder—Feb. 12, 1898.

Scenic Art. Prof. Herkomer. An address before the Arch. Assn., London, considering the construction of the auditorium of theatres; realism on the stage; and the lighting of the stage. 9000 w. Arch, Lond—Dec. 13, 1895.

Theatre Construction. Clarence Backhouse. Read before the Insurance Inst., Sydney, Australia. Hints on the planning and construction. 6000 w. Aust Min Stand—Aug. 30, 1900.

**American.**—On Some American Theatre Designs. Editorial review of book on "The Planning and Construction of American Theatres," by William H. Birkmire, with criticisms of presented designs. 2200 w. Builder—March 6, 1897.

**Berlin.**—The "Westen" Theatre in Berlin (Das Theater des Westens in Berlin). Illustrated description of this handsome new theatre in the fashionable quarter of Berlin. 1 plate. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—May, 1897.

The "Westen" Theatre in Berlin (Das Theater des Westens in Berlin). Description of this handsome new theatre in the fashionable quarter of Berlin, with plans and phototypes of the exterior and interior. 4000 w. 4 plates. Wiener Bauindustrie Zeitung—June 3, 1897.

**Brooklyn.**—The Folly Theatre, Brooklyn. Illustrated description of the general arrangement and special steel work of a 100x150 ft. theatre, the first constructed under the New York building laws. 2000 w. Eng Rec—Aug. 11, 1900.

**Chicago.**—The New Great Northern Theatre and Hotel Building, Chicago. Illustrated description. 4000 w. In Arch—Sept., 1896.

See also **Reconstruction.**

Works of Charles Garnier. J. R. Coolidge, Jr. A study of his designs for large theatres. Serial. Ill. Arch Rev—Sept., 1898.

**Jersey City, N. J.**—Recent Theatre Construction. Illustrated description of the metal work in a Jersey City theatre. 1500 w. Eng Rec—Sept. 16, 1899.

**Kieff.**—International Competition for Theatre, Kieff. Account of a theatre to be built in a Russian town, in plans for which architects of all nations are invited to compete. Regulations for the competition are given, with plans. 1500 w. Jour Roy Inst of Brit Archt's—Sept. 17, 1896.

**Munich.**—See **Stage Revolving.**

**Palermo.**—The New Municipal Theatre at Palermo. Brief history of the building, with drawing of the elevation, a longitudinal section, and two plans. 1400 w. Builder—Jan. 4, 1896.

**Prague.**—See **FIREPROOF CONSTRUCTION—Theatre, Prague.**

**Reconstruction, Chicago.**—Strengthening the Walls of a Theatre. Describes the reconstruction of bulging walls and decaying roof trusses of the Madison Street opera-house, Chicago. 600 w. Eng Rec—April 30, 1898.

**Sanitation.**—See **SANITATION—Theatre.**

**Singapore.**—See **TOWN HALL.**

**Stage.**—Modern Theatre Stages. Edwin O. Sachs. Historical account of the movement known by name of "stage reform," which originated in Austria about twenty years ago. The writer shows to what extent modern sciences and methods have already been brought into service, and how the protection of audiences and employés has been attended to. Ill. Serial. Engng—Jan. 17, 1896.

**Stage Mechanism.**—Stage Mechanism. Edwin O. Sachs. Showing how modern sciences and methods have been applied in stage management. Ill. 5500 w. Jour Soc of Arts—April 22, 1898.

The Mechanics of Stage Effects (Ueber Bühnentechnik). F. Brandt. A general review of the machinery for producing stage effects, from early times to the present. Two articles. 4000 w. Glaser's Annalen—Oct. 1, 15, 1900.

**Stage, Revolving.**—Revolving Stage of the Paris Variety Theatre (Scène Tourante du Théatre des Variétés à Paris). The inclined floor of the stage revolves like a turn-table, thus enabling one setting to be prepared while the other is being used, and making very prompt changes of scene possible. 1000 w. Génie Civil—March 12. 1898.

The Revolving Stage at the Munich Royal Residence and Court Theatre. Illustrated description. 1200 w. Am Arch—Sept. 12, 1896.

**Vicenza, Italy.**—The Olympian Theatre of Palladio at Vicenza. Extract from a work by Albert A. Hopkins. Illustrates and describes one of the oldest permanent theatres in Europe. 1300 w. Sci Am—July 16, 1898.

**Vienna.**—The Construction of the Imperial Jubilee Theatre in Vienna (Ueber deu Bau des Kaiser-Jubiläums-Stadttheatres in Wien). Franz Freiherr v. Krauss. A very full account of this fine new theatre building, with plans and sections. Especial care has been given to the lighting and ventilation. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 20, 1899.

The Reconstruction of the Vienna Burgtheatre (Die Reconstruction des Burgtheatres). A criticism of the numerous defects of the building, by Prof. Prokop, with suggestions for its interior reconstruction, and incidentally many useful notes on theatre construction in general. 4500 w. Zeitschr d Oesterr Ing u Arch Ver—May 14, 1897.

**Wiesbaden, Germany.**—The New Royal Theatre at Wiesbaden (Das Neue Königliche Theater in Wiesbaden). With views of the exterior and interior and plans and sections of the building. The mechanical details are of much interest, and the general design noteworthy, the orchestra being sunk below the parquet, as at Bayreuth. Two articles. 4000 w. Deutsche Bauzeitung—Aug. 13, 17, 1898.

The New Royal Theatre at Wiesbaden (Das Neue Königliche Theater in Wiesbaden). With elevation, plans and section of this handsome theatre. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 6, 1899.

**THEODOLITE.**

See **SURVEYING INSTRUMENT.**

**THERMITE PROCESS.**

See **ALUMINOTHERMY.**

**THERMO-CHEMISTRY.**

**Electromotive Force.**—See **ELECTRIC CELL**—Electromotive Force; **ELECTRO-CHEMISTRY; THERMO-ELECTRICITY.**

**Iron and Steel.**—See **IRON**—Solution Theory; Thermo-Chemistry.

**THERMODYNAMICS.**

See also **ENTROPY; HEAT; STEAM ENGINE; STEAM ENGINEERING.**

Thermal Lines on the Isometric Planes. Lays down the common "thermal lines" of thermodynamic graphics in such a manner that they may all be exhibited at once and their peculiar characteristics compared. Ill. 1100 w. Sib Jour of Engng—Feb., 1900.

The Variation of Energy in Isothermal Transformations (De la Variation de l'Energie dans les Transformations Isothermes). A mathematical investigation by M. Pellat presented to the French Academy by M. Lippmann, giving particular applications of the general formula of Clapeyron. 1200 w. Comptes Rendus—Nov. 8, 1897.

**Absolute Zero.**—See **THERMOMETRY.**

**Diesel Motor.**—See **Heat Motor Cycles; OIL ENGINE**—Diesel.

**Entropy.**—Heat Diagrams and Cycles of Gases (Das Wärmediagramm der Gase und deren Kreisprozesse). Ugo Ancona. A mathematical discussion of the entropy diagram, with an examination of special cases. 3000 w. Zeitschr d Ver Deutscher Ing—July 23, 1898.

The Heat Diagram of Saturated Vapors, and its Applications to Heat and Cold Engines (Das Wärme Diagramm der Gesättigten Dampfe und seine Anwendung auf Heiss und Kalt-Dampfmaschinen). An analytical and geometrical investigation of the entropy diagram by Prof. Ancona, of Milan. Two articles. 10000 w. Zeitsch d Ver Deutscher Ing—April 17 and May 15, 1897.

See also **Graphics; Theta-Phi Diagram; ENTROPY.**

**Gas Engines.**—See **Heat Motor Cycles; GAS ENGINE**—Thermodynamics.

**Graphics.**—Graphic Calorimetry of the Steam Engine (Calorimétrie Graphique de la Machine à Vapeur). Fritz Krauss. (French translation by Ch. Bellens). An illustrated account of graphical methods in thermodynamics, particularly of entropy diagrams. 9000 w. Rev de Mécanique—May 31, 1900.

Graphics of Thermodynamic Law. R. H. Thurston. An illustration of the value of the graphic method in the discussion of special thermo-dynamic problems, being the application of this method to the second form of the general equation expressing the first law of thermodynamics as formulated by Clausius and Rankine. 1200 w. Jour Fr Inst—Jan., 1896.

**Heat Motor Cycles.**—A Discussion of Heat Motor Cycles (Die Beurteilung der Kreisprozesse von Wärmekraftmaschinen). An examination of the Carnot cycle by Prof. Meyer, with especial reference to the Diesel heat motor. 8000 w. Zeitsch d Ver Deutscher Ingenieure—Sept. 25, 1897.

The Theory of Heat Motors (Zur Theorie der Wärmemotoren). Donat Banki. A mathematical examination of the Carnot cycle, and a discussion of its applicability to actual motors. Many diagrams and tables. 7000 w. Zeitschr d Ver Deutscher Ing—Aug. 13, 1898.

The Imperfections of the Cycles of Heat Motors. The "Economical Motor" (Imperfections des Cycles des Moteurs Thermiques. Le "Moteur Economique"). O. Duperrow. A general discussion of the theory of heat engines, with special reference to a type invented by the author, in which he endeavors to combine the advantages of steam and gas engines. Serial. 2 parts. 6000 w. Génie Civil—May 26, June 2, 1900.

See also **GAS ENGINE; GASOLINE ENGINE; OIL ENGINE.**

**Mean Effective Temperature.**—Mean Effective Temperature a Unit of Comparison for Heat Engines. Chas. E. Lucke. A mathematical discussion of different cycles, with diagrams. 2000 w. School of Mines Quar—July, 1900.

**Oil Engines.**—See **Heat Motor Cycles; GAS ENGINE**—Thermodynamics; **OIL ENGINE**—Diesel.

**Refrigeration.**—See **REFRIGERATION**—Thermodynamics.

**Steam Engine.**—A Study of the Steam Engine (Die Beurteilung der Dampfmaschine). E. Meyer. A discussion of the thermodynamic cycles of the steam engine considered in respect to the possible efficiency to be attained in practice. 2500 w. Zeit d Ver Deutscher Ing—Feb. 11, 1899.

See also **Heat Motor Cycles; STEAM ENGINE; STEAM ENGINEERING.**

**Superheated Steam.**—See **SUPERHEATED STEAM**—Thermodynamics.

**Theta-Phi Diagram.**—The Theta-Phi Diagram. Henry A. Golding. The theta-phi diagram shows, by its area, the proportion of heat utilized to the heat received. Comparison is made with the indicator diagram. 900 w. Prac Eng—Dec. 3, 1897.

**THERMO-ELECTRICITY.**

See also **ELECTRIC CELL; ELECTRICITY DIRECT; ELECTRO-CHEMISTRY.**

A Dissertation on Thermo-Electricity. J. Warren. It is proposed to briefly describe and sum up the merits of the various types of thermopiles and conclude with a discussion on the thermo-electric powers of various dissimilar metals and their alloys. Serial. Elec, Lond—July 23, 1897.

Contributions to the Thermo-Electric Problem (Zum Thermoelektrischen Problem). A. Wilke. An examination of the action of heat upon the electrical state of a homogeneous body, in connection with the observations of Hall, v. Ettinghausen, and Nernst. Two articles. 3500 w. Deutsche Zeitschr f Elektrotechnik—Jan. 15, Feb. 1, 1898.

On Thermo-Electricity in Certain Metals. Ludwig Holborn and Arthur L. Day. Gives results of investigations. 1300 w. Am Jour of Sci—Oct., 1899.

Thermo-Electricity (Ueber Thermo-elektricität). C. Liebenow. An address delivered before the Electrotechnical Society, Berlin. Principally theoretical, giving a formula for thermo-e. m. f. 4000 w. Elektrotech Zeitschr—March 22, 1900.

Thermo-Electro Currents (Ueber Thermoelektrische Ströme). H. Egg-Sieberg. An illustrated account of experiments tending to confirm the hypothesis that the direction and intensity of thermo-electromotive forces depend upon the rate of fall of temperature in the conductors. 2000 w. Elektrotech Zeitschr—July 26, 1900.

The Theory of Thermo-Electricity (Ueber die Theorie der Thermoelektrizität). A mathematical treatment of the subject based upon the laws of the conductivity of heat. 1500 w. Elektrochemische Zeitschr—March, 1897.

**Batteries.**—A Novel Form of Thermo-Electric Battery. C. J. Reed. Describes experiments which give further proof of the high thermo-electric power of metals in contact with electrolytes, with explanation of the results. Discussion. Ill. 10500 w. Trans Am Inst of Elec Engs—April, 1898.

Thermo-Electric Batteries. C. J. Reed. An explanation of the two general classes of thermo-electric batteries, with illustrated description of types. Serial. Elec, Lond—Oct. 15, 1897.

Thermo-Electric Batteries. C. J. Reed. Describes the two general classes of thermo-electric batteries and their action. 3000 w. Am Elect'n—April, 1897.

**Bismuth.**—The Thermo-Electric Electromotive Force of Crystallized Bismuth (Sur les Forces Electromotrices Thermo-Electriques dans le Bismuth Cristallisé). A paper by M. Louis Perrot, showing the influence of the relation of the direction of the current to the plane of cleavage, with valuable data in connection with the generation of thermo-electricity. 1800 w. Comptes Rendus—April 25, 1898.

**Clamond Battery.**—Improvements in Thermo-Electric Batteries. James Asher. Methods devised by the writer, for securing good economy in the Clamond type. 1700 w. Elec Rev—Aug. 12, 1896.

**Cox Generator.**—The Cox Thermo-Electric Generator. A brief review of work in this field, with description of Mr. Cox's invention. 2000 w. Elec Rev, Lond—Aug. 21, 1896.

**Fused Salts.**—Thermo-Electric Reactions and Currents between Metals in Fused Salts. Thomas Andrews. Results of extended experimental inquiries by the author on this subject. 2800 w. Ind & Ir—June 26, 1896.

**Galvanic Action Compared.**—Thermo-Electric and Galvanic Actions Compared. Charles J. Reed.

considers thermo-electric and galvanic actions that have been the cause of confusion, and giving illustrations for aid in determining whether a reaction is galvanic or thermo-electric. Discussion follows. Ill. 7500 w. Jour Fr Inst—Dec., 1898.

**Interpolation Formulae.**—Thermo-Electric Interpolation Formulae. Silas W. Holman. In this paper are collected the several well-known types of formulae for expressing the thermal electro-motive force of a couple as a function of the temperature of its junctions. Two new formulae are also proposed. All then are tested against the most reliable, experimental data upon the subject, and their relative merits discussed. 5500 w. Tech Quar—Dec., 1896.

**Safety Lamps.**—See **SAFETY LAMP—Thermo-Electric Magnetism.**

**Stress Measurement.**—See **TESTING—Thermal Conditions.**

**Thermo-Tropic Battery.**—See **ELECTRIC CELL.**

**THERMOMETER.**

**Giant.**—A Giant Thermometer. An account of a large thermometer being made in England to register the earth's heat. It is seventy feet in length. 800 w. Bos Jour of Com—Sept. 24, 1898.

**Recording Beraneck.**—The Beraneck Temperature Recorder (Der Wärmeschreiber, System Beraneck). A revolving drum receives the electrically transmitted indications from any desired number of distant thermometers. 1200 w. Gesundheits Ingenieur—Dec. 31, 1897.

**THERMOMETRY.**

See also **PYROMETRY; TEMPERATURE; THERMOMETER; THERMOPHONE; THERMOSTAT.**

Recent Work in Thermometry. C. Chree. A brief account of recent progress. 5000 w. Nature—July 28, 1898.

**Absolute Zero.**—The Absolute Zero. Explanation of the term, how it is determined, etc., with diagrams. 500 w. Am Elect'n—Aug., 1896.

**Electrical Resistance.**—The Measurement of Temperature: An Application of the Measurement of Resistance. G. M. Clark. The writer proposes to give an outline of the elements of the subject of thermometry, dealing rather with principles than details. Subsequently he will deal with the measurement of resistance, treating the subject in detail. Serial. Elect'n—Dec. 4, 1896.

See also **Low Temperatures; ELECTRIC MEASUREMENT; ELECTRIC RESISTANCE; PYROMETRY.**

**Low Temperatures.**—The Determination of Low Temperatures (Die Bestimmung Tiefer Temperaturen). G. W. Meyer. Describing an electrical method based on the diminution of electrical resistance with reduction in temperature. 2000 w. Elektrochemische Zeitschr—April 1, 1898.

See also **ELECTRO-PHYSICS; LIQUEFACTION.**

**THERMOPHONE.**

An Instrument for Indicating Temperatures at a Distance. Illustrated detailed description of the instrument and its operation. 1500 w. Eng News—Aug. 17, 1899.

The Thermophone. Illustrated description of a new instrument for. and method of determining temperatures in distant and inaccessible places. 900 w. Pro Age—Nov. 15, 1895.

Wiborg's Thermophone (J. Wiborg's Thermophone). The thermophone consists of an explosive pellet embedded in a cylinder of fire-clay. The time elapsing from the exposure to heat to the explosion is a measure of the temperature. 3500 w. Oesterr Zeitschr f Berg u Hüttenwesen—Feb. 20, 1897.

**THERMOPHORE.**

**Pillet.**—The Pillet Thermophore for Heating Rooms. A method of greatly increasing the effect of an open fire-place in heating apartments, while at the same time retaining the advantage of such fire-places for ventilation, as heretofore. Ill. 450 w. Sci Am Sup—Feb. 29, 1896.

**THERMOSTAT.**

See also **FIRE ALARM—Thermostatic.**

**Electrical.**—An Electrical Thermostat. William Duane and Charles A. Lory. Illustrates and describes the construction of an electrical thermostat used in research work when it was necessary to keep the temperature of a bath constant for a considerable length of time. 1200 w. Am Jour of Sci—March, 1900.

**THIRD RAIL ROAD.**

See **ELECTRIC RAILWAY; ELEVATED RAILWAY; UNDERGROUND RAILWAY.**

**Crocker Sectional.**—See **SURFACE-CONTACT TRAMWAY.**

**THOMSON.**

**Sir William.**—See **KELVIN.**

**THORIUM.**

See also **INCANDESCENT GAS LIGHTING; METALS—Rare; MONAZITE; RARE METALS.**

A Rare Metal. T. L. Phipson. The value of thorium and its light-giving property—showing how a new industry has arisen from its discovery. 1500 w. Knowledge—June, 1896.

The Utilization of Rare Minerals (Utilisation Industrielle des Terres Rares). An account of the use of minerals containing thorium for the production of Welsbach light mantles, with suggestions for the utilization of by-products. 1000 w. La Revue Technique—Dec. 25, 1896.

**Monazite, Analysis.**—Estimation of Thoria. Chemical Analysis of Monazite Sand. Charles Glaser. An account of preliminary experiments in a general investigation relating to the best methods of estimating the percentage of thoria, recently become of high commercial importance. 8300 w. Jour Am Chem Soc—Sept., 1896.

**Norway.**—Norwegian Minerals Containing Thorium and Yttrium. L. Schmelck. These minerals are important by reason of the incandescent properties of their oxides. 800 w. Am Mfrs & Ir Wld—Jan. 10, 1896.

**THREAD.**

**Chinese Imports.**—European Sewing Thread in China. Extract from a report of the Austro-Hungarian consul-general, of interest to American manufacturers of sewing threads. 1500 w. U S Cons Repts—Jan., 1896.

**THRUST BEARINGS.**

See also **MARINE ENGINE; SHAFT.**

A Practical Formula for Thrust Bearings. J. Husband. This formula is based upon the assumption that the whole area of the collars on the screw shaft is not in contact with the bearing surface. The investigation from which the formula is derived is also presented. 200 w. Prac Eng—Feb. 7. 1896.

**THRUST BLOCK.**

**Friction.**—See **MARINE ENGINE—Thrust Blocks.**

**TICKET MACHINE.**

**Electric Tramway.**—An Electric Automatic Ticket Machine for Electric Railways (Elektrischer Fahrkarten-Automat für Elektrische Bahnen). An illustrated description of a coin-in-the-slot machine for supplying tickets on electric cars, which is operated by electro-magnets. 1200 w. Elektrizität—June 9, 1900.

**TIDAL MOTOR.**

See **SEA MILL; TIDE POWER.**

**TIDAL WAVE.**

**Japan.**—See **EARTHQUAKE—Japan.**

**TIDE.**

See also **HARBOR; RIVER REGULATION; SHORE PROTECTION; WATER CURRENTS.**

The Problem of the Tides, and the Limitations of the Present Solution of that Problem. John F. Hayford. A general study of the subject as a whole. 9500 w. Trans Assn of Civ Engs of Cornell Univ—June, 1896.

**Current Velocity.**—The Distribution of Velocity in Tidal Currents (Distribution des Vitesses dan les Courants de Marée). M. Bourdelles. A general discussion of tidal currents, as influenced by the configuration and depth of the harbor, based upon numerous observations made in France and elsewhere. 6500 w. 4 plates. Ann des Ponts et Chausseés—4 Trimestre, 1898.

**English Channel.**—A Study of the Action of the Tides in the English Channel (Etude du Régime de la Marée dans la Manche). M. Bourdelles. An exhaustive examination of the channel tides, with hydrographic maps and tables. 15000 w. 2 plates. Ann des Pontes et Chaussées—3 Trimestre, 1899.

**Suez Canal.**—Tides in the Suez Canal (Etude du Régime de la Marée dans le Canal de Suez). M. Bourdelles. A very complete study of the conditions determining the movement of tides in narrow channels, with a new hypothesis to account for certain anomalies in the observed tidal movements in the canal. Ill. 4000 w. Ann des Ponts et Chaussées—8e. Trimestre, 1898.

**TIDE GATE.**

See also **LOCK.**

**Philadelphia Canal.**—Twin Tide Gate for the Swanson Street Canal Outlet, Philadelphia, Pa. Harrison Souder. Illustrates and describes the construction. 1000 w. Eng News—July 20, 1899.

**TIDE GAUGE.**

See also **RIVER GAUGE; WATER-LEVEL INDICATOR.**

**Registering.**—A Registering Tide-and-Rain-Gauge (Ueber einen Registrirenden Pegel und Regenmesser). A column of water is sustained by atmospheric pressure and the variations of pressure due to varying levels operates the registering pencil. 1800 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 8, 1897.

**TIDE POWER.**

See also **SEA MILL; WAVE POWER.**

**Davies Motor.**—Power from the Tides. Gives illustrated description of a tidal motor, the invention of Edward Davies, and explains the working of the arrangement. 1700 w. Can Eng—Dec., 1896.

**Hamburg.**—The Application of Electricity to the Utilization of Natural Water Power (Die Anwendung der Elektrischen Kraftübertragung auf die Nutzbarmachung der Natürlichen Wasserkräfte). A discussion by Dr. Voller, of the possibility of utilizing tide power with especial reference to the proposed application at Hamburg. 3000 w. Die Elektrizität—May 8, 1897.

**TIE.**

See **CROSS TIE.**

**TIE PLATE.**

See **TRACK—Tie Plate.**

**TILE.**

See also **BRICK; ROOFING; TERRA COTTA.**

**Drain.**—See **DRAINAGE—Tile.**

**Interior Finishing.**—See **BRICK.**

**Manufacture.**—Manufacture of Tiles in Foreign Countries. Consular reports concerning this industry from the various countries. 8300 w. U S Cons Repts, No. 581—Nov. 16, 1899.

See also **TILE WORKS.**

**Roofs.**—See **ROOFING—Tiles.**

**Spanish.**—See **BRICKWORK.**

**TILE WORKS.**

**Bohemia.**—The New Tile Factory at Eichicht, Bohemia (Nouvelle Tuilerie Mécanique d'Eichicht). A general description showing the arrangement and operation of machinery for the production of tiles with a minimum of manual labor. 1000 w. Génie Civil—April 2, 1898.

**Cadinen, Prussia.**—Steam Tile Works at Cadinen (Dampfziegelei auf Cadinen). R. Weber. An illustrated description of the machinery for handling the material at the tile-kilns on the German Emperor's estate of Cadinen, West Prussia. 800 w. Zeitschr d Ver Deutscher Ing—March 17, 1900.

**TIMBER.**

See also **BUILDING MATERIAL; FORESTRY; LUMBER INDUSTRY; TREE; WOOD.**

Timber and Timber Structures. T. Roger Smith. A lecture delivered at Carpenter's Hall, London. Deals with its preparation and care as a material of carpentry and joinery, and its use in the construction of buildings. 7000 w. Builder—June 24, 1899.

**Belgian Trade.**—The Lumber Trade of Belgium. This is one of the most important articles in the Belgian import trade. The valuation of imports from different countries is given, and information valuable to American exporters. 3500 w. U S Cons Repts—Oct., 1898.

**Bridge.**—Life of Bridge Timbers and Advisability of Protecting Same from the Weather. Extracts from a committee report presented at the Detroit meeting of the Assn. of Ry. Supts. of Bridges and Buildings. Ill. 1700 w. Ry & Engng Rev—Oct. 21, 1899.

The Life of Timber Employed in Railway Bridges in the United States. Tabulated report presented at convention of Assn. of Ry. Supts. of Bridges and Buildings. 400 w. Eng News—Oct. 26, 1899.

See also **Strength; BRIDGE—Wooden; RAILWAY BRIDGE; TRESTLE.**

**Dam.**—Longevity of Timber for Dams. E. R. Beardsley. The writer demonstrates the superior advantage of pine over oak timber for subaqueous structures acted on by running water, and says that the method of building should be determined largely by the kind of timber available. 1000 w. Am Miller—Feb., 1896.

See also **DAM; WEIR.**

**Dry Dock.**—See **DRY DOCK; DRY DOCK FAILURE.**

**Durability and Decay.**—Durability and Decay of Timber. Extract from "Bulletin No. 10 (Timber) of the U. S. Department of Agriculture." A study of the conditions affecting the durability of wood. 1400 w. Arch & Build—April 18, 1896.

**Engineering.**—Engineering Timber. R. Phillips. Read before the Gloucester Engng. Soc. Interesting information about various kinds of timber. 2500 w. Arch, Lond—Feb. 16, 1900.

**Felling Season.**—The Influence on the Quality of Timber of the Time When It Is Felled (Ueber den Einfluss der Fällungszeit auf die Qualität der Nutz-und Bauhölzer). H. Schiller-Tietz. A discussion of the physical and chemical changes that occur in timber at different seasons, and the best time for cutting. 2000 w. Deutsche Bauzeitung—July 14, 1900.

**Mines.**—See **TIMBERING; TIMBER PRESERVATION—Hasselmann.**

**New South Wales.**—The Timbers of New South Wales. Abstract from the report of the government statistician, T. A. Coghlan, reviewing the timber products of the colony. 1100 w. Eng News—April 28, 1898.

**New Zealand.**—New Zealand Timber. Editorial, calling for efforts to stimulate trade between Britain and distant parts of the empire, and calling attention to New Zealand timber as a promising opening for such trade, with particulars relating to kinds and value of timber available. 1800 w. Engng—Aug. 7, 1896.

**Nicaragua and Costa Rica.**—Timber Suitable for Structures in Nicaragua and Costa Rica. Notes gathered from personal observations during residence of two years, and from writings of Spanish authors. 3000 w. Eng News—April 28, 1898.

**Pacific North America.**—The Timber Wealth of Pacific North America. Frank Haines Lamb. Describes varieties of timber, quality of woods, output of mills and capacity of forests, shipments from various points and the evolution of the immense timber industry of the Pacific Coast. 4000 w. Eng Mag—Dec., 1898.

See also **Testing.**

**Pine.**—See **PINE.**

**Preservation.**—See **TIMBER PRESERVATION.**

**Railway Transportation.**—Loading Lumber as Lumbermen See It. Editorial published in "The Timberman" from the view of the shipper, in regard to the furnishing of box cars when required for valuable lumber, and the unjust charges when such cars are not furnished. 1300 w. Ry & Engng Rev—April 23, 1898.

See also **RAILWAY TRANSPORTATION—Timber.**

**Railway Tree Culture.**—Tree Culture by Railways. D. C. Burson. Comments on the prospect of a fuel and lumber famine, and calls attention to what could be accomplished by growing timber on vacant, unimproved right of way lands, and recommends the planting of the catalpa speciosa. 1800 w. Ry Age—April 2, 1897.

**Shipbuilding.**—See **SHIPBUILDING—Timber Supply.**

**Straits Settlements.**—Timbers in the Straits Settlements. Henry J. Child. Paper presented to the Assn. of Surveyors of H. M. Service. A very compact summary of the names, qualities, and uses of different kinds of timber. Most of the timbers named are entirely unfamiliar to the American people. 1400 w. Engng—Aug. 28, 1896.

**Strength.**—Strength of Various Kinds of Timber Used in Trestles and Bridges. Especially with Reference to Southern Yellow Pine, White Pine, Fir and Oak. Discussion of committee report at the convention of the Assn. of Ry. Supts. of Bridges and Buildings. 1600 w. Pro Assn of Ry Supts—Oct., 1896.

See also **Testing.**

**Swedish Trade.**—Notes on the Swedish Timber Trade. A general account of timber ports and districts, with maps. 1800 w. Builder—Sept. 8, 1900.

**Teak.**—See **TEAK.**

**Testing.**—The Present Status of the Study of Timber (Der Heutige Stand der Holzuntersuchungen). M. Rudeloff. A discussion of the present methods of testing timber, with suggestions as to the international unification of testing methods. 7500 w. Mitt aus den Kgl Tech Versuchsanstalt—Part IV., 1899.

The Proper Unit Stresses for Timber. F. E. Kidder. A plea for uniformity in a standard of unit stresses, comprising a review of building laws in various cities as related to strength of materials. 1600 w. In Arch—Aug., 1896.

The Strength of Timber, and How to Test It. This paper is based on a lecture delivered by Prof. Hudson Beare. Deals with the methods and modern experiments for the determination of the chief mechanical properties. 3500 w. Builder—June 2, 1900.

Scientific Timber Testing. B. E. Fernow. By the chief of the Division of Forestry, in the United States Dept. of Agriculture. The paper deals with the considerations which are necessary for successful testing. 3300 w. Digest of Phys Tests—April, 1896.

See also **BEAM; PINE.**

**Testing Compression.**—Compression of Timber Across the Grain. Tests made on the 300,000-lb. Emery testing machine at the laboratory of the Massachusetts Institute of Technology, with results. 250 w. Tech Quar—June-Sept., 1896.

**Testing, Pacific Coast.**—Physical Tests of Some Pacific Coast Timbers. Frank Soulé. Reports tests of Douglas spruce and California redwood. 1200 w. Trans Am Inst of Min Engs—Sept., 1899.

**Testing, U. S. Government.**—Progress in Timber Physics. A valuable report of the Division of Forestry of the U. S. Department of Agriculture, giving the results of timber tests, including data about the influence of size of test specimens, and of the distribution of moisture. 16000 w. U S Dept of Agriculture, Circular No. 18—Jan. 2, 1898.

Progress in Government Timber Testing. From the annual circular (No. 18) of the forestry division of the department of agriculture, on the investigations made during 1897. Gives briefly the most important conclusions reached, with editorial. 3800 w. Ry & Engng Rev—July 2, 1898.

**United States.**—American Lumber. B. E. Fernow. The value of this industry in the United States, with very interesting statistics, and the need of restorative measures. 3000 w. Chau—Feb., 1899.

### TIMBERING.

See also **COAL MINE; COAL MINING; GOLD MINE; MINE; MINING.**

Methods of Mine Timbering. Illustrated extract from "Bulletin No. 2, of the California State Mining Bureau." Examples of square setts are given, including those used on the "Comstock Lode." Serial. Min Jour—Nov. 23, 1895.

Mine Timbering. David J. Evans. Read before the Indiana Min. Inst. Presents various ways of cutting and placing timbers to secure the best results. 1600 w. Mines & Min—Aug., 1900.

On the Theory of Timbering. Henry Louis, in the "Colliery Manager." The need of data at present unknown, which can only be derived from experiment. 2800 w. Mines & Min—June, 1900.

The Applicability of Certain Kinds of Wood for Mine Timbers (Ueber die Gebrauchsfähigkeit einiger Holzarten zum Grubenausbau). Ch. Dütting. Giving the results of endurance tests of various kinds of mine timbers, and methods of timber preservation. 2500 w. Glückauf—Oct. 8, 1898.

The Stability of Certain Woods for Mine Timbering. C. Dütting. From a paper read before the Munich Mining Congress. An account of investigations to establish the value of beech props, to ascertain the suitability of acacia wood, and to determine whether preservative substances can be employed with advantage. 4000 w. Col Guard—Oct. 28, 1898.

Timbering and Supporting Underground Workings. George L. Kerr. Abstract of paper read at a general meeting of the Mining Inst. of Scotland. Discusses timbering and its cost, steel and iron supports, brick walls and girders, and strength and preservation of timber. 3500 w. Ir & Coal Trds Rev—Dec. 16, 1898.

Timbering Underground Workings. George L. Kerr. Extract from a paper read before the Min. Inst. of Scotland. Illustrates and describes the kind of timber and the methods of setting for supporting workings in various kinds of ground. 1400 w. Mines & Min—June, 1899.

**Accidents.**—Mine Timbering and Accidents in Mines. A. H. Stokes. Suggestions of a general character, considering the timbering of roadways, removal of broken pumps, setting bars, setting props in the stalls, etc. 2800 w. N Z Mines Rec—April 17, 1899.

See also **COAL MINE ACCIDENT; MINE ACCIDENT.**

**Black Hills, S. D.**—Methods of Mine Timbering. A detailed description of devices for various uses with cuts of a Black Hills gold mine. 2000 w. Aust Min Stand—Jan. 23, 1896.

See also **GOLD MINING.**

**Bracing.**—Comparative Tests of Bracing for Wooden Bents. Edgar Kidwell. Describes a series of experiments made to obtain data as to the relative value of the different forms of bracing with conclusions. Ill. 5000 w. Pro L Sup Min Inst—Aug., 1896.

**Coal Mines.**—A New Method of Coal Mining (Nouvelle Méthode d'Exploitation de la Houille). Describing method of timbering in the Grand Combe coal mines, by which the efficiency of operation is materially increased. 1200 w. Génie Civil—Dec. 16, 1899.

Colliery Timber and Timber Calculations. George Johnson. Shows the methods of calculating and discusses the usual practice in the timber trade in England. 2000 w. Col Guard—Dec. 8, 1899.

Pit Props and Their Setting. J. Dickinson. Paper read before the Manchester Geol. Soc. On the strength of timber and setting of props, giving opinions of investigators, deductions and comparisons. 5000 w. Ir & Coal Trds Rev—Feb. 23, 1900.

The Economical Use of Timber in Mines. H. W. H. The points of economy in the use of mine timber, with methods considered in their economic bearing. 4300 w. Col Guard—Aug. 28, 1896.

The Main Difficulty of the Timbering Problem. H. W. Halbaum. Examines a case of accident with the view of showing the difficulties to be overcome in the solution of timbering problems. Ill. Serial. Col Guard—Dec. 22, 1899.

Timber and Timbering. H. W. Halbaum. A lecture delivered before the Midland Counties Branch of the National Assn. of Colliery Managers, England. The principles governing the choice of timber and the setting of props in mines; the use of iron and steel props in place of wood; the relation of the height of seam and nature of roof to strength of props; how to place props to secure the best results. 5800 w. Col Eng—Feb., 1897.

The Timbering of Thin Seams (Ueber den Abbau Schmaler Flötze. A description of the system which made it practicable to work veins 50 to 60 centimetres thick, with dips of 40 to 45 degrees. 1500 w. Glückauf—Dec. 9, 1899.

See also **COAL MINE—France; COAL MINING.**

**Comstock Mines.**—Timber and Wood Consumption in the Comstock Mines. William Alvord. Statistics of the immense amount of costly timbering required and interesting information regarding it. Abstract of a paper in Vol. X. of the Pro. of the Am. Forestry Assn. 2800 w. Eng News—Dec. 31, 1896.

**Drawing.**—On an Improved Appliance for Drawing Timber in Mines. D. H. F. Matthews. Describes the improved appliance known as the Sylvester Pulling Jack. Also discussion. 2000 w. Can Min Rev—Aug., 1898.

**English Mines.**—Systematic Timbering in Mines. Discussion of a movement in England to insist on the systematic timbering of mines, showing that such an order would only increase expense and tend to diminish the safety. 800 w. Col Guard—Sept. 8, 1899.

**Gold and Silver Mines.**—Gold and Silver Mining. Francis T. Freeland. Timbering for precious metal mines in Colorado. The methods of working and conditions which influence the methods of timbering. Ill. Serial. Col Eng—Dec., 1896.

See also **GOLD MINE; GOLD MINING; SILVER MINE.**

**Iron Mines.**—See also **IRON MINE; IRON MINING.**

**Iron Mines, England.**—Timbering in the Iron Ore Mines of Cumberland and Furness. John L. Hedley and William Leck. Abstract of a paper read before the Inst. of Engs., England. 2800 w. Col Guard—Sept. 23, 1898.

**Preservation.**—Mine Timber, its Choice and Preservation. Arthur Lakes. Reviews the various timbers used, mentioning some curious kinds the use of which is necessitated in high and arid regions. Also considers methods of preservation. Ill. 1700 w. Mines & Min—April, 1899.

See also **TIMBER PRESERVATION.**

**Strength.**—The Strength of Pit Props. H. Louis. Abstract of paper read before the Fed. Inst. of Min. Engs., England. Researches confined to the initial strength of the prop when ready for setting. Gives results of experiments. 2800 w. Ir & Coal Trds Rev—May 27, 1898.

The Strength of Pit Props. H. Louis, in London "Mining Journal." Records experiments made involving about 170 separate tests. 2200 w. N Z Mines Rec—July 16, 1898.

## TIMBER PRESERVATION.

See also **CROSS TIE; FIREPROOFING; TIMBERING.**

Preservation of Timber. John D. Isaacs. Descriptions of methods of timber preservation given in a paper which was published in a report by the state mineralogist of California. 2900 w. Ry Rev—April 24, 1897.

The Preservation of Structural Timber. John D. Isaacs. Reprinted from the "Thirteenth Report of the State Mineralogist of California." Processes tried and abandoned, with a description of the practically successful processes in use, and those useful under stated conditions. 4000 w. Eng News—March 11, 1897.

Preservation of Timber. Samuel M. Rowe. Reviews facts gained by study, experience and observations, and the processes used. 2300 w. Jour W Soc of Engs—June, 1899.

Preservative Treatment of Timber. O. Chanute. Information concerning the processes tried and results attained; the work as carried on in Europe, and the processes in vogue. Discussion. 15500 w. Jour W Soc of Engs—April, 1900.

Preservation of Timber. Written and oral discussion of Mr. Chanute's paper on this subject. 5000 w. Jour W Soc of Engs—June, 1900.

Tie Treating. O. Chanute. Reviews briefly the history of the preservation of cross-ties by the injection of chemical substances. 1100 w. R R Gaz—April 6, 1900.

Tie Preserving. S. M. R. Letter to the editor containing facts from the experience of the writer as to the value of tie preserving. 1000 w. Ry Rev—Oct. 9, 1897.

The Preservation of Timber. A statement of recent suggestions regarding methods of preserving timber, and a hint concerning the reason that treated timber ties last longer in Europe than in the United States. 1000 w. Eng Rec—Aug. 18, 1900.

**Burnettizing.**—See **Somerville, Texas.**

**Creo-Resinate.**—The Creo-Resinate Wood-Preserving Plant. Illustrated description of works at Perth Amboy, N. J., for the sterilization, vulcanizing, water-proofing and antiseptic treatment of timber. 2300 w. Eng Rec—Sept. 22, 1900.

**Creosoting.**—A Proposed Method for the Preservation of Timber. F. A. Kummer. Describes experiments made with a view of improving the creosoting process. 4400 w. Pro Am Soc of Civ Engs—May, 1900.

A Proposed Method for the Preservation of Timber. Discussion of paper by F. A. Kummer. 4000 w. Pro Am Soc of Civ Engs—Aug., 1900.

A Proposed Method for the Preservation of Timber. Continued discussion of paper by F. A. Kummer. 2500 w. Pro Am Soc of Civ Engs—Oct., 1900.

A Proposed Method for the Preservation of Timber. F. A. Kummer. Condensed from a paper read before the Am. Soc. of Civ. Engs. Describes experiments made with a view of improving the creosoting process. Explains the reasons for the decay of timber, and considers the steps necessary to prevent it. 3200 w. Eng News—June 7, 1900.

The Preservation of Ties. W. H. Glenn. Recommends treating the ties with creosote, and gives suggestions relating to the plant. 1800 w. St Ry Rev—Dec. 15, 1898.

See also **Somerville, Texas.**

**Curtis Paper.**—See **Zinc Chloride.**

**Edgemont, S. D.**—New Tie Treating Plant of the Burlington & Missouri River Railroad. Illustrates and describes the plant at Edgemont, S. D., where an average of 50,000 ties a month are treated. 700 w. R R Gaz—April 6, 1900.

Tie Preserving Plant, B. & M. R. Ry., Edgemont, S. Dak. Illustrates and describes a plant where the zinc-chloride process is used. Also editorial. 1500 w. Ry & Engng Rev—March 31, 1900.

**Electric.**—Electricity and the Seasoning of Timber. A brief description of an important and novel process for the rapid seasoning of timber by the aid of electricity. 700 w. Arch, Lond—Dec. 9, 1898.

The Rapid Seasoning of Wood by Electricity (La Sénilisation Rapide des Bois par l'Electricité). J. A. Montpellièr. A description of the Nodon & Bretonneau process, by which the sap is rapidly replaced by a preservative solution by means of an electric current. Three articles. 4500 w. L'Electricien—Oct. 7, 14, 21, 1899.

The Rapid Seasoning and Fireproofing of Timber by Electricity (La Sénilisation Rapide et L'Ignifugation des Bois par L'Electricité). G. Leugny. An illustrated description of a method of impregnating timber with preservative and fireproofing salts by electrolytic action. 3000 w. Rev Tech—June 10, 1900.

**Europe.**—The Preservation of Railway Ties in Europe. O. Chanute. Paper before the Am. Soc. C. E., giving the results of inquiries in Great Britain, France and Germany; with appendices giving specifications in those countries. 7500 w. Pro Am Soc Civ Engs—Sept., 1900.

**Fireproofing.**—Some Notes on Fireproofing and Preserving Timber. Sherard Cowper-Coles. Reviews various processes and experiments. 2800 w. Ind & Ir—Oct. 20, 1899.

See also **FIREPROOFING.**

**French Railways.**—Note on the Preservation of Wooden Cross-Ties (Note sur la Conservation des Traverses en Bois). An investigation of the economy to be realized by the use of various preservatives, based upon actual results obtained upon the French railways. 3000 w. La Rev Tech—May 10, 1897.

**Haskin.**—The Haskin Process of Preserving Timber. Account of the plant and description of process. Ill. 2400 w. Engr, Lond—Jan. 28, 1898.

Haskinized Wood. Frank Caws. An Explanation of this invention for rendering timber decay-proof. 4800 w. Jour Roy Inst of Brit Archts—March 11, 1899.

**Hasselmann.**—The Hasselmann Impregnating Process (Ueber das Hasselmannsche Imprägnierungs-Verfahren). Max Krause. A method of charging the pores of wood with chloride of zinc, claimed to be especially adapted for mine timbers. 2000 w. Glückauf—Sept. 24, 1898.

The Hasselmann Pickling Process for Mine Timber. Max Krause. From a paper read before the Munich Bergmannstag. Considers how industries that use wood, especially the mining interest, can best and longest maintain it in a condition fit for use. 2500 w. Col Guard—Dec. 2, 1898.

The Hasselmann Process for Treating Railway Sleepers (Ueber die Tränkung der Eisenbahnschwellen nach Hasselmanns Verfahren). The process consists in forcing into the pores of the wood a solution consisting of a mixture of sulphate of alumina and sulphate of iron and copper. 1800 w. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1898.

Wood Preserving in Germany. A. G. Wanier. Describes the Hasselmann process and quotes from authorities and experts concerning its advantages and value. 2800 w. R R Gaz—Feb. 9, 1900.

**Kummer Paper.**—See **Creosoting.**

**Mine.**—The Treatment of Timber for Use in Mines. Robert Martin. Read before the Mining Inst. of Scotland. Treatment to render the wood durable and incombustible. 2500 w. Can Min Jour—May, 1896.

See also **TIMBERING—Preservation.**

**Pavement.**—See **PAVEMENT—Wood Creosoted.**

**Perth Amboy, N. J.**—see **Creo-Resinate.**

**Portable Plant.**—Portable Plant for the Preservative Treatment of Railway Ties. Illustrates and describes a plant that may be hauled to any desired point and set up on temporary side tracks. 1400 w. Eng News—Aug. 17, 1899.

**Railway Superintendents' Report.**—The Chemical Preservation of Cross-Ties. From the report of the committee at the annual meeting of the Am. Soc. of R. R. Supts. at Nashville, Tenn. Shows the economy due to use of preservatives, and quotes tables from the report of E. E. Russell Tratman. 900 w. Ry Rev—Sept. 25, 1897.

**Russia.**—The Injection of Structural Timber With Antiseptics (Injection des Bois de Construction par les Antiseptiques). M. Karitschkoff. An account of the results of experiments made in Russia with the alkaline wastes from the petroleum refineries, for the preservation of railway sleepers and structural timber. 3000 w. Bull de la Soc d'Encour—June, 1899.

**Somerville, Texas.**—Tie and Lumber Preserving Plant at Somerville, Texas. Illustrated description of the plant, which comprises all the appliances essential for burnettizing and creosoting, and of the processes used. Other information is also given. 3000 w. Ry Rev—Sept. 11, 1897.

Tie Preservation in the Southwest. Information on the operation and development of the preservation plant at Somerville, Tex., with some of the results of the zinc-chloride process on ties laid thirteen years ago. Ill. 1100 w. Ry & Engng Rev—Sept. 10, 1898.

**Willhouse System.**—Treating Railroad Ties and Timber. A description of the method and apparatus used on the Atchison, Topeka & Santa Fé Ry., at Las Vegas, New Mexico. The Willhouse system. 800 w. Loc Engng—May, 1900.

**Woodiline.**—Preserving Timber with Woodiline. The method is described and advantages stated. 1800 w. R R Gaz—Jan. 24, 1896.

Woodiline for Timber Preservation. Some of the advantages of tie preservation are spoken of and particular mention is made of the effects of woodiline, and also of its properties. 1600 w. Eng, Lond—Feb. 29, 1896.

**Zinc Chloride.**—The Artificial Preservation of Railroad Ties by the Use of Zinc Chloride. Walter W. Curtis. Report of the author's investigations to determine the value of the treatment, with a résumé of knowledge on this subject. 19000 w. Pro Am Soc of Civ Engs—April, 1899.

The Artificial Preservation of Railroad Ties by the Use of Zinc Chloride. Discussion of paper by Walter W. Curtis. 7500 w. Pro Am Soc of Civ Engs—Aug., 1899.

The Artificial Preservation of Railroad Ties by the Use of Zinc Chloride. Discussion of paper by W. W. Curtis. 1000 w. Pro Am Soc of Civ Engs—Sept., 1899.

The Artificial Preservation of Railroad Ties by the Use of Zinc Chloride. Continued discussion of paper by W. W. Curtis. 3300 w. Pro Am Soc of Civ Engs—Oct., 1899.

The Artificial Preservation of Railroad Ties by the Use of Zinc Chloride. Continued discussion of paper by Walter W. Curtis. 3300 w. Pro Am Soc of Civ Engs—Dec., 1899.

See also **Somerville, Texas.**

### TIMBER TRANSPORTATION.

**Railways.**—See **RAILWAY TRANSPORTATION—Timber; TIMBER—Railway Transportation.**

### TIME.

See also **CLOCK; NAVIGATION; WATCH.**

**Decimal System.**—See **DECIMAL SYSTEM.**

**Electric System.**—See **ELECTRIC CLOCK.**

**Standard.**—International Unification of Time (L'Unification Internationale des Heures). A discussion of the subject of standard time for Europe, based upon the same system as that used in the United States. But three meridians would be necessary for all Europe. 3500 w. Le Génie Moderne—June 1, 1897.

### TIME RECORDER.

See also **COST-KEEPING; WORKS MANAGEMENT.**

**Bundy.**—The Bundy Time Recorder. Illustrated detailed description of a machine for registering the actual time a workman enters and leaves the works. 1300 w. Engr, Lond—March 11, 1898.

**Electric System.**—An Electrical Time-Recording System. Describes a system possessing several features of novelty. A method of automatically operating a number of subsidiary clocks, which may be placed any distance apart from a master timepiece. Ill. 1000 w. Prac Eng—Oct. 8, 1897.

### TIN.

See also **LEAD; MINERAL REGION; TIN METALLURGY; ZINC.**

The Ocurrence of Tin. A Selwyn Brown. Describes the deposits in various localities, and some of the singular features. Serial. Aust Min Stand—Nov. 9. 1899.

Tin Supplies. Editorial review of the situation, discussing values and activity in tin mining, sources of supply, etc. 1400 w. Engng—Oct. 19, 1900.

**Alloy.**—See **TIN ALLOY.**

**Analysis.**—Quantitative Estimation of Tin. Cecil J. Brooks. A brief record of experiments made to ascertain the cause of the low results which are often obtained in the determination of tin. 600 w. Eng & Min Jour—May 23, 1896.

**Australia.**—Greenbushes Tin Field. Information concerning the situation and the character of these deposits, which are known to contain deleterious impurities, difficult to eliminate. 2200 w. Aust Min Stand—March 15, 1900.

The Herberton Tin Fields. W. S. Dowel, in the "Brisbane Courier." Information concerning these lode tin deposits in Queensland. Serial. Aust Min Stand—Nov. 17, 1898.

Herberton Tin Field (Q.). Arthur Babington. Information concerning these deposits in North Queensland, and their workings. Serial. Aust Min Stand—Aug. 3, 1899.

The Tate Tin Mines (Q.). W. H. Bain, in the "Wild River Times." Description of the largest and most important of the stream tin mining properties now being worked in North Queensland. 900 w. Aust Min Stand—May 28, 1896.

The Planet Tin Mines. Information concerning this Australian source of supply. 900 w. Aust Min Stand—April 5, 1900.

**Bolivia.**—The Tin Mines of Bolivia. Charles S. Pasley. Paper read before the Inst. of Min. & Met., London. Describes the location and formation. 1400 w. Col Guard—Jan. 6, 1899.

**California.**—The Tin Deposits at Temescal, Southern California. Harold W. Fairbanks. Describes the geology of the district, the vein system and tin deposits. 1700 w. Am Jour of Sci—July, 1897.

The Tin Deposits at Temescal, Southern California. Harold W. Fairbanks. Detailed description of the veins and the country in which they are found. 1500 w. Min & Sci Pr—Oct. 16, 1897.

**Cornwall.**—The Position and Prospects of Cornish Mining. Joseph S. Martin. Notes from the annual report for 1898. Urging that the mines be properly equipped and wisely managed. 2000 w. Col Guard—May 26, 1899.

The Decaying Mining Industries of Cornwall. From the annual report of J. S. Martin, inspector. An account of present conditions, with tables showing the fluctuations in the price of tin since 1850. 1900 w. Ir & Coal Trds Rev—Aug. 10, 1900.

Cornish Tin Mining. Considers reasons why this industry has not revived with the rise in the price of this metal. 1800 w. Engr, Lond—Aug. 17, 1900.

See also **MINE—Cornish; TIN METALLURGY.**

**1899.**—Tin in 1899. Shows the tin received from foreign markets, and gives reports of the trade in New York and London. 3500 w. Eng & Min Jour—Jan. 6, 1900.

**Malay.**—The Malay Tin Industry. T. Flower Ellis. A paper read at a recent meeting of the Chemical and Metallurgical Society of South Africa. Describes these very rich deposits, and the methods of mining and extracting the tin. Serial. Ind & East Eng—June 12, 1897.

The Malay Tin Industry. Shows this to be by far the largest tin producing country in the world, and describes the deposits, mining, etc. 3000 w. Ir Age—Dec. 8, 1898.

The Malay Tin Industry. T. Flower-Ellis. Read at meeting of Chemical and Metallurgical Society of South Africa. Part first deals with the deposits, methods of mining, and methods of extraction. Serial. Aust Min Stand—July 24, 1897.

Lode Tin Mining in the Malay Peninsula. W. H. Derrick. Abstract of paper read before the Inst. of Min. and Met., Lond. Notes on vein mining, describing methods of mining and dressing the ore. 1700 w. Eng & Min Jour—Dec. 30, 1899.

Tin Mining in Perak. A report of this district for 1896, and explanation of causes that lessened the output. 900 w. Ind Engng—Oct. 16, 1896.

See also **TIN METALLURGY—Chinese; Singapore.**

**Mexico.**—The Occurrence of Tin-Ore at Sain Alto, Zacatecas, with Reference to Similar Deposits in San Luis Potosi and Durango, Mexico. Edward Halse. Describes the various workings and compares them with deposits named. Ill. 2400 w. Trans Am Inst of Min Engs—Sept., 1899.

The Tin Deposits of Durango. C. W. Kempton. Communication in discussion of the paper of W. R. Ingalls, showing that the deposits are not sufficiently extensive for mining. 150 w. Trans Am Inst of Min Engs—Nov., 1895.

**Prices.**—See **COPPER INDUSTRY—Prices.**

**Tasmania.**—Tin Mining in Tasmania. H. W. Ford Keyser. Abstract of a paper presented to the general meeting of the Federated Institution of Mining Engineers. Part first gives the early history of tin mining in Tasmania. Serial. Ind & Ir—June 11, 1897.

The Greatest Tin Mine in the Southern Hemisphere. Description, with illustration, of the Mount Bischoff Mine, Tasmania. 3500 w. Aust Min Stand—Sept., 1896.

The Mount Bischoff Tin Mine, Tasmania. Henrich Wilhelm Ferdinand Hayser and Richard Provis. Abstract of a paper read at the Inst. of Civ. Engs., on the geology, method of mining, ore dressing, cost, losses, and water supply. The dressing works are illustrated. Ill. 4000 w. Ir & St Trds Jour—Dec. 28, 1895.

Blue Tier Tin Mining (T.). H. Grant. Information concerning the Anchor Mine. 1300 w. Aust Min Stand—March 29, 1900.

The Blue Tier (Tas.) Tin Dykes. H. Grant. Information concerning this important discovery and the working of the deposits. 900 w. Aust Min Stand—Feb. 15, 1900.

Tasmanian Tin Deposits. M. Grant. The history of tin mining on the Blue Tier formations. 2000 w. Aust Min Stand—Nov. 17, 1898.

Tasmanian Tin Fields. H. Grant. An account of the Blue Tier, in Portland. 2200 w. Aust Min Stand—Sept. 13, 1900.

**TIN ALLOY.**

See also **ALLOY; BRONZE; SOLDERING.**

The Alloys of Tin and Lead. Erwin S. Sperry. Results of investigations to determine what combination of these metals produces the strongest alloy for use as soft solder. 1500 w. Foundry—Aug., 1899.

**TINNING.**

See also **GALVANIZING.**

**Iron Ware.**—Tinning Process for Iron Ware. Describes a tinning process for iron castings. 1300 w. Am Mach—Feb. 22, 1900.

**TIN METALLURGY.**

See also **LEAD METALLURGY; METALLURGY; SMELTING; TIN; ZINC METALLURGY.**

**Chinese.**—Chinese Tin Smelting. Frank Owen. Extract from a paper on "Mining in Perak," read before the Inst. of Mining and Metallurgy, London. Describes their system as carried out in a blast furnace. 1400 w. Col Guard—Nov. 19, 1897.

**Cornwall.**—Crushing and Concentration at Dolcoath Mine, Cornwall. R. Arthur Thomas. Notes the changes which gradually led to the introduction of automatic machinery and the economy secured. 2000 w. Col Guard—April 14, 1899.

Some Products Found in the Hearth of an Old Furnace, upon the Dismantling of the Trethellan Tin Works, Truro, Cornwall. Wm. P. Headden. The furnaces had probably been in use nearly one hundred years, and the ores melted in them were the usual Cornish tin ores, carrying some arsenopyrite. 1400 w. Am Jour of Sci—Feb., 1896.

See also **TIN.**

**Electrolytic.**—See **ELECTRO-METALLURGY.**

**Singapore.**—Tin Smelting at Pulo Brani, Singapore. John McKillop and T. Flower Ellis. A paper read before the Inst. of Civil Engs. It describes in an interesting manner the first successful attempt at competition with Chinese smelters of the Straits Trading Co. 1200 w. Ind & Ir—March 20, 1896.

See also **Chinese.**

**TIN PLATE.**

**American.**—The Tin Plate Industry in the United States. Ira Ayer. An account of the rapid growth of this industry since 1890, and much interesting information concerning the difficulties met and conquered. Also a tabulated statement of production in the United States, for each year since 1892. 6500 w. Jour Fr Inst—June, 1897.

**American Company.**—American Tin Plate Co. An account of the organization, personnel and charter. 4400 w. Ir Trd Rev—Dec. 22, 1898.

**American vs. British.**—British View of the Tin Plate Trade. Abstract of an article in the "Iron and Steel Trades Journal" (London). The opinion is expressed that the tin plate industry has taken firm root on American soil, and all that can be said or done will not alter the fact. The advantage of cheaper English labor is thought to be fully offset by the more modern American plants and labor-saving appliances. 800 w. Bradstreet's—May 2, 1896.

The Tin Plate Industry and American Competition. The impossibility of restoring the scale of 1874, because of the changed conditions, and a report of the progress of the industry in America. 1500 w. Ir & Coal Trds Rev—Nov. 13, 1896.

**British.**—Decline of British Export Trade; Tin-Plate Industry. Gives two commercial editorials from the Birmingham "Daily Post" dealing with downward tendency of British export trade. Also a paper by John Jenkins read at meeting of British Iron Trade Assn. 8000 w. U S Cons Repts, No. 140—June 14, 1898.

The Position and Prospects of the Tin Plate Industry. John Jenkins. A paper read at meeting of the British Iron Trade Assn. Gives figures showing total production, exports, etc., comparing them with the United States reports, with discussion of cost, and points relating to transportation, etc. Also discussion. 2000 w. Col Guard—May 6, 1898.

The Tin Plate Trade in 1896. Records of the most unfortunate year ever known in the industry in Great Britain. 1500 w. Ir & Coal Trds Rev—Jan. 1, 1897.

See also **American vs. British.**

**Manufacture.**—The Manufacture of Tin Plates. George B. Hammond. Read before the Iron and Steel Inst., at Cardiff. Reviews the progress of tin plate manufacture, and deals specially with the manufacture, commencing with steel bars. Ill. 5000 w. Col Guard—Aug. 6, 1897.

The Manufacture of Tin Plates—Past and Present. W. C. Cronemeyer. Describes the work and processes used. 3500 w. Ir & Coal Trds Rev—Aug. 25, 1899.

The Manufacture of Tin Plates. Some observations on the industry with description of an American mill, and of an English mill. Ill. Serial. Met Work—Nov. 16, 1895.

See also **TIN PLATE WORKS.**

**United States.**—See **American; TIN PLATE WORKS.**

**TIN PLATE WORKS.**

**Laughlin, Wheeling, W. Va.**—A Model Tin Plate Plant. Description of the Laughlin Nail Co.'s works, illustrated by three views of the machinery, and one plan. 900 w. Met Work—Jan. 25, 1896.

**United States.**—Quarterly List of Tin Plate Works. An able compilation showing such progress in this industry in the United States as to give force to the prediction, given in editorial remarks and conclusions, that soon all that will remain to the foreign tin plate makers of their once magnificent American trade, will be the re-exporting business. 2500 w. Met Work—April 4, 1896.

**TIRE.**

See also **CAR WHEEL; WHEEL.**

**Automobile.**—Automobiles and the Tire Problem. Opinions of prominent men in the trade concerning the effect of the automobile industry on the demand for rubber. 900 w. Ind Rub Wld—Feb. 1, 1899.

Automobile Tires. H. Falconnet. Illustrated description of such systems as have proven practicable, with the advantages of each. 2200 w. Auto Mag—March, 1900.

The General Relation of Tires to Motor Vehicle Construction. Considers the relation of the parts, and the effect on the wear of tires. 1000 w. Horseless Age—April 5, 1899.

See also **Pneumatic; Rubber; AUTOMOBILE.**

**Bicycle.**—Some Types of English Bicycle Tires. Brief illustrated description of various makes. 1500 w. Ind Rub Wld—Nov. 10, 1897.

See also **Fabrics; Pneumatic; Rubber; Single Tube; BICYCLE.**

**Car Wheel.**—See **Fastening; Heating; Iron Compressed; CAR WHEEL.**

**Fabrics.**—The Manufacture of Fabrics for Tires. Review of the fabrics used and their wear, with an account of the use of sea island cotton, which is considered the most successful. 1700 w. Ind Rub Wld—June 10, 1896.

Progress in the Weaving of Bicycle Tire Fabrics. From "The Cycle Age" (Chicago). Reviews the history of pneumatic tires, the difficulties encountered and the extent to which they have been overcome. 2000 w. Ind Rub Wld—Jan. 10, 1898.

**Fastening.**—The Hönigsvald Method of Fastening Tires on Car Wheels (Ueber die Directe Radreifenverbindung (Patent Hönigsvald) vom Standpunkte der Technologie des Eisens). Albert Sailler. Abstract of an address before a branch of the Oest. Ing. und Arch. Verein, giving an illustrated description of a method in which the tires are partly pressed and partly shrunken on to the wheel. 1600 w. Oest Zeitschr f Berg u Hüttenwesen—June 30. 1900.

**Heating.**—Devices in Use for Heating Tires in Shrinking On and Removal. Illustrates and describes a convenient arrangement for the use of gasoline for tire heating purposes, in use at the Missouri Pacific shops at St. Louis. 450 w. Ry Age—April 30, 1897.

**Iron Compressed.**—An Investigation of the Physical Properties of Compressed Iron Tires. Frederick Grover. Report of a series of tests by the writer, which led him to believe, by the results obtained, that Bauschinger's law concerning the range of elastic limit fails under extreme treatment of the specimen. Ill. 1800 w. Engr, Lond —Sept. 3, 1897.

**Locomotive.**—Flanged Tires for Mogul, Ten-Wheel and Consolidation Locomotives. Abstract of a committee report presented at the annual convention of the Am. Ry. Mas. Mechs.' Assn., at Old Point Comfort, Va., June, 1899. 1200 w. Eng News—June 22, 1899.

**Locomotive Wear.**—Tire Wear of Locomotives. Thomas P. Whelan. Describes causes of uneven wear. 2000 w. Loc Engng—Sept., 1899.

Wear of Tires on the Passenger Engines of the New York Central & Hudson River Railroad for the Past Twenty Years. A valuable paper by Mr. P. H. Dudley, with tables and diagrams, showing the influence of the modern rail with a broad head, on the wear of locomotive tires. 2500 w. R R Gaz—March 13, 1896.

Wear of Tires Affected by Form of Rail Head. Extracts from a paper by Prof. P. H. Dudley, being a review of experience on the N. Y. C. R. R., with different patterns, the conclusion being highly favorable to the broad head. 900 w. Loc Engng—May, 1896.

See also **LOCOMOTIVE—Rail Wear; RAIL—Wear.**

**Pneumatic.**—Pneumatic Tires. Editorial discussion of rubber used, and processes it has to undergo before coming out as a finished tire. 1500 w. Engng—April 16, 1897.

Rolling Resistance to India Rubber Tires. H. E. Wimperis. The present article deals with the elasticity of the air in pneumatic tires, and discusses how far it is perfect or imperfect. Serial. Auto Jour—April, 1899.

Pneumatic Tires for Moto-Vehicles. S. F. Edge. Excerpt from a paper read before the Automobile Club. Considers cost, advantages and disadvantages. 2000 w. Auto Jour—March 15, 1899.

The Manufacture of a Pneumatic Tire. From "La Nature." Illustrated detailed description with related information. 2500 w. Sci Am Sup —May 12, 1900.

See also **Automobile; Bicycle; Rubber; Single Tube.**

**Pneumatic vs. Cushion.**—The Philosophy of the Pneumatic Tire. Reprint from the "N. Y. Sun." An interesting explanation of the action of pneumatic tires on various kinds of roads, with comparison with the cushion tire. 2400 w. Ind Rub Wld—Sept. 10, 1896.

**Pneumatic vs. Iron.**—Pneumatic vs. Iron Tires. From a paper read before the Société des Ingénieurs Civil, by M. Michelin, giving the results of some experiments made to determine the relative qualities of pneumatic and iron tires. 400 w. Prac Eng—July 29, 1898.

Pneumatic vs. Iron Tires for Vehicles. Abstract of article in "Le Génie Civil." Historical. Ill. 500 w. Eng News—Oct. 1, 1896.

**Repairing.**—Practical Hints from a Tire Repair Shop. B. F. Fells. Discusses the treatment of punctures, and the methods of sewing tires. Ill. 1000 w. Ind Rub Wld—Dec. 1, 1898.

See also **Single Tube Repair.**

**Rubber.**—General Notes Respecting India Rubber Tires for Carriages and Moto-Vehicles. Illustrates and describes the chief existing types of tires, gives suggestions relating to the choice of tires, and advice as to their maintenance and preservation. 2400 w. Auto Jour—April, 1899.

India Rubber Carriage Tires. Editorial discussing the growing use of these tires, the cost, quality of rubber, and points connected with the raw material. 2200 w. Engng—April 7, 1899.

Pure Rubber the Weak Point in Bicycle Tires. Gustav Heinsohn. An explanation of the cause of deterioration and the care needed. 500 w. Ind Rub Wld—Nov. 10, 1896.

See also **Automobile; Bicycle; Pneumatic; BALL BEARINGS—Carriages.**

**Rubber Association.**—The Rubber Tire Association. An important organization, embracing most of the manufacturers of tires in this country. 800 w. Ind Rub Wld—Oct. 10, 1896.

**Single Tube.**—Single Tube Tires and the Tillinghast Patents. An article of interest to bicycle manufacturers. A review of the whole subject. 2200 w. Ind Rub Wld—April 10, 1896.

**Single Tube Repair.**—The Repair of Single Tube Bicycle Tires. Several methods of repair are described, with numerous illustrations. 2000 w. Sci Am—Aug. 1, 1896.

**Wagon Draft.**—The Influence of Width of Tire on Draft of Wagons. Gives the results of a series of experiments at the University of the State of Missouri, to determine the influence of the width of tire upon the draft of wagons. 1200 w. Eng News—March 31, 1898.

The Influence of Tire Width on Draft of Wagons. Describes experiments at the Missouri Agricultural College showing wide tires to draw easier on all roads, except under conditions arising but rarely. 1800 w. Eng Rec—March 12, 1898.

**Wear.**—See **Locomotive Wear; CAR WHEEL; RAIL—Wear.**

**TITANIUM.**

See also **METAL—Rare; RARE METALS.**

Titanium and Its Compounds (Le Titane et ses Composés). A discussion of the treatment of titaniferous ores in the blast furnace, by M. Auguste Rossi. Three articles. 10000 w. Génie Civil—June 26, July 3, 10, 1897.

**TOGGLE-JOINT.**

See also **KINEMATICS.**

Toggle-Joints. An illustrated explanation of their principles of operation. 1500 w. Mach, N. Y.—Oct., 1899.

**TOOL.**

See also **MACHINE TOOL; MACHINE SHOP.**

Pump Center Dividers—Some Drilling Tools. A. H. Cleaves. Illustrated description of tools and methods of work. 900 w. Am Mach—Aug. 26, 1897.

Setting a Milling Cutter—Boring and Inside Threading Tools—Making Soft Metal Molds. A. H. Cleaves. A suggestive and instructive practical article. 2300 w. Am Mech—Nov. 28, 1895.

**Bezel.**—A Bezel Turning Tool. A. H. Cleaves. Illustrates and describes a tool of the writer's design used for turning down the rim of a brass bezel for holding a glass over a paper dial in one of the old watch style of cyclometers, and is recommended for similar work. 500 w. Am Mach —Oct. 13, 1898.

**Boiler.**—See **Staking and Riveting; BOILER MANUFACTURE; RIVETING.**

**Books.**—Tool Books. L. D. Burlingame. Suggestions for keeping a systematic record of all tools for special work. 1800 w. Am Mach—Feb. 17, 1898.

**Canal Lock.**—Special Tools Used in Construction of the New U. S. Lock at Sault Ste. Marie. Illustrated description of devices easily made which served their purpose admirably. 900 w. Eng News—Jan. 14. 1897.

**Car Journal Roller.**—See **CAR BEARINGS—Roller** Tool.

**Compressed Air.**—See **COMPRESSED AIR; RIVETING.**

**Crank-Hanger.**—Crank-Hanger Jigs and Tools. A. H. Cleaves. Illustrated descriptions. 600 w. Am Mach—July 13, 1899.

**Cutter Bars and Chucking Reamers.**—Cutter Bars and Chucking Reamers. H. S. Brown. Illustrates and describes these tools which have been recently much improved. 1100 w. Am Mach—Aug. 17, 1899.

**Drill.**—See **Manufacture; Taper; DRILL; GRINDER; JIG.**

**Electric Wiring.**—Connecting Tool for High Tension Conductors (Ableitungs Schraubklemme für Hochspannungsleitungen). P. von Kowaleff. An ingenious tool by use of which a wire may be attached to a high-tension conductor without risk to the operator. 800 w. Elektrotech Zeitschr—April 6, 1899.

See also **ELECTRIC WIRING.**

**Endshaking.**—An Endshaking Tool. Illustrated description of a tool used in watch-making. 600 w. Am Mach—Nov. 23, 1899.

**Forming.**—See **FORMING TOOL.**

**Gauge.**—See **Steam Engine; GAUGE; MICROMETER GAUGE.**

**Grinding.**—See **GRINDER; GRINDING;**

**Hardening and Annealing.**—Case-Hardening and Annealing. Fred. H. Colvin. Reviews the methods used in small shops. 1500 w. Loc Engng—June, 1899.

**Interchangeable Work.**—Tools for Interchangeable Work. Joseph V. Woodworth. Part first illustrates and describes a drilling jig. Serial. Am Mach—Sept. 13, 1900.

See also **INTERCHANGEABILITY.**

**Jigs.**—See also **Crank Hanger; JIG.**

**Jigs and Fixtures.**—Designing Jigs and Fixtures. Edwin C. Thurston. Helpful suggestions for shop work. 1900 w. Mach, N. Y.—May, 1900.

**Laps.**—Laps. Explains the usefulness of these tools and the advantage of having a set in the average shop, giving illustrations of the work. 3500 w. Am Mach—Oct. 7, 1897.

**Lathe.**—See **LATHE—Tool Shape.**

**Locomotive Engineer.**—What is the Smallest List of Tools, Arranged in the Order of Their Importance, that Traveling Engineers Would Recommend to be Carried on Engines, and What Now Carried Can Be Disposed With? Report of committee, with discussion. 3800 w. Trav Engs' Assn—Sept., 1895.

**Manufacture, New Bedford.**—Twist Drill Making and Other Operations at New Bedford. M. Illustrated description of plant, tools and processes. 4400 w. Am Mach—June 4, 1896.

**Pattern-Making.**—Pattern-Making Bench Tools. John M. Richardson. Confined to those tools which the workman can own. 2500 w. Am Mach—April 8, 1897.

See also **PATTERN MAKING.**

**Pneumatic.**—See **COMPRESSED AIR; RIVETING.**

**Pole Sinking.**—See **POLE—Tool.**

**Railway Shops.**—Special Tools; Fitchburg (Mass.) Car Shops. The application of compressed air for the operation of various tools is described, and other economical methods of doing work. Ill. 2300 w. R R Car Jour—March, 1898.

Special Tools in the Missouri Pacific Shops. Illustrated description of molds for piston-rod packing, chuck for screwing in stay-bolts, equalizer clamp, pneumatic dolly bar, and flue expander. 800 w. R R Gaz—Nov. 5, 1897.

See also **RAILWAY SHOP; TOOL ROOM.**

**Ratchet Drill.**—See **RATCHET DRILL.**

**Reamer.**—See **REAMER.**

**Riveting.**—See **Staking; RIVETING.**

**Screw Machine.**—Accurate Screw Machine Work Turning Tools. J. O. Surface. Hints on the making and use of tools. Ill. 1200 w. Am Mach—May 19, 1898.

See also **SCREW—Manufacture; SCREW CUTTING; SCREW DIE; SCREW MACHINE.**

**Setting and Holding Work.**—Special Tools for Setting and Holding Work. H. S. Brown. Brief description of useful tools. Ill. 1400 w. Am Mach—July 6, 1899.

See also **GRINDER—Wax Holder.**

**Staking.**—Staking Tools. A. H. Cleaves. Illustrated description of a jeweler's staking tool, with a set of tools for various requirements. 1000 w. Am Mach—Sept. 16, 1897.

**Staking and Riveting.**—Staking and Riveting Tools. A. H. Cleaves. Illustrated description. 500 w. Am Mach—Oct. 21, 1897.

**Steam Engine.**—Steam Engine Tools and Gauges used by Struthers & Wells Iron Works. John Randol. Illustrates and describes the tools and fixtures used. 2000 w. Am Mach—Nov. 24, 1898.

**Steel.**—See **STEEL MANUFACTURE—Taylor-White;** Tool.

**Taper Drills and Milling Tools.**—A Standard Taper for Twist Drills and Milling Tool Shanks (Ein Normalsystem für Spiralbohrer und Fräserkegel). H. Pasler. Discussing a proposed system similar to the Morse, for use with metric dimensions. 1800 w. Zeitschr d Ver Deutscher Ing—Nov. 11, 1899.

**Taper Pin.**—Taper Pin Turning Tool. A. H. Cleaves. Illustrates and describes a tool long in use in the watch business, for making regulator pins. 700 w. Am Mach—March 10, 1898.

**Tapping.**—A Tapping Tool. A. H. Cleaves. Illustrates and describes a convenient tool. 400 w. Am Mach—July 14, 1898.

**Tapping Limits.**—"Limit" Taps. Horace L. Arnold. Illustrated description of taps of this form, which the writer claims will produce tapped holes varying in diameter only within fixed limits. 2500 w. Am Mach—Nov. 26, 1896.

**Twist Drill.**—See **Manufacture; Taper; DRILL; GRINDER; JIG.**

**Wrench.**—See **WRENCH.**

**TOOL ROOM.**

See also **COST-KEEPING; MACHINE SHOP; WORKS MANAGEMENT.**

**Books.**—See **TOOL.**

**Management.**—Tool Room Management. A paper read before the "Advance Club," Dayton, Ohio, by Joseph Kelly, assistant foreman of the tool room of the National Cash Register Co. Drawings for tools as usually made are criticised. Comment by editor of "American Machinist." 1000 w. Am Mach—Sept. 24, 1896.

**Railway Shop.**—Tool Rooms in Machine Shops. Committee report before the Western Railway Club, embodying recommendation as to selection and arrangement of tools in the room, and regulations for the issuing of tools and their use by workmen. With diagrams. 1400 w. Pro of Cent Ry Club—May, 1896.

**TOOL WORKS.**

See **MACHINE TOOL WORKS.**

**TOP.**

**Chromogeneous.**—On the Chromogeneous Top. Charles Henry. An explanation of apparitions, produced by the rotation of the top and of the inversion of the order of their arrangement when the direction of rotation is reversed. 1000 w. Engng—March 6, 1896.

**TOPOGRAPHIC SURVEY.**

See **SURVEYING—Topographical.**

**TOPOGRAPHY.**

See also **SURVEYING.**

**Geology.**—Geology in Its Relation to Topography. John C. Branner. The origin and controlling factors of some of the more important topographic forms are pointed out and the necessity of a knowledge of structural geology to the topographer, is shown. 8000 w. Pro Am Soc of Civ Engs—Oct., 1897.

Some Illustrations of the Influence of Geological Structure on Topography. Benjamin Smith Lyman. Calls attention to the relation between surface topography and the geological indications and the value in ascertaining the subterranean structure and economic importance. 1200 w. Jour Fr Inst—May, 1898.

See also **GEOLOGICAL SURVEY; GEOLOGY.**

**Underground City.**—The Underground Topography of a City. Wm. Barclay Parsons. Showing how subsurface conditions in cities are studied, and the nature of the facts revealed. Ill. 4100 w. Eng Mag—Sept., 1896.

**U. S. Coastal.**—Coastal Topography of the United States. Oscar C. S. Carter. An interesting and general description, with illustrations of special portions. 7000 w. Pro Engs' Club of Phila—Oct., 1899.

See also **SURVEYING—U. S. Coast.**

**TORNADO.**

See **CYCLONE.**

**TORPEDO.**

See also **TORPEDO BOAT; TORPEDO-BOAT DESTROYER; TORPEDO TUBE.**

**Automobile.**—Improved Directing Device for Torpedoes (Le Nouvel Appareil Directeur pour Torpilles Automobiles). H. Noalhat. Describing the Whitehead and the Howell torpedoes and the Obry gyroscopic device for guiding the former. 8500 w. La Rev Tech—Aug. 25, 1900.

**Howell.**—A New Automobile Torpedo (Nouvelle Torpille Automobile). H. Noalhat. A detailed mechanical description of the Howell torpedo, as made by the French Hotchkiss company. 3000 w. Génie Civil—March 26, 1898.

**Practice, Newport, R. I.**—Torpedo Practice at Newport, R. I. Instantaneous photographs of discharge, with description. 700 w. Sci Am—March 10, 1900.

**Tube.**—See **TORPEDO TUBE.**

**Whitehead.**—The Whitehead Torpedo. W. J. Sears. From the Pro. of the U. S. Naval Inst. Illustrated description, with a brief summary of its preparation for a run. 6000 w. Engng—July 15, 1898.

**Wireless Telegraphy.**—Steering Torpedoes by Means of Wireless Telegraphy. F. A. A. Talbot. An account of experiments made by Mr. Varicas, the inventor of the system, with successful results. 900 w. Sci Am—May 12, 1900.

Torpedo Steering by Ether Waves. Illustrates and describes an invention by Walter Jamieson and John Trotter for the wireless control of torpedoes. 1700 w. Elect'n. Lond—May 19, 1899.

**TORPEDO BOAT.**

See also **STEAM TURBINE; STEAM YACHT—High Speed; SUBMARINE BOAT; TORPEDO-BOAT DESTROYER; WARSHIP.**

Conditions Governing Torpedo Boat Design. R. C. Smith. Reviews the considerations controlling future design, the uses of torpedo-boats and destroyers, and related subjects. 3300 w. N Am Rev—Jan., 1898.

Discussion of the Merits of Torpedo Craft and Some of the Features of Design and Construction. William A. Fairburn. Part first discusses the uses and design of torpedo craft, the type of boat needed, the difficulties, etc. Serial. Marine Engng—Sept., 1898.

Recent Developments in Torpedo Boat Construction. F. S. North. Deals with modern torpedo boats, their operations in the late China-Japanese war, their requirements, etc. 1600 w. Yale Sci M—Jan., 1896.

The Torpedo Boat. A review of the development of this class of war vessels. Considers the essentials to be speed and invisibility. 1400 w. Ir Age—Oct. 28, 1897.

The Torpedo Boat Family (La Famiglia Torpediniera). Lieut. G. Roncagli. An extended history of torpedo and torpedo-boat warfare with much interesting information concerning early torpedo exploits. The author argues for the superiority of the gun over all other weapons. 11000 w. Rivista Marittima—Nov., 1898.

Torpedo Boat Practice. William W. Kimball. Suggestions as to the construction, repair and equipment. 2800 w. Marine Rev—March 2, 1899.

Torpedo Boats in Naval Warfare. Benjamin Micou. Gives the history of torpedo construction, describes their deadly action, calls attention to the small number of these boats owned by the United States, and recommends increasing the number. 3000 w. N Am Rev—Oct., 1897.

Torpedo Craft—United States and Foreign—Types and Employment. R. H. Jackson. Prize essay read before the U. S. Naval Inst., Annapolis, Md. Serial. Marine Engng—Sept., 1900.

What a Torpedo Boat is Like. Lawrence Irwell. Describes these boats and their development, the scanty quarters, and their action. 1500 w. Marine Rev—Aug. 3, 1899.

**Austria.**—Torpedo Boats for the Austrian Navy. Editorial on the trial trip of the "Boa," one of the vessels built for the Austro-Hungarian government, with general remarks on this class of marine construction. 1700 w. Engng—Sept. 23, 1898.

See also **"Viper."**

**Battleships Compared.**—The Battleship and the Torpedo Vessel. Editorial on the discussion at the Royal United Service Institution on the relative military virtues of the battleship and torpedo vessel, especially discussing Admiral Colomb's paper entitled "The Future of the Torpedo." 2200 w. Engng—June 11, 1897.

**"Condor" Trials.**—Progressive Trials of the Italian Torpedo Boat "Condor." From "Revista Marittima." Brief description of vessel, with report of trials. 1500 w. Jour Am Soc of Nav Engs—Feb., 1900.

**"Dahlgren" and "Craven."**—New U. S. 30-Knot Torpedo Boats "Dahlgren" and T. A. M. "Craven." Dimensions, descriptions, plans, and views of engines. 2800 w. Marine Engng—Sept., 1899.

**"Dahlgren" Trials.**—Official Speed Trial of the 30-Knot U. S. Torpedo Boat "Dahlgren." Describes the severe trials which were carried out so successfully. Ill. 2200 w. Marine Engng—Jan., 1900.

**Design.**—See **STEAM YACHT—High Speed.**

**Electric.**—An Electric Torpedo Boat. Advantages that would result from the displacement of the steam engine by a primary battery of this kind of vessel. 1500 w. Elec Wld—May 21, 1898.

Electrical Propulsion for Torpedo Boats. Charles T. Child. A discussion of the present possibilities of electric torpedo boats, showing them to be fitted for satisfactory work, and stating their advantages. 2400 w. Jour of Am Soc of Nav Engs—Nov., 1898.

Electric Torpedo Boats. Charles T. Child. Brief account of the development of torpedo boats and the tactics prescribed at present for their use, with a statement of the advantages of electrical equipment, because of the absence of smoke, steam and noise, and increased effectiveness. 3000 w. Elec Wld—Aug. 6, 1898.

Electric Propulsion for Torpedo Boats (La Propulsion des Torpilleurs par l'Electricité). George Davy. An extended review of a recent paper by C. T. Child on this subject. 1800 w. L'Electricien—March 18, 1899.

Electrical Propulsion for Torpedo Boats. W. F. Durand. A Criticism of C. T. Child's article on the same subject giving many data and arguing that the present limitations of electrical application prevent the use of battery-driven boats. 6000 w. Jour Am Soc of Naval Engs—Feb., 1899.

Electric Propulsion for Torpedo Boats. W. F. Durand. Discusses the limitations and possibilities of electric propulsion, in connection with a review of data given in an article by C. T. Child, published recently in the Jour. of Am. Soc. of Nav. Engs. 4800 w. Sib Jour of Engng—June, 1899.

See also **ELECTRIC BOAT.**

**Engines.**—See also **MARINE ENGINE—Torpedo Boat.**

**"Foote" Trials.**—The Contract Trial of the U. S. Torpedo Boat "Foote." C. N. Offley. Description of vessel and equipment, with account of trial. Ill. 2500 w. Jour Am Soc of Nav Engs—Nov., 1897.

**"Forban."**—See **Speed.**

**"Gwin."**—See **"Talbot" and "Gwin."**

**"Morris."**—The U. S. Torpedo Boat "Morris." H. G. Gillmor and M. A. Anderson. Description with report of trial. 1700 w. Jour Am Soc of Naval Engs—May, 1898.

**"Porter."**—The Torpedo Boat "Porter." Brief illustrated description. 600 w. Sci Am—May 22, 1897.

**"Rodgers."**—The U. S. Torpedo Boat "Rodgers." W. M. Parks. Description and results of trials made with this boat, which is a sister boat of the "Foote." Report of accident during trial. 1000 w. Jour Am Soc of Nav Engs—Nov., 1897.

**Shape.**—On the Shape of Torpedo Boats. H. C. Vogt. Illustrates and describes a model, stating its desirable points. 1000 w. Steamship—March, 1899.

**Speed.**—Are the Last Knots of Speed in Torpedo Vessels Worth Their Cost? Editorial discussion claiming that it has not yet been demonstrated that phenomenal bursts of speed in these vessels will be of value in actual warfare. 2200 w. Eng News—July 5, 1900.

The Problem of Speed. M. J. A. Normand. A paper read before the Maritime Technical Assn. An examination of the speed of torpedo vessels from a general point of view, and of the "Forban" in particular. 3000 w. Eng, Lond—May 22, 1896.

The Speed Problem. J. A. Normand. Read before the Assn. Technique Maritime, Paris. A study of the speed of torpedo boats, the causes of recent progress and the possible causes for future progress. 3200 w. Jour Am Soc of Nav Engs—Feb., 1897.

See also **SHIP PROPULSION; STEAM YACHT—High Speed.**

**Steam Turbine.**—See **STEAM TURBINE; TORPEDO-BOAT DESTROYER—Viper.**

**"Stringham."**—See **TORPEDO-BOAT DESTROYER.**

**Submarine.**—See **SUBMARINE BOAT.**

**Tactical Considerations.**—Tactical Considerations Involved in Torpedo Boat Design. A. P. Niblack. Discusses the characteristics of these boats, considered especially in relation to their operation. 4500 w. Soc of Nav Archts & Marine Engs—No. 13—Nov., 1899.

**"Talbot" and "Gwin."**—The United States Torpedo Boats "Talbot" and "Gwin." M. A. Anderson and H. G. Gillmor. Description with dimensions and report of trials. 2000 w. Am Soc of Naval Engs—May, 1898.

**United States.**—American Torpedo Boats of Recent Construction. Waldon Fawcett. Information concerning the excellence of these boats, especially those constructed on the western seaboard. 2000 w. Mod Mach—Oct., 1899.

Department Plans for Torpedo Boats and Destroyers for the U. S. Navy, Recently Contracted For. Gives the essential elements of design stipulated with plans of engines, and list of contracts let. 3000 w. Marine Engng—Nov., 1898.

Full Details of Sixteen Torpedo Boats to be Built for the United States Government. 2400 w. Engng Mech—Nov., 1898.

Our Torpedo Boat Flotilla. Waldon Fawcett. Discusses the policy of the U. S. navy with regard to torpedo boats, and the achievements of the latest boats. 2200 w. Marine Rev—Sept. 28, 1899.

The New Torpedo Craft of the United States Navy. R. G. Skerrett. Illustrated description, with table giving general particulars and principal dimensions of the boat. 1200 w. Harper's Weekly—Dec. 26, 1896.

Torpedo-Boat Design and the New Torpedo Boats of the United States Navy. H. G. Gillmor. Read at New York meeting of the Society of Naval Architects and Marine Engineers. Reviews the development of torpedo-boat construction, and discusses the requirements of seagoing and coast-defence torpedo-boats. Ill. 6200 w. Eng News—Nov. 18, 1897.

See also **TORPEDO-BOAT DESTROYER.**

**U. S. in Spanish War.**—Torpedo Boats in the War with Spain. Reviews what these boats did in the war, showing that they served mostly as dispatch boats, and pickets. They could not resist modern rifle projectiles, but torpedo-boat service is the most dangerous, and did much to improve the personnel of the navy. 4200 w. Scribner's Mag—Nov., 1898.

**United States, Thirty-Knot.**—Our Latest Thirty-Knot Torpedo Boats. R. G. Skerrett. Describes these boats which are really torpedo boat destroyers. 1500 w. Harper's Wk—Sept. 11, 1897.

**"Viper."**—The Austrian Torpedo Boat "Viper." Illustrated general description which is also made the occasion for a general discussion of the policy of building vessels of the destroyer type. Cuts show arrangement of the Yarrow boilers in Dutch cruisers. 1800 w. Eng, Lond—April 3, 1896.

See also **TORPEDO-BOAT DESTROYER.**

**TORPEDO-BOAT DESTROYER.**

See also **STEAM TURBINE; TORPEDO BOAT; WARSHIP.**

The Development of the Torpedo Boat Destroyer. John Platt. A very complete and fully illustrated account of the latest developments in the construction of the torpedo boat destroyer, as distinguished from the smaller and weaker torpedo boats. 3000 w. Eng Mag—May, 1898.

Torpedo Boat Destroyers. John Isaac Thornycroft and Sydney Walker Barnaby. Reprinted from Pro. of Inst. of Civ. Eng. Paper both historical and technical, with plates. 9300 w. Jour Am Soc of Nav Eng—Nov., 1895.

Torpedo Boat Destroyers. Data from circular issued by the Navy Department, giving the elements of design, machinery, etc. 2000 w. Jour Am Soc of Naval Engs—Aug., 1898.

Torpedo-Boat Destroyers. G. W. Dickie. A paper presented before the Society of Naval Architects and Marine Engineers, giving detailed description of a torpedo-boat destroyer, designed with especial reference to the conditions which prevail on the Pacific coast of the United States. 2500 w. 1 plate. Trans Soc N A & M E—1898.

**"Akebono."**—Engines and Boiler; Japanese Torpedo-Boat Destroyer "Akebono." Illustrated description. 1000 w. Engng—June 30, 1899.

**"Bullfinch" Disaster.**—The "Bullfinch" Disaster. Gives a reduced facsimile of the connecting rod and discusses why the rod broke. Deals with the design of the rod and the material. 2800 w. Engr, Lond—Sept. 1, 1899. Serial. 1st part.

The "Bullfinch" Disaster. Gives a discussion of the accident to H. M. destroyer "Bullfinch," which occurred July 21. 3500 w. Engng—Aug. 25, 1899.

**"Capitan Orella."**—Torpedo-Boat Destroyer "Capitan Orella." Illustrated description and comments. 1200 w. Engng—Oct. 16, 1896.

**Engines.**—See also **MARINE ENGINE—Torpedo-Boat Destroyer.**

**"Entre Rios."**—Torpedo-Boat Destroyer "Entre Rios." Illustrated description. 700 w. Engng—Oct. 2, 1896.

**"Fame."**—H. M. S. "Fame," a Recent Type of British Torpedo-Boat Destroyer. Brief illustrated description. 500 w. Marine Engng—Jan., 1898.

**"Furor" and "Terror."**—Torpedo-Boat Destroyers "Furor" and "Terror." Illustrated description. 15000 w. Engng—Jan. 1, 1897.

**"Hai Lung."**—Fastest in the World. Illustrates and briefly describes the Chinese torpedo-boat destroyer "Hai Lung," which holds the speed record of the world, attaining 36.7 knots. 700 w. Marine Rev—Feb. 2, 1899.

**"Ikadsuche."**—The Torpedo-Boat Destroyer "Ikadsuche" for the Imperial Japanese Navy. Report of the preliminary trial giving reproduction of a photograph taken when the vessel was traveling over 31 knots. 450 w. Engng—Dec. 30, 1898.

**"Janus."**—H. M. Torpedo-Boat Destroyer "Janus." Illustrations and description of the engines and boilers of this vessel. 2300 w. Engng—July, 31, 1896.

H. M. Torpedo-Boat Destroyer "Janus." Illustrated description. 800 w. Engng—July 24, 1896.

**"Lightning" Collision.**—The Torpedo-Boat Destroyer "Lightning" after Collision with a Barge. Description, with illustrations, of damage to this boat caused by her collision with a barge. 1100 w. Engng—Dec. 6, 1895.

**"Rocket," "Shark" and "Surly."**—The Torpedo-Boat Destroyers "Rocket," "Shark" and "Surly." Illustrated detailed description. 1600 w. Engng—Nov. 22, 1895.

**"Santa Fé."**—The "Santa Fé," Torpedo-Boat Destroyer. Illustrated description. 1200 w. Eng, Lond—July 31, 1896.

**Sea Service.**—Torpedo-Boat Destroyers for Sea Service. James Howden. Read before the Brit Inst. of Naval Archts. Illustrates and describes designs for making these vessels more effective as sea boats. 4000 w. Trans of Brit Inst of Naval Archts—March, 1899.

**"Star" Accident.**—The Accident to H. M. S. "Star." Editorial on the accident to the torpedo-boat destroyer, caused by a split cylinder. 1400 w. Engng—May 7, 1897.

**Steam Turbine.**—See **"Viper"; STEAM TURBINE.**

**"Stringham."**—U. S. S. "Stringham," Torpedo-Boat Destroyer under Construction at Wilmington, Del. Illustrates and describes this boat, now being constructed at Wilmington, Del., noting its novel features. 1000 w. Marine Engng—Feb., 1899.

**"Stringham" Launch.**—Launch of the "Stringham." Describes the launch of the largest torpedo boat built or building for the United States Navy; giving also brief accounts of other vessels at the Wilmington, Del., works. 900 w. Marine Rev—June 15, 1899.

**"Thrasher" Stranding.** —The Stranding of the "Thrasher." Interesting illustrations showing the damage sustained by this torpedo-boat destroyer, which ran ashore on the rocks of Dodman Point, with comments. 1800 w. Engng—Nov. 26, 1897.

**United States.**—Torpedo-Boat Destroyers for the United States Navy. Illustrated description of the vessels of this class ordered for the U. S. navy, with particulars of the engines, and criticisms of the designs. 3500 w. Engr, Lond—Oct. 21, 1898.

See also **TORPEDO BOAT.**

**"Viper."**—H. M. Torpedo-Boat Destroyer "Viper," with Parsons Turbines. Brief illustrated description. 500 w. Engng—Feb. 16, 1900.

**"Viper" Trial.**—H. M. Torpedo-Boat Destroyer "Viper," Leading particulars of the vessel and account of the official trial. 1400 w. Engng—May 11, 1900.

### TORPEDO TUBE.

See also **TORPEDO; TORPEDO BOAT; TORPEDO-BOAT DESTROYER; WARSHIP.**

Torpedo Discharge Tubes. A report and description recently prepared by Sir William Armstrong, Whitworth & Co. of their new torpedo discharge tube. Ill. 2500 w. Engr, Lond—May 27, 1898.

### TORSION.

See **TESTING MACHINE—Torsion.**

### TOWAGE.

**Danube Tests.**—Experiments of the Danube Navigation Company (Expériences faites par la Société de Navigation sur le Danube). An account of the dynamometric tests of the resistance of boats to haulage under various loads and speeds. 2000 w. Génie Civil—July 31, 1897.

See also **RIVER REGULATION.**

### TOW BOAT.

**"Abram Minis."**—Fine New Coast Tug. Illustrates and describes the new sea-going tug-boat "Abram Minis." 1800 w. Naut Gaz—July 19, 1900.

**Boiler.**—See **MARINE BOILER—Tow Boat.**

**"Delmar."**—New Type Tugboat. Illustration and description of the "Delmar," combination harbor and sea-towing steamer. 1000 w. Naut Gaz—Aug. 9, 1900.

**Dutch.**—Dutch-Built Tugboats. Illustrated description of some of the powerful tugboats sailing under the Dutch flag. 4200 w. Steamship—Oct., 1897.

**French.**—The Tow-Boats "Infatigable" and Taillebourg" (Les Remorqueurs "Infatigable" et "Taillebourg"). A full description of two powerful tow-boats recently acquired by the French government from Holland, with photographs and a plate of engine details. 2500 w. 1 plate. Génie Civil—April 8, 1899.

**French Salvage.**—Salvage Tug for the French Navy. Illustrated detailed description. 800 w. Engng—Feb. 14, 1896.

**"Gypsum King."**—The "Gypsum King." Illustrated description of the new steel sea-going tug-boat being built by the Burlee Dry Dock Company for the New York and Nova Scotia trade. 2300 w. Naut Gaz—Feb. 16, 1899.

**"John K. Cowen."**—New Steel Harbor Tug. Description of the "John K. Cowen," with illustration. 1000 w. Naut Gaz—Oct. 4, 1900.

**Mississippi.**—Large Steam Tenders. Illustrates and describes a fleet of five vessels under construction for the Mississippi River Commission by the Iowa Iron Works of Dubuque, Iowa. 1700 w. Marine Rev—Aug. 3, 1899.

**N. Y., N. H. & H. R. R. Co.**—New Steel Screw Transfer Tugs for the N. Y., N. H. & H. Railroad Co. Illustrated detailed description of interesting examples of this type. 2500 w. Marine Engng—March, 1900.

**Pennsylvania R. R.**—New Harbor Tugboats. Illustration, with description, of one of the three powerful vessels added to the Pennsylvania R. R. Co.'s fleet. 1300 w. Naut Gaz—Aug. 30, 1900.

**"R. W. Wilmot."**—Most Powerful Tug. Illustration with description of the new towing steamer, "R. W. Wilmot," which exceeds in engine capacity any other similar craft in American waters. 1400 w. Marine Rev—April 20, 1899.

**"Richard Croker."**—Tug "Richard Croker," for Dock Dept., City of New York. Illustration, drawings and description of a steel tug well equipped for harbor service. 1800 w. Marine Engng—Sept., 1900.

### TOWER.

See also **ARCHITECTURE; DOME; OBSERVATORY; ROOF; SPIRE; STEEPLE.**

The Theory of Dome and Tower Construction (Zur Theorie der Kuppel und Turmdächer). H. Müller-Breslau. A further discussion of the principles of framing the members of metal domes and spires, and the computation of stresses therein. 5000 w. Zeitschr d Ver Deutscher Ing—April 8, 1899.

Towers and Spires. George H. Blagrove. Part first deals with the foundations of towers. Serial. Ill Car & Build—April 8, 1898.

**Bell Ringing.**—The Effect of Bell Ringing on the Stability of Towers (Beobachtung von Thurmschwingungen beim Läuten der Glocken). J. Bürgin. Giving data and results of micrometric measurements upon a tower in which heavy bells were rung. Two articles. 3000 w. Deutsche Bauzeitung—June 28, 30, 1899.

**Bell, Rome.**—The Mediaeval Campanili of Rome. J. Tavenor Perry. Illustrated description and historical account of these bell-towers. Also discussion. Ill. 8000 w. Jour Roy Inst of Brit Archs—Feb. 26, 1898.

**Chicago.**—City Tower of Chicago. Brief illustrated description of a proposed structure. 600 w. W Elec—Sept. 5, 1896.

**Eiffel.**—The Stability of the Eiffel Tower (Sur la Stabilité de la Tour Eiffel). A report upon the movements of the tower, due to the action of the wind, of solar heat, etc. A daily period was found, but no appreciable displacement of the apex during the year 1896-97. 1000 w. Comptes Rendus—Dec. 6, 1897.

**Electric, Buffalo.**—See **ELECTRIC TOWER.**

**Metal Frame.**—See also **DOME.**

**Pisa.**—The Problem of the Leaning Tower of Pisa. William H. Goodyear. A study of leaning buildings of Italy, the façade of the Cathedral, the tower, and other structures, aiming to give a solution of the problem of construction. Ill. 8500 w. Arch Rec—Jan.-March, 1898.

**Stolberg.**—The Observatory Tower of Stolberg (Der Aussichtsturm auf der Josephshöhe bei Stolberg am Harz). A handsome iron lookout tower, 118 feet high. The top is in the form of a horizontal Greek cross with four large projecting balconies. 1200 w. Zeitschr d Ver Deutscher Ing—April 10, 1897.

### TOWN HALL.

See also **MUNICIPAL BUILDING; PUBLIC BUILDING.**

**Singapore.**—Victoria Town Hall and Theatre, Singapore. Perspective view with brief description. 500 w. Ind Engng—Nov. 12, 1898.

**Suresnes, France.**—The New Municipal Buildings of Suresnes (Les Nouveaux Edifices Communaux de la Ville de Suresnes). An illustrated account of the new town hall of Suresnes, near Paris, with a description of the handsome electric-lighting plant. 1800 w. La Revue Technique—Oct. 25, 1897.

**West Orange, N. J.**—See **SCHOOL.**

### TRACK.

See also **CROSS TIE; RAIL; RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY.**

Notes on Track. W. M. Cramp. Part first is introductory to a study of the proper construction and efficient maintenance of railroad track. Serial. Ry Rev—May 8, 1897.

Permanent-Way Construction (Vom Eisenbahn-Oberbau). H. Claus. With especial reference to the use of steel sleepers, and heavier rails, with data from the St. Gothard and the Liége-Limburg railways. 3000 w. Glaser's Annalen—April 15, 1899.

**American Construction.**—See also **RAILWAY CONSTRUCTION.**

**American Standards.**—Standards of Track Construction on American Railways. Gives tabulated statements representing the standard practice now in force in the United States, Canada and Mexico, with other information, and editorial comment. 8000 w. Eng News—Aug. 30, 1900.

Standard Track of American Railways. An

important and valuable compilation of the standard practice of 53 chief American roads as to every important item of track construction, given both in the form of descriptive notes and in a well arranged table. With editorial. 9700 w. Eng News—June 25, 1896.

**Asphalt Streets.**—See **Street, Minneapolis.**

**British.**—The Superstructure of British Railways (Les Voies des Chemins de Fer Anglais). Comparing British and French railway construction, with sections of rails, chairs and joints used on the leading English railways. Two articles. 5000 w. 1 plate. Génie Civil—Nov. 27, Dec. 4, 1897.

**Broad Flange vs. Tie-Plate.**—See **Tie-Plate vs. Broad Flange; RAIL—Sandberg.**

**Cable Railway.**—English Methods of Cable Track Construction. Alex. McCallum. English and American methods are compared showing greater economy on the side of the English type. 1800 w. St Ry Jour—April, 1896.

See also **Street, Broadway Alteration; Street, St. Louis; CABLE RAILWAY.**

**Concrete Foundations.**—See **Demerbe; Street.**

**Crossing.**—See also **Frog Formulas; Manganese Steel; GRADE CROSSING.**

**Crossing Computations.**—A Short Method for Railroad Crossing Computations. L. K. Vial, and R. B. Ketchum. Gives in detail a solution used by the Ajax Forge Co., Chicago, and by the Western Indiana Railway Co., with a discussion of the approximation involved, and a brief comparison with other methods. 1500 w. Technograph, No. 12—1897-8.

**Curves.**—See **RAILWAY CURVE.**

**Demerbe System.**—Recent Tramway Construction, with Special Reference to the Demerbe System. Wm. Dawson. Paper before the British Association, giving an illustrated description of the Demerbe trough-type rail and data concerning its satisfactory performance in Bradford. 2400 w. Elec Engr, Lond—Sept. 14, 1900.

Recent Tramway Construction: With Special reference to the Demerbe System. William Dawson. Read at Bradford meeting of the Brit. Assn. for the Adv. of Science. An illustrated description of the system named, with brief notes on other systems. 2500 w. Elec Rev, Lond—Sept. 28, 1900.

**Displacement by Ocean Waves.**—See **Wave Displacement.**

**Electric Railway.**—Construction and Maintenance of Electric Railway Tracks. George H. Neilson. Abstract of paper read before the Penna. State Assn. Treats briefly of foundation, concrete, ties, rails, splices, frogs, etc., and of points of interest in the construction of suburban roads. 2000 w. St Ry Jour—Nov., 1896.

Construction and Maintenance of Electric Street Railway Tracks. George H. Neilson. Abstract of paper read before the Penna. State Street Ry. Assn. A brief discussion of established points in city and suburban construction. 2200 w. St Ry Rev—Sept. 15, 1896.

Some Notes on Electric Street Railway Track. W. M. Camp. Points out present tendencies in street railway track construction as regards the types of materials used, the manner of putting them together in the track and the materials used therein. 4200 w. Wis Eng—Jan., 1897.

Track and Track Joints. Construction, Maintenance and Bonding. M. K. Bowen. A discussion of the subjects mentioned in title. Read before the Am. St. Ry. Assn., St. Louis. 2800 w. Elec Eng—Oct. 28, 1896.

Track Construction for Electric Railways. F. A. Vaughn. Illustrated discussion of important points in construction and maintenance, with description of present practice for urban and interurban lines. 3500 w. Wis Engr—Jan., 1900.

See also **Street; ELECTRIC TRAMWAY; ELECTRIC RAILWAY.**

**Experiments, Watertown, Mass.**—Government Railroad Track Experiments. Report of the commanding officers at the Watertown Arsenal, Mass., regarding railroad-track experiments. 1200 w. Loc Engng—Nov., 1896.

Railroad Track Experiments. From the report of the tests of Metals and Other Materials at the United States Testing Plant at Watertown, Mass., for the year 1895. Experiments and results, with editorial. Ill. 2900 w. Ry Rev—May 1, 1897.

**Far East.**—Track Construction in the Far East. Brief illustrated description of peculiar methods. 700 w. Ry & Engng Rev—Sept. 10, 1898.

**Frog.**—See also **RAILWAY SWITCH—Frog.**

**Frog Formulas.**—A Method of Determining Railway Crossing Frog Formulas. G. B. Zahniser. Mathematical. 500 w. Eng News—April 21, 1898.

See also **Crossing Computations.**

**Gauge.**—Fixed Point on the Mixed Gauge. J. B. A suggestion to overcome difficulties arising from the use of the mixed gauge. Ill. 1800 w. Ind Engng—Feb. 13, 1897.

The Relative Cost of Narrow and Standard Gauge Railroads. Letter from M. N. Forney in reply to inquiry regarding first cost. Thinks there would be no difference if the rolling-stock was of the same character in each. 1800 w. Am Eng & R R Jour—Nov., 1897.

**Gauge Widening.**—A Change to Standard Gauge on the Columbia & Puget Sound Railroad. The method followed will be of interest to those interested in maintenance of way. 900 w. Ry & Engng Rev—Dec. 18, 1897.

Change of Gauge on the Columbia and Western Ry. An account of the work of widening the gauge without interrupting traffic. 700 w. Ry & Engng Rev—July 15, 1899.

See also **RAILWAY CURVE.**

**German Improvements.**—Improvements in the Permanent Way of the Railways of Germany (Zur Verbesserung des Oberbaues auf Deutschen Eisenbahnen). A paper by Prof. Goering before the railway society with illustrations of improved fastenings, rail joints and track construction. Serial. Glaser's Annalen—March 1, 1898.

Track Improvements on German Railways. Information from an address by Prof. Goering. 1600 w. Ry & Engng Rev—June 9, 1900.

See also **RAILWAY PERMANENT WAY.**

**Grand Central Station, N. Y.**—A Costly Track for Hard Service. The elaborate equipment at the Grand Central terminal, New York City is described, with special reference to steel ties and rail fastenings. 1400 w. R R Gaz—Jan. 31, 1896.

**Guard Rail.**—See **RAIL—Guard.**

**Laying.**—See **Repairing; TRACKLAYING.**

**Longitudinal Sleepers, Austria.**—Longitudinal Sleepers in Austria. From an interesting paper presented by W. Hohenegger before the International Ry. Congress. Illustrated account of construction. 1000 w. Ry Rev—Oct. 31, 1896.

**Manganese Steel Points and Crossings.**—Manganese Steel Points and Crossings. Recommending manganese steel for positions of heavy wear and alleging American experience in support of the practice. 700 w. Ry Wld—June, 1896.

**Mine Roads.**—See **MINE ROADS.**

**Mixed Gauge.**—See **Gauge.**

**Modern Developments.**—Modern Developments in Track and Track Work. E. E. Russell Tratman. Abstract of an address delivered before the Roadmaster's Assn. of America, at Detroit. Remarks on improvements and features which depart somewhat from usual practice. 3000 w. Eng News—Sept. 21, 1899.

**Oil Sprinkling.**—See **CAR; RAILWAY PERMANENT WAY.**

**Outer Rail Elevation.**—See **RAILWAY CURVE—Gauge Widening; Rail Elevation.**

**Permanent.**—A Design for a Permanent Track for Steam Railways. J. W. Schaub. Illustrates and describes a design for a permanent roadbed and track. Also a lengthy editorial examining the above design and describing a construction developed by a member of the editorial staff. 7000 w. Eng News—Jan. 5, 1899.

**Pot Sleeper, India.**—Pot Sleepers on the Great Indian Peninsula Ry. Illustrates the pattern now standard with this company and gives a brief account of past experience with these sleepers. 700 w. Ry & Engng Rev—June 9, 1900.

**Renewal.**—See **Repairing; Street, St. Louis.**

**Repairing, Europe.**—Some Methods of Repairing Tracks in Europe. Editorial on the methods employed, the advantages and objections. 1000 w. Ry & Engng Rev—May 5, 1900.

**Roads.**—See **TRACKWAY.**

**Sand.**—The Sand Track. Robert Grimshaw. The discussion of methods which make it safe to derail a locomotive or car. The article has some interesting data. 1800 w. Sci Am Sup—March 7, 1896.

**Sanding.**—Track Sanding Arrangement. Illustrates a new and exceedingly simple design which is not patented. 700 w. R R Gaz—July 15, 1898.

See also **STREET RAILWAY.**

**Sanding at Stations.**—Track Sanding Device for Terminal Stations (Voies Ensablées pour Gares Terminus). Description of a device by means of which the rails may be sanded automatically by the action of the approaching train. 2500 w. La Revue Technique—Dec. 25, 1896.

**Sleeper.**—See **Pot Sleeper, India; Longitudinal Sleepers, Austria; Steel Foundations; CROSS TIE.**

**Splice Bar.**—See **RAIL—Illinois Central Ry.; N. Y. Central; RAIL JOINT.**

**Spotting and Grooving Machine.**—The Spotting and Grooving Machine—Flint & Pere Marquette Ry. Illustrated description of a device for the cutting and evening of the rail seats on the ties as they lie in the track. 1600 w. Ry & Engng Rev—Sept. 23, 1899.

**Steel Foundations.**—Steel Foundations for Steam Railroad Track. Gustav Lindenthal. Considers the substitution of metal cross ties for those of wood, and heavier and harder rails for the lighter rails in use. Serial. R R Gaz—Sept. 8, 1899.

See also **CROSS TIE.**

**Street.**—A Novelty in Street Railway Track. Describes a track with 60 ft., 57 lb., T rails, supported at the joints by inverted pieces of the same section riveted base to base. The rails are laid on longitudinal beams of concrete. 600 w. Eng Rec—Nov. 11, 1899.

Construction and Maintenance of Street-Railway Tracks. Edward Butts. Read at the convention of the Am. St. Ry. Assn. Presents a construction which experience has shown to be satisfactory. Also discussion. 5000 w. St Ry Rev—Oct. 20, 1899.

Cost of Track Construction. Specifications of eleven methods of construction with the estimates of cost, as prepared by John A. Beeler for the Denver Consolidated Tramway Co. 850 w. St Ry Jour—Sept. 15, 1897.

Cost of Track Laying. Itemized estimated cost of six sections of road-bed and track for street railways. Each section is illustrated, and the article is valuable throughout. 2500 w. St Ry Rev—Jan. 15, 1896.

Electric Street Railway Tracks. R. J. McCarty. Three methods of laying ties on broken stone mixed with sand. The one proposed will cost $1736 per mile of single track road-bed. 1800 w. St Ry Jour—Feb., 1896.

Some Examples of Tracklaying for Street Railways (Einige Aufgaben über Berechnung von Geleisanlagen für Strassenbahnen). Especially devoted to methods of laying out curves and turnouts, given problems being solved in detail. 2500 w. Ill. Zeitschr f Klein u Strassenbahnwesen—Dec. 1, 1898.

Street Railway Roadbed. Mason D. Pratt. Illustrated descriptions of early types and patents of rail sections and splices. 1800 w. St Ry Jour—Jan., 1896.

Street Railway Track Construction. M. D. Burke. Brief description of construction for horse-cars, the transition to tracks for motors in present use, with suggestions of such forms as appear appropriate for existing conditions. Ill. 5800 w. Jour Assn of Engng Socs—April, 1899.

The Modern Street Rail and Its Relation to Pavements. J. W. Howard. The kinds of rail and their effect on adjacent pavement are briefly considered. 700 w. Munic Engng—Feb., 1897.

The Street Railway Track of the Future. A discussion of present problems and practice, and of essentials of the ideal. 1800 w. Eng News—Oct. 15, 1896.

Track and Overhead Department Economics. J. W. Greer. The advantage of the T rail and the best method of laying track is discussed. Serial. St Ry Rev—Dec. 15, 1895.

Track Construction. D. F. Carver. A paper before the N. Y. Street Railway Assn., giving the writer's views, especially as to substructure for street railway track. 2000 w. St Ry Rev—Sept. 15, 1898.

Tramway Permanent Way, as Adaptable for Mechanical Traction. John S. MacGregor. A detailed consideration of the construction of what may be deemed at the present time a thoroughly good permanent way. 4000 w. Ry Wld—Oct., 1896.

See also **Demerbe; Electric Railway; Vienna; CITY RAILWAY; ELECTRIC TRAMWAY; STREET RAILWAY; TRACKWAY.**

**Street, Broadway Alteration.**—Preparing to Operate the Broadway Cable Road by Electricity. An illustrated account of rapid and extensive alterations of the track equipment of the Broadway line, without interrupting traffic. 500 w. Elec Rev, N. Y.—Sept. 19, 1900.

**Street, Buffalo.**—Substructure of Street-Car Tracks, Buffalo, N. Y. Illustrates system of 60-ft. rails on longitudinal concrete beams. 300 w. Eng Rec—Jan. 8, 1898.

Track Construction in Buffalo. Illustrates and describes the trench construction, and smooth excavation construction, and the organization of the laborers. 800 w. St Ry Rev—Jan. 15, 1900.

**Street, Cincinnati.**—Reconstruction of Cable Track in Cincinnati. Bert S. Baldwin. Description of method of reconstruction which progresses while both electric and cable cars are operating. 1500 w. St Ry Rev—March 15, 1897.

Track Construction of the Cincinnati Street Railway Company. A report on the construction that has had five years' wear, and changes made in power. Ill. 1200 w. St Ry Jour—July, 1899.

**Street, Detroit.**—Concrete Work in Detroit. F. A. Little. Facts derived from the construction of nearly fifty miles of track on a concrete foundation in Detroit. 3000 w. St Ry Rev—Jan. 15, 1897.

**Street, Kansas City.**—The Construction and Maintenance of Street Tracks. Describes the work in Kausas City, which has the rails supported on longitudinal beams of concrete. 1800 w. Eng Rec—Nov. 11, 1899.

**Street, Marseilles.**—The New Permanent Way of the Marseilles Tramways (Les Nouvelles Voies des Tramways de Marseille). A. Magnier. With sections of the rails, details of the joints and bonding, and views of the switches and curves. 2500 w. Revue Technique—Aug. 25, 1899.

**Street, Minneapolis.**—Concrete Work in Track Construction. Data on the cost of trench work in Minneapolis, with illustrations. 1200 w. St Ry Rev—Feb. 15, 1897.

Modern Street Railway Track Construction on Asphalt Paved Streets. F. W. Cappelen. Description of work in Minneapolis. The street railway company aim to construct a first-class track in every respect. 2200 w. Munic Engng——Nov., 1896.

The Construction of Street Railway Tracks in Minneapolis and St. Paul, Minnesota. F. W. Cappelen. Paper presented at the Chicago meeting of the American Society of Municipal Improvements, with views. A very full account of this work. 2500 w. Eng News—Oct. 14, 1897.

**Street, New Orleans.**—Heavy Track Construction in New Orleans. Illustrates and describes probably the heaviest T-rail track construction ever laid for electric service in the United States. 1000 w. St Ry Jour—June 2, 1900.

**Street, New York.**—The Street Railway Tracks and the Pavements in New York. George E. Waring, Jr. Illustrated description of sections of rail and pavement in various parts of New York, with commendation of the track as laid in Vienna, and urging the correction in N. Y. City. 1300 w. Harper's Weekly—Feb. 13, 1897.

See also **Street, Broadway Alteration.**

**Street, Pittsburg.**—New Track Construction in Pittsburg. Description with extracts from specifications. 1300 w. St Ry Jour—May, 1897.

**Street, Rochester, N. Y.**—Recent Street Track at Rochester, N. Y. Illustrated description of rails on longitudinal concrete beams, with cross-ties of old rails. 500 w. Eng Rec—Oct. 21, 1899.

**Street, St. Louis.**—Track Renewal on the Olive Street Cable Road, St. Louis. An account of this work, which consists of laying 60 ft. rails with welded joints. 1000 w. R R Gaz—Oct. 22, 1897.

**Street, Scranton, Pa.**—Track Construction Used in Scranton, Pa. Frank Silliman, Jr. Read before the Penn. St. Ry. Assn. Illustrated description. 700 w. St Ry Rev—Nov. 15, 1899.

**Street, Sioux City, Iowa.**—Recent Track Construction of the Sioux City Traction Company. Chester P. Wilson. Extracts from the specifications showing details of construction, with explanatory notes. Ill. 2500 w. St Ry Jour—Aug., 1898.

**Street, Toronto.**—Track Construction without Ties in Toronto. Sections of track are shown. 100 w. St Ry Jour—Dec., 1895.

**Tamping by Compressed Air.**—Recent Experiments in Tamping Track by Compressed Air. F. R. Coates. Read before the New England Roadmasters' Assn., Boston. Remarks the lack of progress made in surfacing track, and reviews some recent work in the use of the air blast. 3300 w. Compressed Air—Oct., 1898.

**Thrower.**—See **TRACK THROWER.**

**Tie-Plate.**—The Requirements of Tie-Plates for Railway Track. Benjamin Wolhaupter. A discussion of the action and wear of rail and tie under service load, and deduction of principles therefrom. 3800 w. Eng News—Sept. 3, 1896.

Tie Plates. Report of the Committee on Road port presented at the Denver convention of the Road Masters' Assn. of America. 2200 w. R R Gaz—Sept. 23, 1898.

Tie Plates. Report of the Committee on Roadway, Am. Soc. R. R. Supts., with correspondence. The report is highly favorable to the tie-plate for safety and economy. 6500 w. Eng News—Sept. 17, 1896.

**Tie Plate Gauge.**—A Tie-Plate Setting and Surfacing Gauge. Illustrated description of a tool for securing accurate work and its time record. 900 w. Eng News—Aug. 2, 1900.

**Tie Plate vs. Broad Flange.**—Broad Flanges vs. Tie-Plates. Editorial discussion of an article by C. P. Sandberg, indexed from London "Engineering," on the advantage of using heavier rails for railways laid with flange rails. 1800 w. R R Gaz—Feb. 10, 1899.

See also **RAIL—Sandberg.**

**Traffic.**—Relation of Track to Traffic. B. R. Coates. Read before the Roadmasters' Assn. of America. Discusses this subject and gives the opinion that the track conditions are not proportionate to the load and stress. 1800 w. Ry & Engng Rev—Sept. 16, 1899.

The Relation of Track to Traffic on American and Foreign Railways. R. E. Russell Tratman. Information acquired in the course of extensive investigations of this subject is presented and discussed, with details in tabular form for comparison. 3700 w. New York R R Club—Dec. 17, 1896.

**Tunnels.**—Comparative Advantages of Ballasted Cross Ties and Unballasted Longitudinals for Railway Track in Tunnels. Jules Michel, in "Revue Générale des Chemins de Fer." Abstract translation of this article which discusses the comparative advantages and cost. 900 w. Eng News—Aug. 10, 1899.

See also **RAILWAY PERMANENT WAY; TUNNEL.**

**U. S. Government Experiments.**—See **Experiments, Watertown, Mass.**

**Vienna.**—The Superstructure of the Vienna Railroad. From a lecture by Hugo Koestler. Detailed description, especially considering the joint construction. 2000 w. R R Gaz—May 4, 1900.

**Wave Displacement.**—Two Unusual Instances of Railway Track Displaced by Ocean Waves. Illustrates a case on the Nantasket Branch of the New York. New Haven and Hartford, and one on the Old Colony R. R. 450 w. Eng News—Aug. 24, 1899.

**Wood Screws.**—See **RAIL FASTENING; SCREW—Wood.**

## TRACK DEFORMATION.

See also **BRIDGE STRESSES; RAIL CREEPING; RAIL DEFLECTION; TRACK INSPECTION.**

Changes in the Form and Position of Rails (Veränderungen in der Lage und Form des Eisenbahn Gestanges). Braunig, in Köslin. An exhaustive experimental investigation on the changes produced in the form and position for a long term of years and all conditions of weather. 10500 w. Zeitschrift für Bauwesen, x-xii.—1896.

## TRACK DEPRESSION.

See also **GRADE CROSSING; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; SUBWAY.**

**Chicago.**—See **RAILWAY TERMINAL; TRACK ELEVATION.**

**Newton, Mass.**—Depression of the Tracks of the Boston & Albany R. R., at Newton, Mass. Illustrated description of the depression of the four-track line of the Boston & Albany, below the normal surface of the ground. 900 w. Eng News—March 18, 1897.

## TRACK ELEVATION.

See also **GRADE CROSSING; RAILWAY BRIDGE; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; VIADUCT.**

**Boston.**—Elevation of the N. Y., N. H. and H. R. R. at Boston, Mass. Illustrated description of a costly piece of work, including construction of bridges and stations, laying of sewers and water-mains, elevation of freight yards and incidental work. 2800 w. Eng News—Jan. 14, 1897.

Track Elevation—N. Y., N. H. & H. R. R. in Boston. Illustrated detailed description of plans. 1200 w. Ry Rev—April 4, 1896.

See also **BRIDGE—Skew; RAILWAY TERMINAL.**

**Brockton, Mass.**—Track Elevation at Brockton, Mass; N. Y., N. H. & H. R. R. Illustrated description of an interesting example of work. 1200 w. Eng News—March 25, 1897.

**Chicago.**—Track Elevation in Chicago. The first six papers of a series on this subject, giving illustrated descriptions of work on the C. & N. W. Ry., P. C. C. & St. L. Ry., I. C. Ry., C. M. & St. P. Ry.. and C. B. & Q. Ry. 15600 w. Jour W Soc of Engs—Oct., 1898.

Track Elevation in Chicago. Four illustrated papers of track elevation and depression in Chicago, with discussion. The papers are by W. H. Coverdale, H. W. Parkhurst, G. W. Vaughn, and Marvin H. Dey. 14000 w. Jour W Soc of Engs—Dec., 1898.

Track Elevation in Chicago. Illustrated description of the raising of the joint tracks of the Lake Shore and Michigan Southern and the Chicago, Rock Island and Pacific Railways. 2500 w. R R Gaz—Nov. 6, 1896.

Chicago Track Elevation. Plan and profile of the work to be done this year by the Chicago & Northwestern Railway and the Pittsburg, Cincinnati. Chicago & St. Louis Railway jointly in elevating the tracks running south in Rockwell Street from the Galena Division. 700 w. R R Gaz—Aug. 13, 1897.

Progress of Track Elevation by the Chicago & Northwestern Railway in Chicago. An account of rapid work. 1000 w. Eng News—Oct. 28, 1897.

Track Elevation, Chicago & Northwestern Ry., in Chicago. A general review of the character and scope of proposed work, and the methods to be employed. 2200 w. Eng News—Aug. 20, 1896.

Track Elevation in Chicago. Summary of what has already been published on this subject, with additional information of interest, taken from report made to the Department of Public Works, Chicago. 1700 w. R R Gaz—Jan. 14, 1898.

Track Elevation in Chicago. Explains the work made necessary by an amendment extending the work about one mile. 1000 w. R R Gaz—Feb. 4, 1898.

Track Elevation and Depression at the 16th St. Crossing, Chicago. This section, which is probably the most complicated system of grade crossings in Chicago, is illustrated and described. 1800 w. Eng News—July 14, 1898.

Track Elevation in Chicago. A general survey of the situation, with special reference to the Sixteenth Street crossing. Ill. 3400 w. Ry Age—May 28. 1897.

Track Elevation in Chicago. Illustrates and describes interesting features in the progress of the work of eliminating grade crossings at Sixteenth Street. 1000 w. Ry Age—July 29, 1898.

Track Elevation in Chicago. Commences an illustrated description of the extent and character of the work done by each railway company. Also editorial. 7500 w. Eng News—Jan. 11, 1900.

See also **CONCRETE—Chicago Track Elevation; RAILWAY TERMINAL.**

**Chicago and Northwestern Ry.**—Track Elevation on the Milwaukee Division of the Chicago and Northwestern Railway. General description of the proposed work, with quantities of materials involved and methods of work adopted. Serial. R R Gaz—Aug. 7, 1896.

**Chicago Elevated.**—Raising the Metropolitan West-Side Elevated Railway of Chicago. Illustrated description of the work made necessary by the elimination of railway crossings at grade, along Rockwell street, where the elevated road crosses the tracks of two surface roads. 2500 w. Eng News—Sept. 30, 1897.

Track Elevation in Rockwell Street, Chicago. Description, with map of tracks, of the most expensive piece of track elevation for the distance, yet undertaken in Chicago. 2000 w. Ry Rev—Aug. 21, 1897.

**Jersey City.**—Erie Track Elevation in Jersey City. Plans showing proposed elevation of the tracks, with explanation of the situation. 1100 w. R R Gaz—Jan. 29, 1897.

Track Elevation of the Erie R. R. through Jersey City, N. J. Illustrates and describes a proposed plan for elevating tracks, and building a new passenger line in open cut across Jersey City Heights, thus avoiding the passage through Bergen Tunnel. 900 w. Eng News—Aug. 18, 1898.

See also **RAILWAY TERMINAL.**

**New York.**—Erection of the Park Avenue Viaduct, New York. Part first describes and illustrates the false work supporting temporary tracks and new centre girders. Serial. Eng Rec—Feb. 27, 1897.

The Park Avenue Viaduct Improvement, New York City. Descriptive account of an extensive and important piece of construction, with drawings of many details. 900 w. Eng Rec—Sept. 26, 1896.

New York Central Track Elevation in Park Avenue, New York. Brief, illustrated description of the changes which have been made in narrowing the viaduct, with outline of previous work. 1700 w. R R Gaz—Jan. 8, 1897.

The Elevated Tracks of the New York Central Railroad in New York City. A series of views, with description of the work of raising the tracks to an elevated steel structure, and the various expedients which were resorted to in keeping the traffic and the new construction going at the same time. It is pronounced one of the most brilliant engineering feats on record. 2800 w. Sci Am Sup—Feb. 20, 1897.

See also **BRIDGE—Harlem River.**

**Norwalk, Conn.**—Track Elevation at South Norwalk. An illustrated description of the permanent and temporary work. 1500 w. R R Gaz—Sept. 4, 1896.

**TRACK INSPECTION.**

See also **CAR—Inspection; RAIL DEFLECTION; RAILWAY PERMANENT WAY; TRAIN RESISTANCE.**

**Boston & Albany.**—The Annual Inspection of the Boston & Albany Railroad. George W. Blodgett. Account of the inspection annually made on this road, with illustrated description of the principal features of the Dudley dynagraph car. 2000 w. R R Gaz—Dec. 17, 1897.

**Desdouits Apparatus.**—A Graphical Registering Method for Railway Track Inspection (Méthode Graphique pour la Reconnaissance et la Vérification du Tracé des Voies de Chemins de Fer). M. Desdouits. An illustrated description of work with a pendulum registering apparatus, which records all the features of the track when run over it on any kind of vehicle. 8000 w. 2 plates. Ann des Ponts et Chaussées—4th quarter, 1899.

**Dudley Apparatus.**—See **Boston & Albany; High Speed; N. Y. Central; RAIL DEFLECTION.**

**Equilibristat.**—The Equilibristat. Don J. Whittemore. Describes an instrument for determining, while riding over the road, the difference of elevation between the opposite rails, whether the outer rail on curves is properly elevated, and also for other track work. Discussion and correspondence. Ill. 6500 w. Jour W Soc of Engs—Oct., 1898.

**High Speed.**—The Effect of High Speed on Track Maintenance. P. H. Dudley. Reply to query of the "R. R. Gaz." on this subject, showing that it has been an important factor in raising the standard of track, hastened the introduction of heavier rails, etc. 800 w. R R Gaz—Dec. 25, 1896.

**Louisville and Nashville.**—Track Inspection on the Louisville and Nashville. Describes a car recently fitted for track inspection, and the method of work. 1500 w. Ry & Engng Rev—Jan. 8, 1898.

**N. Y. Central.**—Permanent Way of the New York Central. Diagrams as condensed from records made by Mr. Dudley's Apparatus, with remarks. 1100 w. R R Gaz—Aug. 3, 1900.

The Condition of Track on the New York Central. P. H. Dudley's autographic records of the condition of the track of the New York Central for 1898 and 1899. 1 plate. 600 w. R R Gaz—Sept. 14, 1900.

**Stickney Indicator.**—The Stickney Track Indicator. The instrument is attached to the bottom of the car and records automatically any sudden divergence from a straight line motion. Ill. 350 w. R R Gaz—Feb. 14, 1896.

**Street.**—See **STREET RAILWAY—Dynagraph Car.**

**Vassioutinsky Apparatus.**—Apparatus of M. Vassioutinsky for Registering Temporary Deformations in Railway Superstructures (Appareil de M. Vassioutinsky pour Enregistrer les Déformations Temporaires des Superstructures des Voies Ferrées). Translation from the Russian describing a modification of the Ast apparatus for recording irregularities in the track. Ill. 1200 w. Bull de la Soc d'Encour—May 31, 1900.

**TRACKLAYING.**

See also **RAILWAY CONSTRUCTION; RAILWAY PERMANENT WAY; TRACK; TRACK THROWER.**

**Behrends Machine.**—Machine for Laying Railway Track (Maschine zum Verlegen von Geleisen. The Behrends apparatus is intended for handling sections of track and steel sleepers, and consists of a cantilever crane carried on a special steam motor car which hauls the construction train. 1800 w. 2 plates. Zeitschr d Ver Deutscher Ing—May 21, 1898.

**Boston and Albany.**—Laying New Steel. E. A. Haskell. Gives a description of the method of work in track laying on the Boston & Albany Railroad. 2800 w. R R Gaz—June 3, 1898.

**Canadian Pacific.**—Tracklaying by Machinery on the Canadian Pacific Ry. Description of the work and the machine. 1700 w. Eng News—June 14, 1900.

**Holman-Burke Machine.**—Holman-Burke Track-Laying Machine on the "Soo Line." Describes and illustrates an improved machine in use on the Minneapolis, St. Paul and Sault Ste. Marie Ry. 1600 w. Ry & Engng Rev—Sept. 9, 1899.

**Minn., St. P. & "Soo" Ry.**—Tracklaying on the Minneapolis, St. Paul & Sault Ste. Marie Ry. in 1898. A complete detailed illustrated description. Several devices are shown in the inset illustration for facilitating rapidity of handling of ties, spikes, bolts, plates, etc. The labor and expense account are given along with other valuable details. 2800 w. Eng News—Nov. 14, 1895.

**TRACK TANK.**

See also **RAILWAY WATER STATION; TANK—Railway; WATER SUPPLY—Railway.**

Supply Water to Moving Trains (Alimentation d'Eaus des Locomotives en Marche). An illustrated description, mainly of English and American apparatus for scooping water from a tank between the rails and delivering it to a tender of a moving train. 1200 w. Génie Civil—Sept. 16, 1899.

The Use of Track Tanks. Editorial on the limited use and the reasons why they are not usually profitable. 1300 w. R R Gaz—Dec. 9, 1898.

**TRACK THROWER.**

**Water Scoop.**—See **WATER SCOOP.**

**Creese.**—The Creese Track Thrower. Illustrates and describes a recently invented machine and its operation. 500 w. Ry & Engng Rev—Oct. 28, 1899.

**TRACKWAY.**

See also **RAIL—Street; TRACK—Street; WAGON—Bonner Rail.**

Steel Rails for Common Roads. An editorial examination of this proposed innovation with a view to gain a clear idea of its possible merits and demerits. The conclusion is that the merits as contrasted with the demerits, do not warrant an actual trial in service. The subject is very ably treated. 3200 w. Eng News—May 7, 1896.

**Holt.**—Plateways. A. Holt. Excerpt of a paper read before the Students' Engng. Soc., with editorial. An article advocating the practicability of the plateway system, and its power to revolutionize inland transportation. 6000 w. Auto Jour—Feb., 1900.

Mr. Alfred Holt's Plateway Scheme for Heavy

Traffic. Illustrates and describes this system, stating its merits. 2200 w. Auto Jour—Jan., 1899.

**Liverpool-Manchester.**—A Motor Plateway between Liverpool and Manchester. An explanation of Dibbin's scheme, giving a section of road. 1700 w. Auto Jour—Sept. 15, 1899.

**San Francisco.**—See **RAIL—Street.**

**Silesia.**—Wagon Tracks in Silesia (Strassengeleise in Schlesien). H. Pusch. An article from the "Centralblatt für Bauverwaltung," describing steel tracks for wagons laid down in a Silesian village street. 1000 w. Mitt de Ver f d Förd d Local u Strassenbahnwesens—July, 1900.

**U. S. Agricultural Dept.**—A Steel Trackway for Wagon Roads. Illustrated description of experiments being made by the United States Department of Agriculture to determine the practicability of steel trackways. The object is to furnish a wear-resisting surface, reduce the expense of maintenance, and the labor of hauling heavy loads. 1600 w. Ir Age—Oct. 7, 1897.

The Road of the Future—Solution of the Bad Thoroughfare Question. Advocacy of steel rail roadways, by Gen. Stone, of the Agricultural Dept. 1300 w. Clay Rec—Aug. 12, 1896.

**Wagon Draft.**—See also **TIRE; TRACTION.**

**TRACTION.**

See also **CAR—Dynamometer; RAILWAY MOTIVE POWER; TRAIN RESISTANCE.**

**Diagrams.**—Traction Diagrams. Thomas Tomlinson. The first part criticises the general insufficiency of data accompanying traction diagrams, and discusses such diagrams from the points of production, interpretation and utility. Serial. Elec Rev, Lond—July, 1896.

**Meter.**—A Meter for Measuring Tractive Force on Electric Tramcars. Gisbert Kapp. Translation of paper read before the Verband Deutscher Electrotechniker. Describes the apparatus, giving diagram and illustration. The height of the liquid indicates the tractive force. 2000 w. Elect'n, Lond—Aug. 17, 1900.

Traction Meter for Electric Cars (Zugkraftmesser für Elektrische Bahnwagen). Gisbert Kapp. A paper read before the Verband Deutscher Elektrotechniker, giving the theory and a description of a simple apparatus, consisting of a horizontal tube with vertical legs, in which the height of liquid in one of the legs indicates the tractive force. With diagram and illustration. 1200 w. Elektrotech Zeitschr—July 12, 1900.

**Starting and Stopping.**—Stopping and Starting in Mechanical Traction (Les Arrêts et les Démarrages en Traction Mécanique). A mathematical discussion of the loss of time and energy in stopping and starting mechanically propelled vehicles. 2000 w. La Rev Tech—March 10, 1897.

**Tire Width.**—See **TIRE—Wagon Draft.**

**Vehicles on Roads.**—Tests of Resistance of Vehicles on Common Roads by the U. S. Department of Agriculture. Report of a series of experiments to determine the value of tractive force in the case of vehicles and roads now in use. 1300 w. Eng News—March 18, 1897.

**TRACTION ENGINE.**

See also **AUTOMOBILE; STEAM VEHICLE.**

Something About Traction Engines. Joseph B. Hall. On their principal uses and the treatment they receive. Ill. 1000 w. Am Mach—July 21, 1898.

**Agricultural Work.**—See also **ELECTRICITY.**

**American.**—Latest types of American Traction Engines. William Fletcher. A brief comparison of some of the best American traction engines with the road engines manufactured in England, with description of American types. Ill. Serial. Engr, Lond—June 10, 1898.

**American for Russia.**—American Traction Engines for Russia. Illustrated description of engines made in California, to be used as a substitute for camel trains in hauling supplies to the mines in Russia. 1000 w. Engr, Lond—Sept. 28, 1900.

**Boydell.**—The Boydell Traction Engine. Illustrated detailed description. 700 w. Eng, Lond—Aug. 7, 1896.

**Electric.**—See **ELECTRICITY; ELECTRIC VEHICLE.**

**Military.**—Traction Engines in War. Illustrated description of these engines, about to be given a trial in the Transvaal campaign. 600 w. Engr, Lond—Nov. 24, 1899.

See also **TRACTION TRAIN.**

**Ring Rail.**—A Road Ring Rail Tractor. Illustrated description of a German solution of the problem of diminishing resistance caused by uneven roads. 1200 w. Auto Jour—March 15, 1899.

**Roads.**—Steam Locomotives on Common Roads. W. Fletcher. Description of various designs and uses to which they are put. Serial. Eng, Lond—Jan. 17, 1896.

Traction Engines and Roads. The topics of weight of traction engines as related to the sustaining power of road surfaces, legal restrictions and licenses, are considered from the English standpoint. 2000 w. Arch, Lond—July 24, 1896.

**Scotte.**—Road Motors in France. Editorial on the experiments made in France with the Scotte system of road traction, which is in effect a tramway without rails, with interesting features of the system. It has been working a year and seems to have proved its suitability for use under certain conditions. 2300 w. Engng—Nov. 26, 1897.

The Scotte Automobile Carriage (Der Scott'sche Zug). Illustrated description of the Scotte steam traction carriage for regular train service. 2000 w. Oesterr Monatschr f d Oeffent Baudienst—July, 1897.

See also **STEAM VEHICLE.**

**South Africa.**—Traction Engines in South Africa. Illustrates and describes these engines, showing the development to fit them for Colonial work. Report of the commission sent out to obtain information of their work. 3800 w. Engr, Lond—Dec. 8, 1899.

**Toward.**—The Toward Steam Moto-Tractor. An official description with illustrations. 1200 w. Auto Jour—Sept., 1898.

Toward's Steam Tractor. Illustrated description of a steam tractomotor built at Newcastle-on-Tyne. 700 w. Engr, Lond—Aug. 19, 1898.

**TRACTION METER.**

See **TRACTION—Meter.**

**TRACTION TRAIN.**

See also **TRAIN—Armored.**

**Armored, South Africa.**—Armored Traction Trains for South Africa. Information concerning these trains, and their usefulness, reporting a successful trial run. 2300 w. Engng—May 18, 1900.

**TRADE MARK.**

See also **PATENT.**

Pending Trade Mark Legislation. Editorial. Discusses, with approval, a pending amendment to the present U. S. trademark law, which provides for granting trademarks used in commerce among the states, and not restricting it as heretofore, to goods used in commerce with a foreign nation or some Indian tribe. 1400 w. Sci Am—March 7, 1896.

**TRADE STATISTICS.**

See also **ENGINEERING COMPETITION; INDUSTRY.**

**British and German, 1897.**—British and German Trade in 1897. A comparison of the leading branches of trade of both countries and their relative development. 1600 w. Engng—April 22, 1898.

**TRADE UNION.**

See also **LABOR; MACHINERY; STRIKE; WAGES; WORKS MANAGEMENT—Labor Questions.**

The Effects of Trade Unionism upon Skilled Mechanics. Hiram S. Maxim. Trade unionism results in opposition to modern machinery and methods, dulls and retards the skilled mechanic and is detrimental to the country by curtailing the output and delivering the industries into the hands of competing nations of independent workmen. Many forcible illustrations from personal experience are given. 3500 w. Eng Mag—Nov., 1897.

**Architects.**—See **ARCHITECT—Trades Unions.**

**British.**—Trade Unions in Great Britain and Ireland. General digest of the Seventh Annual Report of the Labor Dept. of the British Board of Trade, so far as it deals with trade unions. Contains an array of reliable statistics. 1700 w. Bull Dept of Labor—Jan., 1896.

Trade Unions in 1896. Interesting information culled from the Ninth Report on Trade Unions in Great Britain. 1800 w. Jour Gas Lgt—Feb. 8, 1898.

A Study in Trade Unionism. Benjamin Taylor. Discusses the methods of the unions as brought out in the recent engineering strike and their present degrading influences. 7000 w. Nineteenth Cent—April, 1898.

What They Propose to Do. Gives proposed demands and propositions. 1000 w. Engng Mech—March, 1898.

**British Engineers.**—The Amalgamated Society of Engineers, in England. History of the society, with details as to its general system of management, with discussion of the probable results of the struggle in which it is at present engaged. Also editorial. 4800 w. Engr, Lond—Oct. 29, 1897.

See also **STRIKE.**

**History.**—Fifty Years of Unionism; A Retrospect. Editorial review of the trade dispute in 1852. Comparison is made, step by step, with the present dispute, showing that they were on similar and parallel lines and that history may repeat itself. 3300 w. Engng—Dec. 10, 1897.

**Italian.**—The Autonomy of Labor. Henry W. Wolff. The Italian labor organizations are, among other European societies, shown to have been most effective in good results. Descriptions of some of the principal societies and their operations are given. 7500 w. Contemporary Rev—Aug., 1896.

**Japan.**—Trade Organization in Japan. An account of customs in trade, showing that guilds are common and trade associations numerous. 1400 w. Dom Engng—Dec., 1897.

**Public Duty.**—Trade Unions and Public Duty. Jane Addams. A comparison of trades union and national measures, with defense of the methods employed by unions, and condemnation of the general public in its attitude toward industry. 6500 w. Am Jour of Soc—Jan., 1899.

**Railway.**—See **RAILWAY EMPLOYEE—Labor Organization.**

**TRADE WASTE.**

See **BY-PRODUCTS; FACTORY WASTE; RIVER POLLUTION; WASTE UTILIZATION; WORKS MANAGEMENT—Waste.**

**TRAIN.**

See also **CAR; RAILWAY EQUIPMENT; RAILWAY OPERATION; ROLLING STOCK.**

**Acceleration.**—See **TRACTION; TRAIN RESISTANCE.**

**Adams's Air-Splitting.**—Adams's Air-Splitting Train. An illustrated description of the cigar-shaped train fitted up by Frederick U. Adams for reducing the resistance of the air. 700 w. R R Gaz—June 8, 1900.

Experimental Train for Testing Atmospheric Resistance. Illustration of the train and an account of the trial run of forty miles between Baltimore and Washington. Also editorial. 1600 w. Sci Am—June 9, 1900.

**Air Brakes.**—The Making Up of Freight Trains Partially Equipped with Air Brakes. Edward Grafstrom. States the prevailing custom and discusses whether or not it is the best. 1400 w. Eng News—Dec. 23, 1897.

See also **AIR BRAKE.**

**Air Resistance.**—Air Cutter to Reduce Atmospheric Resistance to Railway Trains. H. W. Perry. Graphical representations of air resistance are given and remedies suggested. 1000 w. Ind Engng—Sept. 26, 1896.

See also **Adams's Air Splitting.**

**Armored.**—Armor Protected Troops. Discusses armored trains, armored motor-cars, and coats-of-mail. 2000 w. Engr, Lond—Nov. 3, 1899.

**"Break-in-Two."**—See **CAR COUPLER.**

**British-American.**—An Innovation on the South-eastern Train. Illustrated description of train on the American plan introduced on the South-eastern Railway of England. It is very largely patronised and will be followed by similar trains. 2000 w. Ry Wld—Jan., 1897.

**Circus.**—An American Circus Train in England. Instructions contained in a circular, issued by the Midland Railway of England, for the handling of the Barnum & Bailey circus train from Sheffield to Leeds. 1200 w. Ry Age—July 22, 1898.

**Detention.**—See **RAILWAY OPERATION.**

**European vs. American.**—Their Trains and Ours. Robert P. Porter. From "Boston Transcript." Experiences of an American on European railways. 2000 w. Ry Rev—Nov. 20, 1897.

**Fast.**—See **FAST TRAIN.**

**Hospital.**—See **HOSPITAL TRAIN.**

**Intercommunication.**—See **TRAIN INTERCOMMUNICATION.**

**Royal.**—See also **CAR—Private; RAILWAY OPERATION—Royal Train, Eng.**

**Siege.**—Siege Train for the War. Illustrates the trucks and locomotives forming the train supplied to the British war office, giving an account of the rapid work in connection with the order. 1300 w. Engr, Lond—Jan. 19, 1900.

See also **Armored.**

**Vestibule.**—See **CAR.**

**TRAIN HEATING.**

See **CAR HEATING.**

**TRAINING SHIP.**

See also **WARSHIP.**

**German.**—Life of Naval Cadets and Apprentices on the German School Ships. Part first gives illustrations and particulars of the drill in sail manoeuvres. Serial. Sci Am Sup—Aug. 12, 1899.

**U. S. Naval Academy.**—The New Training Vessel for the Naval Academy. Robert G. Skerrett. Illustrated description of vessel to be built, for which the United States Congress has granted $125,000. 800 w. Harper's Wk—Nov. 27, 1897.

**TRAIN INTERCOMMUNICATION.**

Intercommunication in Railway Trains. J. Pigg. Illustrated description of device intended for use on English railways. 2000 w. Elec Eng, Lond—Feb. 28, 1896.

Railway Passenger Communication. Report of the committee appointed by the British Board of Trade, to consider points relating to the means of communication between passengers and guards on railway trains. 3200 w. Elec Engr, Lond—July 15, 1898.

**Electric.**—Electrical Passenger and Guard Communication. Illustrated description of arrangements employed on the Great Eastern Railway of England. 700 w. Transport—July 8, 1898.

Electric Intercommunication in Railway Trains. W. E. Langdon. Read at meeting of the Inst. of Elec. Engs., London. Considers: (1) the electrical system; (2) mode of connecting vehicles; (3) the means for claiming the attention of the officials in charge of the train. Ill. Serial. Elec Eng, Lond—Dec. 16, 1898.

**TRAIN LIGHTING.**

See **CAR LIGHTING.**

**TRAIN PARTING.**

See **CAR COUPLER—Break-in-Two.**

**TRAIN RESISTANCE.**

See also **LOCOMOTIVE PERFORMANCE; LOCOMOTIVE RATING; TRACK INSPECTION; TRACTION; TRAIN.**

Investigations of Train Resistances. Reviews discrepancies and opinions, formulae and test-results. 1700 w. Loc Engng—Sept., 1896.

Measurement of the Tractive Force. Resistance and Acceleration of Trains. A. Mallock. Read before the British Assn. Short account of experiments recently made on electric and other railways. Ill. 1800 w. Engr, Lond—Sept. 28, 1900.

Some Notes on Train Resistance. T. Lester Daniel. Considers the advantages to be gained by reducing resistance, and gives results obtained from dynamometer car test, etc. 1500 w. N W Ry Club—May, 1900.

Train Resistances. Lester Daniel. Some results obtained by tests, and investigations and formulas. 1500 w. Engs' Year Bk, 1900—Univ of Minn.

Train Resistance. Angus Sinclair. The text-book formulae impugned and evidence of their inaccuracy furnished. Incidentally the fast run on the L. S. & M. S. is defended against attacks based on theoretical calculations. 1500 w. Engng—April 3, 1896.

Train Resistance. Editorial discussion of this subject, with suggestions for further investigations. 2200 w. Engr, Lond—Oct. 22, 1897.

Train Resistance. A discussion of this subject, especially of the way in which it varies with the speed. 2300 w. Engr, Lond—Feb. 18, 1896.

Train Resistance. Letters to the editor taking exception to previous editorial on this subject, with an editorial reply. 2500 w. Engr, Lond—Sept. 23, 1898.

**Acceleration.**—Comparative Rates of Acceleration. George L. Fowler. Gives a diagram showing the comparative rates of acceleration of the Schenectady experiments and those obtained by the writer, with conclusions. 1100 w. R R Gaz—Jan. 21, 1898.

**Acceleration and Braking.**—Train Acceleration and Braking. W. B. Potter. Presents fundamental formulae and endeavors to show how far they are borne out by actual tests. 1600 w. St Ry Jour—Oct., 1897.

See also **BRAKE TESTS; ELECTRIC CAR.**

**Air Resistance.**—See **TRAIN.**

**Baldwin Formula.**—The Baldwin Train Resistance Formula. An account of the Baldwin trials and deductions on which the formula was based. 800 w. R R Gaz—March 17, 1899.

**Caledonian Ry.**—Train Resistance. A series of diagrams selected from a record from minute to minute of the work done by an engine in hauling a train on the Caledonian Ry. Also a chart of combined results. Editorial discussion of the diagrams and what they prove. 1800 w. Engr, Lond—Dec. 23, 1898.

**Curves and Tangents.**—The Motion of Locomotives and Cars on Tangents and Curves. A. Von Borries. Extracts translated from an important work, "Die Eisenbahn-Technik der Gegenwart," by W. W. Nichols. Discusses the action of the forces developed upon the various portions of railway curves. 1800 w. R R Gaz—May 6, 1898.

Train Resistances on Straight and Curved Tracks. Frank C. Wagner. From a paper presented at the Boston meeting of the Assn. for the Advancement of Science. Explains manner of obtaining data and the results. 800 w. R R Gaz—Aug. 26, 1898.

**Dynamometer.**—See **CAR—Dynamometer; DYNAMOMETER—Train Resistance.**

**Electric Railway.**—Concerning Tractive Resistances. An article discussing the uncertain factors in train resistances at the high speeds to which electric traction tends. 1800 w. St Ry Jour—Aug. 4, 1900.

See also **Acceleration and Braking; STREET RAILWAY—Dynagraph Car; TRACTION.**

**French Experiments.**—The Resistance of Rolling Stock to Traction at High Speeds (Résistance à la Traction du Material Roulant à Grand Vitesse). F. Barbier. A discussion of the recent experiments made on the Northern Railway of France, with diagrams and curves, showing the relation between speed and resistance. 2000 w. Génie Civil—April 9, 1898.

Train Resistances. M. Barbier, in the April issue of the "Revue Générale des Chemins de Fer." Discussing the question of train resistances at high speeds. The paper is considered a valuable contribution to this subject. 2800 w. R R Gaz—May 21, 1897.

**Graftio Formula.**—A Formula for Train Resistance. Henry Graftio. Gives some of the results secured abroad. 3900 w. St Ry Jour—May, 1899.

**Loaded and Empty.**—Resistance of Empty and Loaded Coal Cars. Gives the results thus far obtained in investigations. 1000 w. R R Gaz—April 14, 1899.

The Resistance of Loaded and Empty Freight Cars. Gives results of some interesting dynamometer tests made a few years ago, which show the relation between loaded, partially loaded and empty freight cars. Also editorial. 1800 w. R R Gaz—March 24, 1899.

**Lundie Formula.**—A New General Formula for Train Resistance. Gives a general formula which the editor says appears to be applicable to passenger trains of all weights, running at all speeds. Worked out by John Lundie as a result of a long series of tests of trains in actual service. 1700 w. St Ry Jour—Feb., 1899.

A New Train Resistance Formula. Editorial criticism of the Lundie formula given in the "Street Railway Journal" for February. 2400 w. R R Gaz—Feb. 17, 1899.

Train Resistance. Editorial discussion of formula of John Lundie, given in the "Street Railway Journal." 800 w. Engng—Feb. 10, 1899.

A New Formula for Train Resistance. Editorial discussion of a new formula by John Lundie, given in the "Street Railway Journal." 1100 w. Engr, Lond—Feb. 17, 1899.

A New Train Resistance Formula. Mr. Lundie's formula, as given in the "Street Railway Journal," with editorial comment. 2200 w. Ry Mas Mech—March, 1899.

A New Train Resistance Formula. Comment on the Lundie formula published in the "Street Railway Journal." 1700 w. Loc Engng—March, 1899.

Train Resistance. John Balch Blood. Criticises methods used by Mr. Lundie, and gives calculations made by the writer and other tests. Also a number of letters to the editor in regard to the Lundie formula. 4500 w. St Ry Jour—March, 1899.

**Street Railway.**—See also **Acceleration and Braking; Electric Railway.**

**TRAIN RULE.**

See **RAILWAY OPERATION—Train Rule.**

**TRAIN SERVICE.**

See also **FAST TRAIN; RAILWAY OPERATION.**

A Suggestion for an Improvement in Train Schedules. George B. Leighton. A plea for afternoon trains for runs of moderate length. 900 w. R R Gaz—Aug. 28, 1896.

**British.**—The Summer Train Services. An exposition of modern English passenger service as developed by the rivalry of the East and West Coast lines. 1600 w. Engng—July 10, 1896.

The May Train Services. Charles Rous-Marten. New departures of the British railway companies. 1200 w. Engr, Lond—May 7, 1897.

The Summer Train Services. Charles Rous-Marten. Comment on the marked retrogression, so far as speed goes, on the English railways. No such records as were made a year ago are shown though the time is better than before the "race." Also calls attention to novelties on the different roads. 2000 w. Engr, Lond—July 30, 1897.

The Past Summer Train Services. Editorial comment on the English and Scotch train service of the past season. 1800 w. Engng—Oct. 22, 1897.

The May Train Services. Charles Rous-Marten. A criticism of the summer service time-tables in England. 1300 w. Engr, Lond—May 20, 1898.

The July Train Services. Charles Rous-Marten. Reviews the most prominent features of the July alterations in England from an engineering viewpoint, in relation to the progress or retrogression shown by the various railways. 2000 w. Engr, Lond—July 8, 1898.

The Summer Train Improvements. Editorial comment on the train service of Great Britain. 2000 w. Engng—Aug. 19, 1898.

The Winter Train Services. Charles Rous-Marten. Considers the changes on British roads, and a note concerning the "Nord" express of France. 700 w. Engr, Lond—Oct. 6, 1899.

**British and Foreign.**—Train Service in England. W. M. Acworth. States the condition of train service in England as compared with the United States and France, and the efforts being made to improve the English service. 1000 w. R R Gaz—July 8, 1898.

**British and French.**—The Summer Train Services—British and French. Charles Rous-Marten. Review of improvements and progressive features of the various lines. 4000 w. Engr, Lond—July 28, 1899.

**France.**—Passenger Train Service in France in 1896. P. Marry. Discussion in detail of recent improvements. 700 w. R R Gaz—Jan. 1, 1897.

**London and Liverpool.**—The London and Liverpool Train Service. Editorial criticism of the service on the London and Northwestern Railway, with discussion of the situation. 1200 w. Engng—July 8, 1898.

**New York Stations.**—Trains in and out of New York Terminal Stations. An interesting summary of the number of trains daily, on the various roads. 450 w. R R Gaz—Nov. 26, 1897.

**U. S. Transcontinental.**—Notes on a Transcontinental Trip. The notes are of characteristic features of the train service on the various roads travelled over. Serial. Eng News—Sept. 3, 1896.

**TRAMWAY.**

See also **CITY RAILWAY; LIGHT RAILWAY;**

NARROW GAUGE RAILWAY; STREET RAILWAY.

**Accumulator.**—See **ACCUMULATOR TRAMWAY.**

**Aerial.**—See **CABLEWAY.**

**Cable.**—See **CABLE RAILWAY.**

**Coal Mines.**—See **COMPRESSED-AIR HAULAGE; MINE HAULAGE.**

**Compressed Air.**—See **COMPRESSED-AIR HAULAGE; COMPRESSED-AIR TRAMWAY.**

**Electric.**—See **ACCUMULATOR TRAMWAY; ELECTRIC CONDUIT TRAMWAY; ELECTRIC RAILWAY; ELECTRIC TRAMWAY; SURFACE-CONTACT TRAMWAY.**

**Gas.**—See **GAS TRAMWAY.**

**Granite.**—The Heytor Granite Tramway. W. B. Paley. An account of a unique railroad in the west of England, built in 1820 by a private individual. 900 w. R R Gaz—July 21, 1899.

See also **QUARRY RAILWAY.**

**Mine.**—See **COMPRESSED-AIR HAULAGE; MINE HAULAGE.**

**Overhead.**—See **OVERHEAD TRAMRAIL.**

**Steam.**—See **STEAM TRAMWAY.**

**Storage Battery.**—See **ACCUMULATOR TRAMWAY.**

**Surface Contact.**—See **SURFACE CONTACT TRAMWAY.**

**TRANSFER BRIDGE.**

See **FERRY BRIDGE.**

**TRANSFER TABLE.**

See also **RAILWAY SHOP—Shifting Arrangement; TURNTABLE.**

Transfer Tables. Illustrates and describes a novel design at the Portsmouth shops of the Seaboard Air Line. Also the table at Parsons, Kan., in the shops of Missouri, Kansas & Texas Ry. 800 w. Ry Age—April 20, 1900.

**Compressed Air.**—Transfer Table at Huntington Shops—Chesapeake and Ohio Railway. Illustrated description of a transfer table in which compressed air is the motive power. 600 w. Loc Engng—June, 1897.

**Electric.**—The Electric Transfer Table of the Orleans Railway (Le Chariot Transbordeur Electrique de la Compagnie d'Orleans). M. Sobouret. Describing an improved electric transfer table, requiring no pit to be excavated; the whole structure being above the main track level. 2500 w. 1 plate. Rev Gen des Chemins de Fer—Dec., 1899.

See also **ELECTRIC TRAVERSER.**

**TRANSFORMER.**

See also **ALTERNATOR; ELECTRIC CURRENT CONVERTER; ELECTRIC CURRENT RECTIFIER; ELECTRIC DISTRIBUTION; ELECTRIC TRANSMISSION; INDUCTION COIL; MOTOR GENERATOR; ROTARY CONVERTER.**

Design, Construction and Test of a 1250-Watt Transformer. Henry S. Carhart. Describes the construction of a transformer by two students, under the direction of the writer, in order to determine how far theory dictated correct practice. 1700 w. Elec Wld—Sept. 18, 1897.

The Alternate Current Transformer. J. D. Morse and J. E. Pfeffer. Description of researches with table of principal observations and calculations, and diagrams. 5000 w. Tech—May, 1896.

The Alternate Current Transformer. The first of a series of articles on the construction and design of alternate current transformers, and the part played by them in the distribution of electricity. Serial. Elec, Lond—May 21, 1897.

Transformers. G. W. F. A study of the apparatus and the principles governing its action, with the electrical, magnetic and mechanical features of the design and construction. Serial. Can Elec News—Sept., 1896.

Transformers. James Swinburne. Tracing the developments during the last twenty years. 2400 w. Elec Rev, Lond—Nov. 12, 1897.

**Acheson Graphite Co.**—A Transformer for Furnishing Large Currents. Illustrated description of a transformer of about 450-K.-W. capacity, built for the Acheson Graphite Co. 800 w. Eng News—March 8, 1900.

**Ageing Tests.**—See **Tests, Purdue.**

**American.**—A Complete Test of Modern American Transformers of Moderate Capacities. Arthur Hillyer Ford, with introductory note by Dugald C. Jackson. Complete results of Mr. Ford's transformer tests, which represent the product of all the American makers except two. 7000 w. Bull of Univ of Wis—Vol. 2, No. 1, 1896.

**American Construction.**—See also **INCANDESCENT LAMP.**

**British.**—Transformers in Practice. Traces the improvements in design of transformers, giving illustrated descriptions of three types in favor in England, with general remarks of interest. 5000 w. Engr, Lond—Nov. 25, 1898.

**Buffalo-Niagara.**—Lowering Transformers for Niagara Power. J. S. Peck. Illustrated description of the large transformers recently furnished the Cataract Power & Conduit Co., of Buffalo, N. Y., and the method of regulation employed. 2000 w. Elec Wld—April 9, 1898.

The Transforming Central Station of the Buffalo General Electric Company. Illustrates and describes this station, belonging to the Niagara system, and made necessary for adaptation of Niagara power for the various services. 3800 w. Elec Wld—Jan. 28, 1899.

**Carborundum Plant.**—The New Transformer Equipment of the Carborundum Company at Niagara Falls. J S. Peck. Briefly describes the process of manufacture of carborundum, and the new transformer and regulator recently installed which doubles the capacity of the plant. Ill. 2500 w. Elec Wld—Jan. 7, 1899.

**Consonance.**—Notes on Electrical Consonance. A. W. Chapman. Results showing the effect of capacity in the secondary of a transformer, and that the primary current may be made to lead its E. M. F. for only a limited range of capacities in the secondary. 1200 w. Elec Wld—June 15, 1896.

**Continuous Current.**—See **ELECTRIC CURRENT CONVERTER; MOTOR GENERATOR; ROTARY CONVERTER.**

**Core Losses.**—See **Iron Losses.**

**Current-Rushes.**—Current Rushes into Transformers. R. C. Clinker. An explanation of the rush of current that often takes place through the primary winding at the instant of switching a transformer on to a live circuit. 800 w. Elect'n, Lond—June 15, 1900.

**Curve Analysis.**—An Analysis of Transformer Curves. Charles K. Huguet. Experimental investigations conducted by the writer in Tulane University, with discussion. 4800 w. Trans Am Inst of Elec Engs—May, 1896.

An Analysis of Transformer Curves. Charles K. Huguet. Paper presented at the 13th general meeting of the Am. Inst. of Elec. Engs. Experiments conducted by the writer at Tulane University to investigate a question, which has been subject to an apparent conflict of opinion, by analyzing the current curve into its various components. 1600 w. Elec—May 27, 1896.

Analysis of Transformer Curves. W. G. Rhodes. Mathematical analysis of curves obtained by C. K. Huguet of Tulane University. 700 w. Elec Rev, Lond—Aug. 14, 1896.

See also **Diagram; Theory; ALTERNATING CURRENT; MAGNETIC INDUCTION.**

**Design.**—Alternate Current Transformer Design. The article is a conclusion to a series of articles recently published in this paper, and gives a worked example of a simple design. Ill. Serial. Elec, Lond—Dec. 10, 1897.

Design for a Simple Transformer in Four Sizes. Cecil P. Poole. Illustrates and describes transformers that can be built by any amateur without the use of machine tools. 1200 w. Am Elect'n—July, 1900.

Practical Transformer Calculation. Franz J. Dommerque. The method of calculation is explained. 1800 w. Elec Engng—May 1, 1897.

The Latest Development in Transformer Design and Operation. H. C. Wirt. The reasons why old forms have been discarded; the requirements; and illustrated descriptions. Also discussion. 2800 w. Jour of Elec—Aug., 1900.

The Design of Transformers. Frederick W. Carter. On the best proportions to give to transformer cores, and the most advantageous distribution of the wasted energy, together with a direct method for the design of transformers, in order to obtain maximum all-day efficiency. Discussion. 9000 w. Trans Am Inst of Elec Engs—Nov., 1898.

**Diagrams.**—Experimental Study of Transformer Diagrams. Harry E. Clifford, Nathan Hayward, and Robert Anderson. Descriptive of tests, with graphical representations. 1200 w. Tech Quar—June, 1898.

The Simple Transformer Diagram. Frederick Bedell. The production of an electromotive force in the secondary. The essential relations between the various quantities involved in the simple transformer. 2500 w. Sib Jour of Engng—Nov., 1895.

A New Transformer Diagram. Frank G. Baum. Describes a new method for obtaining the instantaneous values of the primary and secondary currents and magnetic flux of a transformer. 2500 w. Phys Rev—Feb., 1899.

See also **Curve Analysis.**

**Dynamo Distribution Compared.**—Transformers vs. Dynamos. Editorial comment on progress in England in electric lighting, with consideration of whether it is better to generate currents of high potential with a dynamo and transmit them direct, or to generate low-tension currents, transform them up, and then transmit them. Favors the high pressure dynamo. 1800 w. Engr, Lond—May 13, 1898.

**Eddy Current Losses.**—Eddy Current Losses in Transformers. Fitzhugh Townsend. Describes experiments made at Columbia University. 1800 w. Trans Am Inst of Elec Engs—April, 1900.

See also **Iron Losses; ARMATURE; ELECTRIC MACHINERY; HYSTERESIS.**

**Efficiency.**—A Short Method of Determining Transformer Efficiency. S. E. Johannesen. Compares the shorter with the general method, illustrating its advantage. 2500 w. Elec Wld—May 14, 1898.

The Efficiency of the Alternating Current Transformer. Alexander Russell. Describes a graphical method of finding the efficiencies of a transformer at all loads which is simple and gives accurate results. 1700 w. Elect'n, Lond—March 25, 1898.

The Maximum Efficiency of Transformers. Bernard P. Scattergood. Formulae are deduced which it is said may be safely used to determine the conditions of maximum efficiency. 1000 w. Elect'n—May 29, 1896.

Transformer Economy. F. H. Leonard, Jr. Read before the Can. Elec. Assn. On the practical use and high efficiency of the apparatus, and matters relating. Serial. Can Engr—July, 1899.

**Electro-Therapeutic.**—See **ELECTRO-THERAPEUTICS—Transformer.**

**Fault Tests.**—Faults and How to Find Them. Discusses faults in transformers. 1600 w. Prac Eng—Feb. 12, 1897.

**Fleming Lecture.**—Alternate Current Transformers. Abstract of the last of Dr. J. A. Fleming's Cantor lectures on the above subject. 1200 w. Engng—Feb. 14, 1896.

Alternate Current Transformers. Abstract of Dr. Fleming's third Cantor lecture. 1200 w. Engng—Feb. 7, 1896.

Alternate Current Transformers. J. A. Fleming. Cantor lecture delivered Jan. 20, 1896. Explains the action of the transformer. To be followed by other lectures on the construction, testing and employment. 6000 w. Jour Soc of Arts—July 10, 1896.

Alternate Current Transformers. Review of a lecture by Dr. J. A. Fleming, the first of four Cantor lectures on this subject. 1000 w. Engng—Jan. 24, 1896.

**Formulæ.**—Formulae for Transformers. Alexander Russell. In proving the formulae in this paper no assumptions have been made as to the shape of the curve of the applied electromotive force, or as to the shape of the permeability curve of the iron core. Formulae are found for the ordinary transformer with a non-inductive load, then with inductive loads and condenser loads. Also methods of boosting and compensating are discussed. 4500 w. Elect'n—March 26, 1897.

**Helios.**—A New Type of Transformer (Ueber eine Neue Type von Transformatoren). C. P. Feldmann. An illustrated description of the new Helios transformer, in which the method of winding is simplified. 1500 w. Elektrotech Zeitschr—Nov. 2, 1899.

A New Type of Transformer. Illustrates and describes a new type of transformer constructed by the Helios Co., of Cologne, as given in an article by C. P. Feldmann. 700 w. Elec Engr, Lond—Dec. 29, 1899.

**High Potential.**—The Construction of a 150,000 Volt Transformer. Ellery B. Paine and Harry E. Gough. A short description of this piece of apparatus designed and constructed as a subject for post-graduate thesis work at the Worcester Polytechnic Inst. Ill. 1500 w. Elec Wld—July 16, 1898.

See also **Tesla High Potential.**

**Inductive E. M. F.**—Inductive E. M. F. in Transformers. John B. Whitehead, Jr. Deals with the graphic representation of the drop of pressure, and with the algebraic estimation of the inductive drop as dependent upon the relative association of the primary and secondary coils. 2000 w. Elec Wld & Engr—May 5, 1900.

**Inductive Loads.**—Inductive Loads (Arc Lamps and Motors) on Alternating Current Transformers. D. C. Jackson. Abstract of a paper read before the Northwestern Elec. Assn., at Milwaukee. Calls attention to the effect of arc lamps, or fan motors, when connected to transformers. 1500 w. Elec Wld—Feb. 4, 1899.

**Iron Losses.**—Experimental Tests on the Influence of the Shape of the Applied Potential Difference Wave on the Iron Losses of Transformers. Stanley Beeton, C. Percy Taylor, and J. Mark Barr. Read before the Inst. of Elec. Engs. An account of some fairly complete experiments on this subject, which were carried out at the Central Technical College, about one year ago. Work of previous investigators is reviewed, apparatus described, etc., in part first. Serial. Elect'n—May 15, 1896.

Iron Losses in Transformers and the Higher Harmonics in the Potential-Difference Wave. William Beckit Burnie. Criticism of statements made by C. P. Feldman in article entitled "The Influence of the Shape of the E. M. F. Curve upon the Iron Losses of Alternating Current Transformers." 1200 w. Elect'n—Aug. 27, 1897.

Separation of the Iron Losses of a Transformer. H. S. Carhart. A method based on the measurement of these combined losses at two frequencies. 600 w. Elec Wld—March 5, 1898.

The Separation of the Iron Losses in the Transformation of Alternating Currents (Ueber die Trennung der Eisenverluste bei Wechselstrom Transformatoren). W. Peukert. A discussion of the methods of distinguishing between the extent of losses due to eddy currents and hysteresis in transformers. 3000 w. Elektrotech Zeitschr—Sept. 21, 1899.

Transformer Core Losses. W. Elwell Goldsborough. On the improvements in transformers and the effect of the apparatus on the earning capacity of plants, showing the gain that follows the substitution of modern transformers for the antiquated types. 3800 w. Elec Wld & Elec Engr—May 20, 1899.

Transformers: Iron Loss—Its Increase—The Remedy. G. Wilbur Hubley. Read before the Nat. Elec. Lgt. Assn., New York. The writer has studied this subject carefully for several years and gives data, tests, etc., compiled from actual facts and conditions. 2200 w. Elec, N. Y.—June 7, 1899.

See also **Eddy Current Losses; Tests.**

**Leakage Current.**—Loss of Revenue Due to Transformer Leakage Current. Spring S. Armstrong. Showing the poor economy of cheap transformers, and urging the use of the largest transformers possible, looking beyond the immediate future for economies to be effected. 1800 w. Elec Eng—Dec. 25, 1895.

Transformer "Leakage Current." Dugald C. Jackson. Leakage current no longer a criterion of losses in transformers. Data and directions for testing transformers are appended. 1400 w. Am Elect'n—Aug., 1896.

**Losses.**—See **Eddy Current Losses; Iron Losses.**

**Magnetic Leakage.**—A Graphical Treatment of the Effect of Magnetic Leagake on Transformer Regulation. F. G. Baum. Description of method. 1200 w. Elec Wld & Engr—Jan. 13, 1900.

**Niagara-Buffalo.**—See **Buffalo-Niagara.**

**Plates.**—The Geometrical Form of Transformer Plates. George Adams. Treating of the best form of plate, with illustrations and comments. 900 w. Elec Rev, Lond—Dec. 27, 1895.

**Polyphase.**—Tests on Large Polyphase Transformers. Desire Korda. Experimental results obtained by writer. 1400 w. Elec Eng—July 15, 1896.

See also **Three-Phase-Two-Phase; ELECTRIC DISTRIBUTION; ELECTRIC TRANSMISSION.**

**Protective Devices.**—Protective Devices for Transformers. Herbert C. Wirt. Read before the Northwestern Elec. Assn. Calls attention to devices which have been designed to render the transformer absolutely safe. Also suggests precautionary measures. Serial. Elec Rev—Jan. 27, 1897.

See also **LIGHTNING ARRESTER.**

**Ratio.**—A New Method of Determining Ratio of Transformation. J. R. Bibbins. Describes a simple and accurate method that is satisfactory when specially calibrated instruments are not available. 600 w. Elec Wld & Engr—Sept. 9, 1899.

**Regulation.**—On the Predetermination of the Regulation in Alternating Current Transformers. A. E. Kennelly. Gives computations showing that the behavior of a transformer, under any given conditions of primary pressure and secondary load, may be predicted with all desired precision when the three transformer impedances have been found. 500 w. Elec Wld & Engr—Sept. 2, 1899.

The Predetermination of the Regnlation of a Transformer with Non-Inductive Load. F. Bedell, R. E. Chandler, and R. H. Sherwood, Jr. Presented at the Detroit meeting of the Am. Assn. for the Advancement of Science. Gives a method for determining the exact regulation of a transformer without the necessity of applying a load. 2300 w. Elec Wld—Aug. 14, 1897.

Transformer Regulation. Joseph Bijur. An investigation of the causes which produce a drop of potential. 8200 w. Elec Wld—March 27, 1897.

Transformer Regulation. A. R. Everest. Discusses methods of determining the regulation of a transformer. 1800 w. Elec Wld—June 4, 1898.

Transformer Regulation. Frederick Bedell. An explanation of a simple working formula for determining the regulation drop in lighting and power transformers. 900 w. Elec Wld—Oct. 8, 1898.

See also **MAGNETIC LEAKAGE.**

**Rotary.**—See **ROTARY CONVERTER.**

**Rotary Field.**—See **ROTARY CONVERTER—Woodbridge Rotary Field.**

**Schlatter System.**—A Means of Diminishing the Energy Losses in Alternating Current Transformer Distribution. From "L'Industrie Electrique." Describes and illustrates the apparatus devised by Alfred Schlatter. which has given good results. 1800 w. Elect'n, Lond—Jan. 14, 1898.

The Distribution of Alternating Currents by Means of Transformers (Verteilung von Wechselstrom mittels Transformatoren). Showing the relative efficiency of transformers, and describing the Schlatter transformer system. 2500 w. Elektrotech Rundschau—Dec. 1, 1897.

**Station Manager's View-Point.**—Alternating Current Transformers—From the Station Manager's View-Point. W. F. White. Presents some results obtained by a plant in remodeling its transformer system, by using a secondary network, fed by large transformers working in multiple, but located one at each centre of distribution, noting some advantages of the change. 3000 w. Trans Am Inst of Elec Engs—May, 1898.

See also **ELECTRIC STATION MANAGEMENT.**

**Tesla High-Potential.**—Tesla's High-Potential Transformer. Explains the plan of winding the coils, the connection, and manner of using, stating some of the advantages. 900 w. Elec Eng, N. Y.—Nov. 11, 1897.

See also **ELECTRIC INVENTION; INDUCTION COIL.**

**Testing.**—A Differential Method for Testing a Single Transformer. S. E. Johannesen. Describes a method devised by the writer, by which a single transformer may be tested under actual working load conditions with an energy consumption equivalent to the transformer losses alone. 1700 w. Elec Wld & Elec Engr—July 29, 1899.

Practical Methods of Transformer Testing. J. H. Barbour and K. G. Glover. Abstract of a thesis test. Gives methods used. Ill. 900 w. Sib Jour of Engng—Feb., 1898.

Transformer Testing for Central Stations. J. H. Perkins. The paper points out the extensions and changes which practice has shown to be desirable in the methods used. 2500 w. Wis Engr—May, 1899.

**Tests.**—See also **Fault Tests; Iron Losses.**

**Tests, Purdue.**—Transformer Core Ageing Tests. W. Elwell Goldsborough. A report of experimental investigations. 1800 w. Elec Rev, N. Y.—Oct. 17, 1900.

Transformer Economy. Winder Elwell Goldsborough. Abstract of paper read before the Nat. Elec. Lgt. Assn., at Chicago. Discusses the results of a test at Purdue laboratories of a number of transformers of recent design, giving also much information about transformers. 4200 w. Elec Wld—June 25, 1898.

Transformer Tests. W. Elwell Goldsborough. Abstract of a paper read before the Nat. Elec. Lgt. Assn., New York. Reports the results of a series of tests made at the electrical laboratories of Purdue University. Five different transformers were tested with gratifying results. 3700 w. Eng News—June 1, 1899.

**Theory.**—A Discussion of the Operation of the Alternating Current Transformer (Ueber Auffassung und Darstellung der Vorgänge im Wechselstromtransformator). Dr. C. Heinke. A very thorough mathematical treatment, using both graphical and analytical methods. Three articles. 12000 w. Elektrotech Zeitschr—March 2, 9, 16, 1899.

Simple Analytical Theory of the Transformer. Frederick Bedell. Mathematical. 1200 w. Sib Jour of Engng—Dec., 1895.

See also **Curve Analysis; Wave Form Effects.**

**Three-Phase-Two-Phase.**—Design, Construction and Test of a 2½ K. W. Three-Phase, Two-Phase Transformer. A. F. McKissick. Describes work done by T. G. Connor and B. S. Patrick, under the direction of the writer to determine how far theory dictated correct practice. 1200 w. Am Elect'n—July. 1898.

Transformation from Three-Phase to Two-Phase Currents. P. G. Watmough. An illustrated explanation of the manner in which the change is effected. 700 w. Elec Wld & Elec Engr—July 22, 1899.

**United States.**—See **American.**

**Wave-Form Effects.**—The Effect of Alternating Current Wave-Forms on Transformer Losses. Louis Duncan, Ferd B. Keidel, William L. Hodges and Edmund Frank. Diagrams and report of investigations. 1100 w. Elec Rev, N. Y.—April 26, 1899.

See also **Curve Analysis; Iron Losses.**

**Welding.**—A Design for a Small Welding Transformer. George T. Hanchett. An illustrated description of a simple device of this class, which can be made from cheap materials with simple tools. 2000 w. Am Mach—Jan. 26, 1899.

Miscellaneous Shop Uses of the Welding Transformer. George T. Hanchett. Notes briefly some of the applications. 700 w. Am Mach—March 23, 1899.

See also **ELECTRIC WELDING.**

**TRANSFORMER PATENT.**

See also **ELECTRIC PATENTS.**

**Zipernowski - Déri.**—The Zipernowski - Déri-Blathy Transformer Distribution Patents. Text of two patent specifications that have recently expired, which, it is claimed cover the general principles governing practical transformer construction and alternate current distribution. 2400 w. Elect'n, Lond—April 21, 1899.

The Zipernowski-Déri Patent. Full text of this patent for a system of transformer distribution, with both the provisional and complete specification. 4000 w. Elec Eng, Lond—Aug. 12, 1898.

**TRANSIT.**

See **SURVEYING INSTRUMENT.**

**TRANSPORT.**

See also **TRANSPORT SERVICE.**

**"Grant."**—Special Government Vessels. The Army Transport "Grant" and sister ships. William A. Fairburn. An account of the refitting of the vessels purchased of the Atlantic Transport Line. Ill. 4500 w. Marine Engng—March, 1899.

**"Hardinge."**—Launch of Troopship "Hardinge." A general description of a British troopship, recently launched on the Clyde. 1300 w. Marine Rev—Sept. 13, 1900.

The Indian Troopship "Hardinge." Illustrated description of a twin-screw vessel with a gross tonnage of about 5600 tons, and a capacity for 1400 troops and all accoutrements. 1700 w. Engr, Lond—Aug. 17, 1900.

**"Kildonan Castle."**—The Transport of Troops. Illustrates the Castle Liner "Kildonan Castle" as a troopship, considering its fittings as ideal for this purpose. 1000 w. Engng—Nov. 17, 1899.

**TRANSPORTATION.**

See also CANAL; CONVEYER; MECHANICAL HANDLING; RAILWAY TRANSPORTATION; ROAD; TRANSPORT; WATERWAY.

The Relative Size of the Trading World in 1860 and in 1896. A well written, thoughtful and suggestive editorial with statistics of the growth of railway and marine facilities for transportation, compiled from authoritative sources. 2500 w. Eng News—Sept. 17, 1896.

**Bosnia and Herzegovina.**—Road and Railway Communication in Bosnia and Herzegovina. Treats briefly of the excellence attained in the last twenty years in internal traffic communications. 2000 w. Eng, Lond—Oct. 30, 1896.

**Canal.**—See Railway vs. Canal; CANAL; WATERWAY.

**China.**—See Hand Power, China.

**Coal.**—See COAL TRANSPORTATION; MINERAL TRANSPORTATION.

**Colombia.**—Difficulties of Transportation in the Tropics. C. P. Yeatman. Picturing the workings of competition between the locomotive and the mule. Ill. 4100 w. Eng Mag—Aug., 1897.

See also ENGINEER—Tropical Service.

**Country Districts.**—The Improvement of Transportation in Country Districts. E. E. Russell Tratman. Read at meeting of the Illinois Soc. of Engs. & Surv. Discusses roads and their improvement, the building of a railway, etc. 2200 w. Brick—April, 1898.

See also ROAD.

**East River, N. Y.**—Plans for Increasing Transportation Facilities in and about New York, East River Transit. A discussion of the projects to bridge or tunnel the North and East Rivers, with information of the present standing of each scheme. Ill. 8400 w. Eng News—Nov. 18, 1897.

See also BRIDGE; TUNNEL.

**England.**—See WATERWAY.

**Goods in Cities.**—The Transportations of Goods in Towns and Cities. Editorial considering the problem of the cheaper transportation of goods through city streets, pointing out the fact that this work is at present done in an inefficient and extravagant manner, whereas it might, by a systematic organization, be conducted at a small part of its present cost. 2500 w. Eng News—May 14, 1896.

**Great Lakes.**—See GREAT LAKES—Transportation; IRON ORE TRANSPORTATION.

**Hand Power, China.**—Transporting Heavy Masses without the Use of Wheeled Vehicles. W. F. Durfee. Describes a method of carrying a heavy weight a distance by manual power, in use by the Chinese. Ill. 900 w. Am Mach—Sept. 1, 1898.

**Hudson River. N. Y.**—Plans for Extending Transportation Facilities in and About New York—North River Transit. Presents the schemes under discussion for crossing the North River and the cause of their being thus far unable to secure the necessary capital. 3300 w. Eng News—Nov. 25, 1897.

See also BRIDGE; TUNNEL.

**Iron Ore.**—See IRON ORE TRANSPORTATION.

**Klondike.**—Transportation Routes to the Klondike. A summary of the reported routes existing and projected. 1200 w. Ry Age—Aug. 6, 1897.

See also GOLD REGION.

**Madagascar.**—See MADAGASCAR; ROAD.

**Mechanical.**—See CABLEWAY; CONVEYOR; MECHANICAL HANDLING; TRANSPORTER.

**Mine.**—See also MINE HAULAGE; MINE ROAD.

**Mine, Wheel and Pack.**—Wheel and Pack Transport for Mines. C. C. Longridge. Considers the systems of transport and the kind of transport, discussing the advantages under various conditions. 3000 w. Engr, Lond—March 9, 1900.

**Mineral.**—See COAL TRANSPORTATION; MINERAL TRANSPORTATION.

**Mining.**—See MINING—Transportation.

**Mining Machinery.**—Transporting Mining Machinery. Transporting an 800-lb. cam shaft through a timbered country to an Oregon gold mine. Ill. 600 w. Min & Sci Pr—Feb. 15, 1896.

**New York.**—The Transportation Problem in New York City. The editor thinks the present transportation systems overcrowded, but says the free spirit of Americans will rebel at any underground transportation scheme, and further that easy transportation induces increased traffic. 1600 w. Sci Am—Jan. 25, 1896.

The Transportation Problem in New York City. Suggestions for increasing the facilities of the elevated roads, the Broadway cable road, and the Brooklyn bridge road. 1800 w. Sci Am—Feb. 22, 1896.

See also East River; Hudson River; BRIDGE; CITY RAILWAY; ELECTRIC CONDUIT TRAMWAY;; ELEVATED RAILWAY; RAILWAY TERMINAL; STREET RAILWAY; TALL BUILDING; TRAIN SERVICE; TUNNEL; UNDERGROUND RAILWAY.

**New York Ocean.**—See OCEAN; STEAMSHIP.

**Ocean.**—Rates of Speed and Rates of Freight. Their relation is ably considered. The limit of 19½ knots, with 7 days limit of time for remaining in port is fixed as the speed for maximum profit, for a ship of 10000 tons burden. Above this speed profits rapidly diminish. 2800 w. Engr, Lond—Feb. 28, 1896.

Sea Borne Traffic. James Adamson. Abstract of paper read before the Inst. of Marine Engs. Notes the great improvements in water transportation, the advantages, cost, etc. 1800 w. Ir & Coal Trds Rev—May 4, 1900.

See also Transatlantic; MERCHANT MARINE; NAVIGATION; SHIP—Loading; STEAMSHIP.

**Ocean, Eastern Asia.**—Ocean Transportation to Eastern Asia. Eugene T. Chamberlain. The importance of improved facilities for ocean transportation is shown. 2000 w. N Am Rev—July, 1900.

**Paris.**—Public Transportation Facilities in Paris and its Vicinity (Les Transports en Commun dans Paris et sa Banlieue). Charles Jean. A review of the present and proposed facilities, including omnibuses, horse, steam, and cable tramways, and steam railways, in view for the heavy demands upon the service expected during the Exposition. Serial. Génie Civil—Jan. 13, 1900.

See also Paris Exposition: AUTOMOBILE—Cab; AUTOMOBILE COMPETITION—Cab; ELECTRIC CONDUIT TRAMWAY; ELECTRIC RAILWAY; ELECTRIC TRAMWAY; RAILWAY TERMINAL; STREET RAILWAY; UNDERGROUND RAILWAY.

**Paris Exposition.**—Facilities for Handling Crowds at the Paris Exposition. Abstract translation from "Le Chemin de Fer." Brief account of the arrangements being made for the transportation of the immense crowds expected. 1100 w. Ry & Engng Rev—Dec. 2, 1899.

Local Transportation at the Paris Exposition. Henry Harrison Suplee. Discusses the problems of city-traffic and describes the solution found in connection with the Exposition, especially the travelling sidewalk. Ill. 2600 w. Eng Mag—Aug., 1900.

The Approaches and Transportation Facilities of the Paris Exposition of 1900. E. L. Corthell. Information collected during a recent visit, including illustrated description of the engineering works connected with the subject. 7500 w. Pro of Am Soc of Civil Engs—Jan., 1899.

Transportation at the Paris Exposition (Die Weltausstellung in Paris, 1900. Das Verkehrswesen). Dr. J. Kollmann. A criticism of the transportation exhibit, and general description of local transportation about the Exposition, particularly of the moving sidewalk. Serial. 1st part. 4000 w. Zeitschr d Ver Deutscher Ing—July 21, 1900.

Transportation Systems of the Paris Exposition. Illustrated detailed description of the three means of travel provided; the moving sidewalk, the electric railroad, and the extension of the Railroad of the West. 2500 w. St Ry Jour—May 5, 1900.

See also MOVING SIDEWALK: MOVING STAIRWAY; PARIS EXPOSITION—Construction; STREET RAILWAY—Paris; TRANSPORTATION EXHIBIT.

**Rail vs. Water.**—See Railway vs. Canal.

**Railway.**—See RAILWAY TRANSPORTATION.

**Railway vs. Canal.**—Our Railroads and Our Canals. George H. Daniels. Extracts from an address delivered before the Utica Chamber of Commerce. 1700 w. Ry & Engng Rev—Feb. 24, 1900.

Railroads versus Canals. J. A. Latcha. Arguments against canal building, especially the Nicaragua canal, and urging the development of railroads, and lessening the cost of operation, enabling the commodities of the United States to be delivered in Europe and Asia, at prices that would undersell the world. 7500 w. N Am Rev —Feb., 1898.

Rail vs. Water Transportation: A Defence of the Latter. Letter from Chauncey N. Dutton, with editorial reply. 3000 w. Eng News—Nov. 23, 1899.

The Comparative Cost of Rail and Water Transportation in Europe. Information from important treatises of European engineers of high standing, giving facts regarding foreign costs of transportation. 2800 w. Eng News—July 19, 1900.

**Railway vs. Canal, France.**—The Cost of Transport (Les Prix de Transport). A discussion of the relative cost of merchandise transport in France by rail and by canal, showing the economy of canal transport to be less than is generally supposed. 1500 w. Moniteur Industriel—Sept. 17, 1898.

**Rhine Valley.**—Commercial Facilities of the Rhine Valley. Information respecting the transportation between Mannheim, an important commercial center in southern Germany, and the seacoast. 900 w. U S Cons Repts No. 312—Dec. 30, 1898.

**Road.**—See **ROAD TRAFFIC.**

**South Africa.**—Transport Problems in South Africa. Discusses the questions of ocean transport, railway communication, etc. 2200 w. Trans—Oct. 23, 1896.

See also **RAILWAY.**

**Transatlantic.**—See also **Ocean; STEAMSHIP.**

**Transatlantic Passenger.**—Transatlantic Passenger Traffic. Editorial. Review of official returns for 1895. 800 w. Engng—Jan. 31, 1896.

Transatlantic Passengers. Interesting statistics of the passenger traffic entering and leaving New York during the past year. 1000 w. Engng—Feb. 3, 1899.

**Works.**—Means of Transport in and About Works. Jenner G. Marshall. From a paper read before the South Staffordshire Inst. of Iron & Steel Works Managers. Considers fixed means, including canal and dock basins, railways, cranes, elevators, conveyors, capstans and rope-haulage; and movable, including carts, trolleys, sliding skids, ways and rollers, traction engines, etc. 3300 w. Col Guard—March 30, 1899.

See also **CONVEYOR; MECHANICAL HANDLING; TRANSPORTER.**

**TRANSPORTATION EXHIBIT.**

See also **LOCOMOTIVE EXHIBITION; PARIS EXPOSITION; RAILWAY EXHIBITION; TRANSPORTATION—Paris Exposition.**

**Paris.**—Paris Exposition Notes. Illustrated description of some of the railway and tramway exhibits. 1500 w. St Ry Jour—Aug. 4, 1900.

**United States at Paris.**—At the Paris Exposition. The United States Transportation exhibits at Vincennes illustrated and described. 2000 w. Ry Age—Sept. 14, 1900.

**TRANSPORTER.**

See also **CABLEWAY; CONVEYOR; MECHANICAL HANDLING.**

**Temperly.**—The Temperly Transporter. The transporter consists of an I beam supporting a travelling carriage. It is portable and easily adapted to any condition. Ill. 1300 w. Ind & Ir—Dec. 20, 1895.

**TRANSPORT SERVICE.**

See also **TRANSPORT.**

**U. S. Army.**—Transport Service of the United States Army. Describes the ships and their equipment and comments on the speedy organization. Ill. 2500 w. Marine Rev—Sept. 28, 1899.

Work of the U. S. Army Transport Service at San Francisco, Cal. An illustrated account of difficulties met and conquered in the transportation of 40,000 troops across the Pacific to the Philippines. 1800 w. Marine Engng—Feb., 1900.

**TRAVELING ENGINEERS.**

See **RAILWAY ASSOCIATION; RAILWAY EMPLOYEE.**

**TRAVERSER.**

See also **TRANSFER TABLE.**

**Electric.**—See **ELECTRIC TRAVERSER.**

**TREE.**

See also **FORESTRY; LANDSCAPE ARCHITECTURE; PARK; TIMBER; WOOD.**

**Protection.**—Dangerous Enemies of Trees. Editorial on the beauty and care of trees bordering streets, the necessity of awakening public sentiment for their protection, etc. 1500 w. Gar & For—April 8, 1896.

**Washington Streets.**—Tree Planting in the Streets of Washington. William P. Richards. An outline of this enterprise which is under the direction of the District authorities, with facts and opinions relating to it. 2400 w. Munic Engng——Nov., 1898.

**TRENCH MACHINE.**

See also **CAR—Ditching; DITCHING MACHINE; STEAM SHOVEL.**

A New Trench Machine. Illustrated description of a machine of the steel trestle type, put on the market by the Potter Mfg. Co. of Indianapolis. 500 w. Eng News—April 28, 1898.

**TRESTLE.**

See also **BRIDGE—Trestle; Wooden; RAILWAY BRIDGE; VIADUCT.**

Economical Designing of Timber Trestles. A. L. Johnson. Abstract from Bull. No. 12, of the U. S. Division of Forestry, giving also Mr. Lindenthal's comments thereon. The various designs are illustrated and dimensions and formulae given for making calculations. 2700 w. Ry Rev —March 21, 1896.

**Earthwork.**—See **EARTHWORK—Trestle Replacing.**

**Electric Railway.**—Trestle for Single-Track Electric Railway. Description with specifications. The bents and framing on a 350-ft. radius curve are illustrated fully. 600 w. Eng News—April 16, 1896.

See also **VIADUCT.**

**Fire Protection.**—Protection of Trestles from Fire, Including Methods of Construction. Report of G. W. Hinman to the Convention of Ry. Supts., with design and discussion. 1500 w. Pro of Assn of Ry Supts—Oct., 1896.

**Flume.**—Trestle for Carrying a Flume at Saltville, Va. Emile Low. Description, with illustrated details, of trestle designed for a special purpose. 900 w. Eng News—Oct. 1, 1896.

**Temporary.**—Temporary Trestles over Washouts. Abstract from a committee report to the Assn. of Supts. of Bridges and Buildings, with details of methods considered best in opening the road to traffic. 1200 w. R R Gaz—Nov. 15, 1895.

Building Temporary Trestles. A paper read before the Assn. of R. R. Supts. of Bridges and Buildings on methods of handling wrecks, replacing trestles, bridging washouts, and expedients for similar emergencies. 3800 w. Ry Age —Nov. 22, 1895.

Building Temporary Trestles Over Washouts and Burnouts. George J. Bishop. A paper prepared for the Amer. Assn. of Bridges & Buildings, but not read. The article treats of the organization and equipment required for such emergencies, with special reference to repairs of badly side washed embankments. 3000 w. Ry Age—Jan. 3, 1896.

Methods and Special Appliances for Building Temporary Trestles Over Washouts and Burnouts. Discussion at sixth annual convention of the Assn. of Ry. Supts. of Bridges and Buildings. 2800 w. Pro of Assn of Ry Supts—Oct., 1896.

**TROLLEY.**

See also **ELECTRIC TRAMWAY; OVERHEAD TRAMRAIL.**

**TROLLEY PATENT.**

See also **ELECTRIC PATENT.**

The Trolley Opinion. Opinion of Judge Townsend in the case of Thomson-Houston Electric Company vs. The Winchester Avenue Railway Company. An important decision affecting the electric railway industry. 3500 w. Elec Ry Gaz —Dec. 14, 1895.

**Base.**—The Trolley Base Suit. Decision just rendered by the Circuit Court of Appeals in New York, involving the manufacture and use of trolley bases. Opinions in full, with editorial. 4200 w. Elec Eng—Aug. 5, 1896.

**Van Depoele.**—The Van Depoele Trolley Decision. George H. Benjamin. The writer thinks the General Electric Company still controls the "so-called trolley invention." 1700 w. Elec Rev— Aug. 4, 1897.

### TROLLEY WIRE.

See ELECTRIC LINE; ELECTRIC TRAMWAY—Overhead Construction.

### TROOPSHIP.—See TRANSPORT.

### TRUCK.

**Automobile.**—See AUTOMOBILE; AUTOMOBILE COMPETITION; ELECTRIC VEHICLE; GASOLINE VEHICLE; STEAM VEHICLE; TRACTION ENGINE.

**Car.**—See CAR TRUCK.

**Electric Locomotive.**—A Passenger Locomotive Truck. Illustrates and describes a truck built by the J. G. Brill Co., of Phila., to carry an electric passenger locomotive which shall not only haul a train but carry passengers. 1800 w. Ry Wld—Sept. 8, 1898.

Special Brill Truck for a 96,000-lb. Locomotive Passenger Car. Illustrates a special truck built for a locomotive-passenger car being constructed in France for high-speed electric railway service. 900 w. Eng News—May 19, 1898.

**Kinetic Motor.**—See KINETIC MOTOR.

**Locomotive and Electric Car.**—Parallel in the Development of the Locomotive and Electric Car Truck. John A. Brill. Illustrated account showing a remarkable and interesting parallel in the successive steps by which the development has progressed. 1500 w. Ry Wld—June 8, 1899.

**Locomotive Swivel.**—The Busse Locomotive Swivel Truck (Laufachseneinrichtung für Schienenfahrzeuge, Bauart Busse). A form of single swivel axle to be used both forward and as a trailer for locomotives for use on sharp curves. 1200 w. Glaser's Annalen—Nov. 15, 1897.

See also LOCOMOTIVE—Rail Wear.

**Street Railway.**—See also RAIL—Street.

### TRUSS.

See also BRIDGE; BRIDGE DESIGN; FLOOR; FRAMEWORK; GIRDER; ROOF TRUSS.

**Brooklyn Bridge.**—Buckling of Trusses on Brooklyn Bridge. Editorial on the recent anxiety concerning the safety of this bridge, describing the cause of the buckling of the four main trusses. 500 w. R R Gaz—Aug. 5, 1898.

See also BUCKLING.

**Roof.**—See ROOF TRUSS.

**Scissors.**—How to Determine the Stresses in Scissors Trusses. F. E. Kidder. An explanation of the peculiarities in the application of the method for determining stresses in this type, which is much used in roofing. Ill. Serial. Archts' & Builds' Mag—Jan., 1900.

**Suspended Railway.**—See SUSPENDED RAILWAY—Truss.

**Timber.**—Experiments on Full-Sized Timber Trusses. G. K. Scott-Moncrieff. The object of the experiments described was to ascertain whether trusses, as constructed according to English practice, had any advantages over others designed more in accordance with theory, and more economical in material. Ill. 3000 w. Jour of Roy Inst of Brit Archt's—Jan. 14, 1899.

See also BRIDGE—Wooden; TRESTLE.

**Waddell.**—See BRIDGE—Kansas City, Pittsburg & Gulf Ry.

**Waldorf Hotel.**—A Large Truss in the Waldorf Hotel Extension, New York City. An interesting piece of structural work in the shape of a great truss carrying a floor so as to leave a room free from columns. Illustrations, with description of the special methods required for the work. 1400 w. Eng News—March 5, 1896.

### TRUST.

The Strength and Weakness of the Trust Idea. John Graham Brooks. An acknowledgment of the merits which the trust can claim as an aid to organizing industry, and an arraignment of the abuses and evils which attend the craze for combinations. Full publicity and access to information is proposed as a remedy. 4500 w. Eng Mag—Dec., 1899.

### TUBE.

See also PIPE; TUBE MANUFACTURE.

**Aluminum Bronze.**—See ALUMINUM BRONZE—Tubing.

**Bicycle.**—See Strength; BICYCLE; BICYCLE MANUFACTURE; TUBE MANUFACTURE.

**Boiler.**—See BOILER; TUBE MANUFACTURE; WATER-TUBE BOILER.

**Crookes.**—See CATHODE RAYS; ELECTRO-PHYSICS; RADIOGRAPHY; ROENTGEN RAYS; VACUUM TUBE.

**Steel.**—Steel Tubes. H. K. Landis. The use and strength of steel tubes, with brief description of process of making. 900 w. Am Mfr & Ir Wld—Sept. 18, 1896.

See also Bicycle; Strength.

**Strength.**—Strength of Tubing. Oberlin Smith. The lack of data and the urgent need of more light upon this subject and agreement upon standard specifications are topics discussed. 1000 w. Ir Age—July 2, 1896.

Strength of Bicycle Tubes. Oberlin Smith. Reviews briefly seamless tube drawing and describes tests made, giving results of some 28 tests of pieces about 15 inches long. Ill. 1900 w. Jour Gas Lgt—Aug. 8, 1899.

**Vacuum.**—See VACUUM TUBE.

### TUBE MANUFACTURE.

See also PIPE MANUFACTURE; TUBE.

**Alma Works, Walsall.**—The Alma Tube Works. An account of the works at Walsall, Eng., giving an abstract of a specification for solid-drawn plain steel tubes, showing how severe are the requirements. The process is described. 3000 w. Engng—July 30, 1897.

**Bicycle.**—The Manufacture of Bicycle Tubing. Illustrated detailed description of the plant of the Pope Tube Co., of Hartford, Conn., manufacturers of bicycle tubing. 4800 w. Ir Age—Jan. 7, 1897.

See also BICYCLE MANUFACTURE.

**Boiler.**—See Boulet; BOILER CONSTRUCTION; BOILER MANUFACTURE; WATER-TUBE BOILER.

**Boulet.**—The Manufacture of Iron Boiler Tubes (Fabrication des Tubes à Fumée en Fer). Describing the Boulet system of making lap welded boiler tubes, with illustrations of the machines and description of the methods of testing the finished product. 3000 w. Génie Civil—Sept. 11, 1897.

The Manufacture of Metallic Tubes by the Boulet Process. Detailed illustrated description of processes of making butt-welded tubes, lap-welded tubes, Mannesmann tubes, and tubes by a new process called the Boulet process. 2900 w. Sci Am Sup—Feb. 29, 1896.

**Casting Ingots.**—Casting Solid Pig Ingots for Drawing Tubes. Walter J. May. Suggestions that may be helpful in producing good castings. 1500 w. Prac Engr—Sept. 28, 1900.

**Coatbridge, Scotland.**—See IRON INDUSTRY—Scotland.

**Dick Extrusion Process.**—The Production of Tubes and Rods by Means of Hydraulic Presses (Die Erzeugung von Rohren und Stangen Mittelst Hydraulischer Presse). Otto Weiss. A paper before the German Society of Mechanical Engineers describing Dick's process of forming tubes of various sections from ductile metals. 4000 w. Glaser's Annalen—Jan. 15, 1899.

The Production of Metallic Tubes by Extrusion. Illustrates and describes the system invented by Alexander Dick. 1800 w. Engng—Jan. 6, 1899.

**Erhardt Process.**—The Manufacture of Seamless Tubing (Verfahren zur Herstellung von Nahtlosen Hohlkörpern). H. Zobler. A description of the Erhardt process, by which a steel mandrel is pressed through the solid blank, which is afterwards drawn. 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 10, 1900.

Erhardt Process for Tubular Bodies. From the repotr of the U. S. Consul General at Frankfort. A method of forming tubes by forcing a mandrel into the hot metal contained in a matrix which is the shape desired in the finished piece. It is said to be an excellent process. 1100 w. Ir Tr Rev—Nov. 21, 1895.

**Iron and Steel.**—The Manufacture of Iron and Steel Tubes. Edward C. R. Marks. The subject will be confined to butt and lap welded tubes of iron, open or close jointed and consolidated tubes, and processes for the production of weldless or seamless steel tubing for the construction of bicycle frames and for other purposes. Serial. Prac Eng—Nov. 20, 1896.

See also Steel.

**McCool Seamless.**—The McCool Seamless Tubing. An illustrated account of the manufacture of seamless steel tubing by a new process of rolling. 1200 w. Am Mfr & Ir Wld—Nov. 11, 1898.

illustrated account of the Perrin process of making wrought iron tubes, which requires only two heats and two operations. 500 w. Ir & Coal Trds Rev—Sept. 14, 1900.

**Ribbed Seamless.**—A Machine for Drawing Seamless Steel Tubes with Longitudinal Ribs. Illustrated description of the methods of manufacture, and statement of advantages claimed. 1200 w. Eng News—March 1, 1900.

The Production of Ribbed Tubes and Poles (Herstellung von Rippenrohren und Rohrmasten). Otto Klatte. Describing a method of rolling seamless ribbed tubing from the ingot, for use as trolley poles, etc. 2000 w. Stahl und Eisen —March 1, 1899.

**Seamless.**—Method of Manufacture and Tests of a New Seamless Tube. R. C. Carpenter and P. J. Fickinger. Describes a new form of tubing made by drawing lap-welded steel tubing until the desired gauge is obtained. The process is fully described, and the high quality of the product shown by the results of tests. 2500 w. Am Soc of Mech Engrs, No. 785—June, 1898.

The Production of Seamless Tubing. H. S. Wilson. Describes the oldest methods and traces the various changes which have led to modern practice. Ill. 4900 w. Jour Assn of Engng Socs —June, 1899.

See also **Erhardt; McCool; Ribbed.**

**Steel.**—The Steel Pipe and Tube Industry. Illustrated detailed description of the work as carried on by the National Tube Works Co. Serial. Sci Am—Oct. 23, 1897.

See also **Bicycle; Iron and Steel.**

**TUG BOAT.**

See **TOW BOAT.**

**TUNGSTEN.**

See also **METAL—Rare; RARE METAL; STEEL —Special; STEEL ALLOY.**

**New South Wales.**—Tungsten Ores in N. S. W. Joseph E. Carne. Memoranda respecting the occurrence in this colony. No payable deposits have yet been discovered. 2 parts. 3800 w. Aust Min Stand—Jan. 6, & 13, 1898.

**TUNNEL.**

See also **INTAKE; MINING; SUBWAY; TUNNEL VENTILATION; UNDERGROUND RAILWAY.**

Famous Tunnels. A few particulars respecting some of the more famous tunnels in the world. 1400 w. Ill Car & Build—April 3, 1896.

Notes on Tunneling. Abstract of remarks by Sir Benjamin Baker on the behavior of earth through which tunnels are driven. 1300 w. Eng Rec—July 8, 1899.

**Alpine.**—The Great Alpine Tunnels. Francis Fox. A discourse delivered at the Royal Inst. Considers tunneling and the remarkable instances of the past, discussing in detail the Mont Cenis, St. Gothard and Simplon tunnels. Ill. 4000 w. Nature—July 19, 1900.

See also **Arlberg; Simplon; MOUNTAIN RAILWAY; RAILWAY; TUNNEL VENTILATION.**

**Argo.**—Argo or Newhouse Tunnel. Arthur Lakes. The purpose for which it is being driven and the method of driving. Ill. 3800 w. Mines & Min—Aug., 1900.

**Arlberg.**—See **LIQUID FUEL; RAILWAY; TUNNEL VENTILATION.**

**Baden Railways.**—Some Tunnel Reconstruction on the Baden State Railways (Ueber einige Tunnel-Umbauten auf den Grossh. Badischen Staats-Eisenbahnen). J. Rosshändler. An illustrated account of the rapid repairing and enlargement of three tunnels, without interrupting traffic. 1100 w. Deutsche Bauzeitung—June 23, 1900.

**Beach Broadway.**—See **New York.**

**Berlin.**—See **Spree River.**

**Blackwall, London.**—The Blackwall Tunnel, London. Illustrations and brief description of the construction, of interest in connection with the project for connecting Brooklyn and Manhattan by tunnel. 1800 w. Sci Am—April 7, 1900.

The Blackwall Tunnel Beneath the Thames. Illustrated detailed description with information regarding cost, machinery, etc. 7000 w. Sci Am Sup—July 3, 1897.

The Blackwall Tunnel. An account of the inauguration ceremony, and a description of a tunnel 27-ft. in external diameter, and 6200-ft. long,

ficulties and at a cost of over 1,000,000 pounds. 2700 w. Trans—Nov. 1, 1895.

The Blackwall Tunnel. An editorial account of a visit to the recently completed subaqueous portion of this important work. Remarks followed by a description of the construction. 2500 w. Builder—Nov. 2, 1895.

The Blackwall Tunnel. The description is well illustrated, and the manner of overcoming the unusual difficulties encountered is fully treated. 5000 w. Eng, Lond—Dec. 27, 1895.

The Blackwall Tunnel. Illustrated description of this interesting engineering work recently completed and opened. 4500 w. Eng, Lond—May 21, 1897.

The Opening of the Blackwall Tunnel. Reviews the history of the project. 8000 w. Trans—May 28, 1897.

See also **Greathead; Shield; Thames.**

**Boston.**—See **Shield, Boston; TUNNEL VENTILATION; UNDERGROUND RAILWAY.**

**Boston Harbor.**—The East Boston Tunnel. Illustrated description of the double-track street-railway tunnel now being constructed under Boston Harbor by the Boston Transit Commission. 1000 w. Eng Rec—June 2, 1900.

**Budapest Water-Works.**—See **WATER-WORKS—Budapest Tunnel.**

**California Mine.**—See **Mine, California.**

**Cascade, Washington.**—Survey and Construction of the Cascade Tunnel by the Great Northern Railway Through the Cascade Range, State of Washington. M. E. Reed. An illustrated account of the work. 2400 w. Engs' Year Book, Univ of Minn—1900.

Survey and Construction of the Cascade Tunnel by the Great Northern Railway Through the Cascade Range, State of Washington. M. E. Reed. Illustrated account of a tunnel being constructed by the most improved methods. 2500 w. Engs' Year Bk., 1900—Univ of Minn.

See also **SWITCHBACK.**

**Cast Iron Segments.**—Cast Iron Segments for Railway and Other Tunnels. Evelyn G. Carey. Paper read before the Inst. of Engs. and Shipbuilders. The method of casting and joining the segments is described and fully illustrated while a number of cases are given to show variation in form due to different requirements. 5000 w. Ind & Ir—Jan. 31, 1896.

**Chattanooga Mountains.**—Repairing a Tunnel on the Western and Atlantic R. R. W. H. Whorley. Read before the Engng. Assn. of the South. Describes this work on a tunnel passing through a ridge in the Chattanooga Mts. It was carried on without interrupting traffic. 1600 w. Eng News—Jan. 26, 1899.

**Chicago.**—Municipal Tunnel Driving by Day Labor, Chicago. Paul G. Brown. Illustrated description of the methods employed by the city in completing, at much less than the contract price, tunnel operations which had been abandoned by the contractors. 1800 w. Eng Rec—Feb. 3, 1900.

See also **Shield, Hastings, Chicago.**

**Cleveland Water Main.**—A Submerged Water Main Tunnel, Cleveland, O. Illustrated description of a tunnel 575 feet long, carrying a 48-in. riveted-steel pipe under a river. 1600 w. Eng Rec—Oct. 22, 1898.

**Colorado Mine.**—See **Mine, Colorado.**

**Compressed Air.**—Experience with Compressed Air Tunnelling. Abstract of a paper by George Henry Dunlop, read before the Victorian Inst. of Engs. at Melbourne, giving the writer's experience with hydraulic shield tunnelling in connection with sewerage and other work, and referring to the relative advantages and disadvantages of each system. 4000 w. Engng—Nov. 11, 1898.

Tunnelling by Compressed Air. E. W. Moir. Read before the Soc. of Arts. Illustrated review of "shield-driven" tunnels, dating from the time of Brunel. The description of the work done by compressed air is very interesting. 10500 w. Jour of Soc of Arts—May 15, 1896.

See also **COMPRESSED AIR; COMPRESSED AIR PLANT; MINING; ROCK DRILL.**

**Cowenhoven.**—See **Mine, Colorado.**

**East River, N. Y.**—The Proposed East River Tunnel. Brief account with illustrations of the tunnel proposed by the Long Island Railroad Co., with references also to other projects. 1200 w. Sci Am—July 1, 1899.

See also BRIDGE; RAILWAY PROJECT—Long Island; UNDERGROUND RAILWAY—Brooklyn-New York.

**Gardanne, Marseilles.**—The Construction of a Subterranean Gallery Which is to Connect the Lignite Mines of Gardanne, near Marseilles, with the Sea (Mines de Lignite de Gardanne Bouches-du-Rhone Construction d'une Galerie Souterraine Destinée à Relier la Concession à la Mer). H. Schmerber. A long and well illustrated account of methods of construction and apparatus employed. Serial. 3 parts. 6000 w. Génie Civil—May 26, June 2, 9, 1900.

The Tunnel from the Gardanne Mines to the Sea (La Galerie des Mines de Gardanne à la Mer). A description of the work now in progress to enable the lignite mines of Gardanne to be connected with the Mediterranean near Marseilles. 3000 w. Revue Technique—Sept. 25, 1900.

See also MINING MACHINERY—Electric Drill.

**Gibraltar.**—Proposed Tunnel under the Strait of Gibraltar (Projet de Tunnel sous le Détroit de Gibraltar). With maps, and general outline of the scheme of M. Berlier for the construction of a tunnel under the Strait of Gibraltar, between Tarifa in Spain, and Tangier, Morocco. 1200 w. Génie Civil—Feb. 19, 1898.

**Greathead.**—Remarks on Subaqueous Tunnelling by Shield and Compressed Air. J. H. Greathead. A paper read before the Inst. of Civ. Engs., describing the tunnel under the Thames, 73 feet below high water, and 10 ft. 6 in. in diameter. 1800 w. Col Guard—Nov. 22, 1895.

See also Shield; Thames; UNDERGROUND RAILWAY.

**Hamilton, Ont.**—The Construction of a Railway Tunnel at Hamilton, Ontario. Peter Mogensen. Describes in some detail the construction of a 2000-ft, double track tunnel, chiefly through loose material, with data of quantities and cost. Ill. 3500 w. Tech—May, 1896.

The Hamilton Tunnel. Description and illustrations of design, methods of construction and plant installed. 4700 w. Eng Rec—Aug. 28, 1897.

**Hudson River.**—Bridging the North River. Walter H. Knight. A letter to the editor explaining why the writer considers a tunnel under the North River at New York the much more feasible plan. 1000 w. R R Gaz—Dec. 10, 1897.

**Hydraulic Shield.**—See Shield.

**Intake.**—See INTAKE.

**Irish Channel.**—An Irish Channel Tunnel. James Barton. Brief paper read before the Federated Inst. of Min. Eng. Discusses the route desirable, the geological formation, and the ventilation. 1200 w. Col Guard—Sept. 17, 1897.

An Irish Channel Tunnel. J. Ferguson Walker. A collection of the main facts of the history of proposed railway communication between Great Britain and Ireland, with some suggestions as to the practical realisation of the scheme. 7800 w. Contemporary Rev—March, 1897.

The Irish Channel Tunnel Scheme. Editorial on the scheme to construct a tunnel between Scotland and Ireland. 1600 w. Engr, Lond—July 14, 1899.

**Irrigation.**—See IRRIGATION—Tunnel.

**Jungfrau.**—See MOUNTAIN RAILWAY.

**Lake.**—See INTAKE.

**London.**—See Blackwall; Greathead; Shield; Thames; UNDERGROUND RAILWAY.

**Los Angeles, Calif.**—See SWELLING EARTH.

**Marseilles-Gardanne.**—See Gardanne-Marseilles.

**Melbourne Sewer.**—See Shield, Melbourne; SEWERAGE—Melbourne.

**Mersey, Liverpool.**—The Mersey Tunnel. Historical account of the undertaking and the difficulties encountered. 1800 w. Ill. Car & Build—July 21, 1899.

**Military.**—Rapid Mining System for Defense of Fortifications (Nouveau Procédé de Construction Rapide des Galeries de Mines pour la Défense des Forteresses). A form of portable wooden shield is used to enable military tunneling to be rapidly and successfully done. 1500 w. 1 plate. Génie Civil—June 11, 1898.

**Milwaukee River Flushing.**—See SEWER—Flushing Tunnel.

**Mine.**—Tunnelling by Cross Cut and on the Vein in Metal Mines. Arthur Lakes. Discussing its advantages and uncertainties. Circumstances where a cross-cut should not be run and where it may be profitable, and some notable instances of each. Ill. 3000 w. Mines & Min—Nov., 1898.

Tunnels and Tunnel Sites. T. A. Rickard. Discusses the value of tunnels in mining, the recent decision of the Supreme Court in the Enterprise-Rico-Aspen tunnel case, and the writer's views on this subject. 1400 w. Eng & Min Jour—July 17, 1897.

See also Argo; MINE DRAINAGE; MINE SURVEYING; MINING; ROCK DRILL; SURVEYING—Stopes.

**Mine, California.**—Note on the Cost of Tunneling at the Melones Mine, Calaveras County, California. W. C. Ralston. Gives the cost of driving an adit at the Melones mine in 1898, and comparison with the cost of similar work at the Hogsback mine in 1888. 2000 w. Trans of Am Inst of Min Engs—Dec., 1898.

Tunneling on the Mother Lode. W. C. Ralston. Description of work and report of cost of tunneling by the Melones Mining Co., in the Mother Lode, in Calaveras Co., Cal., with comparison of cost of tunneling at the Hogsback mine in Placer Co., Cal. Ill. 1800 w. Min & Sci Pr—Nov. 5, 1898.

**Mine Coeur d'Alene, Idaho.**—Tunnel Development at Coeur d'Alene. W. C. Clark. A brief account of two cases of blind leads. 1000 w. Mines & Min—Oct., 1900.

**Mine, Colorado.**—Some Important Mining Tunnels in Colorado. Thomas Tonge. Descriptive of the Bobtail, Revenue, Cowenhoven, Newhouse, United States, Pennsylvania, Knickerbocker and other mining tunnels. Ill. 3900 w. Eng Mag—Feb., 1897.

The Cowenhoven Adit Level. David William Brunton. Contributed to the British Inst. of Civ. Engs. Describes the conditions existing in the silver mines of the Aspen district, Colorado, which necessitated the construction of this tunnel, the difficulties overcome, method of construction, ventilation, means of communication, expense, etc. Ill. 6400 w. Col Guard—June 24, 1898.

The Crown Point Mine and Knickerbocker Tunnel, Idaho Springs, Colo. Arthur Lakes. The situation of the latter and a comparison of the circumstances under which it is driven, with numerous other past and prospective tunnel schemes. 2000 w. Col Eng—Nov., 1896.

**Montreal.**—See SUBWAY.

**Mushkaf-Bolan, India.**—The Tunnels of the First Division of the Mushkaf-Bolan Railway, India. William Arthur Johns. Describes the construction of the six short tunnels found necessary by the route traversed, with statement of cost. Serial. Ind & East Eng—Aug. 28, 1897.

See also RAILWAY—Baluchistan.

**Nashua Aqueduct, Mass.**—See AQUEDUCT—Nashua, Mass.

**Nassbach, Austria.**—See ROCK DRILL—Electric.

**Newhouse.**—See Argo.

**New York.**—The Beach Broadway Tunnel. Illustrates and describes the tunnel built in 1869 under Broadway, New York, and the car used in it. 1000 w. Sci Am—April 15, 1899.

See also East River; Hudson River; UNDERGROUND RAILWAY.

**Niagara Falls.**—A Description of the Intersection of the Cataract Construction Company's Tunnels at Niagara Falls, N. Y. George F. Simpson. An illustrated detailed description of this work. 6500 w. Trans Assn of Civ Engs of Cornell Univ —1900.

See also HYDRO-ELECTRIC PLANT.

**North Bessemer, Pa.**—North Bessemer Tunnel. F. E. House. Illustrates and describes the methods of construction used in the Pittsburg, Bessemer & Lake Erie Tunnel. Also discussion. 4200 w. Pro Engs Soc of W Penn—June, 1899.

The North Bessemer Tunnel. F. E. House. Read before the Engs.' Soc. of W. Penna. Describes the construction and the causes for change of plans. 2200 w. R R Gaz—July 7, 1899.

The North Bessemer Tunnel. Describes the driving of a tunnel 2900 ft. long for a double-track railway. 600 w. Eng Rec—Nov. 11, 1899.

**Oil Fuel.**—See **LIQUID FUEL—Arlberg Tunnel, Austria; TUNNEL VENTILATION—Arlberg.**

**Ontario, Calif.**—See **IRRIGATION—Tunnel.**

**Paris.**—See **Shield; ELECTRIC RAILWAY; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; SUBWAY; UNDERGROUND RAILWAY.**

**Passy.**—See **RAILWAY CONSTRUCTION—Paris; RAILWAY TERMINAL—Paris; SUBWAY—Paris.**

**Permanent Way.**—See **RAILWAY PERMANENT WAY—St. Gothard; Tunnel; TRACK—Tunnel.**

**Philadelphia.**—See **SUBWAY.**

**Providence Sewer.**—See **SEWER.**

**Quicksand.**—A Tunnel Through Quicksand. Harrison P. Eddy. An interesting, finely illustrated account of a method of tunnelling through bad ground, in Worcester, Mass. 3700 w. Jour of Worcester Poly Inst—March, 1900.

See also **SHAFT SINKING.**

**Repairing.**—See **Baden Railways; Chattanooga Mountains, Ronco, Genoa.**

**Ronco, Genoa.**—Building the Ronco Tunnel, Near Genoa, Italy. From "Le Génie Civil." Briefly describes the method of reconstruction, giving illustrations. 800 w. Eng News—April 19, 1900.

The Reconstruction of the Ronco Tunnel (Reconstruction du Tunnel de Ronco). With plate of details showing the construction of the centering and vaulting; also the mathematical computations for the earth-pressure and pressure curves in the arch. 3000 w. 1 plate. Génie Civil—Feb. 17, 1900.

**St. Gothard.**—See **RAILWAY PERMANENT WAY; TUNNEL VENTILATION.**

**Salt Mine.**—See **SALT—Salzburg.**

**Sewer.**—See **Shield; SEWER; SEWERAGE.**

**Shield.**—The Use of the Shield in Subway Construction (L'Emploi du Bouclier dans la construction des Souterrains). R. Legouëz. Discussing the tunnel work of Brunel, Greathead, Berlier, and others, with the use of improved shield, including tables of rapidity of construction and cost of work for a number of cases. 3000 w. Génie Civil—March 19, 1898.

A Hydraulic Shield for Shallow Tunnels. An illustrated description of a shield designed especially for tunneling under city streets at small depths. It has been in successful operation for some months in constructing an outlet sewer in Paris, France. It is semi-circular in shape. 1100 w. Eng News—July 9, 1896.

See also **Blackwall; Greathead; Military; Spree River; Thames; SEWER—Paris; SEWERAGE—Melbourne.**

**Shield, Boston.**—Constructing City Street Tunnels. Illustrated description of methods adopted on the Boston Subway. 3200 w. Eng Rec—Aug. 20, 1898.

Shield Tunneling for the Boston Subway. Illustrates in detail the operations involved in constructing this hydraulic roof-shield. 900 w. Eng Rec—Feb. 26, 1898.

The Roof Shield in the Boston Subway. Describes a novel development of shield tunneling as used in the Boston subway. It consists in cutting the shield in two and using the upper half only. Ill. 2000 w. R R Gaz—Feb. 12, 1897.

Tunnel Roof-Shield Used in the Boston Subway. Illustrated description of the form of shield used. 1500 w. Eng News—June 24, 1897.

See also **UNDERGROUND RAILWAY—Boston.**

**Shield, Hastings, Chicago.**—The Hastings Tunneling Shield. An illustrated description of the latest form of tunneling shield, which is being used in the 20 ft. intercepting sewer at Chicago. 2000 w. Eng News—Aug. 3, 1899.

**Shield, London.**—Guiding Tunnelling Shields. Harley H. Dalrymple-Hay. Remarks on the desirability of adopting some means of directing the course of a shield, with details of a system which has met with some measure of success in a recent example in the City and Waterloo Railway. Ill. 2600 w. Ry Wld—July, 1897.

Tunnel Shields, Central London Railway. Describes special features of shields 12.5 and 22.8 feet in diameter used in tunneling clay and marl under 20 pounds air pressure. 800 w. Eng Rec—April 23, 1898.

Tunneling with Shields. Illustrated extracts from paper of H. H. Dalrymple-Hay, before Inst. of C. E., describing the different methods of shield tunneling on the Waterloo and City Railway, particular attention being given to methods of timbering in advance of the shield in water-bearing strata. 5500 w. Eng Rec—July 14, 1900.

See also **Blackwall; Greathead; Thames; UNDERGROUND RAILWAY—London.**

**Shield, Melbourne, Australia.**—A Wooden Lining for Shield-Driven Tunnels. Illustrates and describes methods used in the construction of the sewerage system of Melbourne, Australia. 1000 w. Eng News—Dec. 29, 1898.

Shield Tunneling for Sewers in Melbourne. Illustrated description of methods and apparatus used in 7 miles of sewers 5 to 12 feet in diameter. Abstract of paper read before the Victoria Inst. of Engs. by George Henry Dunlop. 6000 w. Eng Rec—Oct. 15, 1898.

The North Yarra Sewer Tunnel, Melbourne. Illustrated abstract of a paper by H. V. Champion, describing a tunnel in bad soil, driven by means of a shield and compressed air. 4000 w. Eng Rec—April 8, 1899.

See also **SEWERAGE—Melbourne.**

**Shield, Paris Railway.**—The Shield Used in Constructing the Orleans Railway Tunnel, Paris. Brief abstract translation from "Le Génie Civil." Gives illustrated description of the shield and the methods of construction employed. 1300 w. Eng News—May 4, 1899.

See also **ELECTRIC RAILWAY—Paris; RAILWAY CONSTRUCTION—Paris; RAILWAY TERMINAL—Paris; SUBWAY; TRANSPORTATION; UNDERGROUND RAILWAY.**

**Shield, Paris Sewer.**—Improved Method of Sewer Construction (Nouveau Mode de Construction des Souterrains). M. Bechmann. Describing the improved method of tunneling under city streets without disturbing the surface, using shields operated by hydraulic cylinders, as employed in the new Clichy sewer at Paris. 10000 w. 1 plate. Ann des Ponts et Chaussées, Part I.—1897.

The Use of the Shield in the Construction of Subways (Emploi du Boucleir dans la Construction des Souterrains). R. Godfernaux. A review of the work of M. Legouëz, with especial reference to the great Clichy collecting sewer. 5000 w. La Revue Technique—March 25, 1898.

See also **SEWER—Paris; SEWERAGE—Paris.**

**Simplon.**—The Simplon Tunnel. A well illustrated description of a proposed tunnel through the Alps at Simplon, connecting Italian and Swiss railways. The contract has been let, and the principal engineering features of the work are described. Serial. Engng—Dec. 6, 1895.

The Simplon Tunnel. A brief account of this tunnel through the Alps, 12¼ miles long, to be constructed at a cost of $13,500,000. 1300 w. Eng Rec—May 23, 1896.

The Simplon Tunnel. A glance at the various problems, physical, mechanical and economical, that have had to be solved. 1800 w. Nature—April 29, 1897.

The Simplon Tunnel. The latest project for tunneling the Simplon, and present status of the enterprise as given by M. Jules Michel, in the "Revue Générale des Chemins de Fer." Map and Ills. 1600 w. Eng News—May 27, 1897.

The Simplon Undertaking (L'Entreprise du Simplon). An account of the work involved in the construction of a railway across the Simplon Pass, including the Simplon tunnel of over 12 miles long. The total outlay is to be 70,000,000 francs. 1500 w. Moniteur Industriel—Sept. 10, 1898.

Notes on the Driving of Simplon Tunnel, Swiss Alps. Leopold Meyer. A general outline of the work, describing the surface installations, mode of work for the driving and power used, the ventilation and refrigerating plant. 2200 w. Can Min Rev—April 29, 1899.

The Work on the Simplon Tunnel (I Lavori del Sempione). Pietro Biraghi. A discussion of the quarterly report of the work both at the north and south ends, and a description of the power plants at each entrance. Three articles. 5000 w. Rivista Gen del Ferrovie—May 7, 15, 21, 1899.

The Boring of the Simplon Tunnel (Die Durchbohrung des Simplon). H. Claus. A very complete description of the inception, progress and present state of this work, with sketch map and sections of the tunnel. 7000 w. Glaser's Annalen—May 15, 1899.

The Piercing of the Simplon. Interesting information relating to this important work, its present actual condition, etc., giving a brief review of its history and development. 1500 w. Engr, Lond—Aug. 11, 1899.

The Construction of the Simplon Tunnel (Der Bau des Simplon-Tunnels). A general review of the conditions which preceded the undertaking, and an account of the progress up to date. Two articles. 3500 w. Schweizerische Bauzeitung—Oct. 7, 14, 1899.

A New Tunnel Over the Alps. Information relating to the progress of work on this railway tunnel. 800 w. Loc Engng—Dec., 1899.

The Simplon Tunnel. Brief account of machines used in the work and methods by which it is hoped to complete this great work in less than contract time. 700 w. U S Cons Repts, No. 639—Jan. 27, 1900.

The Work on the Simplon Tunnel (I Lavori pel Traforo del Sempione). A review of the progress made during the last three months of 1899, with details of the operation of the rock drills and other machinery. 1500 w. Gior d Lav Pubb e d Str Ferr—Feb. 7, 1900.

Simplon Tunnel (Simplon-Tunnel). Abstract of the Jura-Simplon R. R. Co.'s report for the quarter ending March 31, 1900, giving general figures and tables showing the progress of the work in various ways. 1500 w. Schweiz Bauzeitung—May 12, 1900.

The Construction of the Simplon Tunnel (Der Bau des Simplon Tunnels). C. J. Wagner. A full report of the progress made on this great undertaking to the end of 1899, with maps. 6500 w. Zeitschr d Oest Ing u Arch Ver—May 25, 1900.

The Simplon Tunnel. Illustrated description of the methods adopted at each end of this tunnel, and a statement of work accomplished up to 1900. 3000 w. Eng Rec—July 7, 1900.

The Machinery Employed and Methods of Construction Adopted at the Simplon Tunnel. Charles Beresford Fox. Abstract of a paper read before the Inst. of Civ. Engs. of Gt. Britain. An account of the undertaking, with description of constructive details. 6500 w. Eng News—Aug. 30, 1900.

**Spree River, Berlin.**—The Tunnel Under the Spree, near Treptow. From "Illustrirte Zeitung." Illustrated description of a tunnel undertaken to test the adaptability of the ground under Berlin for the construction of an underground railway. It is to form part of a future street railway from Treptow to the Silesian station. 900 w. Sci Am Sup—Jan. 23, 1897.

The New Treptow-Stralau Tunnel Under the Spree. From "Das Buch für Alle." Brief illustrated description of an important engineering work. 600 w. Sci Am Sup—May 20, 1899.

The First Subaqueous Tunnel in Germany. Brief account of the tunnel in course of construction under the river Spree in Berlin. 900 w. Engr, Lond—Sept. 1, 1899.

The Tunnel Under the Spree, Between Stralau and Treptow, near Berlin (Der Spree-Tunnel zwischen Stralau und Treptow bei Berlin). With plan and profile of the tunnel and illustrations of the method of operating the shield and conducting the work. 1800 w. Glückauf—Jan. 1, 1900.

See also **UNDERGROUND RAILWAY—Berlin.**

**Steel Cylindrical.**—The Design and Construction of a Small Steel Cylindrical Tunnel. H. D. Woods. Illustrated detailed description. 800 w. Eng Rec—Feb. 20, 1897.

**Strickler, Colo.**—The Strickler Tunnel. Built to increase the water supply of Colorado Springs. Map, profile of the tunnel location, view of the east portal of the tunnel and cross-sections are given. 990 w. Eng Rec—Aug. 8, 1896.

See also **WATERWORKS—Colorado Springs.**

**Submerged.**—A Submerged Tunnel. Abstract of a paper, "A Study of a Proposed Method of Building a Submerged Tunnel," by James Cowan Meem. Read before the Brooklyn Engineers' Club. Describes a method applicable to any case where the bottom is not of extraordinary depth and is of such a character as to admit of its being dredged. 1200 w. Eng Rec—Nov. 13, 1897.

See also **Blackwall; Cleveland Water Main; East River; Hudson River; Spree River; Thames; PIPE LAYING; WATER PIPE.**

**Surveying.**—See **SURVEYING—Tunnel.**

**Sutro.**—See **MINE DRAINAGE—Sutro Tunnel.**

**Swelling Earth.**—See **SWELLING EARTH—Los Angeles.**

**Thames.**—The Proposed Thames Tunnel. Editorial discussion of the tunnel to be constructed under the Thames from Shadwell to Rotherhithe, making suggestions for improvements. 1000 w. Engr, Lond—April 7, 1899.

See also **Blackwall; Greathead; Shield; UNDERGROUND RAILWAY—London.**

**Track.**—See **RAILWAY PERMANENT WAY—St. Gothard; Tunnel; TRACK—Tunnel.**

**Treptow-Stralau.**—See **Spree River.**

**Turchino, Italy.**—The Construction of the Turchino Tunnel. Illustrated description of a 2190-ft. tunnel driven in an unusual manner, which is explained in detail. 800 w. Eng Rec—June 2, 1900.

The Turchino Tunnel (Le Tunnel de Turchino). A description of the recently completed tunnel on the Genoa-Ovada-Asti railway, by which connection is made with the Mont Cenis route to Switzerland and France. A profile and sections are given. 2000 w. Génie Civil—Dec. 23, 1899.

**Ventilation.**—See **TUNNEL VENTILATION.**

**Washington Aqueduct.**—See **AQUEDUCT—Washington Tunnel.**

**Waterworks.**—See **Cleveland Water Main; Strickler, Colo.; INTAKE; WATERWORKS.**

## TUNNELING.

See **TUNNEL.**

## TUNNEL VENTILATION.

See also **DRAIN—Ventilation; MINE VENTILATION; SEWER—Ventilation; UNDERGROUND RAILWAY; VENTILATION.**

The Ventilation of Tunnels. Francis Fox. Condensed from a paper read before the Inst. of Civ. Engs., England. Describes the systems in use in various tunnels and the results. Long discussion. 7500 w. Eng News—Aug. 31, 1899.

The Ventilation of Tunnels (Ventilation des Tunnels). R. Godfernaux. The first paper of a series treating very thoroughly of the conditions involved in tunnel ventilation, both from a practical and theoretical standpoint. Data from numerous existing tunnels are given. Serial. Part I. 2500 w. Génie Civil—Aug. 19, 1899.

**Arlberg.**—Ventilation Difficulties in the Arlberg Tunnel. Abstract from an article in "Revue Generale des Chemins de Fer." Trouble from the use of coal and coke were largely overcome by the use of petroleum for steam producing. 1100 w. Eng News—March 18, 1897.

**Boston Subway.**—Ventilation of the Boston Subway. Description of a plant with electrically driven fans which change the air in the subway every 15 minutes. 600 w. Eng Rec—Nov. 19, 1898.

Ventilation of the Boston Subway. Extract from a report of S. Homer Woodbridge. 2700 w. W Elec—Nov. 23, 1895.

**St. Gothard.**—The Ventilation Plant for the St. Gothard Tunnel (Ventilations-Anlage für den Gotthard-Tunnel). A description of the Saccardo ventilating system as installed at Göschenen for forcing air through the St. Gothard tunnel. 3500 w. Schweizer Bauzeit—June 17, 1899.

The Ventilation of the St. Gothard Tunnel. At first natural ventilation of this tunnel proved sufficient, but increased traffic made necessary artificial ventilation. The means adopted to secure the desired results are here described. 1000 w. Engng—June 30, 1899.

Ventilation of the St. Gothard Tunnel. Editorial on the condition of the air in this tunnel, and the means recently adopted to effect a change of air, which has thus far proved effective. 1000 w. R R Gaz—July 14, 1899.

The Ventilation of Long Tunnels (Die Lüftung Langer Tunnel). A. Birk. An investigation of the use of fan ventilation for tunnels, with especial reference to the application of the Saccardo system at the St. Gothard tunnel. 4500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1900.

The Ventilation of the St. Gothard Tunnel (La Ventilation du Tunnel du Saint-Gothard). A detailed description of the Saccardo system as installed at Göschenen for the maintenance of a constant current of air through the tunnel; with graphical diagrams showing the velocity of the air. 5000 w. 1 plate. Rev Gen des Chemins de Fer—Nov., 1899.

The Ventilation Plant for the St. Gothard Tunnel (Lüftungs-Anlage für den Gotthard-Tunnel). A description of the Saccardo system recently installed at the Göschenen end of the tunnel. Diagrams showing the movement of trains and the velocity of air are given. 1800 w. 2 plates. Glaser's Annalen—Dec. 1, 1899.

**TURBINE.**

See also **HYDRO-ELECTRIC PLANT; STEAM TURBINE; WATER POWER; WATER MOTOR; WATER WHEEL.**

Machines of the Turbine Class (Les Turbo-Machines). A. Rateau. A series of articles on the various machines of the turbine class, including hydraulic and steam turbines, fans, centrifugal pumps, and screw propellers. The two articles thus far published are devoted to the mathematical principles involved. Two articles. 12000 w. Revue de Mécanique—July, Sept., 1897.

Recent Turbines (Neuere Turbinenanlagen). A. Pfarr. Detailed description of a number of important installations of vertical and horizontal turbines, with plate of details of the 7 foot turbine of the Girard type for the Cape Town electric plant. 7500 w. Zeitschr d Ver Deutscher Ing—July 10, 1897.

**American.**—The Evolution of the American Type of Water Wheel. W. W. Tyler. A review of the history of the American turbine, giving the results of the competitive tests at Philadelphia in 1859 and in 1876, with the improvements that have been developed and much interesting information. Ill. 6000 w. Jour W Soc of Engs—April, 1896.

**Escher-Wyss.**—See **TURBINE WORKS—Escher-Wyss.**

**Francis.**—The Blades of the Francis Turbine (Ueber Francis-Turbinenschaufelung). Speidel & Wagenbach. A discussion of the proper curvature of the blades of turbines of the Francis pattern, with geometrical method for laying out. 2500 w. Zeitschr d Ver Deutscher Ing—May 20, 1899.

**Ganz, Budapest.**—The Turbines of Ganz & Co., at the Budapest Exposition (Die Turbinen von Ganz & Co. auf der Milleniums-Landesausstellung zu Budapest). With excellent illustrations of vertical and horizontal turbines and governors by this well-known firm. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 21, 1897.

**Gas.**—See **GAS TURBINE.**

**Geneva Exhibition.**—Turbines and Their Regulators Exhibited at Geneva (Die Turbinen und deren Regulatoren auf der Schweiz. Landesausstellung in Genf 1896). Franz Prášil. A most valuable series of illustrated articles describing the latest forms of Swiss turbines and governors. Seven articles, with many illustrations. 16000 w. Schweizer Bauzeit—Nov. 14, 21 and 28, and Dec. 5, 12, 19 and 26, 1896.

**Governor.**—See **Geneva Exhibition; Hydraulic Regulator; Paris Exposition; GOVERNOR—Electric; Hydraulic; HYDRO-ELECTRIC PLANT; WATER WHEEL—Governing.**

**Horizontal.**—A Notable Pair of Horizontal Turbines. Gives illustrated description of a powerful pair of turbines erected for the Boston and Montana Consolidated Copper and Silver Mining Company, at Great Falls, Montana. 900 w. Sci Am—Sept. 25, 1897.

The Use of Turbines with a Horizontal Shaft for Running Dynamos. From "Le Génie Civil." Illustrated description of some special turbines designed for the running of dynamos. 1800 w. Sci Am Sup—July 10, 1897.

See also **Niagara, Geyelin-Jonval.**

**Hot-Air.**—The Utilization of Heat in the Hot-Air Turbine (Wärmeausnutzung der Heizluftturbinen). V. Lorenc. A mathematical discussion of motors of the class in which the heated gases of combustion are projected against an impact turbine, showing that no higher thermal efficiency can be expected than has already been attained with the steam engine. 2000 w. Zeitschr d Ver Deutscher Ing—Feb. 24, 1900.

**Hydraulic Regulator.**—High-Pressure Turbine Wheel, with Hydraulic Regulator (Hochdruk-Turbine mit hydraulischer Patent-Regulierung). A turbine of the Pelton type, controlled by a centrifugal governor and differential hydraulic gear, constructed by Theo. Bell & Cie, of Kriens, Switzerland. 1000 w. Schweizer Bauzeit—Feb. 6, 1897.

See also **Governor.**

**Low-Pressure.**—Low-Pressure Turbines with Increased Rotative Speed (Ueber Niederdruckturbinen mit Gesteigerter Umdrehungszahl). Prof. R. Escher. A mathematical discussion showing that by modifying the bucket curves a higher rotative speed can be obtained than usual with low heads, thus enabling direct connection to be made with electric generators. 1800 w. Schweizer Bauzeit—Jan. 8, 1898.

See also **Strensham Mills, Eng.; Transformer.**

**Niagara.**—See also **HYDRO-ELECTRIC PLANT.**

**Niagara Fourneyron.**—A Turbine of the Niagara Power Co. De Volsen Wood. Results of calculations of the performance of a large turbine of the Fourneyron type, based upon data supplied by Prof. Coleman Sellers. Ill. 1500 w. Am Mach—Jan. 23, 1896.

**Niagara, Geyelin-Jonval.**—The New 2500 Horse-Power Turbines at Niagara. S. S. Knight. Illustrates and describes a pair of Geyelin-Jonval horizontal axis turbines lately installed. 600 w. Sci Am—Dec. 10, 1898.

**Paris Exposition.**—Report upon Exhibits Class 20, at the Paris Exposition (Bericht über die Objecte der Klasse 20, "Diverse Motoren" an der Weltausstellung in Paris, 1900). F. Prášil. Especially devoted to the study of turbines and regulators exhibited at Paris. Serial. Schweizer Bauzeit—Sept. 29, 1900.

Turbine Construction (Die Weltausstellung in Paris, 1900. Turbinenbau). Prof. E. Reichel. A general review of turbine construction and the present state of the art; with references to some of the exhibits at Paris. 3000 w. Zeitschr d Ver Deutscher Ing—May 26, 1900.

**Regulation.**—See **Geneva Exhibition; Hydraulic Regulator; Paris Exposition; GOVERNOR—Electric; Hydraulic; HYDRO-ELECTRIC PLANT; WATER WHEEL—Governing.**

**Rheinfelden.**—The Turbines of the Hydraulic Power Plant at Rheinfelden (Die Turbinen der Kraftübertragungswerke Rheinfelden). F. Prášil. With details of construction and description of the regulating apparatus. 2500 w. Schweizer Bauzeit—Oct. 7, 1899.

The Turbines of the Rheinfelden Power Plant (Die Turbinen der Kraftübertragungswerke Rheinfelden). F. Prášil. Giving details of the construction and arrangement of the triple turbines at Rheinfelden of 840 h. p. each. 3500 w. Zeitschr d Ver Deutscher Ing—Oct. 7, 1899.

See also **HYDRO-ELECTRIC PLANT.**

**Screw.**—The Efficiency of the Screw Turbine (Die Nutzleistung der Schraubenturbine). M. Möller. A mathematical discussion showing the conditions under which the highest efficiency may be attained. 2000 w. Zeitschr d Ver Deutscher Ing—May 13, 1899.

**Steam.**—See **STEAM TURBINE.**

**Strensham Mills, Eng.**—Turbine Installation at Strensham Mills. Describes the successful utilization of a water-power having a fall of only 2 feet. Ill. 1700 w. Engng—June 2, 1899.

**Switzerland.**—See **Geneva Exhibition; Paris Exposition.**

**Transformer.**—The Construction and Operation of the Transformer Turbine (Bericht über die Konstruktion und Wirkungsweise der Transformator Turbine). F. Prášil. A description of the improved turbine by which sufficiently high speeds may be obtained for direct driving of electric generators from low-pressure water. Three articles. 7500 w. Schweizer Bauzeit—Nov. 25, Dec. 2, 9, 1899.

**TURBINE WORKS.**

**Escher-Wyss.**—The Engineering Works of Escher, Wyss & Co. Description of works established in the town of Zürich in 1805, and now covering about 35 acres. 3300 w. Engng—Nov. 3, 1899.

**TURNING.**

See also **LATHE.**

**Slender Metal Articles.**—Device for Turning Slender Metal Articles. Illustrated description of a machine invented by J. D. Mattison. 700 w. Am Mach—Nov. 18, 1897.

**TURNTABLE.**

See also **LOCOMOTIVE HOUSE; RAILWAY YARD; ROUNDHOUSE; TRANSFER TABLE.**

Designs for Standard 60-ft. Center-Bearing Locomotive Turntable. C. L. Strobel. Illustrated description of recent designs of the writer differing from the usual type in that no trailing wheels are used, and also in the manner in which the load is supported at the center. 1200 w. Eng News—March 31, 1898.

Some Examples of Recent Practice in Turntable Design. An examination in a general way of some of the theoretical and practical considerations which enter into turntable design and construction, with a study of the particular designs illustrated in the present number. Serial. Eng News—April 1, 1897.

Three Examples of Recent Practice in Locomotive Turntable Construction. Describes the hydraulic center-bearing table on the Chicago, Milwaukee and St. Paul Ry., recent practice on the Lehigh Valley Ry., and a pitless turntable built by the Toledo Foundry & Machine Co. 2500 w. Eng News—Nov. 18, 1897.

**Compressed Air.**—The Greenleaf Center-Bearing Turntable. Illustrated description of turntable operated by compressed air. 1800 w. Eng News—May 13, 1897.

**Diameter Increase.**—An Arrangement for Increasing the Available Diameter of Turntables. From the "Revue Générale des Chemins de Fer." Description of an arrangement used by the Eastern Railroad of France for increasing the available diameter of their turntables. Ill. 600 w. R R Gaz—Nov. 26, 1897.

**Electric.**—Electric Capstan and Turntable Gear; Northern Railway of France. Illustrated detailed description. Serial. Engng—Oct. 7, 1898.

Electric Turntable for the Erie Railroad. Describes an installation at Jersey City, which is in effect, a small drawbridge, the essential difference being that the table see-saws over the center. Illustrations and editorial. 2000 w. R R Gaz—Oct. 14, 1898.

Locomotive Turntable Operated by Electric Motor. Illustrated description of the manner of applying an electric motor to the turntable at the West Milwaukee roundhouse of the Chicago, Milwaukee & St. Paul Railway. 800 w. Am Eng & R R Jour—June, 1897.

The Use of Electricity for Turning Locomotives and Cars. J. G. Rawn. Describes a plan devised for turning the 60-ft. turntable at Chillicothe, O., by means of an electric motor. Ill. 600 w. Am Elect'n—April, 1898.

**Greenleaf.**—See **Compressed Air.**

**Locking.**—See **BRIDGE MACHINERY.**

**TURPENTINE.**

Gathering Naval Stores. Lee J. Vance. The turpentine industry in the United States and its methods contrasted with French methods, the latter being considered much superior. 3800 w. Pop Sci M—Feb., 1896.

**TURQUOISE.**

See also **PRECIOUS STONES.**

**Arizona.**—A Turquoise Deposit in Mohave County, Arizona. A. B. Frensel. An account of a deposit uncovered in Aug., 1898. 700 w. Eng & Min Jour—Dec. 10, 1898.

**Mexico.**—Turquoise Mining in Mexico. W. C. Fenderson. Refers to superstitions relating to this stone because of its change of color, and gives brief account of method of mining. 2200 w. Min & Sci Pr—March 6, 1897.

**Persia.**—The Turquoise Mines of Persia. H. L. Geissel. An account of the only mines producing this stone, and of the primitive method of mining. 1100 w. Sci Am—April 21, 1900.

Turquoise Mining in Persia. Particulars respecting the celebrated turquoise mines near Nishapur, in Persia, from report of Consul-General Elias. 700 w. Col Guard—Sept. 25, 1896.

**TURRET.**

See also **ARMORED SHIP; ARMOR PLATE; BATTLESHIP; COAST DEFENCE; MONITOR; NAVAL ARCHITECTURE; WARSHIP.**

Modern Turrets. Illustrated description of several types, and recent improvements in construction. 1200 w. Sci Am Sup—Jan. 20, 1900.

**Canet Electric.**—See **Electric.**

**Electric.**—Canet's Electrically Worked Turrets. Description with illustrations showing the arrangement of the turret, mountings, training gear, and ammunition hoist on board the "Skjold." 800 w. Engng—Dec. 6, 1895.

Electric Turret for Armorclads. From "La Nature." Illustrated description. 700 w. Sci Am Sup—Oct. 3, 1896.

The Schneider-Canet Electric Turrets (Les Tourelles Electriques Schneider-Canet). Geo. Dary. A general description of electric mechanism for moving turrets and big guns on men-of-war. 1200 w. Electricien—June 16, 1900.

Schneider-Canet Naval Turrets. Illustrated detailed descriptions of these turrets and their operation. 2500 w. Sci Am Sup—Nov. 18, 1899.

**Gruson.**—Gruson Rotating Turrets. T. Guilford Smith. Illustrates and describes the construction and merits of this class of gun-protection. 2300 w. Trans Am Inst of Min Engs—June, 1900.

The Gruson Chilled Cast-Iron Turrets to Be Manufactured in the United States. An illustrated description of the Gruson turret, with an account of tests, and the preparations for their manufacture in this country. 3300 w. Ir Age—Dec. 28, 1899.

**"Kearsarge."**—The Superimposed Turrets of the "Kearsarge." Illustrated description, with amount of test made to determine whether the structure could sustain the heavy strain while firing the guns. 1700 w. Sci Am—April 14, 1900.

**"Massachusetts."**—Turret of the Battleship "Massachusetts" Under Fire. Photographic reproductions, with description of an experimental test of turret, similar to the one named, under such conditions as will obtain in an actual sea fight. 1500 w. Sci Am—Dec. 12, 1896.

**Schneider-Canet.**—See **Electric.**

**Superimposed.**—A Discussion of the Superimposed Turret for Warships. Presents the arguments in favor and against the system. 1400 w. Sci Am—Nov. 25, 1899.

See also **"Kearsarge."**

**"Texas."**—The Improved Turrets of the Battleship "Texas." Robert W. Henderson. Illustrates and describes the improvements instigated by Lieut. F. J. Haeseler, showing the method of loading the guns. 2200 w. Sci Am—April 1, 1899.

**TURRET LATHE.**

See **LATHE—Turret; SCREW MACHINE.**

**TURRET SHIP.**

See also **ARMORED SHIP; BATTLESHIP; MONITOR; TURRET; WARSHIP.**

Ericsson's First Monitor and the Later Turret Ships. George L. Fowler. The evolution of a radical change in battleship design. Ill. 3300 w. Eng Mag—Oct., 1897.

**TUYERE.**

See also **BLAST FURNACE; CUPOLA.**

Making Tuyeres—Bronze or Copper. Phil. Pastre. Illustrated description. 800 w. Mach, N. Y.—May, 1897.

**Blast Furnace.**—Tuyeres in the Iron Blast Furnace. Contributions to the discussion of this subject by B. F. Fackenthal, Jr., John M. Hartman, R. W. Raymond and others. Ill. 11000 w. Trans Am Inst of Min Engs—Oct., 1898.

**TYPE.**

**Dovetailing.**—See **DOVETAILING—Type.**

**TYPE-CASTING MACHINE.**

**Wicks.**—Rotary Type-Casting Machine. Illustrated description of the Wicks machine. 1400 w. Engr, Lond—Oct. 14, 1898.

**TYPESETTING MACHINE.**

See also **PRINTING.**

Machine Substitutes for the Composition of Types by Hand. Harold M. Duncan. Deals with the machines which have reached commercial stages, from the standpoint of principles. Considers the operations and requirements of good printing. Ill. 11000 w. Jour Fr Inst—Oct., 1897.

**Cox.**—The Cox Typesetting Machine. Illustrated detailed description. 1100 w. Engng—Nov. 18, 1898.

**Lanston.**—The Lanston "Monotype" Composing and Type-casting Machine. Illustrated detailed description. 2600 w. Ind & Ir—Nov. 12, 1897.

The Lanston Typesetting and Casting Machine. A description, with illustrations, of the character and operation of the Lanston "Monotype" machine. 1800 w. Eng News—Nov. 2, 1899.

**TYRE.**

See **TIRE.**

**UNDER-CLAY.**

See **FIRECLAY—Coal Seam Under-Clays.**

**UNDERGROUND CHAMBER.**

**Explosives Magazine.**—See **EXPLOSIVE—Magazines Underground.**

**Moisture-Proof.**—The Construction of Moisture-Proof Underground Chambers. L. R. Grabill. Discusses methods and gives plan and description of an underground dynamo-room of moisture-proof construction. 1500 w. Eng News—Sept. 6, 1900.

**UNDERGROUND RAILWAY.**

See also **CITY RAILWAY; ELEVATED RAILWAY; SUBWAY; TUNNEL; TUNNEL VENTILATION.**

**Beach, Broadway, N. Y.**—See **TUNNEL—New York.**

**Berlin.**—The Berlin Underground Railway (Berliner Untergrundbahn). A brief description of the electric tramway between Treptow and the Silesia Railway Station. Excellent illustrations of the tunnel under the river Spree are given. Ill. 800 w. Zeitschr f Klein u Strassenbahnen—Dec. 1, 1899.

See also **TUNNEL—Spree River.**

**Boston.**—Lease of the Boston Subway. The two bills introduced in the Legislature are explained, with a statement of the views of the commission, and the terms of the lease as finally adopted. 2000 w. R R Gaz—March 5, 1897.

Opening of the Boston Subway for the West End Trolley Cars. H. W. Weller. Brief description of the portion open to public travel. The route is indicated and the work described in detail. Ill. 3500 w. Elec Eng—Sept. 2, 1897.

Progress on the Boston Subway. Account of progress and of peculiar features in the work, with map and illustrations. 400 w. St Ry Rev—Oct. 15, 1896.

Progress of the Boston Subway. Information gained during a recent visit, relating to the progress of this interesting work, methods, etc. Ill. 2800 w. Eng News—Feb. 4, 1897.

Results of Experience with the Boston Subway (Erfolge und Erfahrungen mit der Bostoner Unterpflasterbahn). Fritz v. Emperger. An examination of the Boston subway, with especial reference to underground railways in other cities. 5000 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 5, 1900.

The Boston Electric Subway. Illustrated description. 1800 w. Sci Am—Sept. 5, 1896.

The Subway in Boston. Extract from report of Howard A. Carson, under the caption "Studies for Cross-Sections," also regarding the ventilation of the subway, from report of S. Homer Woodbridge. 2700 w. W Elec—Nov. 23, 1895.

The Boston Subway. An interesting illustrated description of this great engineering work, and the advantage it has already proved to the much congested traffic. 5500 w. Elec Wld—Feb. 11, 1899.

The Boston Subway. Brief illustrated description. 1000 w. St Ry Rev—Aug. 15, 1898.

The Boston Subway. Brief history and illustrated description of this very successful engineering work, giving information concerning traffic, platforms and stations, construction and equipment, and cost. 5000 w. St Ry Jour—Sept., 1898.

The Boston Subway. J. E. Talbot. The purpose of the article is to describe in some detail the electrical and cognate features of the work. Ill. 3500 w. Elec Wld—Sept. 11, 1897.

The Boston Subway. Part first gives the history, general conditions, map, location, types of construction, general cross-sections, ventilation, waterproofing, European comparisons, East Boston tunnel. Charlestown bridge, etc. 2800 w. Eng Rec—Jan. 23, 1897.

The Completion of the Boston Subway and New Arrangements of Street Cars. States the alterations in plans made necessary by new developments in connection with the Boston Elevated Railway. Describes the stations, stairways, and other interesting particulars. Ill. 2800 w. R R Gaz—Oct. 21, 1898.

The Underground Railway of Boston. Jane A. Stewart. An illustrated account of this successful undertaking, and the relief it has proved to the congested traffic of the city. 3000 w. Chau—March, 1899.

Views in the Completed Portion of the Boston Rapid-Transit Tunnel. Interesting views of this subway, showing its attractive appearance, with some information relating to tracks, lighting system, station equipment, etc. 1500 w. Eng News—Feb. 3, 1898.

See also **ELECTRIC RAILWAY—Multiple-Unit; ELECTRIC TRAMWAY; ELEVATED RAILWAY; TUNNEL—Boston Harbor; Shield, Boston; TUNNEL VENTILATION.**

**Brooklyn-New York.**—A Brooklyn and New York Rapid-Transit Tunnel. A plan for removing steam-railway traffic from the surface of Atlantic avenue and for improving rapid-transit facilities. Proposes an electric line, partly elevated and partly in tunnel, with a tunnel under the East River and a terminal at Church and Cortlandt streets, New York. 1400 w. Eng News—Jan. 14, 1897.

A Great Underground Railway Undertaking. Reviews the proposed work of tunneling under the East River and a portion of Brooklyn. 1800 w. Eng Rec—May 20, 1899.

See also **TUNNEL—East River.**

**Brussels.**—The Metropolitan Railway of Brussels (Le Métropolitain de Bruxelles). A discussion of the proposed tunnel and depressed local railway now under consideration for the city of Brussels. 2000 w. Moniteur Industriel—June 11, 1898.

**Budapest.**—The Budapest Electric Railway. Brief review of the Hungarian capital, especially its street railways, giving an account of the construction of the underground railway and its operation. Ill. 2500 w. Trans—Jan. 29, 1897.

The Budapest Subway Railway. J. Kollmann. Abstract from an article in the "Elektrotechnische Rundschau." Brief description of a road built for the exhibition that it seems probable will remain in use. 1000 w. Elect'n—Nov. 6, 1896.

The Budapest Underground Electric Railway. Illustrated description of this subway which has been working some months with success. 2500 w. Ry Wld—April, 1897.

The Electric Railways of Budapest (Die Elektrischen Stadtbahnen zu Budapest). A very full account of the surface and underground electric railways of Budapest, including photographs of power houses and portions of the subway. 7500 w. Elektrotech Zeitschr—Sept. 9, 1897.

The Electric Underground Railway at Budapest (Le Chemin de Fer Electrique Souterrain de Budapest). P. Crépy. Description, with photographs of stations and views of the cars, trucks, boilers and engines. 2000 w. 1 plate. La Rev Tech—Aug. 10, 1898.

The Electric Underground Road in Budapest. Josef Herzog. A descriptive account of the inception of the project, the construction of the road and installation of power. Ill. 1300 w. Elec Wld—Oct. 24, 1896.

The Francis-Joseph Electric Underground Railway ot Budapest (Die Budapester Elektrische Franz-Josef Untergrundbahn). With plan of the lines and photographic views, together with sections of tunnel. 4500 w. Mitt d Ver f d Ford d Local u Strassenbahnwesens—Sept., 1897.

The Underground Railway at Budapest (Die Elektrische Untergrundbahn su Budapest). A very complete illustrated account of the roadway and power plant of this pioneer electric underground road. Two articles. 5000 w. Schweizer Bauzeit—April 10 and 17, 1897.

Underground Electric Road in Budapest. Brief description of construction, operation, and equipment; with sectional drawings. 700 w. R R Gaz—July 31, 1896.

**Chicago.**—Proposed Plans for Chicago Subways. Brief illustrated description of six subway loops to take cars of the street railway lines entering the business portion of the city. 1400 w. W Elect'n—Aug. 18, 1900.

**Glasgow.**—Glasgow District Subway. An examination of the financial results as given in the report of the first half year of the working of this railway. Makes comparison with the Liverpool Electric Railway and the South London Electric Railway. 2500 w. Ry Wld—Dec., 1897.

Glasgow District Subway. Data and illustrations relating to this underground passenger cable railway. 1800 w. St Ry Rev—March 15, 1896.

The Glasgow District Subway. A few notes and impressions gleaned by a recent visit since the railway opened for public service. 2500 w. Ry Wld—Jan., 1897.

The Glasgow District Subway. An illustrated account of the actual operation of this line. 3500 w. Ry Wld—Aug., 1897.

The Glasgow District Subway. Brief description, with map and sections. 1400 w. Engr, Lond —Dec. 4, 1896.

The Glasgow District Subway. Description of construction and operation of an underground rapid-transit cable road just to be opened. 1400 w. Arch, Lond—Sept. 4, 1896.

The Glasgow District Subway. Gives a few details of the general features, the schemes that led up to it, and the reasons for the form it has finally taken, also describing the electric gear used. Ill. Serial. Elec Eng, Lond—Jan. 21, 1898.

The Glasgow Subway and Cable Traction. An illustrated description of this line, about to be opened for public traffic. It is 6½ miles long, entirely under ground, and particularly interesting because of some novel methods adopted in boring the tunnels, and in view of the fact that the cable traction plant installed is one of the largest and probably the most complete yet laid down. Serial. Engng—Nov. 6, 1896.

**London.**—Building an Underground Railway. Abstract of a lecture by Basil Mott, giving a description of the construction of the Central London Railway. 1800 w. Builder—Feb. 18, 1899.

Deep Tunnel Railways for London. Editorial discussion of some of the schemes for the solution of the transit difficulties. 1800 w. Engng —April 9, 1897.

Electric Underground Railway in London. A description taken from the London "Times." 1600 w. U S Cons Repts, No. 796—Aug. 2, 1900.

Electricity on the London Central Underground. Describes the system of electrical equipment which is entirely American. Map. 1800 w. Elec Eng —June 30, 1897.

London Underground Electric Railroads. Brief review of the lines in operation or in a forward state of construction. 1500 w. R R Gaz—Feb. 4, 1898.

New Underground Electric Railways in London. Present status and projected equipment of all underground London railways with electric motors. Map. 500 w. Elec Eng—Aug. 19, 1896.

Some Notes on the Central London Railway. Gilbert Rosenbusch. Illustrates the tunnel work and gives interesting information. 1000 w. Eng News—Dec. 29, 1898.

Speed on the London Undergrounds. Illustrates and describes the methods used on the Central London Ry., and gives tabulated records of time on this road and also on the District Ry., and the City and South London Ry. 1700 w. Elec Engr, Lond—Oct. 5, 1900.

The Central London Railway. A brief account of the opening and notice of the interesting features. 2000 w. Builder—June 30, 1900.

The Central London Railway. A review of the traffic relations of the line, its general characteristics, and equipment. 2000 w. Br Arch—Sept. 2, 1898.

The Central London Railway. C. H. Grinling. An account of the formation of the company, with description of the road, which is to be 6½ miles in length and to have 14 stations. An underground electric road. 2800 w. R R Gaz—Nov. 20, 1896.

The Central London Railway. Describes the western part of this road which runs from Marble Arch to Shepherd's Bush. Ill. 4000 w. Trans —Sept. 3, 1897.

The Central London Railway. Editorial on the opening and operating of the electric railway. 2300 w. Engng—June 29, 1900.

The Central London Railway. History of an underground electric traction line on which work is to be begun at once, with notes of other pending schemes. 1600 w. Eng, Lond—July 10, 1896.

The Central London Railway. Part first considers the route taken and some of the construction work, giving plans, maps, etc., and general remarks on the enterprise. Serial. Engr, Lond—Nov. 4, 1898.

The Central London Underground Railway. The first of a series of articles describing and illustrating this urban railway undertaking. Serial. Elec Wld & Engr—July 21, 1900.

The Future of London Railways. G. F. Millin. Discusses the changes to the advantage of London, made possible by the inventions of the electric light, the use of electricity for light and traction, and the Greathead shield. 4200 w. Contemporary Rev—July, 1900.

The New Underground Railway in London (Le Nouveau Chemin de Fer Souterrain de Londres). An account, from a French point of view, of the Central London Railway, with plan of the route and a plate showing arrangement of the power plant and construction of the electric locomotives. 3500 w. 1 plate. Génie Civil—June 25, 1898.

The Underground Railways of London. Frederick E. Cooper. A very fully illustrated account of the underground railways of the metropolis, from the first undertakings to the latest projects. 6000 w. Eng Mag—Sept., 1898.

The Brompton and Piccadilly Circus Railway. Some facts concerning this deep-level tubular electric line and its connections, with map. 400 w. Transport—April 22, 1898.

Underground London. From "Chambers' Journal." An article considering in general the rapid improvement of traveling facilities, and specially the Central London Electric Railway about to be built. 1600 w. Am Arch—Dec. 21, 1895.

Under-Tunnelling the District Railway. Report of Sir Benjamin Baker on the proposed electric express line of railway beneath the existing Metropolitan District system. 1500 w. Arch, Lond—Nov. 13, 1896.

The Ventilation of the Metropolitan Railway. Editorial on the "Blue-Book" just issued by the Board of Trade Committee appointed to report on the London underground railway, as to the quality of the air, and the remedy. 2000 w. Engr, Lond—Oct. 15, 1897.

The London "Underground" and Electrical Equipment. The conclusions of the commission appointed by Parliament to inquire into the ventilation of the tunnels of the Metropolitan steam line, with the general characteristics, details of trans, etc. 2200 w. R R Gaz—Feb. 25, 1898.

The Future of the "Underground" Railway. George Frederick Bird. Discusses the series of experiments being undertaken with the object of adopting electric traction and outlines a scheme for rendering more efficient service and overcoming the objectionable features. 4500 w. Engr, Lond—Feb. 3, 1899.

Metropolitan Railways. Editorial discussing the difficulties to be overcome in using electricity as the power in the London underground railway. 1400 w. Engr, Lond—May 27, 1898.

The Ventilation of the Underground. Comments on the evidence given in the report of the Board of Trade of London, discussing the advisability of substituting electricity as a motive power, means of ventilation, etc. 3500 w. Trans —Oct. 29, 1897.

Electric Traction on the Metropolitan District Railway. An illustrated description of what has been thus far accomplished. Also editorial. 3500 w. Elect'n, Lond—May 25, 1900.

Electric Traction on the Metropolitan Railway, London. Details as to the permanent way and the equipment. 3300 w. Engr, Lond—May 18, 1900.

City and South London Railway Extensions. Illustrates and describes the interesting operations in connection with this work. 1400 w. Elec Rev, Lond—Dec. 16, 1898.

The Advantages to Be Gained by Selecting Rolling Stock for a Given Service. Douglas T. Heap. Explains the traffic arrangements on the Waterloo and City Ry., England, and the alterations made by a service of single cars. 1000 w. Tram & Ry Wld—July 5, 1900.

The Electrical Equipment of the Waterloo and City Railway. Bernard Maxwell Jenkin. Read before the British Inst. of Civ. Engs. Illustrated detailed description. Serial. Prac Engr—June 15, 1900.

The Making of a Tunnel—The Waterloo and City Railway. From "The Graphic," London. Illustrated description. The tunnel runs through clay, under the river, a total distance of a mile and a half; the excavation work is done under air pressure to keep out the river water, the iron casing following it up. 1200 w. Sci Am Sup—Dec. 21, 1895.

The Waterloo and City Railway. W. B. Paley. Information concerning the operation and equipment of this road. 1000 w. Mech Wld—Sept. 23, 1898.

The Waterloo and City Railway, London. W. B. Paley. A general description of the tunnels, lighting, equipment and train movement. 1000 w. R R Gaz—Sept. 9, 1898.

The Waterloo and City Railway. An account of the formal inauguration of the line though not yet open for public traffic. 1800 w. Transport—July 15, 1898.

Waterloo and City Railway. Brief account of this deep-tunnel railway recently inaugurated. 2300 w. Engng—July 8, 1898.

Waterloo and City Railway. A description of this interesting English line, with illustrations of the equipment. Map. 2000 w. Ry Wld—June 2, 1898.

The Whitechapel and Bow Railway. Brief description of what will probably be the last steam underground railway of London. 1200 w. Engr, Lond—July 27, 1900.

See also **ELECTRIC POWER STATION; TUNNEL.**

**New York.**—A Feasible Plan for the New York Rapid Transit Ry. Editorial, discussing some of the engineering features of the enterprise, and outlining a plan based on securing an arrangement with the Metropolitan St. Ry. Co. for the operation of a system of express tunnels beneath some of the North and South lines. 2200 w. Eng News—Dec. 29, 1898.

Contracts and Quantities in the New York Rapid Transit Railway Work. Editorial giving figures showing the enormous quantity of engineering material to be consumed in carrying out this great project. 2200 w. Eng News—May 24, 1900.

Electric Underground Railway for New York, U. S. A. Illustrated detailed description of the plans as now adopted. 5000 w. Engr, Lond—April 27, 1900.

Expert Opinion of the New Rapid Transit Proposition in New York. Letter from Stuyvesant Fish, president of the Illinois Central, containing valuable suggestions based on experience. 2800 w. St Ry Jour—April, 1899.

General Structural Details of the New York Rapid Transit Tunnel Railway. Illustrates the details as finally decided upon by the commission, with description of route and explanation of drawings. 2300 w. Eng News—Dec. 14, 1899.

Mr. Sprague on Underground Rapid Transit. From the "N. Y. Evening Post." An account of an interview with Mr. Frank J. Sprague. 1500 w. Elec Ry Gaz—Feb. 15, 1896.

New Life for the New York Underground Railway. A review of the terms under which the Metropolitan Street Railway Co., of New York, offered to build an underground railway in the city. 1300 w. Eng Rec—April 1, 1899.

New York and the Rapid Transit Tunnel—What Streams and Creeks It Cuts Through. A short description of the creeks underlying Manhattan island which must be diverted or arched over. 1400 w. Fire & Water—April 7, 1900.

New York Rapid Transit Outlook. Considers the report of the Rapid Transit Commissioners favoring the building of the road, and the prospect of the work being undertaken in the near future. 1100 w. Eng Rec—Nov. 13, 1897.

On With the Tunnel. Letter to the editor discussing the problem of more closely uniting the various districts of Greater New York. 1800 w. R R Gaz—Jan. 19, 1900.

Rapid Transit in New York. Showing how the present laws must be modified in order to induce a contractor to take up the work of building an underground railway in New York City. 900 w. Bradstreet's—March 21, 1896.

Rapid Transit in New York. A free abstract of the report of the chief engineer, with map and profile, and some typical sections; also editorial comment. 3500 w. R R Gaz—Nov. 13, 1896.

Rapid Transit in New York City. Editorial on the proposition of the Metropolitan Street Railway Company to build and operate the tunnel railroad which the commissioners have long been trying to get built. 1200 w. R R Gaz—March 31, 1899.

Reports on the Modified Routes for the New York Rapid Transit Railway. Illustrated description of the new plan, which differs from the old chiefly in comprising only those lines that are immediately necessary, and the substitution of the Elm street route for the Broadway lines between City Hall and Union Square. 5000 w. Eng News—Nov. 12, 1896.

The Contract for the New York Rapid Transit Railway. An editorial summary of the conditions under which it is proposed to carry out this work. 2000 w. Eng News—Nov. 23, 1899.

The New York City Rapid Transit Proposition of the Metropolitan Street Railway Company. A copy of the proposal of the Metropolitan St. Ry. Co., with explanation of the plan, and editorial. 5500 w. St Ry Jour—April, 1899.

The New York Rapid Transit Tunnel. Gives an illustrated description of the construction as planned, the route, stations, equipment, etc. 6000 w. Ir Age—Oct. 19, 1899.

The New York Rapid Transit Situation. States the conditions on which contractors for this work are to submit bids. The contract is one of the largest placed since Eads contract for the Mississippi jetties. 1800 w. Eng Rec—Oct. 28, 1899.

The New York Rapid Transit Tunnel. Illustrates the main features of construction in the proposed work, with map showing route, and gives an account of the undertakng. 1100 w. Sci Am—Feb. 3, 1900.

The New York Rapid Transit Road (Die Rapid Transit-Stadtbahn für New York). F. M. v. d. Werra. A good description, very well illustrated, of the road in general and varions details of construction. Serial. 2 parts. 7500 w. Zeitschr d Ver Deutscher Ing—May 26, June 2, 1900.

The Rapid Transit Situation In New York City. Editorial discussion of the decision of the Appellate Division of the Supreme Court, New York, which renders it very doubtful whether the enterprise can ever be carried out. 1200 w. Eng News—Dec. 23, 1897.

The Supreme Court Commission's Report on the New York Rapid Transit Ry. The most important work now under way in the United States. The editor summarizes the history and present status of the scheme and makes extracts from the report. The underground system estimated to cost less than $50,000,000, is fully discussed. 3800 w. Eng News—March 12, 1896.

Will the Proposed Underground Railway in New York Pay? Describes the route, giving map, and also details of the project, discussing the financial requirements, etc. 2500 w. St Ry Jour—Dec., 1899.

See also Reno System; **CITY RAILWAY; MUNICIPAL OWNERSHIP**—New York Rapid Transit; **RAILWAY TERMINALS**—New York; **TOPOGRAPHY**—Underground; **TRANSPORTATION; TUNNEL.**

**Operating Systems.**—The Choice of an Operating System for City Subway Roads (Die Wahl des Betriebs-Systemes für Städtische Tiefbahnen). Gustav Schimpff and Wm. Kübler. A general review of the principal subway roads of the world, with table and illustrations. Serial. Deutsche Bauzeit—May 5, 1900.

**Paris.**—For Paris Underground Railroads. From the "Moniteur Industriel." An account of the plan to construct 33½ miles of underground electric roads. 500 w. R R Gaz—Nov. 25, 1898.

Paris Metropolitan Underground Electric Road. Some particulars relating to this road now in process of construction. Ill. 600 w. Elec Eng, N. Y.—Jan. 26, 1899.

Preliminary Work on the Metropolitan (Underground) Railway, Paris (Le Métropolitain de Paris. Travaux Préparatoires en Cours d'Exécution). Description of methods of work, especially in the rearrangement of sewers, etc. Illustrations and one plate. 3500 w. Génie Civil—Oct. 22, 1898.

Street and Local Railways at the Paris Exposition (Die Strassen-und Kleinbahnen auf der Pariser Weltausstellung). Statistics of tramways in Paris, with an illustrated account of the new underground road. 1600 w. Zeitschr f Klein-u Strassenbahnen—Aug. 1, 1900.

The Definite Project for the Metropolitan Railway of Paris. Notes on the methods adopted for building this system as abstracted from "Le Génie Civil." 1300 w. Eng News—Aug. 26, 1897.

The Metropolitan Railway in Paris. Historical account and illustrated description of the construction. 4000 w. Engr, Lond—Jan. 26, 1900.

The Metropolitan (Railway) in Paris (Le Métropolitain de Paris). Georges Leugny. An illustrated description, with map, of this important undertaking, giving also historical data, particulars of tunnels, stations, costs, methods of work, etc. 4000 w. La Rev Tech—Dec. 10, 1898.

The Metropolitan Railway of Paris. An outline of the main features of this subway system, now 6¾ miles long, but planned to be 48½ miles. 1000 w. Eng Rec—Aug. 11, 1900.

The Metropolitan Railway of Paris (Chemins de Fer. Le Métropolitain de Paris. Description Générale du Résau Projeté. Description Detaillée de la Partie Exécutée). A. Dumas. An elaborately illustrated description of this fine underground road, part of which is now in operation, and its construction. 16000 w. 5 plates. Génie Civil—July 21, 1900.

The Metropolitan Railway Company, of Paris (Compagnie du Chemin de Fer Métropolitain de Paris). The report of the administrative council, at the general meeting, on the road and its finances. 3000 w. Moniteur Industriel—July 28, 1900.

The Metropolitan Railway of Paris. Illustrated description of this road, its construction, equipment and operation. 5000 w. St Ry Jour—Sept. 1, 1900.

The Metropolitan Railway of Paris (Le Métropolitain de Paris). G. Leugny. An account of the present state of the work, with plans showing the arrangement of the tunnels at important intersections and terminals. 3000 w. La Rev Tech—Jan. 10, 1899.

The Metropolitan Railway of Paris (Le Métropolitain de Paris). G. Leugny. A description of the progress of the underground work, showing the operation of the shield and the methods of manipulation. 2000 w. La Rev Tech—June 10, 1899.

The Paris Metropolitan Railway (Le Métropolitain de Paris). A review of the probable traffic and finances of this new underground road. 2000 w. Moniteur Industriel—Aug. 4, 1900.

The Paris Metropolitan Underground. A very complete illustrated account of the road and equipment. 1500 w. Elec Wld & Engr—Aug. 11, 1900.

See also **ELECTRIC RAILWAY; RAILWAY CONSTRUCTION; RAILWAY TERMINAL; SUBWAY; TRANSPORTATION; TUNNEL.**

**Reno System.**—The Reno Rapid Transit Plan for Broadway, New York. J. W. Reno. An article aiming to show that an economical rapid transit system may be constructed at a cost of construction not above $35,000,000. Ill. 1300 w. Sci Am Sup—April 24, 1897.

### UNDERPINNING.

See also **BUILDING CONSTRUCTION; FOUNDATION; TALL BUILDING.**

**Church, London.**—Underpinning of St. Mary Woolnoth. Illustrations showing interesting engineering work being carried on in London, made necessary by the extension of the City and South London Ry., underground. The Lombard street station will be situated under this church. 1600 w. Engng—July 29, 1898.

**Heavy Buildings.**—The Underpinning of Heavy Buildings. Jules Breuchaud. Illustrated description of a novel method recently adopted for the support of heavy buildings. The foundation work for the Commercial Cable Building, twenty-one stories high, at Broad and New sts., New York City, is described, with the method for preventing damages to adjacent buildings. 2700 w. Am Soc of Civ Engs—Dec., 1896.

**Office Building, Chicago.**—Reconstruction of a Chicago Building Sub-structure. Illustrated description of method of underpinning a heavy 80x100-ft. building to put in a sub-basement, The Equitable Building. 1000 w. Eng Rec—July 9, 1898.

**Office Building, New York.**—Underpinning the Stokes Building, New York City. The problems that arise in the erection of the tall and heavy buildings in lower New York, are considered, and a description of the work named, with illustrations, is given. 3800 w. Eng Rec—Aug. 8, 1896.

**Party Walls.**—Developments of Architectural Construction. Illustrated description of methods of underpinning heavy party walls. Serial. Eng Rec—June 4, 1898.

**Shop Walls.**—Underpinning Shop Walls. Illustrated description of the different methods employed in supporting the walls of a shop engaged in heavy manufacturing while a tunnel was being driven in sandy soil near by. 1200 w. Eng Rec—Jan. 13, 1900.

**Toronto.**—Street Front Reconstruction. Illustrated description of the method used in a Toronto building to replace masonry wall piers with steel columns on the same foundations. 500 w. Eng Rec—Feb. 10, 1900.

**Without Supports.**—Underpinning Without Supports. Illustrates and describes the method of supporting a heavy wall, 94 feet high, carried less than 5 feet below the curb line, while an adjacent lot was excavated 9 feet below its footing. 1500 w. Eng Rec—Sept. 30, 1899.

### UNIT.

See also **STANDARDIZING; WEIGHTS AND MEASURES.**

**Electric.**—See **ELECTRIC MEASUREMENT—Standard; ELECTRIC UNIT; WEIGHTS AND MEASURES.**

**Mechanical.**—Notes on the Definitions of Some Mechanical Units. William Kent. Read before the session of Mech. Science and Engng. of the Am. Assn. for the Adv. of Science, at Boston. Discusses the difference of opinion existing between physicists and engineers in regard to definitions of commonly used terms. 1800 w. Eng News—Dec. 1, 1898.

See also **MECHANICS.**

**Work.**—A New Unit of Work (Ueber eine neue Arbeitseinheit). It is suggested that a pressure of 1 atmosphere into a volume of 1 liter be called a liter atmosphere as a unit of work pv. Proposed by H. Lynen at the Aix-la-Chapelle branch meeting. 1000 w. Zeitschr d Ver Deutscher Ing—Feb. 20, 1897.

### UNITED KINGDOM.

See also **ENGINEERING COMPETITION; INDUSTRY; MANUFACTURING**; and under specific tities.

England's Economic and Political Crisis. J. N. Larned. An interesting study of the conditions which have affected the development of England, and the causes that have operated to diminish the economic capability in production and trade. 8500 w. Atlantic M—March, 1898.

The Trade and Industries of the United Kingdom in Their Relations to Those of Other Countries. Extracts from a report which the Statistical Department of the Swedish Administration has this year issued on the trade and industries of Great Britain and Ireland in their relation to those of foreign countries, showing that their position continues to compare favorably with any other nation. 2500 w. Col Guard—July 8, 1898.

### U. S. SOUTHERN STATES.

See also **COAL INDUSTRY; GOLD REGION; IRON INDUSTRY**, etc.

**Industries.**—The Industrial Condition of the Southern United States before 1860. Richard H. Edmonds. Historical review with statements tending to prove that the industrial condition of the south has been misrepresented, and that previous to the war it was quite abreast of the times. 5000 w. Chau—Feb., 1896.

### UNIVERSITY BUILDING.

See **COLLEGE; EDUCATION; LABORATORY; LIBRARY; SCHOOL.**

**California.**—A Western City of Learning. Samuel E. Moffett. Explains the scheme of the University of California, aiming to secure the most artistic collection of buildings possible for the beautiful site at Berkeley, Cal. 4000 w. Harper's Wk—Sept. 11, 1897.

An International Architectural Competition. Summarizes the purposes and results of the preliminary competition for the University of California buildings. 1500 w. Eng Rec—Oct. 15, 1898.

The California University Competition. Editorial on this proposed international competition, giving an outline of the arrangements. 2800 w. Builder—Feb. 12, 1898.

for the University of California. Abstract of the programme with map. 3000 w. Jour Roy Inst of Brit Archts—Jan. 29, 1898.

The Californian University Competition. Report of the reception, preparation and judgment of the plans submitted in competition for the "Phoebe A. Hearst architectural plan for the University of California." 1700 w. Arch, Lond—Jan. 27, 1899.

See also **LANDSCAPE ARCHITECTURE.**

**Columbia.**—Columbia University, N. Y. Illustrated description of the new buildings, especially the library, with brief history of the college. 3000 w. Sci Am—March 26, 1898.

The Dedication of the New Site of Columbia University. A brief account of the dedication, with illustration of the library building, and progress made on other buildings to be erected. 1100 w. Science—May 8, 1896.

See also **EDUCATION; LIBRARY.**

**Edinburgh.**—McEwan Hall, Edinburgh University. R. A. Illustrations, plan and general description of a beautiful building recently opened. 1500 w. Builder—Dec. 11, 1897.

McEwan Hall of the Edinburgh University. A description of the building given by W. McEwan to the University of Edinburgh. 2800 w. Arch, Lond—March 6, 1896.

**Leipzig.**—The Surroundings and New Buildings of the University of Leipzig (Die Um- und Neubauten der Universität Leipzig). With plans of the old arrangement when the cloister was standing, also the condition before the new work, as well as the present improved arrangement. 1800 w. Deutsche Bauzeitung—Jan. 22, 1898.

**McGill.**—The Mining and Chemistry Building of McGill University. Describes a very complete Eng & Min Jour—Dec. 24, 1898.

**Princeton.**—The New Buildings at Princeton University. The new library and new dormitory buildings are illustrated and described. 1700 w. Sci Am—Oct. 29, 1898.

See also **LIBRARY.**

**Wisconsin.**—See **ENGINEERING BUILDING.**

**UNIVERSITY DEGREES.**

**French.**—New Academic Degrees at Paris. C. W. A. Veditz. Discusses recent changes and proposals for reorganization in the French universities of interest to American students contemplating foreign study. 1700 w. An Am Acad—March, 1896.

**German.**—See **EDUCATION—German Degrees.**

**URANINITE.**

See also **MINERAL; MINERAL REGION.**

**Colorado.**—Some Notes on the Occurrence of Uraninite in Colorado. Richard Pearce. Read before the Colorado Scientific Society in Denver. History of its first discovery in Aug., 1871, and of the amount and value realized. 900 w. Min Ind & Rev—May 7, 1896.

**URANIUM.**

See also **METAL—Rare; RARE METALS.**

Uranium. A. Selwyn Brown. Relates the discovery of this mineral, giving such information as has been obtained, and some of the uses to which it is applied. 1500 w. Aust Min Stand—Oct. 20, 1898.

Uranium and Its Ores. J. Ohly. Describes the ores and some of the uses. 1600 w. Min & Sci Pr—Aug. 25, 1900.

**Electric Properties.**—See **ELECTRO-PHYSICS—Uranium.**

## V

**VACUUM BOTTLE.**

A Hermetic Emptying Device (Le Verseur Hermétique). A description of the de Sennevoy device by means of which any desired amount of liquid may be drawn from a vessel without permitting the entrance of air or other substance. 1200 w. La Rev Tech—March 10, 1898.

Les Verseurs Hermétiques. H. Joshua Phillips. Illustrated description of patent of Baron de Sennevoy—a device which permits any amount of liquid to be drawn from a bottle without admission of air or other substance. 1600 w. Ind & Ir—Sept. 23, 1898.

**VACUUM PAN.**

See **SUGAR REFINING.**

**VACUUM TUBE.**

See also **CATHODE RAY; ELECTRO-PHYSICS; RADIOGRAPHY; ROENTGEN RAY.**

Some Researches with Vacuum Tubes (Einige Versuche mit Vakuumröhren). Investigating the fluorescent action, and discussing the researches of Korda, Oudin and Colardeau. 2000 w. Elektrotech Zeitschr—May 6, 1897.

**Cathode Disk Rotation.**—On a Rotational Motion of the Cathode Disk in the Crookes Tube. Francis E. Nipher. Read before the Academy of Science of St. Louis. An account of an observation made in the use of the Crookes tube and subsequent experiments. 800 w. Elec Rev—May 27, 1896.

**Continuous Spectra.**—On the Cause of Continuous Spectra in Exhausted Tubes. W. H. Birchmore. A speculation as to its possible origin, with description of phenomena. 2700 w. Elec Eng—July 8, 1896.

**Crookes.**—Concerning Crookes Tubes. C. C. Hutchins and F. C. Robinson. An article proving that the making of these tubes need not be beyond the resources of the ordinary laboratory. A little skill in glass-blowing and in the manipulation of the pump is all that is required. 1800 w. Am Jour of Sci—June, 1896.

On a Crookes Apparatus. H. Pfloum, in "Wied. Ann." Description of the behavior of a 7 B bulb. 800 w. Elect'n—April 24, 1896.

**Discharges.**—Electrical Discharges in Vacuo. J. Warren. Part first gives explanation of phenomena appearing in the discharges in vacuum tubes. Serial. Elec, Lond—Dec. 17, 1897.

See also **ELECTRIC DISCHARGE.**

**Geissler.**—A Theory to Explain the Stratification of the Electric Discharge in Geissler Tubes. H. V. Gill. Presents certain ideas regarding the cause of this phenomenon, and describes some experiments made to test the value of these ideas. Ill. 8000 w. Am Jour of Sci—June, 1898.

**Photometry.**—On the Relation between Pressure, Current, and Luminosity of the Spectra of Pure Gases in Vacuum Tubes. Ervin S. Ferry. Investigations for the purpose of studying photometrically the changes produced in the spectra of pure gases when subjected to various conditions of current and pressure. 1800 w. Phys Rev—July, 1898.

**Spectra.**—See **Continuous Spectra; Photometry; SPECTRA.**

**VACUUM TUBE LIGHTING.**

See also **SPECTRA.**

Vacuum Tube Lighting. M. A. Edson. Read before the Chicago Electrical Assn. Discusses the various sources of artificial illumination and the problem of reflection and diffusion of light, with a review of the work done in vacuum tube lighting. 2800 w. W Elec—March 6, 1897.

Vacuum Tube Lighting. Reviews the early development of this form of lighting and describes and illustrates the system. 2500 w. Pro Age—July 1, 1898.

**Controller.**—See **CONTROLLER—Vacuum Tube Lighting.**

**Moore.**—Recent Developments in Vacuum Tube Lighting. D. McFarlan Moore. Presented at meeting of Am. Inst. of Elec. Engs., N. Y., with discussion. The object of the paper is not only to call attention to the advantages of vacuum tube lighting, but more particularly to a simple method of obtaining a current which will ultimately make such a system possible. Ill. 15800 w. Trans Am Inst of Elec Engs—March, 1896.

Recent Developments in Vacuum Tube Lighting. D. McFarlan Moore. Paper read at the meeting of the Am. Inst. of Elec. Engrs. The object of the paper is not only to call attention to the advantages of vacuum tube lighting, but more particularly to a simple method which will ultimately make such a system universally feasible. 8300 w. Elec Eng—April 29, 1896.

The Energy Required in Moore Vacuum Tube Lighting. Nelson W. Perry. Results of tests made by Mr. Wetzler with description of the method of making these tests, with the aim of obtaining data as to power expenditure. 1200 w. Elec—May 27, 1896.

Vacuum Tube Illumination by the D. McFarlan Moore System. Illustrated description. 1300 w. Sci Am—Feb. 29, 1896.

Vacuum Tube Lighting. An account of a private seance given by D. McFarlan Moore at his laboratory, to a number of invited guests, to demonstrate the progress made in vacuum tube lighting. Also editorial. 1200 w. Elec—June 2, 1897.

Moore Latest Vacuum Tube Lighting Apparatus. Illustrated description of apparatus. 300 w. Elec Eng—July 29, 1897.

See also **Photography**; **SPECTRA.**

**Photography.**—Photographs Taken by the Moore "Etheric" Light. Results obtained by the employment of the direct lighting effects of vacuum tubes in the photography of objects in the usual manner. 600 w. Elec Eng—Feb. 5, 1896.

**Rare Earths.**—See **RARE EARTHS—Luminosity.**

**Tesla.**—Tesla's Important Advances. His remarkable achievements in vacuum tube lighting. 500 w. Elec Rev—May 20, 1896.

Tesla's Latest Advances in Vacuum Tube Lighting. Nikola Tesla. Experiments on the application of tubes of high illuminating power to photography and other purposes. Ill. 1000 w. Elec Rev, N. Y.—Jan. 5, 1898.

See also **CONTROLLER—Vacuum Tube Lighting; ELECTRIC INVENTION; INDUCTION COIL.**

## VALPARAISO.

**Chile.**—The Industries of Valparaiso. Abstract of an article in the "Chilian Times." Statistical in character. 900 w. Bd of Trd Jour—April, 1896.

## VALVE.

See also **SAFETY VALVE; STEAM ENGINE; STEAM ENGINEERING; VALVE GEAR; VALVE SETTING; WATER PIPE; WATERWORKS.**

Something About Valves. W. H. Wakeman. Facts from the writer's experience. 1300 w. Am Mach—Nov. 9, 1899.

**Allen.**—See **LOCOMOTIVE VALVE.**

**Andrews and Martin.**—The Andrews and Martin Balanced Slide Valves. Illustrates and describes a valve more especially intended for use on marine engines, stating its advantages. 1600 w. Engng—Aug. 11, 1899.

**Automatic.**—See **Groignard; Koch.**

**Balanced Piston.**—A New Balanced Piston-Valve and Its Application to Four-Crank Engines. Wm. O'Brien. Discussion of a paper before the Institution of Engineers and Shipbuilders in Scotland, at Glasgow. 700 w. Ir & Steel Trds Jour—Sept. 15, 1900.

**Blowing Engines.**—Valves for Blowing Engines (Ueber Gebläseventile). H. Hörbiger. Illustrating and describing improved forms of annular air valves for blast furnace blowing engines. 3000 w. Stahl und Eisen—Jan. 1, 1898.

See also **Hot Blast; BLAST FURNACE; BLOWING ENGINE.**

**Brindley's Hydraulic.**—Brindley's Hydraulic Working Valve. Illustrates an ingenious invention in pressure valves for use with heavy hydraulic machinery. 600 w. Engr, Lond—Sept. 15, 1899.

**Engines and Compressors.**—A New System of Valves for Steam Engines, Air Engines and Compressors. Fred W. Gordon. Illustrates and outlines a system of valves showing their adaptability to shaft governed or automatic vibrating engines. 3500 w. Trans Am Soc of Mech Engs—May, 1899.

**Friction.**—Engine Valve Friction. W. A. Gordau and F. H. Hazard. Experimental research with tabulated data. 1000 w. Sib Jour of Engng—June, 1896.

Friction of Throttle Valves. An editorial pointing out the wire-drawing resulting from valves of bad form. 500 w. Eng Rec—July 23, 1898.

See also **FRICTION; STEAM ENGINE.**

**Gas Engine.**—See **GAS ENGINE—Valves.**

**Groignard.**—An Automatic Stop Valve (Sur une Valve-Clapet Automatique d'Arret). The Groignard valve can be opened by hand, and will remain open until closed, unless the pipe should burst in which case it closes automatically by the action of the escaping steam. 1200 w. Bull de la Société d'Encour—May, 1898.

**Hot-Blast.**—Hot-Blast Valves. James Robinson. Read before the West of Scotland Iron and Steel Inst. A record of the hot-blast valves the writer has had in use, their working, design, defects, alterations, and improvements. Ill. 1800 w. Ir & Coal Trds Rev—Feb. 17, 1899.

See also **Blowing Engine; BLAST FURNACE; TUYERE.**

**Hydraulic.**—A 42-Inch Hydraulic Valve. Illustrated description of a hydraulic piston attachment for opening and closing large gate valves. 400 w. Eng News—Aug. 20, 1896.

See also **Brindley; Liebenow, Reservoir Outlet; HYDRAULIC MACHINERY; WATER PIPE; WATERWORKS.**

**Koch.**—Self-Acting Stop and Regulating Valves (Selbstthätiges Absperr-und Regel-Ventil). Describing and illustrating several forms of the Koch automatic stop valve, which closes of itself if a burst pipe permits an escape of steam. 2000 w. Zeitschr d Ver Deutscher Ing—June 4, 1898.

**Liebenow Water.**—The Liebenow Water Valve (Das Liebenowsche Nebenschlussventil). An auxiliary valve to be used in connection with water meters to prevent the "water hammer" action and reversal of current. Its use shows a marked increase in accuracy of the meters. 3000 w. Zeitschr d Ver Deutscher Ing—April 3, 1897.

**Lifts.**—Valve Lifts. Herbert Aughtie. Diagrams of various valves are given and studied. 1100 w. Prac Eng—May 14, 1897.

**Locomotive.**—See **LOCOMOTIVE VALVE.**

**Locomotive Tests, Purdue.**—Testing Slide Valves on Purdue University Locomotive. Describing the joint investigations of the University and the Master Mechanics' Committee, and criticising the failure of railroad corporations to assist in such work. 900 w. Loc Engng—May, 1896.

See also **LOCOMOTIVE TEST; STRONG LOCOMOTIVE.**

**Piston.**—Piston Valves. W. H. Booth. First part describes and illustrates a continuous bodied piston valve and a provision for preserving the circularity. 1000 w. Am Mach—May 21, 1896.

See also **Balanced Piston; CYLINDER—Long-Stroke; LOCOMOTIVE VALVE.**

**Poppet.**—Poppet Valves: Their Construction and Calculation. L. Berger. Gives illustrated description of the construction of the valves, and considers the calculations for the springs with the object of obtaining the best performance possible. 1600 w. Horseless Age—April 18, 1900.

See also **VALVE GEAR—Zvonicek.**

**Reducing.**—Pressure Reducing Devices (Druckverminderer). Hr. Randel. With illustrations and descriptions of a variety of reducing valves, and a discussion of the principles on which their action depends. 2000 w. Zeitschr d Ver Deutscher Ing—Aug. 26, 1899.

**Relief.**—New Air-Relief and Pressure-Relief Valves. Illustrated description of new forms of valves for water mains. 900 w. Eng Rec—April 29, 1899.

**Reservoir Outlet.**—Outlet Valves at the Burrator Reservoir of the Plymouth Water Works. Edward Sandeman. Gives a general idea of the works and describes the manner in which the outlet pipes are controlled. Ill. 1300 w. Inst of Mech Engs—1899.

Outlet Valves, Burrator Reservoir, Plymouth, England. Illustrated description of 3-beat cage valves at the outlets of pipes 25 to 36 ins. in diameter, by the use of which a gate chamber was made unnecessary. 600 w. Eng Rec—Feb. 10, 1900.

See also **GATEHOUSE; RESERVOIR—Gate.**

**Safety.**—See **SAFETY VALVE.**

**Setting.**—See **VALVE SETTING.**

**Springs.**—See **SPRING—Valve.**

**Throttle.**—Quick-Opening Throttle Valves. Peter H. Bullock. The author believes that while, as a rule, throttle valves should be operated slowly, provision for operating them quickly ought also to be provided for use in cases of emergency. He illustrates and describes means for doing this, of his own devising. 700 w. Am Mach—Aug. 6, 1896.

See also **Friction.**

**Water Flow.**—See **WATER FLOW—Valves.**

**Water Pipe.**—See **WATER PIPE—Tapping Machine.**

See also STEAM ENGINE; VALVE; VALVE SETTING.

A Rational Method of Studying Valve Motions. Henry Hess. Method devised by the writer to trace and show the performance of a certain complicated valve gear. Ill. 1700 w. Mach—April, 1897.

Engine Valve Motions. Theo. F. Scheffler, Jr. Comments on the general redesigning of valve motions which seems to be taking place, and describes a few of the most modern types of engines, particularly with reference to valve motion. 2800 w. Sci Mach—Aug. 1, 1897.

The Design of Cut-Off Slide-Valve Gear (Zur Beurteilung von Expansionsschiebersteurungen). Prof. A. Bantlin. An illustrated article on the design of slide-valve gear, with special reference to the securing of ample admission of steam. 3500 w. Zeitschr d Ver Deutscher Ing—July 7, 1900.

Valve Gear Design. Jas. Dunlop. The first of a series of articles treating of this subject designed to meet the requirements of engineers designing engines. Almost every type of engine is intended to be deal with and the development of valve gears from their simplest to their more complicated forms illustrated. Serial. Prac Eng—Feb. 18, 1898.

Valve Gears. E. T. Adams. The author promises with much that is old to present something new in the treatment of the subject. The first part deals with the theoretical indicator card, and construction of the slide valve. Serial. Mach—Nov., 1896.

**Accuracy.**—The Accuracy of Valve Gear. A criticism of terms in which the action of steam engine valves is generally stated. 1500 w. Engng—Nov. 8, 1895.

**Angular Advance.**—Angular Advance. A critique on a method often employed in explanation of the meaning and effect of angular advance in cases where link-motion reversing gear is used. A correction of the method is proposed and explained. 1200 w. Loc Engng—April, 1896.

**Assistant Cylinder.**—Assistant Cylinder for Valve Gears. Basil H. Joy. Read before the Inst. of Marine Engs. Incorporated. Describes the machine and the principles, giving some practical results. 4000 w. Prac Eng—April 2, 1897.

**Brown Engine.**—Setting the Valves of the Brown Engine. Thomas Hawley. An article written some time ago and published by request of the educational committee of the various N. A. S. E. Associations. Illustrated description of the Brown engine with directions for setting the valves. 2500 w. Safety V—Dec., 1896.

**Corliss.**—Corliss Valve Gear. Editorial on the difficulties standing in the way of the production of a positive Corliss gear. 1500 w. Engr, Lond—Aug. 19, 1898.

Corliss Valves and Gears. The first of a series of articles considering the proportions of Corliss valves, the action of the wrist-plate on the valve movement, etc. Ill. Serial. Mech Wld—July 7, 1899.

Suggestions on the Design of Corliss Valve Gears. John H. Barr. The paper explains certain expedients which have been found helpful in reaching a fairly satisfactory solution by trial on the drawing board. Gives method of determining the angle of advance of the eccentric, and method of projection directly from the virtual eccentric. Ill. 3300 w. Sib Jour of Engng—Oct., 1898.

See also Diagram; Proell-Corliss; STEAM ENGINE.

**Corliss Positive-Motion.**—Positive-Motion Corliss Valve Gear (Zwangläufige Corlissteuerungen). H. Dubbel. A Corliss valve gear without trip motion, arranged especially for locomotives. Data of tests are given showing the economy of a locomotive with this gear over the slide valve. Two articles. 7000 w. Zeitschr d Ver Deutscher Ing—June 10, 17, 1899.

**Cut-Off.**—See also INDICATOR DIAGRAM; STEAM ENGINEERING.

**Diagram.**—The Slide Valve Diagram. Treats merely of the practical construction. 1400 w. Am Elect'n—Feb., 1897.

The Study of Valve Motions from Diagrams. J. C. Smith. Illustrates and describes the diagram of Prof. Zeuner reduced to a solution easily

15, 1899.

**Diagram, Bilgram.**—Bilgram's Diagram and the Solution of Problems Involving Lead. Merrill Van G. Smith. Showing that one of the fundamental problems involving lead, cited in Prof. Fox's recent article on the Zeuner Diagram, can be solved by a plain and exact construction quite as simply as by the Zeuner diagram. 500 w. Jour Fr Inst—Nov., 1898.

**Diagram, Brix.**—The Bicentric Slide-Valve Diagram (Das Bizentrische Polare Exzenterschieber Diagramm). A new diagram by Chief Engineer Brix, of the Russian navy. It determines the valve positions taking into account the angular deviations of the valve and connecting rod. 3000 w. Zeitschr d Ver Deutscher Ing—April 10, 1897.

**Diagram, Corliss.**—Valve Diagrams for Corliss Valve Gear (Schieberdiagramme für Corlissteuerungen). A. Seemann. Showing how the Müller valve diagram may be applied to the Corliss engine, giving accurate results with little labor. 2500 w. Zeitschr d Ver Deutscher Ing—June 11, 1898.

**Diagram, Müller.**—The Application of the Double Valve Diagram (Ein Beitrag zur Beurtheilung der Zweischiebersteuerung). K. Gelinek. A discussion of the application of the Müller valve diagram to slide valve gears with cut-off valve operated by a separate eccentric. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—May 27, 1898.

**Diagram, Proell.**—See Proell-Corliss.

**Diagram, Zeuner.**—The Zeuner Diagram. William Fox. Aiming to prove that there are no problems incapable of an exact geometrical solution by means of this diagram. Serial. Jour Fr Inst—May, 1898.

**Electrical Operation.**—Electrically Operated Valve Gear—Is it a Simplification or a Complication? Robert A. Bruce. Discusses the effort being made to replace the Corliss valve gear by electrically operated valves, and thinks it doubtful whether economy or convenience can be secured in this way. 1600 w. Am Mach—Aug. 31, 1899.

**Hardie.**—The Hardie New Valve Gear. Illustrated description with tabulated results of distribution obtained. 400 w. R R Gaz—March 9, 1900.

**Indicator Diagrams.**—See INDICATOR DIAGRAM—Valve Gear.

**Lang.**—Lang Radial Valve Gear. Lincoln A. Lang. Illustrates and describes a new gear that has been applied to several small steam vessels on the Great Lakes. 2200 w. Marine Rev—Oct. 19, 1899.

New Valve Gear for Steam Engines. Illustrated description of the Lang valve gear, which is reported as giving satisfactory results on marine and stationary engines to which it has been applied. 1200 w. Eng News—Feb. 15, 1900.

**Link Motion.**—The Distribution of Work in Compound Engines by the Link Motion (Die Arbeitsverteilung bei Verbundmaschinen mit Kulissensteuerung). W. Schwarz. Giving a graphical method for determining the work performed at various points of cut-off. 1000 w. Zeitschr d Ver Deutscher Ing—May 28, 1898.

**Locomotive.**—See LOCOMOTIVE VALVE GEAR; VALVE.

**Long Quick-Acting.**—A Quick-Acting Valve Gear. Describes an invention of A. Long, possessing qualities worth examining. Ill. 500 w. Bos Jour of Com—Aug. 6, 1898.

**Marine Engines.**—Single-Eccentric Valve-Gears for Marine Engines (Beitrag zur Praktischen Konstruktion der Einexzenter-Umsteuerungen für Schiffsmaschinen). Von Berling. A general investigation of the so-called "radial" valve gears, including nearly every variety used in marine practice; with valve diagrams and illustrations of constructive details. Two articles. 5000 w. Zeitschr d Ver Deutscher Ing—April 2, 9, 1898.

See also Stevens Marine; MARINE ENGINE.

**Peaucellier Link.**—The Peaucellier Link Work. A. Ewbank. A detailed study of this device for obtaining rectilinear motion from rotary motion. 1800 w. Ind Engng—July 25, 1896.

**Port Openings and Eccentricity.**—Port Openings and Eccentricity (Kanalweite und Excentrizität). A. Ehrlich. With diagrams showing the relation between the width of port and throw of eccentric. 1200 w. Zeitschr d Ver Deutscher Ing—Sept. 10, 1898.

**Pouse Gear.**—See STEAM ENGINE—Electric Station.

**Proell-Corliss.**—The Proell-Corliss Engine and the Proell Valve Diagram. Hermann Kuhne. Read before the Inst. of Engineers and Shipbuilders in Scotland, Oct. 26, 1897. Illustrated description of the Proell expansion apparatus, and the engine named. 1300 w. Prac Eng—Dec. 10, 1897.

**Pumps.**—Valve Setting on Steam Pumps. Details of valve gear as shown on the Deane, of Holyoke, pumps are given and discussed; also the Deane duplex pump, and a compound duplex pump. Ill. 1800 w. Power—April, 1897.

See also **PUMP; PUMPING ENGINE.**

**Radial.**—See **Lang; Marine Engines.**

**Rider.**—Investigations Upon Regulation With the Rider Valve Gear (Versuche über die Regulirung der Rider-Steuerung). Dr. Camerer. An examination of the Rider valve-gear, with especial reference to the influence of friction upon regulation. Two articles. 7000 w. Zeitschr d Ver Deutscher Ing—Nov. 25, Dec. 2, 1899.

**Setting.**—See **VALVE SETTING.**

**Stevens Marine.**—The Stevens Valve Gear for Marine Engines. Andrew Fletcher. Two letters on the origin and introduction of this form of valve gear, with drawings. 2000 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Willans.**—Valve Gear of the Willans Engine. John Svenson. Comments on the characteristics of this gear and a statement of its leading advantages. Ill. 1800 w. Trans of Am Soc of Mech Engs, No. 797—Nov., 1898.

See also **STEAM ENGINE.**

**Winding Engines.**—Notes on Valve Gears for Winding Engines (Einige Bemerkungen über Fördermaschinen-Steuerungen). P. Hartmann. A comparison of the merits of poppet and slide valves for winding engines for mine use. 1800 w. Glückauf—Feb. 26, 1898.

See also **HOISTING ENGINE.**

**Zeuner Diagram.**—See **Diagram, Zeuner.**

**Zvonicek.**—Steam Engine of 500 H. P., with Zvonicek Valve Gear (500 Pferdige Dampfmaschine mit Ventilsteuerung von Zvonicek). Illustrating an improved from of poppet valve gear with automatic cut-off. 800 w. Zeitschr d Ver Deutscher Ing—Sept. 3, 1898.

**VALVE SETTING.**

How to Set Valves. Ira A. Moore. Gives careful directions showing that there is nothing very perplexing in the work. 4000 w. Loc Engng—Jan., 1899.

**Buckeye and Rollins Engines.**—Setting the Valves of the Buckeye and Rollins Engines. H. H. Kelley. Illustrates and describes the construction, giving directions. 2300 w. Engr, U. S. A.—July 15, 1899.

**Slide.**—Setting a Slide Valve. F. F. Hemenway. The slide valve has been selected as the most common type, and thus better adapted to an exposition of the principles of valve setting in general. Serial. Mach, N. Y.—Sept., 1896.

Setting Side Valves. Thomas Hawley. Abstract of a lecture delivered before the Wells Memorial Inst., Boston. Gives some points and suggestions regarding the methods. 1800 w. Bos Jour of Com—Feb. 12, 1898.

**VANADIUM.**

See also **METAL—Rare; RARE METALS.**

**Alloys.**—The Alloys of Vanadium (Les Alliages de Vanadium). An account of the process of M. Helouis for the production of an alloy vanadium, aluminum and sodium, for use in the metallurgy of iron and steel. 1000 w. La Revue Technique—May 25, 1897.

**Electro-Deposition.**—A Note on the Electro-Deposition of Vanadium. Sherard Cowper-Coles. Where found, prices, etc., with some of its characteristics. 500 w. Elec Rev, Lond—Feb. 17, 1899.

See also **ELECTRO-METALLURGY.**

**Steel.**—See **STEEL ALLOY—Vanadium.**

**VANNER.**

**Lührig.**—See **MINE—Tasmania.**

**VAPORIZATION.**

See **EVAPORATION; GASES—Vaporization Heat; HEAT—Latent; STEAM.**

**VARIABLE SPEED.**

See **AUTOMOBILE—Gearing; BICYCLE—Gear; CONE WHEEL; GEAR—Variable Speed; POWER TRANSMISSION—Variable Speed; PULLEY—Cone.**

**VARNISH.**

See also **METAL PROTECTION; PAINT; PAINTING.**

Varnishes, etc., Used in Building Structures, by Wood Workers, etc. The treatment of the various kinds of wood, and the composition of the varnish to be used. 4500 w. Builder—Oct. 29, 1898.

**Iron Protection.**—See **PAINT.**

**Woodwork.**—Polishes and Varnishes for Woodwork in Building. H. C. S. Gives ingredients and methods of preparation for a number of stains, varnishes, etc. 1200 w. Ill Car & Build—Jan. 28, 1898.

**VAULT.**

See also **ARCH; GROINED ARCH.**

Modern Vault Construction. John Beverley Robinson. Illustrated detailed description of the requirements and construction of vaults, attacks on vaults, etc. 4400 w. Arch Rec—April-June, 1897.

Vaults without Centerings. From "La Nature." Illustrations and notes concerning the modern method employed for the construction of vaults. 1200 w. Sci Am Sup—Sept. 9, 1899.

**Ribbed.**—Ribbed Vaults. Tracing the progress of vaulting, with the advantages peculiar to the different kinds, and references to some notable work. 2300 w. Arch, Lond—May 15, 1896.

**Spiral.**—See **STAIR—Circular.**

**VEIN.**

See **MINERAL VEIN; SILVER GEOLOGY.**

**VENICE.**

The Lagoons of Venice. Giacomo Boni. Discusses the scheme for modernizing Venice, and urging all who have influence to use it in defending her lagoons. Ill. 2500 w. Jour Roy Inst of Brit Arch'ts—June 11, 1898.

**VENTILATION.**

See also **BLOWER; CAR VENTILATION; DRAIN—Ventilation; FAN; HEATING AND VENTILATION; MECHANICAL PLANT; MINE VENTILATION; PLUMBING—Ventilation; SEWER—Ventilation; TUNNEL VENTILATION.**

The Working of Ventilation Systems. Comment on the report of W. N. Shaw, to the Local Government Board, England, concerning the ventilation and warming of dormitories, workshops and schools. 1800 w. Jour Gas Lgt—April 4, 1899.

Necessity of Ventilation. H. Eisert. Presented at meeting of American Soc. of Heating and Ventilating Engs. Shows the necessity of constantly renewing the air, the changes wrought by respiration, combustion, etc. 3000 w. Pro Age—Feb. 15, 1899.

Ventilation. R. H. Smith. Consideration of the methods and principles of the ventilation of buildings. 2800 w. Engr, Lond—May 5, 1899.

Ventilation. The statement of requirements is regarded as much more simple than their satisfactory fulfillment. The injurious principles given off in expired air are grouped as carbonic impurities, as distinguished from carbonic acid, which, were it the only impurity, would not generally be present in injurious quantity. 1600 w. Arch, Lond—July 24, 1896.

Ventilation of Buildings. R. C. Carpenter. Translation from Peclet's Traite de la Chaleur, with notes. Serial. Heat & Ven—May 15, 1896.

Ventilation of Buildings. R. C. Carpenter. The first of a series of articles which will describe applications of various methods as practiced in France thirty or thirty-five years ago, and also give historical references to various systems. Serial. Heat & Ven—May 15, 1898.

Ventilation Practically Considered. Rufus R. Wade. Abridged from a work published for private distribution. Discusses the methods under the heads of natural, mechanical, and by aspiration. 2800 w. San Plumb—Jan. 1, 1898.

Ventilation Without Draughts. Arthur Rigg. Discusses various systems, and gives the author's views of essentials to efficient ventilation. General discussion. Ill. 10000 w. Jour Soc of Arts—Jan. 19, 1900.

**Air Ducts.**—Dangerous Air Ducts. Abstract of a paper by John Gormly, read at meeting of Heat. and Ven. Engs., describing construction liable to distribute sewer air through a building. 600 w. Eng Rec—Jan. 27, 1900.

The Proper Location of Air Ducts. David B. Dick. From a paper on Ventilation, read before the Toronto San. Assn. Gives experiments made to test the temperature at various heights in rooms, and discusses the problem, concluding that the warm air should be admitted at the floor, and the outlet be at the ceiling. 1500 w. San Plumb—June 1, 1897.

**American System.**—Inlet or Outlet Ventilation. Lewis W. Leeds. Describes the system formerly used by the writer and found unsatisfactory, and also the present practice. 3300 w. Ill Car & Build—Oct. 14, 1898.

**Anemogene.**—See **Ship and Stokehold.**

**Architects.**—Ventilation for Residences. The neglect of architects to consider ventilation in plans for residences is criticised. 900 w. Dom Engng—July, 1896.

**Auditorium, Boston.**—Ventilation of Steinert Hall, Boston. A full account of the method of heating an auditorium and music hall in Boston, by means of which the purity of the atmosphere is maintained at all times. 2000 w. Eng Rec—Sept. 17, 1898.

**Basements.**—The Purification of Basements and Arrangement of Ground Ventilation (Die Reinigung des Untergrundes und Einrichtung einer Bodenventilations-Anlage). Discussing the importance of proper ventilation of basements as well as the surrounding soil, both from considerations of health and safety. 2500 w. Gesundheits Ingenieur—July 31, 1897.

**Blower System.**—Some Facts in the History of the Blower System. Walter B. Snow. Traces the progress of this system from its earliest history. Ill. Serial. Met Work—March 19, 1898.

**Boston Subway.**—See **TUNNEL VENTILATION.**

**Buffalo Real Estate Exchange.**—Ventilation and Lighting of the Buffalo Real Estate Exchange. Illustrated detailed description of a radical departure from the usual method of constructing a modern office building. The indirect system of heating is used throughout, and every room in the 11-story building is ventilated. The ventilation is forced by blowers. 2800 w. Eng Rec—May 2, 1896.

**Capitol, Washington.**—Ventilating the United States Senate Chamber. A full description of the changes made to remedy the defects of the system installed. Ill. Serial. Eng Rec—Oct. 16, 1897.

Ventilation of the Hall of the House of Representatives and the South Wing of the Capitol, Washington, D. C. From a report of S. Homer Woodbridge. Discusses the advantages of upward and downward ventilation, favoring the upward system. Ill. Serial. Heat & Ven—Oct., 1899.

Ventilation of the National Capitol. J. G. Dudley. An interesting description of plant which was designed by Gen. Meiggs, and has been in operation for more than thirty years. 2000 w. Heat & Ven—July 15, 1896.

**Car.**—See **CAR VENTILATION.**

**Chimney vs. Fan.**—Relative Efficiency of Ventilation by a Chimney and by a Fan. R. C. Carpenter. Determined by circulation and by reference to experiments made relating to efficiency of fans and engines. 2800 w. Heat & Ven—Feb. 15, 1897.

**Clinic.**—Ventilation of the Polhemus Memorial Clinic. Illustrated description of a ventilating plant of particular interest on account of the height, number of occupants, vitiating elements, and that the construction was such that flues in the outside wall were in no case possible. 2500 w. Eng Rec—Sept. 25, 1897.

**Color-Printing Establishments.**—Sanitation of Establishments Used for Color Printing (Assainissement des Locaux Destinés à l'Impression à l'Aide des Couleurs en Feuilles). J. Carlioz. A discussion of the unhealthfulness of color printing by the "dusting on" processes, with illustrations showing methods of arranging exhaust ventilating fans for the removal of the dust. 1800 w. Génie Civil—Nov. 4, 1899.

**Drain.**—See **DRAIN—Ventilation; PLUMBING—Ventilation; SEWER—Ventilation.**

**Dry Air.**—Compressing Air to Produce a Dry Atmosphere. Frank Richards. In response to an inquiry where dry air is needed in the manufacture of a chemical, the writer explains how to obtain such an atmosphere. 1300 w. Am Mach—April 20, 1899.

**Expired Air.**—Expired Air and Problems of Ventilation. Important contradictions of certain accepted views. The injurious effects of expired air are attributed almost wholly to increase of carbonic acid and decrease of oxygen. Doubt is thus thrown upon advanced theories of ventilation. These views seem likely to arouse discussion. 900 w. Pop Sci M—Feb., 1896.

**Fans.**—See **Blower System; Chimney vs. Fan; BLOWER; FAN; HEATING AND VENTILATION.**

**Gas-Heated Rooms.**—See **GAS HEATING—Ventilation.**

**Hospital.**—Neglect of Ventilation in Some Hospitals. Thomas Barwick. Read before the Am. Soc. of Heat. and Ven. Engs. Describes the conditions found in various hospitals, showing the lack of proper ventilation. 1800 w. Dom Engng—Feb., 1900.

See also **Clinic; HEATING AND VENTILATION; HOSPITAL; MECHANICAL PLANT.**

**Hospital Plenum.**—Hospital Planning in Regard to Plenum Ventilation. William Henman. Read at the San. Inst. Congress. Describes the arrangements made for ventilating the Belfast Royal Victoria Hospital, and the advantages of the Plenum system. 1800 w. Brit Arch—Sept. 15, 1899.

**House of Representatives.**—See **Capitol, Washington.**

**Humidity.**—Mixtures of Air and Watery Vapor. Frank Richards. Diagrams are given and explained, of interest in studying the problem of controlling the relative humidity of air by means of its artificial compression and expansion. 900 w. Am Mach—June 22, 1899.

Moisture in the Air of Rooms. J. H. Kinealy. From "Heating, Ventilating and Sanitary Plumbing." The sources of moisture, the amount, etc., are discussed. 3800 w. Pro Age—Sept. 1, 1900.

The Arid Atmosphere of our Houses in Winter. Henry Barnes. Abstract of paper read before the American Public Health Assn., at Philadelphia meeting. Compares the atmospheres of heated houses with the natural atmosphere, and discusses means for increasing the humidity. 1500 w. Heat & Ven—Dec. 15, 1897.

The Humidity of the Air (Die Feuchtigkeit der Luft). Bruno Griep. Discussing the importance of introducing moisture into artificially warmed rooms, in order that the most healthful proportion may be maintained. 1000 w. Gesundheits Ingenieur—June 30, 1897.

The Influence of Moisture in the Air upon the Health of Occupants of Closed Rooms (Die Bedeutung des Wasserdampfgehaltes der Luft für die Gesundheit der im Geschlossenen Raum sich Aufhaltenden Menschen). H. C. Nussbaum. Emphasizing the importance of maintaining the proper degree of humidity in artificially warmed rooms. 2500 w. Gesundheits Ingenieur—July 31, 1899.

See also **Textile Factories; Weaving Shed; HUMIDITY.**

**Jail, Newark, N. J.**—The Ventilation of a Newark Jail. Illustrated description of a direct-indirect heating system with ventilation by means of a roof exhaust fan. 700 w. Eng Rec—June 10, 1899.

**Large Buildings.**—Ventilation of Large Buildings. Merwyn O'Gorman. Read before the Civ. and Mech. Engs.' Soc. of London. Discusses methods used and the importance of furnishing 1000 cubic feet of air per hour for each person. 4400 w. Arch't, Lond—March 23, 1900.

**Library, Chicago.**—See **FAN—Chicago Library.**

**Marine Boiler Room.**—See **Ship's Boiler Room.**

**Mines.**—See **MINE VENTILATION.**

**Moisture.**—See **Humidity.**

**Natural.**—Natural Ventilation. W. M. Watson. Suggests systems of ventilating not covered by patents, and discusses methods that have been found satisfactory. Ill. 2400 w. Can Eng—Aug., 1897.

Natural Ventilation (Ventilazione Naturale degli Ambienti). D. Spataro. An exposition of Recknagel's theory and a discussion of the most suitable types of walls for dwelling houses. Ill. 5000 w. Annali d Soc d Ing e d Archit Ital—Sept., Oct., 1898.

**Plenum.**—See **Hospital Plenum; School Plenum.**

**Post-Office, Omaha.**—Ventilation of the Omaha Post-Office. Illustrated description of the design and construction of an elaborate job. 1700 w. Eng Rec—June 4, 1898.

**Plumbing.**—See **DRAIN—Ventilation; PLUMBING—Ventilation.**

**Public Buildings.**—The Choice of Ventilating Systems for Schools, Theatres, Churches, etc. (Die Auswahl des Ventilations-Systems für Schulen, Theater, Kirchen, u. s. w.). A paper read before the sanitary association of Berlin by Prof. Rietschel. 3000 w. Gesundheits Ingenieur—July 15, 1897.

**School.**—The Value of Ventilation (Der Wert der Ventilation). H. C. Nussbaum. A review of a recent work by Dr. Krieger, discussing at length the importance of proper ventilation of school houses, as well as suitable means for accomplishing the result. 4000 w. Gesundheits Ingenieur—Dec. 15, 1899.

Ventilation of School Buildings. Read before the Am. Inst. of Instruction, Bethlehem, N. H. A general dissertation upon school ventilation, its cost, etc. Serial. Heat & Ven—Sept. 15, 1896.

Ventilation of School Buildings. Paper read before the Am. Inst. of Instruction, Bethlehem, N. H. Practical illustrated dissertation upon the inexpensive means of improving the ventilation of school buildings which have not been provided with adequate systems. 2000 w. Heat & Ven—Oct. 15, 1896.

Ventilation of School Buildings. S. H. Woodbridge. Considers the relation of air to vital energy, cost of air supplied, and some simple methods of ventilating. Ill. 2300 w. San Plumb—April 15, 1897.

See also **HEATING AND VENTILATION.**

**School, Auburn, N. Y.**—Ventilation of an Auburn, N. Y., School. Detailed illustrated description of an interesting plant in which indirect radiation only is employed. 1100 w. Eng Rec—Dec. 28, 1895.

**School, Boston.**—Ventilation of Schools as Affected by Poor Sanitary Apparatus. Abstract from the report of the expert committee appointed by Mayor Quincy, of Boston, to examine into the sanitary condition of the school-houses in Boston. 2700 w. Heat & Ven—April 15, 1896.

**School, Brooklyn.**—Ventilation of a Brooklyn (N. Y.) School. Ventilation is effected by forcing the air through the buildings by a blower and out through a system of vent flues leading to a main ventilating shaft. 1500 w. Eng Rec—March 20, 1897.

**School, Lynn, Mass.**—System of School-House Ventilation at Lynn, Mass. Illustrated description of improvements at the Centre Street School. It is a system of jacketed stoves. 1000 w. Heat & Ven—Dec. 15, 1898.

**School, Plenum.**—Plenum Ventilation in its Application to Public Elementary Schools. S. Barwise. Shows the necessity of mechanical ventilation, and discusses the exhaust system as well as the plenum. Discussion. 5600 w. Jour of San Inst—Jan., 1899.

**School, Washington.**—Ventilation of a Washington, D. C., School. A description of the latest type of hot-blast heating installations. Ill. 1200 w. Eng Rec—Feb. 26, 1898.

**Senate Chamber.**—See **Capitol, Washington.**

**Sewer.**—See **SEWER—Ventilation.**

**Sewer Gas.**—See **Air Ducts; SEWER—Gas.**

**Ship.**—The "Boyle" System of Ship Ventilation. Illustrated detailed description. 3000 w. Steamship—July, 1897.

Ventilation in Warships. Editorial discussion of much needed improvements. 1400 w. Eng, Lond—July 31, 1896.

See also **VENTILATOR COWL.**

**Ship and Stokehold.**—Ship and Stokehold Ventilation. Illustrated description of apparatus patented by Messrs. Evans, Harris & Evans, of Manchester. It is called the "Anemogene" system, and is deserving of the attention of ship owners. 500 w. Steamship—Nov., 1896.

**Ship's Boiler Room.**—The Ventilation of the Boiler Room. From "Army & Navy Journal." Proposes a change from the existing system based on the principle that each man must be his own refrigerator. Comparatively dry air is directed upon the nearly nude bodies of the men in order that perspiration may be rapidly vaporized and cooling produced. 1400 w. Am Eng & R R Jour—Nov. 14, 1895.

See also **MECHANICAL DRAFT.**

**Siegel-Cooper Store, N. Y.**—See **MECHANICAL PLANT—Department Store.**

**Telephone Building.**—Pure Air in a Telephone Building. Describes the unusual means to accomplish this end, resorted to in the new telephone building in Cleveland, O. Ill. 700 w. Eng Rec—Nov. 27, 1897.

See also **TELEPHONE EXCHANGE.**

**Tests.**—Some Accepted Tests of Ventilation—Are They Reliable? T. C. Northcott. Read at the Atlantic City, N. J., meeting of the Am. Soc. of Heat. & Ven. Engs. Discusses the tests for carbonic acid gas, the lime water test, and the anemometer. 1800 w. Met Work—July 23, 1898.

Some Accepted Tests on Ventilation—Are They Reliable? T. C. Northcott. Discusses the shortcomings of tests in use, though recommending their use until less defective methods can be substituted. 1800 w. Dom Engng—Aug., 1898.

**Textile Factories.**—Ventilation of Textile Factories. W. H. Casmey. Read before the Yorkshire Dyers' and Colourists' Assn. Part first is largely arguments showing the necessity of fresh air both from a commercial and sanitary point of view. Serial. Prac Engr—July 8, 1898.

See also **Weaving Shed; HUMIDITY; TEXTILE FACTORY.**

**Tunnel.**—See **TUNNEL VENTILATION; UNDERGROUND RAILWAY.**

**Underground Railway.**—See **TUNNEL VENTILATION—Boston Subway; UNDERGROUND RAILWAY—London.**

**Upward vs. Downward.**—Upward and Downward Ventilation. An explanation of their relative advantages. 500 w. Eng Rec—Aug. 26, 1899.

**Washington Capitol.**—See **Capitol, Washington.**

**Weaving Sheds.**—Carbon Dioxide. Percy Bean. Considers its relation to the humidifying and ventilation of weaving sheds. 2800 w. Bos Jour of Com—March 25, 1899.

See also **Humidity; Textile Factories; HUMIDITY.**

## VENTILATOR COWLS.

A Practical Geometrical Method of Laying Out Ship Ventilator Cowls. C. M. Jones. Describes method of development. 2000 w. Marine Engng—Sept., 1900.

## VENTING TOOL.

See **FOUNDRY.**

## VESSEL.

See **SAILING VESSEL; SHIP; STEAMSHIP; WARSHIP.**

## VESTIBULE TRAIN.

See **CAR—Vestibule.**

## VIADUCT.

See also **BRIDGE; RAILWAY BRIDGE; TRACK ELEVATION; TRESTLE.**

**Alterations Without Falsework.**—Viaduct Alterations Without the Use of Falsework. F. S. Edinger. Reported at the meeting of the Assn. of Ry. Supts. of Bridges and Buildings. Describes repairs without falsework to a structure 117 ft. high and 440 ft. long, without delay of trains. 1400 w. Ry & Engng Rev—Dec. 9, 1899.

**Bohemia.**—The Viaduct at Drum and Neuschloss on the Northern Bohemian Transverse Railways (Die Viaducte bei Drum und Neuschloss auf der Nordböhmischen Transversalbahn). H. Rosche. With a view of the Korba viaduct and a plan of the country traversed. 1500 w. Zeitsch d Oesterr Ing u Arch Ver—Jan. 27, 1899.

**Burma.**—See **Gokteik.**

**Chicago and Eastern Ill. Ry.**—New Viaduct Construction on the C. & E. I. Ry. Illustrated detailed description of two steel viaducts, one over Little Saline Creek, and the other over Grasshopper Creek. 1200 w. Ry & Engng Rev—Feb. 17, 1900.

**Cleveland, O.**—See **BRIDGE—South Rocky River.**

**Cornwall, Eng.**—Reconstruction of Railway Viaducts in Cornwall. Relates to the replacement or reconstruction of the many viaducts on the Great Western main line in Cornwall, without interruption of traffic. 1200 w. Builder—Aug. 26, 1899.

Railway Viaducts in Cornwall, Old and New. T. H. Gibbons. A general description of the old viaducts, placing them under two classes; those carried on timber trusses, supported for the most part on timber piles which form the piers; and those over valleys when good foundations are to be had. Also describes the new viaducts. Ill. 3500 w. Inst of Mech Engs—1899.

**Edgebrook, Mo.**—Double-Track Electric Railway Viaduct for St. Louis and Suburban Ry. at Edgeb.ook, Mo. Illustrates and describes a steel structure recently erected about eight miles from St. Louis, Mo. 1200 w. Eng News—Dec. 23, 1897.

**Eglisau, Rhine.**—The Viaduct Over the Rhine at Eglisau (Der Rhein-Viadukt bei Eglisau). A fully illustrated description of this new viaduct including the construction of the tall piers and masonry arches of the approaches, and the false works and details of the central truss; also graphical records of the deflections under test. Two articles. 3000 w. Schweizerische Bauzeitung—Dec. 17, 24, 1898.

**Electric Railway.**—An Electric Street Car Viaduct. Illustrated description of the viaduct that carries the Consolidated Traction Co.'s electric car line on the turnpike between Jersey City and Newark over the D. L. & W. R. R. Co.'s tracks. 1200 w. Eng Rec—June 5, 1897.

See also **Edgebrook, Mo.**; **TRESTLE.**

**Floor Details.**—Floor Details of a City Viaduct. Illustrated description of a shallow floor system with special protection against gases from locomotives passing below. 1000 w. Eng Rec—Sept. 30, 1899.

See also **BRIDGE—Gas Protection**; **BRIDGE FLOOR.**

**Gokteik, Burma.**—The Gokteik Gorge Viaduct. Illustrations and brief description of the bridge on the Mandalay Ry., India, built by the Pennsylvania Steel Co. 900 w. Ind & East Engr—June, 1900.

**Hackensack Meadows.**—See **Electric Railway.**

**Kinzua, Pa.**—The Reconstruction of the Kinzua Viaduct. Illustrations and brief account of the reconstruction made necessary by the recent great increase in the weight of engines and rolling stock. It is said to be the fourth highest bridge in the world. 1200 w. Sci Am—Oct. 27, 1900.

**Korba.**—See **Bohemia.**

**Montreal.**—See **SUBWAY.**

**Müngsten, Germany.**—See **BRIDGE.**

**Mussy, France.**—The Mussy Viaduct; Paris, Lyons, and Mediterranean Railway. Illustrates and describes several interesting features. 1100 w. Engng—April 30, 1897.

**Nashville, Tenn.**—Bifurcated Viaduct Approaches in Nashville, Tenn. Illustrated description of the plan of construction adopted. 1000 w. Ry & Engng Rev—May 26, 1900.

**New York.**—A Proposed Bridge from Fort Washington to Kingsbridge, New York City. Brief illustrated description of design by W. B. Parsons. 400 w. Eng News—Feb. 4, 1897.

Proposed Extension of Amsterdam Avenue, New York, North from Fort George. Illustrated description of a proposed extension by means of a steel viaduct and arches, which will greatly enhance the driving facilities of the northern part of Manhattan Island. 900 w. Sci Am Sup—Feb. 6, 1897.

Riverside Drive Viaduct, New York. Illustrations and brief description of the interesting features of a viaduct being constructed to connect Riverside Drive with the driveways further north. 1200 w. Sci Am—July 21, 1900.

The Manhattan Valley Viaduct, New York City. Illustrated detailed description of the viaduct to carry the extension of Riverside Drive, from 127th street to 135th street, in New York. 1900 w. Eng News—June 8, 1899.

The Riverside Drive Bridge. A New York highway bridge, 1564 feet long, with a 60-ft. carriage way, and two ten-ft. sidewalks. The bridge consists of 25 arch-spans in which particular attention was paid to harmonious outlines. 1000 w. Eng Rec—Jan. 8, 1898.

The Riverside Drive Viaduct, New York. Illustrated description of a viaduct 1800 ft. long and 80 ft. wide, consisting of short masonry approaches, a 130-ft. steel arch, three of 18 ft., and twenty-two of 65 feet. The article illustrates all the special details of both masonry and steel work. 3500 w. Eng Rec—Aug. 25, 1900.

See also **BRIDGE—Harlem River**; **TRACK ELEVATION.**

**Paris.**—See **RAILWAY CONSTRUCTION**; **RAILWAY TERMINAL.**

**Park Avenue, N. Y.**—See **BRIDGE—Harlem River**; **TRACK ELEVATION—New York.**

**Pennsylvania Western.**—See **BRIDGE—Fort Perry, Pa.**

**Prichard, Switzerland.**—See **BRIDGE CONSTRUCTION—Lausanne.**

**Seine River.**—The Masonry of the New Viaducts over the Seine (Exécution de Maçonneries des Nouveaux Viaducs sur la Seine). Description of the new bridges over the Seine on the line of the Western Railway of France between Paris and Havre, with especial reference to the piers of truss bridges and the masonry work of stone arches as well as pneumatic foundations. Two articles, two plates: 6000 w. Génie Civil—Jan. 8, 15, 1898.

**Stone vs. Steel.**—The Design and Cost of Viaducts (Ueber Anlage und Kosten der Bahnviadukte). Rob. Moser. A comparison of the cost of stone and iron viaducts, to the advantage of the former; with curves and tables. 1800 w. Schweizer Bauzeit—June 30, 1900.

**Subaqueous.**—Proposed Subaqueous Viaduct at Sydney, N. S. W. Illustrated description of a proposed plan to build a viaduct on top of the silt-bed, supported by piers carried down to the rock. 1500 w. Eng News—Jan. 21, 1897.

**Sydney, N. S. W.**—See **Subaqueous**; **BRIDGE.**

**Washington, D. C.**—Designs for the Massachusetts Avenue Viaduct at Washington, D. C. Two designs for crossing Rock Creek, one a stone arch, and the other a steel arch. Ill. 600 w. Eng News—March 10, 1898.

The Rock Creek Masonry Bridge, Washington, D. C. Describes novel features of 1341-ft. arch viaduct, designed by G. S. Morison. 900 w. Eng Rec—April 30, 1898.

Competitive Designs for Connecticut Avenue Viaduct, Washington, D. C. A brief statement of conditions governing the work, with illustrated descriptions of designs submitted. 2500 w. Eng News—Jan. 27, 1898.

The Piney Branch Viaduct, Washington, D. C. Thomas C. J. Baily. Illustrated description of the main features. 1000 w. Eng News—May 17, 1900.

### VIBRATION.

See also **ACOUSTICS**; **ELECTRO-PHYSICS**; **HEAT**; **PHYSICS.**

Vibrations and Engineering. John Milne. Earthquake vibrations, train and engine vibrations, etc., are discussed from a scientific standpoint and illustrated by view and diagram. Serial. Engng—March 13, 1896.

**Marine Engines.**—See **MARINE ENGINE—Vibration.**

**Meters.**—Vibration Meters. Description of an instrument especially adapted to railroad locomotives and vehicles. It is claimed that greatly increased economy and safety will result from study of its cards and correction of the defects thereby discovered. 1600 w. Engng—May 22, 1896.

**Sixty-Eight Octaves.**—Sixty-Eight Octaves. T. H. Muras. Table showing, on a uniform scale, the relations of the different kinds of vibrations now known. 250 w. Elec Rev, Lond—April 24, 1896.

**Steam Engines.**—See **STEAM ENGINE—Vibration.**

**Wrought Iron.**—See **WROUGHT IRON—Vibration.**

### VICE WORK.

See also **FIT**; **FITTING**; **MACHINE SHOP**; **METAL WORKING.**

Hints on Vice Work for Young Fitters. F. H. Suggestions for holding work in the vice for the purpose of filing or other operations. Ill. 2000 w. Mech Wld—Aug. 26, 1898.

### VILLA.

See also **COTTAGE**; **COUNTRY ESTATE**; **HOUSE.**

**Florentine.**—Florentine Villas. Lee Bacon. An interesting illustrated description of these villas, written in popular style. 7000 w. Scrib Mag—March, 1896.

**Roman.**—The Villas of Rome. Marcus T. Reynolds. Illustrated description of these beautiful buildings, with a study of the social causes that led to the erection of this type of dwelling. 9500 w. Arch Rec—Jan.-March, 1897.

**Vienna Suburb.**—See RESIDENCE PARK.

**VILLAGE.**

See also WORKMEN'S DWELLINGS.

**Colliery.**—See COAL MINE VILLAGE.

**VILLAGE IMPROVEMENT.**

See MUNICIPAL IMPROVEMENT—Village Societies.

**VISCOSIMETER.**

See also LUBRICATION—Testing.

**Carpenter.**—Carpenter's Viscosimeter. O. Shautz. Illustrated description of a new instrument for testing the "viscosity" of lubricants. 700 w. Sib Jour of Engng—April, 1896.

**Redwood.**—Redwood's Viscosimeter in Practice. H. Andrews and G. E. Brown. Practical directions for the manipulation of this instrument which will enable any one to carry out with accuracy and speed the testing of any oils from a viscosimetric point of view. 3500 w. Prac Eng—Sept. 17, 1897.

**VIS VIVA.**

**Measurement.**—See LIVING FORCE.

**VOLCANIC ASH.**

See PUMICE STONE.

**VOLCANIC PRODUCTS.**

See also PUMICE STONE.

The Utilisation of Volcanic Products. Discusses this new material being introduced for use of dock and railway contractors, builders, etc. Basalt, lava stone, and trass. 3500 w. Engr, Lond—May 26, 1899.

**VOLTA.**

See ELECTRIC CURRENT—Centennial Address; ELECTRICITY—History.

**VOLTAIC CELL.**

See ELECTRIC CELL.

**VOLTAMETER.**

See ELECTRIC MEASUREMENT—Voltameter.

**VOLT-METER.**

See ELECTRIC METER.

**VORTEX MOTION.**

See also PHYSICS.

**Liquids.**—A General Theory of the Laws of Vortex Motion in Liquids (Théorie Générale des Régimes Graduellement Variés dans l'Econlement Tourbillonant des Liquides). J. Boussinesq. A highly mathematical treatment of the subject, deriving the first approximative formulas. 2500 w. Comptes Rendus—June 8, 1897.

See also WATER FLOW—Boussinesq.

## W

**WAGES.**

See also COAL MINER; LABOR; MINER; STRIKE; TRADE UNION; WORKS MANAGEMENT.

Labor's Value. W. S. Rogers. In the first part experience with different systems of wage paying is narrated. Incidentally gain-sharing and profit-sharing are criticised. Serial. Mach—April, 1896.

Some Valuable Wage Statistics. Considers statistics given in the Sept. number of the "Bulletin of the U. S. Dept. of Labor." 2000 w. Gunton's Mag—Jan., 1899.

The Evolution of High Wages from Low Cost of Labor. Edward Atkinson. Read before the Am. Assn. for the Adv. of Science. A statement of existing conditions of prices and wages introductory to a discussion of the views of Malthus and their errors, and drawing conclusions bearing on commerce. 5500 w. Ap Pop Sci M—Oct., 1898.

The Statistics of Wages and the Cost of Living. The seventh and closing lecture in the special course on Social and Industrial Statistics by Carroll D. Wright, U. S. Com. of Labor, at the school of Social Economics, Union Sq., New York. Abstract prepared by J. B. Walker. 1000 w. Sci Am Sup—March 28, 1896.

**British.**—Rates of Wages and Hours of Labor. Comments on information given in the recent report of the Commissioner for Labor on "Changes in Rates of Wages and Hours of Labor in the United Kingdom." 1800 w. Jour Gas Lgt—Aug. 23, 1898.

Recent Foreign Statistical Publications. General report on the wages of the manual labor classes in the United Kingdom, with tables of the average rates of wages and hours of labor of persons employed in several of the principal trades in 1886 and 1891. 5000 w. Bull of Dept of Labor—May, 1896.

Wages and Hours of Labor in Great Britain and Ireland. Synopsis of a report on this subject, published by the Labor Dept. of the British Bd. of Trade. Tabulated statistics, etc. 2700 w. Bull Dept of Labor—Jan., 1896.

Wages and Hours of Labor. Editorial on the report from the Labor Department of the British Board of Trade, urging the desirability of avoiding fluctuations in the rate of wages in hours of labor. 2000 w. Engng—Aug. 26, 1898.

**British Engineering Trade.**—Wages in the Engineering Trade. J. Stafford Ransome. The investigation is chiefly confined to inequalities in different parts of Great Britain, and the reasons for it are sought. The first part deals with reasons popularly assigned but regarded as inadequate. Serial. Eng, Lond—April 3, 1896.

**Coal Miners.**—See COAL MINER; STRIKE—Austria Coal.

**Co-operative Contract.**—A Logical System of Wages. John Richards. Discusses the present methods of compensating labor, and suggests a co-operative contract system, illustrating by example. 3500 w. Am Mach—Aug. 24, 1899.

**Co-operative Plans.**—Wages and Production. Arthur A. Fuller. A discussion of co-operative plans and their effect upon production. 2000 w. Mach, N. Y.—March, 1899.

See also Profit-Sharing.

**Fair.**—Fair Wages. Editorial discussion of the report, just issued, by the Select Committee appointed to consider the working of the Fair Wages Resolution, passed by the House of Commons in England. 2500 w. Engng—Nov. 26, 1897.

**Foundry, England.**—The Labor Question in an English Foundry. R. A. Hadfield. A further contribution to the discussion of the relative merits of the system of payment by time, and payment by the piece, with other conclusions derived from experience in dealing with workmen, particularly in foundries. 2200 w. Am Mach—March 19, 1896.

**Iron Industry.**—See Steel Works; ENGINEERING COMPETITION; IRON INDUSTRY—Supremacy; IRON MANUFACTURE—Labor Cost.

**Miner.**—See COAL MINER; MINER.

**Piece-Work.**—New Shop Methods a Corollary of Modern Machinery. An editorial showing that labor's opposition to the new wage system is like their former opposition to machinery, and equally futile. Improved machinery and intensified production are parts of the same movement. 1800 w. Eng Mag—June, 1900.

Piece-Work Not Essential to Best Results in the Machine Shop. James O'Connell. An official statement of the attitude of American organized labor. 3600 w. Eng Mag—June, 1900.

A Piece-Rate System and Workshop Management. Fred. W. Taylor. An article favoring payment of labor at rates determined by analysis of the labor, and so differentiated as to give the superior workman more than the usual rate and the inferior workman less than the usual rate. 4300 w. Eng Mag—Jan., 1896.

Machinists' Piece-Work. M. S. Link. The piece-work system, while admitted to place workmen in their highest working capacity, is condemned as gradually extinguishing the grade of good all-round machinists. 1500 w. Mach—Oct., 1896.

Methods of Remunerating Labor. P. J. Darlington. A critical comparison of the piece-work, piece-rate, and premium systems of remunerating labor, setting forth the advantages of the piece-rate system. 4000 w. Eng Mag—June, 1899.

Six Examples of Successful Shop Management. Henry Roland. Describing the piece-rate systems in use by the Baldwin Locomotive Works, the Midvale Steel Co., and William Sellers & Co. 3400 w. Eng Mag—Feb., 1897.

Piece Work as an Agency in Machine-Shop Cost Reduction. M. Cokely. Showing the logic and necessity of a wage system providing reward and penalty. 3000 w. Eng Mag—Nov., 1900.

See also **Profit-Sharing; MINER—Wages.**

**Piece-Work, Car Shops.**—Piece-Work in Car Shops. G. L. Potter. Abstract of a paper read before the Western Railway Club advocating piece-work. 2000 w. Ry Rev—March 28, 1896.

Piece-Work in Car Shops. G. L. Potter. A paper read before the Western Railway Club. A discussion of the application to repair work especially, the conclusion being strongly favorable to the system. The paper embodies illustrations of actual practice and of the forms in use in standard car shops. 2300 w. R R Car Jour—April, 1896.

**Piece-Work, Railway Shops.**—The Piece-Work System. The system adopted by the Baltimore and Ohio R. R. is explained and a schedule of prices paid for a large number of separate parts is presented. 600 w. Ry Mas Mech—April, 1896.

Piece-Work in Repair Shops. C. F. Uebelacker. States the conditions which led to the adoption of the piece-work system, how the problem of working up a price list was solved, and general details of the work. The advantages and disadvantages are cited. 3000 w. St Ry Jour—Dec., 1896.

Regarding Piece-Work. Editorial discussion of the advisability of adopting the piece-work system in railway shops. 1800 w. Ry & Engng Rev—Nov. 11, 1899.

**Piece-Work vs. Day's Work.**—Piece-Work vs. Day's Work. Robert Grimshaw. Shows that what might be best for one shop or set of men might prove a failure under different circumstances. 1400 w. R R Car Jour—Jan., 1897.

**Piece-Work vs. Premium Plan.**—Piece-Work and Premium Plan. R. T. Shea. Opposed to the premium plan, and favoring piece-work. Also editorial. 2500 w. Loc Engng—Jan., 1900.

Systems for the Remuneration of Labor. P. J. Darlington. A critical examination of the claims of the premium system, in comparison with the piece-rate method, showing the deficiencies of the former system. 4500 w. Eng Mag—Sept., 1899.

**Premium Plan.**—Actual Experience with the Premium System. H. M. Norris. An interesting account of an attempt to introduce the premium system into an American works, and the obstructive attitude assumed by union labor. 5000 w. Eng Mag—Jan., 1900.

Actual Experience with the Premium Plan. H. M. Norris. Mr. Norris' concluding paper discloses the attitude and policy of American organized labor as opposed to the introduction of any competitive wage system, whereby the return to the workman is based upon his individual effort. 3500 w. Eng Mag—Feb., 1900.

Experience with the Premium Plan of Paying for Labor. F. A. Halsey. Outlines the plan which was described eight years ago, and presents data concerning its working in a well-known manufacturing corporation, which has had the plan on trial for two years, showing that it does what is claimed. 4000 w. Am Mach—March 9, 1899.

Some Questions Regarding the Premium Plan with Answers to Them. F. A. H. Discusses the applicability of the plan to stated conditions. 1800 w. Am Mach—March 23, 1899.

The Administration of the Premium Plan. F. A. Halsey. The purpose of the article is to show just how the plan is carried out in some of the shops where it is used. Serial. Am Mach—July 6, 1899.

The Economics of the Premium Plan. F. A. Halsey. Abstract of a lecture before the Providence Soc. of Mech. Engs. An explanation of the system, giving figures and statements from representative concerns in support of arguments in its favor. 3200 w. Am Mach—May 3, 1900.

The Reference or Premium Plan. Isaac Ross. An explanation of a system that has been worked successfully for seven years. 1500 w. Am Mach—Dec. 7, 1899.

The Determination of Time Limits Under the Premium Plan. George H. Hall. Discusses the importance of the proper establishment of the basis, showing how limits are determined in one shop and the means by which the data for their establishment are determined. 1600 w. Am Mach—July 12, 1900.

**Premium Plan, Ide Works.**—The Premium Plan at the Works of A. L. Ide & Sons. Herman Fernstrom. Describes the system used at these works, considering it more simple than most of the systems presented. 2200 w. Am Mach—Sept. 7, 1899.

**Profit-Sharing.**—Both Sides of Profit-Sharing. Frederic G. Mather. The system discussed and many examples cited where the benefits have been mutual, but concluding that neither profit-sharing nor any other device will improve the situation, if there is lack of sympathy on either side toward the other. 2500 w. Pop Sci M—Jan., 1896.

See also **Co-Operative Plans.**

**Profit-Sharing, England.**—Profit-Sharing in England. Information obtained from Mr. George Livesey regarding the social experiment which has been successfully tried by the South Metropolitan Gas Company, of London. 4500 w. U S Cons Repts—May, 1897.

Profit-Sharing as a Remedy. Editorial discussion of the situation in England, brought about by the strike, and of Mr. Livesey's suggestion of profit-sharing. 2800 w. Engng—Nov. 5, 1897.

**Profit-Sharing, Gas Industry.**—See **GAS INDUSTRY—Profit-Sharing.**

**Profit-Sharing, Ivorydale.**—Profit-Sharing at Ivorydale. I. W. Howerth. Presents the salient features and the results of one of the most successful and impressive examples of profit-sharing in the United States—that of the Proctor and Gamble Company, engaged in the manufacture of soap, candles and glycerine at Ivorydale, Ohio. 4500 w. Am Jour of Soc—July, 1896.

**Profit-Sharing, United States.**—Experience with Profit-Sharing. An able editorial reviewing principally American experiments in this line, and pointing out the limitations which restrict its application, these being found both in the nature of trade and in human nature. The piece-work system is considered preferable. 4500 w. Engng—Dec. 27, 1895.

Profit-Sharing in the United States. Paul Monroe. An account of results in some fifty different establishments in the United States wherein the experiment of profit-sharing has been tried. Some successes and many failures are recorded, and reasons both for success and failure are assigned. The conclusion is that such a system will succeed only with a select few of employers and with a certain grade of skilled or intelligent labor; and that from the point of view of social progress, the system is of little, if any, importance. 11000 w. Am Jour of Soc—May, 1896.

**Shipbuilding**—See **SHIPBUILDING—Wages.**

**Steel Works.**—Continental and English Wages. A comparison of wages in steel works. 700 w. Ir & Coal Trds Rev—Feb. 7, 1896.

See also **ENGINEERING COMPETITION; IRON INDUSTRY—Supremacy; IRON MANUFACTURE—Labor Costs.**

### WAGON.

See also **AUTOMOBILE; STEAM VEHICLE.**

**Bonner Rail.**—The Bonner Rail Wagon. Illustrated description of an invention for cheapening transportation and the handling of freight in connection with electric trolley roads. 700 w. Sci Am—Jan. 13, 1900.

### WALL.

See also **BUILDING CONSTRUCTION; RETAINING WALL.**

**Concrete.**—The Concrete Wall on Clinton Ave., Brooklyn. Illustrated description of a public improvement by which waste lands along a branch of the East River will be converted into a public market-place, with buildings, piers and a basin and channel. 2800 w. Eng Rec—Jan. 9, 1897.

### WAR.

See also **ARMORED SHIPS; GUN FIRE; MILITARY ENGINEERING; NAVAL BATTLE; SEA POWER; WARSHIP.**

**Electricity.**—See **ELECTRICITY—Warfare.**

**Spanish-American.**—Some Lessons of the War from an Officer's Standpoint. John H. Parker. Considers some of the causes of needless suffering, and some of the changes that have been made necessary by improved rifles and by the use of the machine gun. 3800 w. Am Rev of Revs—Oct., 1898.

The Conduct of the War. Gives a leading article from the London "Engineer," containing comments and criticisms of the military and naval operations of the war between the U. S. and Spain, with editorial reply. 3500 w. Eng News—June 16, 1898.

The Lessons of the Spanish-American War. Editorial discussion of Admiral Colomb's paper. 3000 w. Engng—March 10, 1899.

See also **GUN FIRE; NAVAL BATTLE.**

**Turkey-Greece.**—Introduction to the Study of the War between Turkey and Greece. C. F. von der Golts. Discusses the main object and original plans of campaign of the Turks. Serial. Jour of U S Art—July-Aug., 1898.

## WAREHOUSE.

**Dunkirk, France.**—The Export Sugar Warehouse at the Port of Dunkirk (L'Entrepôt Reél des Sucres Indigènes du Port de Dunkerque). A. Boudon. A detailed account of this important structure, with especial reference to the construction of the foundations in loose sand. 2000 w. 1 plate. Génie Civil—Dec. 23, 1899.

**Grain.**—See also **GRAIN ELEVATOR; TANK.**

**Grain, Berlin.**—A Grain Storage Warehouse Plant for Berlin (Getreide-Silo-Anlage für Berlin). M. Buhle. The prize essay of the German Society of Mechanical Engineers for 1896-1897, presenting a complete grain storage and handling scheme for the goods railway station at Berlin. 1 plate. Serial. Glaser's Annalen—Jan. 1, 1899.

**Grain, Roumania.**—The Grain Warehouses of Braïla and Galatz (Les Silos des Ports de Braïla et de Galatz). Describing the new and important grain warehouses in these two important Danube ports in Roumania. 1500 w. 1 plate. Génie Civil—May 15, 1897.

**Hamburg.**—See **FIREPROOF CONSTRUCTION—Warehouses.**

## WAR MATERIAL.

See also **ARMAMENT; ARMOR PLATE; ARTILLERY; BULLET; GUN; PROJECTILE.**

**1898.**—War Material. Editorial review of the progress made during 1898, and the lessons learned from the Spanish-American war. 1800 w. Engr, Lond—Jan. 6, 1899.

**Paris Exposition.**—War Material at the Paris Exhibition. An illustrated account of the display, with comments. 1800 w. Engr, Lond—Aug. 31, 1900.

## WARPING GEAR.

See also **AUXILIARY ENGINE; CAPSTAN GEAR; TOWAGE.**

**"Algoa."**—Warping Gear S. S. "Algoa." Illustrated description. 400 w. Engr, Lond—Aug. 14, 1896.

## WARSHIP.

See also **ARMORED CRUISER; ARMORED SHIPS; BATTLESHIP; CRUISER; GUNBOAT; MONITOR; NAVAL; NAVY; SEA POWER; TORPEDO BOAT; TORPEDO-BOAT DESTROYER; TURRET; TURRET SHIP; WAR MATERIAL.**

The Modern Warship, as Combining in Itself the Highest Results of Skill. Ingenuity and Scientific knowledge. George W. Melville. An address delivered on the occasion of the celebration of the seventy-fifth anniversary of the Franklin Inst. 6500 w. Jour Fr Inst—Feb., 1900.

The Monitor, the Battleship, the Cruiser, and the Destroyer. G. W. Dickie. A critical discussion by the general manager of the Union Iron Works, of San Francisco, of the design and equipment of the several classes of warships, from the view-point of the engineer and shipbuilder. 3500 w. Eng Mag—April, 1899.

The Monitor, the Battleship, the Cruiser, and the Destroyer. G. W. Dickie. Mr. Dickie's concluding paper discusses the function of the cruiser, and gives a very careful analysis of the qualities necessary for an efficient destroyer, with a design for a proposed sea-going torpedo-boat destroyer. 3000 w. Eng Mag—May, 1899.

The World's Principal War Fleets. A review of development of war vessels from earliest times to date, and of the present military marine of the entire world. 5500 w. Engr, Lond—Jan. 24, 1896.

War and Its Modern Instruments. A symposium in which William S. Aldrich treats of "Speed in American Warships." P. H. Colomb discusses the "Test and Value of Speed in Warships"; S. B. Luce discources on "Naval Warfare Under Modern Conditions," and John K. Cree talks of "The Influence of the Air-Ship in War." 14500 w. N Am Rev—Jan., 1896.

**"Argonaut" Trials.**—See **SHIP PROPULSION.**

**Armament.**—The Armament of Battleships (Die Bewaffnung von Kriegsschiffen). Von Neudeck. The first of an important series of articles on the artillery and armament of modern battleships, including guns, carriages, turrets, and mechanism of manipulation. 4500 w. Zeitschr d Ver Deutscher Ing—April 2, 1898.

See also **ARMAMENT; ARTILLERY; GUN;** and under specific types of warships.

**Auxiliary.**—See **"Kherson"; NAVY; STEAM YACHT—Naval Auxiliary.**

**Auxiliary Machinery.**—The Use of Steam Auxiliary Machinery for Warships. Lieut. J. K. Robison. Reviewing the comparative claims and performance of steam and electric auxiliaries, and giving especial attention to the increase of economy secured by recent improvements in design and operation of steam motors, of which many fine illustrations are given. 5000 w. Eng Mag—Oct., 1899.

See also **Complications; Machinery; AUXILIARY ENGINE; ELECTRIC EQUIPMENT—Warships.**

**"Belleisle" Experiments.**—The "Belleisle" Experiments. An illustrated description of the effects of the firing and account of the damage. 3000 w. Engr, Lond—June 8, 1900.

The "Belleisle" Experiments. Describes experiments to be made on this battleship to test the effect of modern shell fire on personnel and material. Ill. 1000 w. Engng—May 18, 1900.

Lessons from the "Belleisle." Editorial on the experiments made to determine the effect of gun fire. Ill. 2000 w. Engr, Lond—June 15, 1900.

**Best Types.**—Best Types of War Vessels. A naval prize essay by Major C. Field, in the "Journal of the Royal United Service Institution," on the essential requirements and characteristics of fighting ships for the British Navy. 5000 w. Marine Rev—Sept. 20, 1900.

**Boilers.**—See **MARINE BOILER; WATER-TUBE BOILER; NAVAL SERVICE.**

**British.**—Our Warships. William Allan. A criticism of modern ships showing that fitted with boilers, as they have been and are being at present, are not reliable, are far from safe, and not the best. 3000 w. Contemporary Rev—March, 1897.

Recent British Warships. Considers three typical modern types of the British fleet, a battleship, a cruiser, and a torpedo-boat destroyer. Colored supplement. 3000 w. Engr, Lond—Dec. 15, 1899.

Ships Building for the British Navy. From "Black and White." Illustration showing the great number of vessels in construction, with information relating to them. 1200 w. Sci Am Sup—Aug. 12, 1899.

The British Mediterranean Fleet at Trieste (Die Englische Mittelmeerflotte in Triest). An interesting description of the technical points of the British warships in the harbor of Trieste, from an Austrian point of view. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—Oct. 15, 1897.

The Progress of British Warships Design. P. H. Colomb. Discusses the changes in design, armament, speed and endurance, favoring the development of the torpedo vessel. 3500 w. N Am Rev—Aug., 1897.

See also **MARINE BOILER; NAVY; SHIPBUILDING—British Naval Work.**

**British, 1899.**—Warship Construction in 1899. An account of vessels launched from the Royal dockyards and from shipbuilding works, steam trials, etc. 3500 w. Engng—Dec. 22, 1899.

**British in Foreign Navies.**—British Ships in Foreign Navies. Archibald S. Hurd. Information concerning the warships being built by the British Government for other Powers, with details showing the number and character of those that have been designed, built, armed and fitted out, and remarks on the strange policy of arming the world against themselves and lending officers to train foreigners in the use of these weapons. 2300 w. Nineteenth Cent—April, 1898.

**British vs. American.**—A Comparison of British and American Naval Vessels. Taken from the "N. Y. Tribune," credited to the London "Mail." An apparently fair and unprejudiced comparison, which concludes that English battleships are better than American, guns much better, projectiles and armor as good, but cruisers much worse. 1200 w. Eng News—Aug. 4, 1898.

**"Chesapeake."**—See Practice Ship.

**Classification.**—Classification of Warships and Torpedo Boats. J. Foster Symes. Explains on what classification depends, and describes the various types. 1800 w. Yale Sci M—Nov., 1898.

The Classification of Warships. Francis Elgar. Read before the Inst. of Naval Architects. The various systems in different countries and the difficulties attending such classification are ably discussed. 6500 w. Engng—July 3, 1896.

The Classification of Warships. Fred. T. Jane. Comparative tables of the warships of England, France, Germany, and Russia, with explanatory notes of interest. 3800 w. Engr, Lond—March 9, 1900.

See also United States Types.

**Coaling at Sea.**—See COALING AT SEA.

**Complications.**—The Increasing Complications in Warships, and How Simple Arrangements Might be Adopted. George W. Dickie. Calls attention to points where improvement in effectiveness and simplicity can be effected as compared with present practice. 5 plates. 7000 w. Soc of Nav Archts & Marine Engs—No. 5, Nov., 1899.

See also Auxiliary Machinery; Machinery; AUXILIARY ENGINE; ELECTRIC EQUIPMENT—Warship; NAVAL ARCHITECTURE.

**"Constitution."**—The Frigate "Constitution." Ira N. Hollis. Reviews the history of this vessel, which is considered to mark the beginning of the United States navy, giving many interesting events connected. 9000 w. Atlantic M—Nov., 1897.

The Hundredth Birthday of the Frigate "Constitution." J. D. Jerrold Kelley. Gives an interesting historical account of this famous American ship. 2200 w. Harper's Wk—Oct. 23, 1897.

**Danish Trials.**—See SHIP PROPULSION.

**Delaware River Yards.**—Warships Building on the Delaware. Henry Starr Richardson. Illustrations of the "Princeton," "Mackenzie," "Alabama" and "Kasagi," with brief remarks. 500 w. Harper's Wk—April 2, 1898.

**Design.**—The Design of Warships. Editorial review of correspondence upon this subject chiefly that which has appeared in its columns with the signature "Argus." 3800 w. Engng—June 5, 1896.

**Development.**—Naval and Coast Defense. History of the development of the modern warship, with numerous illustrations. 3800 w. Sci Am—July 25, 1896.

**Engines.**—See Machinery; MARINE ENGINE.

**Engineers.**—See NAVAL ENGINEER.

**Explosives.**—See EXPLOSIVE—High Naval.

**French.**—Launching of the "Montcalm," the "Dupleix," and the "Yatagan" (Lancement du "Montcalm," du "Dupleix," et du "Yatagan"). A short description of two armored cruisers and a torpedo-boat destroyer, recently launched in France. 600 w. Le Yacht—March 31, 1900.

The French Navy. A brief illustrated review showing the diversity of design and the unique character of the ships. 2000 w. Sci Am Sup—Oct. 6, 1900.

**French, Stranding.**—The Stranding of French Ironclads. Full account of the grounding of the "Formidable" and two other ships of the French Navy, the cause of the accident and their rapid and skillful extrication from a perilous position, with a picture and a map of the harbor of Badines, where the incident occurred. 4000 w. Engng—Jan. 10, 1896.

**"Fulton."**—U. S. Steamer 'Fulton"—Her Design, Construction and Capacity. Charles H. Haswell. An account of the first sea steamer constructed by the U. S. Navy. 1000 w. Jour Am Soc of Naval Engs—May, 1898.

**German.**—Development in Design and Construction of German Men-of-War. A. Dietrich. Read at meeting of Inst. of Naval Architects. The history of the present German navy and the difficulty of producing vessels rivalling those of England and France in German dockyards and with German materials, are narrated in this paper. It is illustrated by diagrams showing the lines of three important German ships. 4000 w. Eng, Lond—June 12, 1896.

The Newest Vessels of the German Navy. From "Ueber Land und Meer." Illustrated brief description of the "Kaiser Friedrich III.," and the cruiser "K." 600 w. Sci Am Sup—April 10, 1897.

The New Naval Bill (Aus der Novelle zum Flottengesetz). A tabulated description of the vessels included in the bill, with a schedule of the construction work allotted to each year. 2500 w. Glaser's Annalen—Feb. 15, 1900.

See also NAVY; SHIPBUILDING.

**German vs. Foreign.**—German and Foreign Warships (Die Kriegsflotten Deutschlands und des Auslandes). A comparison between the German Navy and other European powers, greatly to the disadvantage of the former. 2000 w. and large chart. Stahl und Eisen—April 1, 1897.

**Gun Fire.**—See "Belleisle" Experiments; Yalu Battle; GUN FIRE; NAVAL BATTLE.

**"Hartford."**—Farragut's Old Flagship, the "Hartford." Illustrated description of this ship, which is to be preserved as a training ship. 900 w. Marine Rev—Sept. 28, 1899.

Reconstruction of Farragut's Flagship, the U. S. S. "Hartford." An account of the daring entrance to Mobile Bay, with illustrations of the vessel before and after reconstruction. 1200 w. Sci Am—Jan. 27, 1900.

**Italian.**—See Modern; NAVY.

**Japanese.**—The Coming Sea-Power. Charles H. Cramp. Traces briefly the development of the maritime power of Japan from its foundation, with special attention to her present naval activity, and speculations as to the purpose. 2700 w. N Am Rev—Oct., 1897.

**"Katahdin" Trials.**—Contract and Screw Trials of the U. S. S. "Katahdin." F. C. Bieg. An exhaustive description with numerous illustrations of machinery, etc., and tabulated data derived from the tests. 5000 w. Jour Am Soc of Nav Engs—Feb., 1896.

**"Kherson." Russia.**—The Russian Volunteer S. S. "Kherson." Illustrated description. 2000 w. Engng—Dec. 11, 1896.

See also CRUISER; MARINE BOILER—Belleville.

**"Leander."**—H. M. S. "Leander." Investigations made in reference to the history of this vessel. 1800 w. Engr, Lond—Oct. 29, 1897.

**Machinery.**—Machinery in Naval Warfare (Le Macchine nella Guerra Navale). A. Genardini. A very elaborate discussion of the fundamental importance of efficient and powerful machinery in modern naval warfare. Favorable mention is made of water-tube boilers and the steam turbine. 6000 w. Rivista Marittima—Feb., 1899.

The Mechanism of Our Ships of War. Editorial comment on the complexity of the apparatus and contrivances for manoeuvres and actions, urging attention to simplification. 1600 w. Engr, Lond—Jan. 8, 1897.

See also Auxiliary Machinery; Complications; AUXILIARY ENGINE; ELECTRIC EQUIPMENT—Warship; MARINE ENGINE; and under specific types of warships.

**Modern.**—Modern Warships (Die Heutigen Kriegsmarinen). Von Neudeck. Illustrated and tabulated descriptions of the most recent Italian and Russian warships. 5000 w. Zeitschr d Ver Deutscher Ing—Jan. 30, 1897.

**Modern vs. Old.**—The "Fondroyant" and the "Santa-Fé." A Comparison of Then and Now. Illustration and description of two vessels, the contrast in which exemplifies the advance which has taken place not only in warship building, but in the whole art of mechanical construction. 1200 w. Sci Am Sup—Dec. 19, 1896.

**Old Ironclads.**—On the Fighting Value of Certain of the Older Ironclads if Re-Armed. Lord Charles Beresford. Read before the Inst. of Naval Archts. The proposal to re-arm seventeen vessels; thirteen battleships and four cruisers. Also a list giving proposed armament for each, with comments on paper and discussion. 5400 w. Eng, Lond—April 16, 1897.

**"Pennsylvania" and "Victory."**—The Old Line-of-Battleship "Pennsylvania." Illustrated description of this old battleship, launched in 1837, and of Nelson's flagship, the "Victory." 1600 w. Sci Am—May 27, 1899.

**Practice Ship "Chesapeake."**—Construction and Equipment of the U. S. Naval Academy Practice Ship "Chesapeake." Illustrates and describes this vessel, constructed for the use of the cadets for training. 1600 w. Marine Engng—Oct., 1899.

**Propulsion.**—See **SHIP PROPULSION.**

**Repair Ship.**—See **REPAIR SHIP.**

**Russian.**—See **"Kherson"; Modern; NAVY.**

**Seacoast Batteries.**—Warships and Seacoast Batteries. Operations of the American Squadron at Santiago de Cuba. Translated from the "Revue d'Artillerie," for April, 1899. Discussion. 4300 w. Jour U S Art—March-April, 1900.

See also **COAST DEFENCE.**

**Spanish after Santiago.**—Report upon the Condition of Admiral Cervera's Vessels. Report in full after an examination by a Board of U. S. Naval Officers. Special attention is given to the effect of the U. S. gun fire, of combustible material, and explosions, with the conclusions drawn by the Board. Illustrations showing number and location of hits. Serial. Marine Engng—Oct., 1898.

The Official Report on the Wrecked Spanish Warships. Abstract and summary of conclusions of the investigating board, with comparison of the results with the forecasts. 2000 w. Sci Am—Sept. 10, 1898.

See also **GUN FIRE; NAVAL BATTLE.**

**Spanish vs. U. S.**—Analysis of Squadrons of Spain and United States. Diagrams denoting the existing conditions of the two groups of battleships, armored cruisers and protected vessels, with remarks. Ill. 1000 w. Engr, Lond—April 15, 1898.

English Engineer's Analysis of Squadrons of Spain and United States, with a Reply. Gives a comparison published in the London "Engineer," and a criticism of it. Ill. 2500 w. Sci Am—May 7, 1898.

**Speed Trial.**—See **SHIP PROPULSION**; and under specific types and names of vessels.

**Spithead Review, 1897.**—Naval Review at Spithead in Honor of Queen Victoria's Jubilee. John D. Ford. Interesting account of the naval vessels and incidents of the review, by the chief engineer of the U. S. S. "Brooklyn." 3300 w. Marine Engng—Aug., 1897.

Royal Naval Review. General remarks upon the review at Spithead, with illustrated descriptions of the battleships of the first and second classes, and the first-class cruisers are given in part first. Serial. Ind & Ir—July 2, 1897.

The Review at Spithead. A summary of the features of the fleet, the cruisers, gunboats, torpedo boats, training ships, etc., also the foreign war vessels and merchant steamers. Ill. 3000 w. Engr, Lond—June 25, 1897.

**Steering.**—See **STEERING.**

**Stranding.**—See **French Stranding; BATTLESHIP—"Oregon" Grounding; WRECK.**

**Training Ship.**—See **Practice Ship "Chesapeake"; TRAINING SHIP.**

**Triple Screw.**—The Logical Arrangement of the Motive Power of Warships. George W. Melville. Points out some of the advantages due to the use of three propelling engines as shown in the U. S. cruisers "Columbia" and "Minneapolis," and the methods of arrangement as thus far investigated. Also considers the disadvantages. Serial. Engr, Lond—March 24, 1899.

Admiral Melville's Reply. Reply of the Engineer-in-Chief of the United States Navy to criticisms from English engineers regarding his advocacy of the use of triple screws in vessels of war. 3000 w. Am Mfr & Ir Wld—July 27, 1899.

The Logical Arrangement of the Motive Power of Warships. George H. Melville. Full paper, complete discussion and author's reply. 19800 w. Jour Am Soc of Nav Engs—Aug., 1899.

Triple Screw Vessels. Opinion of Prof. Carl Busley, German Navy, in his paper on "Our Fleet," "Zeitschrift des Vereines Deutscher Ingenieure." 1000 w. Eng—Nov. 21, 1896.

**United States.**—Designs of the New Vessels for the U. S. Navy. Philip Hichborn. A full description of the new vessels for the U. S. Navy, including battleships, monitors, torpedo boats and destroyers, with tables of data and many large folding plates giving the full drawings of the vessels. A most important paper. 5000 w. 27 large plates. Trans Soc N A & M E—1898.

Notes on Our Recent Naval Program and Designs, with Particular Reference to the Influence of the Spanish War. Philip Hichborn. On the effects of the Spanish war on public opinion, and on expert opinion. 3500 w. Marine Rev—Sept. 28, 1899.

Rear Admiral Hichborn's Report. Reviews this exhaustive report on the development of the navy. 1900 w. Marine Rev—Oct. 25, 1900.

Three Samples from the New Navy. Illustrated description of the armored cruiser, "New York," the battleship, "Iowa," and the double-turreted monitor, "Puritan." 1500 w. Am Mach—June 17, 1897.

Defenders of Our Seacoast. Illustrates and describes many vessels of the United States navy, and the launching of the "Kentucky" and "Kearsarge." 6000 w. Engr, Cleveland, O.—April 1, 1898.

Our Eastern Squadron and Its Commodore. Park Benjamin. Some particulars of the squadron under Camara, showing the weakness of the Spanish naval defenses, and also of the squadron the United States was preparing to send east under Watson, with remarks on the personal characteristics of the U. S. Commodore. 4500 w. Am Rev of Revs—Aug., 1898.

Our Latest Naval Vessels. Particulars of the battleships, monitors, torpedo boats and destroyers authorized by Congress. 3500 w. Marine Rev—Aug. 11, 1898.

See also **British vs. American; NAVY.**

**United States Types.**—Types of United States Warships. Brief description of types, from which specific service designed can generally be inferred. 1300 w. Ir Age—Aug. 27, 1896.

**Ventilation.**—See **VENTILATION—Ship.**

**"Victory."**—See **"Pennsylvania" and "Victory."**

**"Vulcan," Repair Ship.**—See **REPAIR SHIP.**

**Yalu Battle.**—The Battle of the Yalu and Its Effect on the Construction of Warships. L. Ferrand. Abstract of a paper read before the Assn. Technique Maritime. In this paper the author reaches the conclusion that the true battleship of to-day can be a sort of monitor, only completely armored, low in the water, invulnerable against light artillery, powerfully armed and with speed sacrificed to protection and armament. 1700 w. Jour Am Soc of Nav Engs—May, 1896.

**"Yashima" Steering Trials.**—See **STEERING.**

**WASHINGTON, D. C.**

See also **ELECTRIC CONDUIT TRAMWAY; PAVEMENT; VIADUCT.**

The National Capital: Its Pavements and Parks, and Its Form of Government. An interesting account of the city and some of the improvements deserving attention; given in view of the annual meeting of the Munic. Improvement Society to be held in this city. Ill. 4000 w. Munic Engng—Oct., 1898.

**WASHOUT.**

See also **FLOOD; FLOOD PREVENTION; RAILWAY ACCIDENT; RIVER REGULATION.**

**Haselton, Ind.**—A Remarkable and Costly Washout. Brief account of the accident on the Evansville and Terre Haute railroad, near Haselton, Ind. Diagram. 500 w. Ry Age—April 2, 1897.

**St. Paul & Duluth Ry.**—Washouts on the St. Paul and Duluth R. R. and Methods for Repairing. Describes the damage done and how some of the difficulties were met, showing the promptness with which obstructions are removed. Ill. 2500 w. Ry Rev—Sept. 11, 1897.

**Temporary Trestles.**—See **TRESTLE—Temporary.**

**WASTE UTILIZATION.**

See also **BY-PRODUCTS; ELECTRIC POWER STATION—By-Products; REFUSE DISPOSAL; SEWAGE FARM; STEAM—Exhaust; WORKS MANAGEMENT.**

The Utilization of Waste. John Birkinbine. On the importance of utilizing waste products in the industries, noting some applications. Discussion. 3200 w. Pro Engs' Club of Phila—July, 1899.

**Animal.**—See **REFUSE DISPOSAL—Animal Wastes.**

**WATCH.**

See also **CLOCK; TIME.**

**Chronograph.**—See **CHRONOGRAPH—Watch.**

**WATCH MANUFACTURE.**

**Waltham.**—The Building of a Watch. Illustrates and describes the construction and adjustment of the machine-made watch, as carried out at the Waltham Watch Factory. 4000 w. Sci Am —March 4, 1899.

See also **WORKS MANAGEMENT—Revolution.**

**WATER.**

**Color.**—Methods for the Determination of Color and the Relation of the Color to the Character of the Water. Frederick S. Hollis. A study of the causes of increase and change of color, with methods of determination of the color. Also discussion. 7000 w. Jour N E Waterworks—Dec., 1898.

The Color of Water, as Affected by Convectional Currents. Review of an interesting study by Prof. W. Spring, of Liège, of the causes that impart color to water in masses. 600 w. Science —May 8, 1896.

See also **WATER ANALYSIS—Standard Prisms.**

• **Composition.**—James Watt and the Discovery of the Composition of Water. T. E. Thorpe. The Watt Memorial Lecture, delivered in the Watt Memorial Hall, Greenock. From "Nature." A statement of the essential facts that led to the recognition of the true chemical nature of water. 7000 w. Sci Am Sup—Aug. 6, 1898.

**Hot.**—See **HEATING; HOT WATER.**

**WATER ANALYSIS.**

See also **WATER POLLUTION; WATER SUPPLY—Examination.**

Chemistry of Water Supply. A. W. Palmer. From a sanitary standpoint water which may continuously be used for drinking without deleterious effects is regarded as pure. An explanation of data obtained by analysis is given. Discussion. 7500 w. Ill Soc of Engs & Surv—1898.

Interpretation of Water Analyses. Floyd Davis. Abstract of a paper read before the Iowa Engineering Soc. Reviews the methods used in investigating water supply, giving much information of evidences of contamination. 4800 w. Munic Engng—June, 1898.

I. Recent Progress in the Methods of Water Analysis. Clarence A. Seyler (Abstract). II. Interpretation of Results of Water Analysis. Sidney Barwise. The standard methods and results are discussed, and the need of more than a single chemical analysis. Discussion. 6500 w. Jour of San Inst—Jan., 1899.

The Chemistry of Water. George H. Pattison. Explains the chemical formula of water and studies each gas separately. 2000 w. Power—Aug., 1897.

Water Analysis. A series of articles designed to explain means and methods whereby the non-medical sanitary officer, or the busy medical officer of health, may make examinations of water for domestic uses. List of apparatus needed, a table of weights and measures, etc. Serial. San Rec—March 20, 1896.

**Bacterio-Chemical.**—The Bacterio-Chemical Examination of Polluted Waters. W. E. Adeney. Results of the latest researches. Serial. Engng—May 29, 1896.

**Bacteriological.**—Detection of Organisms Affecting the Taste and Smell of Water by the Microscope. Abstract of an article in the "Stevens Indicator" by Prof. Albert R. Leeds explaining how examinations can easily be made. 1000 w. Eng Rec —Feb. 20, 1897.

Frequent Biological Examination of the Water Supply a Necessity. Showing that the presence of the colon bacillus is frequently discovered and is a sure indication of sewage pollution. 1800 w. Fire & Water—Sept. 22, 1900.

Microscopical Examination of Water, with a Description of a Simple Form of Apparatus. George C. Whipple. The importance of the study, the methods that have been employed, and description of apparatus. 2400 w. Science—July 16, 1897.

The Practical Value of Bacteriological Examinations of Water. A. M. Bleile. A criticism of bacteriological methods and a discussion of their value. 1500 w. Munic Engng—July, 1899.

See also **Chemical vs. Bacteriological; Sedgwick-Rafter; SEWAGE—Bacteria; WATER POLLUTION—Organisms.**

**Chalk Waters.**—The Saline Constituents of Water from the Chalk. J. C. Thresh. Read before the British Assn. of Waterworks Engs. On the importance of a systematic record being kept of the analyses and other information concerning water supplies. Gives analyses of chalk waters. Discussion. 4000 w. Jour Gas Lgt—June 13, 1899.

**Chemical vs. Bacteriological.**—Bacteriological and Chemical Studies of Public Water Supplies. An argument supporting the proposition that while both the chemist and bacteriologist are necessary to determine the character of potable water, too much reliance upon reports of bacteriologists alone may mislead the public, and stating conditions under which the services of both are required. 1500 w. Eng News—April 30, 1896.

Chemical vs. Bacteriological Examination of Potable Water. W. P. Mason. The depreciation of chemical examination in favor of bacterial, is criticised as having gone too far, and it is maintained that while both methods are valuable, there are cases depending upon special conditions, in which either of these methods might be more reliable than the other. 800 w. Jour of Am Chem Soc—Feb., 1896.

The Chemical and Biological Examination of Potable Waters. Edward F. Willoughby. Abstract of a paper read at the meeting of the Sanitary Assurance Association. The subject is treated from only two standpoints, namely, the ascertaining of the fitness of water for drinking and its qualities for other domestic uses. The examination discussed, therefore, differs materially from an exhaustive chemical analysis of mineral water, and includes the use of the microscope as well as chemical tests for nitrogen, etc. Serial. San Rec—Dec. 20, 1895.

The Chemical and Bacteriological Examination of Water. Percy F. Frankland. Abstract of paper read at meeting of British Assn. of Waterworks Engs. Discusses the purification of water and the importance of bacteriological examination. Discussion. 3500 w. Jour Gas Lgt—June 28, 1898.

**Feed Water.**—See **FEED WATER.**

**Filter.**—An Improved Filter for Microscopical Water Analysis. Daniel D. Jackson. Illustrates and describes an invention of the writer the use of which has given very satisfactory results. 1500 w. Tech Quar—Dec., 1898.

**Illinois.**—Chemical Survey of the Water Supplies of Illinois. Arthur W. Palmer. Account of a series of recent examinations of the water supplies of the state of Illinois, carried out at the University of Illinois; and of an effort to arrive at a standard of purity for well waters. 800 w. Tech—May, 1896.

**Jamaica.**—The Normal Chlorine of the Water Supplies of Jamaica. Ellen H. Richards and Arthur T. Hopkins. Explains the topography of the island, and its position in the path of the trade winds with the effects resulting: gives the method of collecting samples for analysis. and a table of analyses made, with remarks. 4400 w. Tech Quar—Dec., 1898.

**Leighton Buzzard, Eng.**—See **WATERWORKS.**

**Massachusetts.**—Some Results of the Systematic Examination of the Water of Public Water Supplies. X. H. Goodnough. An account of this work in Massachusetts and the information gained. Also discussion. 7000 w. Jour N Eng Waterworks Assn—Sept., 1899.

**Microscopical.**—See **Bacteriological.**

**Nitrites.**—Notes on the Determination of Nitrites in Potable Water. Augustus H. Gill, and H. A. Richardson. The presence of peaty matter having caused discrepancies in the results obtained by Trommsdorff's iodo-zinc starch method, and Griess' a-naphthylamine test, this article formulates a method whereby peaty waters may be decolorized, and the results of the two tests thus made accordant. 400 w. Jour Am Chem Soc—Jan., 1896.

**Organisms.**—See **Bacteriological; WATER POLLUTION.**

**Railway.**—Water Analysis on the Great Northern Railway. P. H. Conradson. Representative diagrams of results are given and explained, with directions for taking water samples. 1300 w. Ry Mas Mech—Sept., 1897.

See also **FEED WATER; WATER SUPPLY—Railway.**

**Sampling Apparatus.**—A Simple Apparatus for Collecting Samples of Water at Various Depths. George Chandler Whipple. Illustrated description. 800 w. Science—Dec. 20, 1895.

**Sanitary.**—The Interpretation of Sanitary Water Analyses. Floyd Davis. A discussion of the questions which must be considered in drawing conclusions from sanitary water analyses, both chemical and microscopical, both with regard to the evidences of safety and the detection of pollution. 3500 w. Eng Mag—April, 1898.

**Sedgwick-Rafter.**—Experience with the Sedgwick-Rafter Method at the Biological Laboratory of the Boston Waterworks. George O. Whipple. A study of the errors to determine the precision of the method as ordinarily used. The most important errors are noted. 1500 w. Tech Quar—Dec., 1896.

On an Improvement in the Sedgwick-Rafter Method for the Microscopical Examination of Drinking Water. Daniel D. Jackson. The method of analysis is briefly described and the sources of error possible. Illustrated description is given of a new glass filter funnel constructed to obviate these errors. 1200 w. Tech Quar—Dec., 1896.

**Silica Standards.**—See **Suspended Matter.**

**Standard Methods.**—Standard Methods of Water and Sewage Analysis. A criticism of the divergent methods of analysis and in stating results, which diminish the value of such work to engineers. 1800 w. Eng Rec—Oct. 13, 1900.

Standard Methods of Water Analysis. The recommendations of a special committee of analysts appointed by the American Public Health Assn. 5800 w. Eng Rec—Oct. 27, 1900.

**Standard Prisms.**—Standard Prisms in Water Analysis and the Valuation of Color in Potable Waters. Albert R. Leeds. Account of attempts to substitute for the hollow wedges containing colored fluids used in nesslerizing, wedges of colored glass. 2300 w. Jour Am Chem Soc—June, 1896.

**Suspended Matter.**—On Rapid Methods for the Estimation of the Weight of Suspended Matters in Turbid Waters. Charles L. Palmerlee and Joseph W. Ellms. A discussion in detail of the difficulties of accurate and rapid determination, noting the factors which influence the processes, and discussing methods. 7000 w. Tech Quar—June, 1899.

Silica Standards for the Determination of Turbidity in Water. George C. Whipple and Daniel D. Jackson. Explains the silica method and commends it for its simplicity, uniformity, and accuracy. 1200 w. Tech Quar—Dec., 1899.

**Zürich.**—See **WATER SUPPLY.**

**WATER BALLAST.**

See **BALLAST.**

**WATER BLAST.**

See also **COMBUSTION—Steam Jet; FORGE—Water Spray Blast.**

On a New Form of Water Blast. Bertram B. Boltwood. Describes and illustrates the essential parts of the apparatus and its action, stating the advantages and giving results of tests to determine the efficiency. 1000 w. Am Chem Jour—July, 1898.

**WATER CLOSET.**

See **BATHROOM; PLUMBING.**

**WATER CONDUIT.**

See also **WATER FLOW; WATER PIPE.**

**East Jersey Co.**—See **WATER FLOW.**

**Steel Arch.**—See **HYDRO-ELECTRIC PLANT—La Praz, Savoy; WATER PIPE.**

**WATER CONSUMPTION.**

See **WATER SUPPLY—Consumption; WATER WASTE; WATERWORKS; WATERWORKS MANAGEMENT.**

**WATER-COOLING TOWER.**

See **COOLING TOWER.**

**WATER CURRENTS.**

See also **RIVER DISCHARGE; RIVER REGULATION; SHORE PROTECTION; TIDE; WATER FLOW.**

**Engineering Works.**—Dangerous Scour Caused by Bridge Piers. A note on the effect of piers in the Gatineau River, Canada, and the remedy. 600 w. Eng Rec—Nov. 11, 1899.

Effects of Engineering Works on Water Currents. Cyrus Carroll. A study of the effects of piers, wharves, abutments, breakwaters, etc., on the currents, and the damage done by too little attention being given to this subject. 2200 w. Can Eng—May, 1896.

Effect of Engineering Works on Water Currents. Effect of combined wind and water action with maps of typical river outlets and an illustration of an unwise attempt at river regulation. Abstract of paper read by Mr. Cyrus Carroll, before the Canadian Society of Civil Engineers. 600 w. Eng News—Aug. 20, 1896.

The Natural Width of River Channels. Observations to determine to what extent the contraction of the waterway at a bridge site may be carried. 1100 w. Ind Engng—June 12, 1897.

See also **BRIDGE PIER.**

**WATER DISTRIBUTION.**

See **WATER PIPE; WATERWORKS.**

**WATER EXAMINATION.**

See **WATER ANALYSIS; WATER POLLUTION; WATER SUPPLY—Examination.**

**WATER FAUCET.**

See also **PLUMBING.**

**Giraud Intermittent.**—Intermittent Faucets (Fontaine Intermittente). The Giraud system feeds two vessels alternately from the main, and the water can only be drawn alternately by reverse operations of one lever, hence it is impossible to leave the faucet running continually. 2000 w. Revue Technique—June 25, 1897.

**WATER FLOW.**

See also **HYDRAULICS; RIVER DISCHARGE; SEWER—Flow; SHIP RESISTANCE; WATER PIPE.**

A New Hydraulic Criterion. A statement of a simple test of the accuracy of experiments on the flow of water in channels, and of its use to detect errors in results otherwise not noticeable. 900 w. Eng Rec—May 5, 1900.

Flow of Water. W. J. Millar. Discusses the three principal causes of loss of head. 700 w. Ind Engng—May 7, 1898.

Uniform Flow in Open Channels. E. S. Bellasis. The paper proposes to supply information regarding the practical aspects of the subject, especially the laws which govern the action of a stream on its channel. Part first consists of preliminary remarks, definitions, etc. 2200 w. Engng—Oct. 23, 1896.

**Austrian Experiments.**—See **Vienna; HYDROGRAPHY.**

**Bazin.**—A Study of a New Formula for Calculating the Discharge of Open Channels (Etude d'une Nouvelle Formule pour Calculer de Débit des Canaux Découverts). H. Bazin. A most important contribution to hydraulic engineering by high authority; developing a much simpler formula than has hitherto been used. The formula is intended to replace the more complicated one of Ganguillet and Kutter. 12000 w. 1 plate. Ann des Ponts et Chaussées—4 Trimestre, 1897.

Recent Experiments upon the Flow of Water over Weirs (Expériences Nouvelles sur l'Ecoulement en Déversoir). H. Bazin. A continuation of the author's classic experiments, this series including dams of a great variety of profile, the results being very fully tabulated. 18000 w. 1 plate. Ann des Ponts et Chaussées—2 Trimestre, 1898.

The Recent Investigations of Bazin on the Flow of Water over Weirs (M. Bazin's Neuere Untersuchungen über den Abfluss an Ueberfällen). A very full abstract of Bazin's most recent hydraulic experiments with tables, diagrams and formulas. 9000 w. Oesterr Monatschr f d Oeffent Baudienst—Sept., 1897.

The Latest Researches of M. Bazin upon the Flow of Water over Weirs (M. Bazin's Neuere Untersuchungen über den Abfluss an Ueberfällen). R. Siedek. A résumé of Bazin's paper in the "Annales des Ponts et Chaussées." 3000 w. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1899.

The New Formula of Bazin (La Nouvelle Formule de M. Bazin). An abstract of the experiments of Bazin and his derivation of a new formula for determining the flow of water in open channels. 1200 w. Génie Civil—March 5, 1898.

A New Formula by Bazin for Computing Flow of Water in Open Channels. Brief explanation of the formula and the reason for deducing it. 900 w. Eng News—July 14, 1898.

See also **Dam; Vienna.**

**Boussinesq.**—Establishment of a Uniform Flow in a Tube of Circular Section (Etablissement du Régime Uniforme dans un Tuyau à Section Circulaire). A further discussion by M. Boussinesq, extending his analytical investigations to tubes of circular cross-section. 3000 w. Comptes Rendus—July 26, 1897.

Gradually Varied Flow in Open Channels (Verification Experimentale de la Théorie de l'Ecoulement Graduellement Varié dans les Canaux Découverts). J. Boussinesq. Showing a very satisfactory agreement between the theoretical deductions and the experimental results. 8000 w. Comptes Rendus—June 14, 1897.

Expression for the Small Transversal Components of the Velocity (Expression des Petites Composantes Transversale de la Vitesse). M. Boussinesq. A further contribution to the mathematical theory of the gradually varied flow of liquids. 2500 w. Comptes Rendus—June 21, 1897.

The Distribution of Velocities in Large Cross-Sections (Distribution des Vitesses à Travers les Grandes Sections). M. Boussinesq. A mathematical discussion, continuing the author's previous researches. 2500 w. Comptes Rendus—July 5, 1897.

The Gradual Variations in the Flow of Water in Channels of Large Section (Ecoulement Graduellement Varié des Liquides dans les Lits à Grande Section). An elaborate mathematical treatment of the subject by M. Boussinesq, giving the derivation of the fundamental equations. 3000 w. Comptes Rendus—May 31, 1897.

Theory of Gradually Varying Flows of Different Rates (Théorie Approchée du Passage d'un Régime Graduellement Varie à un Régime Rapidement Varié). An elaborate mathematical treatment by M. Boussinesq. 8000 w. Comptes Rendus—July 12, 1897.

See also **VORTEX MOTION.**

**Branching Pipes.**—On the Flow of Water in Branching Pipes. A. L. Colsten and R. H. Keays. Account of recent experimental researches made in the hydraulic laboratory of the College of Civil Engineering of Cornell University. 1200 w. Trans Assn of Civ Engs of Cornell Univ—June, 1896.

**Cast Iron Pipe.**—See **Iron Pipe; Pipe.**

**Chézy Formula.**—On the Origin of the Chézy Formula. $V = c \sqrt{rs}$. Clemens Herschel. A translation of as much of the original canal de l'Yvette report as refers to the formula in question. Believed to be for the first time printed. 2300 w. Jour Assn of Engng Soc—June, 1897.

See also **Pipe.**

**Chicago Canal Works.**—Co-efficients in Hydraulic Formulae, as Determined by Flow Measurements in the Diversion Channel of the Desplaines River for the Sanitary District of Chicago. W. T. Keating, with Discussion. Measurements made according to instructions of T. T. Johnston. 8800 w. Jour of W Soc of Engs—April, 1896.

**Colorado.**—See **IRRIGATION.**

**Dam.**—Flow of Water Over Sharp-Crested Weirs. W. C. Parmley. Mathematical discussion of the manner of solving this problem. 4500 w. Wis Engr—June, 1900.

On the Flow of Water Over Dams. George W. Rafter. Presents a collection of new facts obtained during investigations as to the water supply for summit-level canals in the State of New York. Gives points from Bazin's papers, and experimental data from Cornell Univ. and other sources, showing the erroneous use of sharp-crested weir formulas for computing the flow over weirs of all shapes. Ill. 18600 w. Pro Am Soc of Civ Engs—March, 1900.

On the Flow of Water Over Dams. Discussion of paper by George W. Rafter. 7700 w. Pro Am Soc of Civ Engs—May, 1900.

On the Flow of Water Over Dams. Continued discussion of paper by George W. Rafter. 6000 w. Pro Am Soc of Civ Engs—Aug., 1900.

The Flow of Water Over Weirs. Gardner S. Williams. Describes methods of computing, investigations made, etc., considering the reliability of formula used. 3000 w. Trans Assn of Civ Engs of Cornell Univ—1900.

**Dam, Broad-Crest.**—New Experimental Data for Flow Over a Broad Crest Dam. Thomas T. Johnston and Ernest L. Cooley. The method of conducting the field observations, and the results obtained are given in full with tabulated observations. The paper was followed by a theoretical discussion by Mr. Thos. T. Johnston. Ill. 6000 w. Jour of W Soc of Engs—Jan., 1896.

**Dam, Models.**—Experiments on the Flow of Water Over Dams. Abstract of a graduation thesis by born, at the Thayer School of Civil Engineering, giving the results of experiments, with models of several well-known dams. Ill. 2900 w. Eng News—Sept. 27, 1900.

**Dams and Spillways.**—The Flow of Water Over Dams and Spillways. Editorial discussion of the lack of applicability of weir formulas for estimating the discharge over dams and spillways. 900 w. Eng Rec—June 2, 1900.

**Discharge Regulater.**—See **Redwood, Calif.**

**East Jersey Conduit.**—The Capacity of the East Jersey Water Company's Conduit. Rudolph Hering. Valuable criticism upon methods of measuring the flow of water in pipes, noting especially the effect of roughness. 1800 w. Eng News—Jan. 23, 1896.

**Engineering Works.**—See **WATER CURRENTS.**

**Fire Stream.**—See **FIRE STREAM.**

**Formulae.**—A New Method of Computing Hydraulic Problems (Ueber ein Neues Rechnungsverfahren bei Aufgaben der Hydraulik). J. B. Goebel. A mathematical discussion, deriving algebraic formulas and showing their application to the flow of water through pipes. Serial. Gesundheits Ingenieur—June 15, 1899.

Formulae for the Flow of Water in Open Channels (Formeln zur Berechnung des Wasserabflusses in Offenen Gerinnen). R. Siedek. A comparison of the measurements made on the Danube at Vienna with the computed flow by the formulas of Bazin and of Kutter. 1200 w. Oesterr Monatschr f d Oeffent Baudienst—Nov., 1898.

The Selection of a Formula for Velocity (Choix d'une Formule de Célérité). The report of a committee of the French Academy upon the flow of water, recommending the formula of M. Boussinesq. 1500 w. Comptes Rendus—Jan. 9, 1899.

Calculation of the Flow of Water in Rivers and Canals (Berechnung der Abflussmengen in Flüssen und Canälen). A comparison of the new Bazin formula with that of Ganguillet and Kutter, showing both to be based upon the same principles. 1500 w. Zeitschr d Oesterr Ing u Arch Ver—Sept. 9, 1898.

Two Formulae for the Permanent and Uniform Flow of Liquids (Note sur Deux Formules Relatives à l'Ecoulement Permanent et Uniforme des Liquides). Victor Fournié. The formulae considered are those for cylindrical pipes and open canals, and differ somewhat from those in general use. They consider a larger number of factors and, by the suppression of the less important, become more nearly expressions of real laws of flow. 1600 w. Ann des Ponts et Chaussées—3e. trimestre, 1898.

See also **Bazin; Boussinesq; Chézy; Chicago Canal Works; Dam; Pipe; Resistance Immersed Bodies; Rochester.**

**Friction in Mains.**—The Friction in Several Pumping Mains. Freeman C. Coffin. A paper read before the New England Water Works Assn. A tabular statement, with diagram, is given of five different installations of simple and compound pipe relative to the carrying capacity, computed and actual friction. The comparison of computed friction by different formulae is interesting. 2200 w. Eng News—Feb. 20, 1896.

The Friction in Several Pumping Mains. Freeman C. Coffin. Paper read before the New England Water-Works Assn. Results of experiments made upon pumping mains in different cities, with tabulated data. 2200 w. Eng Rec—April 25, 1896.

**Graphical Methods.**—A New Method for the Graphical Treatment of Hydrometric Problems (Neue Methoden für die Graphische Behandlung Hydrometrischer Probleme). Karl Goebl. Showing the method of plotting the data of many observations, and deducing the mean flow from the curves thus obtained. 7500 w. 3 plates. Oesterr Monatschr f d Oeffent Baudienst—March, 1900.

See also **Kutter Formula.**

**Hele-Shaw Experiments.**—The Flow of Water. H. S. Hele-Shaw. Illustrated account of experiments made to investigate the flow of water. 1500 w. Nature—May 12, 1898.

Further Experiments on the Character of Fluid Motion. H. S. Hele-Shaw. Read before the Liverpool Engineering Soc. Illustrated description of recent results of experimental study. 9000 w. Engng—Jan. 6, 1899.

The Motion of a Perfect Liquid. H. S. Hele-

Shaw. An illustrated study of stream lines and the behavior of liquids. 7000 w. Engr, Lond—June 2, 1899.

The Character of Fluid Motion. Illustrated review of experiments by Prof. H. S. Hele-Shaw, showing the stream lines in flowing water. 1900 w. Eng Rec—March 4, 1899.

The Flow of Water. Editorial discussing Prof. Hele-Shaw's experimental method of studying the flow of a perfect liquid. 2000 w. Eng Rec—June 24, 1899.

The Hele-Shaw Experiments and the Stream-Line Theory. Marston Niles. A letter discussing objections to the conclusions drawn from these experiments and pointing out what the writer considers the defects of the system. 4200 w. Engng—July 28, 1899.

See also **SHIP RESISTANCE.**

**Hot Water Pipes.**—See **HEATING—Hot Water Friction.**

**Hydraulic Obstruction.**—The Law of Hydraulic Obstruction in Closed Streams. David Guelbaum. Describes method of investigation which led to the discovery of this law. Ill. 1600 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Hydrometer.**—See **Measuring Appliance; HYDROMETER.**

**Iron-Pipe.**—Flow of Water in Wrought and Cast-Iron Pipes from 28 to 42 ins. in Diameter. Isaac W. Smith. Description of the water supply of the city of Portland, Ore., with tests carefully made, and tables. 4600 w. Am Soc of Civ Engs—May, 1896.

Logarithmic Diagram for Flow of Water in Clean Cast-Iron Pipes Under Pressure. Gives a diagram devised by A. Van Muyden and reconstructed by George T. Prince with American measurements, with directions regarding its use. 900 w. Eng News—July 6, 1899.

The Practical Computation of the Resistances in Pipes (Ein Beitrag zur Berechnung des Rohrwiderstandes in der Praxis). With particular reference to the flow of water in cast iron pipe; friction due to incrustation, influence of slope, etc. 6000 w. Gesundheits Ingenieur—Sept. 15, 1897.

See also **Pipe; Rochester, N. Y.**

**Irrigation.**—See **Measuring Appliances; IRRIGATION—Water Measurement.**

**Kutter Formula.**—Hydraulic Diagrams. Letter from T. Horton and editorial reply on the best methods of plotting the Kutter formula. 2000 w. Eng Rec—July 28, 1900.

See also **Formulae; Six-Foot Conduit.**

**Loch Katrine Aqueduct.**—Observations on the Flow of Water in the New Aqueduct from Loch Katrine: Glasgow Corporation Waterworks. Alexander Fairlie Bruce. The conduits are concrete lined for half their length and have a coefficient or friction of 0.0121 to 0.0125. Complete data accompany report. 900 w. Engr, Lond—Jan. 17, 1896.

See also **WATER SUPPLY—Glasgow.**

**Manchester Canal.**—Automatic Sluice Recorder for the Manchester Ship Canal. A. J. Mentha. Description with drawings of the instrument for ascertaining the quantity of water flowing into or from the canal. Also describes the installation. Serial. Prac Eng—Jan. 27, 1899.

**Measurement.**—See also **IRRIGATION—Water Measurement; WATER METER.**

**Measuring Appliances.**—Some Irrigation Appliances in the San Bernardino Valley, Cal. Notes from a publication of the U. S. Div. of Hydrography relating to the measurement of streams. Describes a floating weir, a measuring box, stop for diversion, and other appliances. Ill. 1300 w. Eng News—Sept. 7, 1899.

See also **Manchester Canal; Pini's Apparatus; Pitot Tube; Recorder; Schultze Electric Apparatus; Williams Cord; HYDROGRAPHY; HYDROMETER; WATER METER.**

**Meter Testing.**—See **HYDROGRAPHY—Austria, 1896; HYDROMETER; WATER METER; WATER RATES.**

**New Westminster, B. C.**—Flowage Test of a 14-in. Riveted Steel Main at New Westminster, B. C. A. McL. Hawks. Description of pipe and of tests. 2000 w. Eng News—July 30, 1896.

Second Test of a 14-in. Riveted Steel Main at New Westminster, B. C. A. McL. Hawks. Description of test and report of results. 800 w. Eng News—July 6, 1899.

**Pini's Apparatus.**—Pini's Apparatus for Measuring the Velocity of Flowing Water (Ueber Sante Pini's Apparate für Geschwindigkeitsmessungen in Fliessenden Wassern). V. Pollack. Describing a modification of the Pitot tube which gives good results in measuring the velocity of currents. Two articles. 9000 w. Zeitschr d Oesterr Ing u Arch Ver—Nov. 17, 24, 1899.

**Pipe.**—Areas and Discharging Power of Pipes. J. L. Bixby, Jr. Plumbing for different diameters. Table of discharging power with explanation, part of which is especially applicable to hot water work. 700 w. Met Work—April 18, 1896.

Determination of the Velocity of Water in Pipes (Bestimmung der Wassergeschwindigkeit in Druckleitungen). A mathematical discussion showing the backward reaction upon the pipe and enabling the strength of anchorage to be computed. 1500 w. Schweizerische Bauzeitung—Oct. 30, 1897.

Familiar Methods for Calculating the Flow of Water Through Pipes. Abridged from an essay presented by the N. Y. delegation and read at the Master Plumbers' Annual Convention, Boston, June 27, 1888. Simple, practical rules for problems in hydraulics. 2000 w. San Plumb—Jan. 1, 1897.

Flow of Water in 48-in. Pipes. Desmond FitzGerald. Over two cart loads of tubercles, which incrusted the interior of the pipes were removed, resulting in an increased flow of 30 per cent. Flashlight photographic views are given of the interior of the pipe, and the method of measuring velocities, etc., is described. The actual observations are given in tabulated form. 5000 w. Am Soc of Civ Engs—Jan., 1896.

Flow of Water in a 48-inch Pipe. Rudolf Hering. A discussion of Mr. FitzGerald's paper before the Am. Soc. of Civ. Engs., commending the use of the Chézy formula $v=c\sqrt{rs}$, and insisting that full description of the conditions to which it is applicable should accompany the presentation of any formula. 1800 w. Eng Rec—Feb. 15, 1896.

The Flow of Water in Pipes. E. Sherman Gould. Considers only pipe of 1000 diametres and upward in length. 1800 w. Am Mach—March 3, 1898.

New Hydraulic Data. A note on the importance of experiments on the flow of water in pipes, as affording a criterion for estimating the reliability of pipe formulas. 700 w. Eng Rec—March 10, 1900.

The Flow of Water in Pipes. C. H. Tutton. An attempt to show that the Torricellian formula, $v^2=2gh$, is misapplied in the fundamental stages of the science of hydraulics. 13 plates. 5700 w. Jour Assn of Engng Socs—Oct., 1899.

See also **Boussinesq; Branching Pipe; East Jersey; Iron Pipe; Pitot Tube; Pressure; Rochester, N. Y.; Six-Foot-Conduit; Steel Pipe; HEATING—Hot Water Friction; PUMP—Water Pipes; SEWER—Flow; WATER HAMMER; WATER PIPE.**

**Pipe Line, Ogden, Utah.**—Experiments on the Flow of Water in the Six-Foot Steel and Wood Pipe Line of the Pioneer Electric Power Company at Ogden, Utah. Charles D. Marx, Charles B. Wing and Leander M. Hoskins. Describes a series of experiments made to determine the relation between the rate of discharge and the loss of head between the rate of discharge and the loss head between certain definite points, giving methods adopted and results obtained. Ill. 13800 w. Pro Am Soc of Civ Engs—May, 1898.

Experiments on the Flow of Water in the Six-Foot Steel and Wood Pipe Line of the Pioneer Electric Power Company, at Ogden, Utah. Second Series. Charles D. Marx, Charles B. Wing, and Leander M. Hoskins. Illustrated description of apparatus and methods used in experimental investigations, giving results. 5800 w. Pro Am Soc of Civ Engs—Feb., 1900.

Experiments on the Flow of Water in the Six-Foot Steel and Wood Pipe Line of the Pioneer Electric Power Company, at Ogden, Utah. Second Series. Discussion of paper by Charles D. Marx, Charles B. Wing, and Leander M. Hoskins. 12500 w. Pro Am Soc of Civ Engs—April, 1900.

**Pipe, Small.**—An Interesting Hydraulic Experiment. Marvin E. Sullivan. Gives experiment demonstrating that the flow in small pipes follows the

& Rev—Sept. 16, 1897.

**Pitot Tubes.**—Experimental Investigation of the Reliability of Pitot Tubes for Determining the Velocity of Flow of Water in Pipes. J. Fraley Baker and Harvey Brett. Graduation thesis. Gives illustrated account of experiments and results. 1600 w. Stevens Ind—Oct., 1898.

See also **Pini's Apparatus.**

**Pressure.**—Pressure in Pipe Due to Stoppage of Flowing Liquid. George M. Peck. Discussion of subject. 600 w. Trans Am Soc of Mech Eng, No. 837—Dec., 1899.

Pressures Resulting from Changes of Velocity of Water in Pipes. J. P. Frizell. A record of experiments and results. 2800 w. Pro Am Soc of Civ Engs—Aug., 1897.

See also **WATER HAMMER.**

**Rates.**—An Inexpensive Method of Determining Charges for Public Use of Large Streams, in a Measure Proportionate to the Amount of Water Used. F. H. Crandall. Describes the use of a small meter placed in a by-pass. 900 w. Jour N Eng Water Works Assn—June, 1897.

**Recorder.**—Improved Water Discharge Recorder. It is intended to keep a graphic record of the gallons flowing over a weir, by means of an automatic water head register. 1500 w. Ind & East Eng—Dec. 21, 1895.

See also **Manchester Canal.**

**Rectangular Pipe.**—Establishment of a Uniform Flow in a Pipe of Large Rectangular Section (Etablissement du Régime Uniforme dans un Tuyan à Section Rectangulaire Large). A discussion of this important problem by M. Boussinesq, with analytical formulas. 3000 w. Comptes Rendus—July 19, 1897.

**Redwood, Calif.**—Discharge Regulator and Tests of 14-inch Redwood Water Main, near Los Angeles, Cal. A balancing pan-and-float system is used to control the discharge. Tests of flow for lengths from 4400 to 8900 feet of pipe are given and values of coefficients deduced. 1000 w. Eng News—Sept. 8, 1898.

**Resistance Immersed Bodies.**—The Resistance of Immersed Bodies and Application of the "Sine Square" Formula (Résistance des Carènes, Essais de Joëssel et Formule du "Sinus Carré"). A. Duroy de Bruignac. An illustrated description of experiments to determine the pressure on surfaces immersed in running water, and discussion of the formulae; with tables. 4000 w. Mem d Soc d Ing Civils de France, No. 12—1900.

See also **SHIP RESISTANCE.**

**Rochester, N. Y.**—Comparison of the Original Computations and the Actual Gaugings of the New Steel Conduit of the Rochester, N. Y., Water-Works. The data for comparison were found by very careful gaugings at different points, and a curious set of conclusions for the case of a riveted steel pipe, made of alternate inside and outside courses, is illustrated diagrammatically. From these data formulae for the constriction, for the enlargement, and for the total loss of head in such pipes are deduced. 3500 w. Eng Rec—May 2, 1896.

New Gaugings of the Rochester Conduits. Describes the results of measurements on the old and new Hemlock Lake conduits in 1898, indicating a slight reduction in their carrying capacity. 1500 w. Eng Rec—April 7, 1900.

New Gaugings of the Rochester Conduit. Reviews experiments on large cast-iron and riveted plate pipe lines about 20 miles long. 1200 w. Eng Rec—Dec. 10, 1898.

**Schultze Electric Apparatus.**—The Measurement of the Velocity of Flow of Streams (Ueber Messungen der Bewegungs-Geschwindigkeiten von Flussläufen). Paul Fuchs. A description of the Schultze apparatus by which information as to the flow and level of streams can be electrically communicated to a distance. 2500 w. Gesundheits Ingenieur—Nov. 30, 1899.

**Sewers.**—See **SEWER—Flow.**

**Ship Resistance.**—See **SHIP RESISTANCE.**

**Siphons.**—Flow of Water Through Siphons. Milo S. Ketchum. Account of experimental researches made in the laboratory of applied mechanics in the Univ. of Illinois, with tabulated data and engraving of apparatus employed. 1700 w. Tech —May, 1896.

See also **SIPHON.**

Foot Conduit. An analysis of recent experiments showing possible defects in Kutter formula when used for large steel and wood pipes. 1100 w. Eng Rec—June 4, 1898.

**Steel Pipe.**—See **East Jersey Conduit; New Westminster, B. C.; Pipe; Rochester, N. Y.; WATER PIPE—Testing.**

**Steel Pipe, Friction Coefficient.**—Friction Coefficient for Riveted Steel Pipe. A. McL. Hawks. Informal discussion of what is the proper friction coefficient for use in the design of riveted steel pipe. 1600 w. Pro Am Soc of Civ Engs—Aug., 1899.

**Surface Resistance.**—See **Hele-Shaw Experiments; SHIP RESISTANCE.**

**Valves.**—The Flow of Water Through Valves. Illustrated report of experiments made by Prof. William T. Magruder at the Ohio State University to determine the influence of various types of valves on the discharge of pipes. 2300 w. Eng Rec—June 24, 1899.

See also **VALVE.**

**Varying.**—See **Boussinesq.**

**Vienna.**—Gauging and Measuring the Flow of Water (Wasseraichungen und Ueberfallmessungen). With illustration and description of the measuring tanks and weir used at the Kaiserbrunnen near Vienna; using the Basin formula. 3000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Sept. 17, 1897.

Influence of the Walls of Trial Tanks Upon the Indications of Current Meters (Einfluss der Wandungen von Versuchscanälen auf die Umlaufwerte Hydrometrischer Flügel). A report of the government hydrographic bureau, showing the precautions necessary for the accurate calibration of current meters. An important contribution to hydrodynamics. 10000 w. 2 plates. Oesterr Monatschr f d Oeffent Baudienst—May, 1899.

See also **HYDROGRAPHY.**

**Weir.**—See **Dam.**

**Weir Calibration, Chicago.**—See **PUMP—Sewage, Chicago.**

**Williams Cord.**—The Williams Hydrometric Cord (Le Cordage Hydrometrique Williams). An improved device for determining the velocity of flow in a stream by measuring the angles of deflection of the catenary formed by a cord attached, under known tension to the banks of the stream and subject to the force of the current. Formula and illustrations are given, and accurate results claimed. 1200 w. Revue Technique —Oct. 10, 1898.

**WATER GAS.**

See also **GAS; GAS INDUSTRY; GAS MANUFACTURE; GAS RETORT—Rotatory; GAS WORKS.**

Developments in the Manufacture and Use of Water Gas. H. Dicke. States the advantages of water gas, discusses the Dellwik process and the manner in which water-gas works can meet the requirements of city use. 2300 w. Gas Wld —Jan. 22, 1898.

Observations Upon Water-Gas. H. Bunte. Considers the Dellwik process, Strache's system, the danger of explosion, and the future of non-luminous gas. 2400 w. Gas Wld—Jan. 14, 1899.

Recent Advances in Lighting by Water Gas. Abstract translation of papers by H. Strache and H. Dicke, published in the "Journal für Gasbeleuchtung." 3500 w. Jour Gas Lgt—Oct. 26, 1897.

Water Gas (Wassergas). Dr. Gerdes. A general discussion of the composition and properties of water gas, with a description of a complete plant as constructed by Julius Pintsch, of Berlin. 4500 w. Zeitschr d Ver Deutscher Ing—Nov. 11, 1899.

Water Gas and Its Applications. Vivian B. Lewes. Briefly reviews the progress of water gas, the economic conditions which up to the present have prevented pure water gas from coming into general use, the success of carburetted water gas, and the history of the industry, noting also recent developments in manufacture which will probably influence its future. Discussion. 8000 w. Jour Soc of Arts—May 13, 1898.

**Analysis.**—The Chemical Composition and Technical Analysis of Water Gas. Edward H. Earnshaw. Gives the scheme of analysis of water gas, calling special attention to the presence of notable quantities of paraffines other than marsh gas, involving a modification of the methods of analysis commonly in use. 3500 w. Jour Fr Inst—Sept., 1898.

**Birkenhead, Eng.**—See **Carburetted, Birkenhead.**

**Birmingham, Eng.**—Carburetted Water-Gas Plant at Saltley Gas Works, Birmingham. Illustrated description of the plant and the process of manufacture. 1600 w. Engng—July 23, 1897.

Water Gas in Birmingham. Notes on water-gas, with a brief account of plant named. 2200 w. Arch, Lond—April 3, 1896.

**Blackburn, Eng.**—Carburetted Water-Gas at Blackburn. S. R. Ogden. A very interesting and full account, with tabulated results of test runs, of a new plant erected at Blackburn, England, which demonstrated its efficiency completely. 2100 w. Gas Eng's Mag—Dec. 10, 1895.

The Installation of Carburretted Water Gas at Blackburn. S. R. Ogden. An important paper giving tabulated statements of working, materials consumed, and results obtained, with discussion. 4500 w. Jour Gas Lgt—Dec. 3, 1895.

**Boiler Settings.**—See **BOILER SETTING—Water-Gas Plant.**

**British Supply.**—Home Office Inquiry into the Supply of Water-Gas. Text of the unanimous report of the Departmental Committee, with editorial comment. 32700 w. Jour Gas Lgt—Feb. 21, 1899.

**Buffalo.**—Water-Gas Plant of the Peoples Company at Buffalo, N. Y. Illustrated description of modern design and construction. 1500 w. Pro Age—Jan. 1, 1900.

**Calorific Value.**—See **CALORIFIC VALUE—Water Gas.**

**Carbonic Oxide.**—See **CARBONIC OXIDE—Gases.**

**Carburetted.**—An Outline Description of Carburetted Water-Gas Manufacture. John M. Rusby. Ill. 3000 w. Stevens Ind—Oct., 1899.

Carburetted Water Gas and Its Use in Coal-Gas Works. Henri Sospisio. An illustrated paper before the International Gas Congress, Paris, giving methods of water-gas manufacture; with discussion by A. G. Glasgow. 6000 w. Jour Gas Lgt—Sept. 18, 1900.

On Water Gas. Henri Sospisio. Abstract of paper read at the Paris Congress. Discusses the Strache, and the Dellwik-Fleischer generators, and points of importance in the manufacture of water gas. Ill. 3000 w. Gas Wld—Oct. 20, 1900.

Notes on Carburetted Water Gas. A. G. Glasgow. Read before the Cleveland Inst. of Engs., Jan. 11, 1897. Gives history, fundamental theory, nature of process, description of apparatus, chemical and physical properties, character of flame, advantages, estimates of cost, etc. 5000 w. Gas Wld—Jan. 16, 1897.

Carburetted Water Gas, with Reference to the Recent Report of the Departmental Committee. A. G. Glasgow. Read before the Incorporated Gas Inst., England. A discussion of the subject from the gas-makers' side. 8400 w. Gas Wld—June 17, 1899.

Carburetted Water Gas as a Coal Gas Auxiliary. A. G. Glasgow. Read before the Am. Gas Lgt. Assn. Considers works of sufficient size for the dual system of production, and suggests how the ultimate result of joint production may be anticipated for comparison with either system singly. 2500 w. Am Gas Lgt Jour—Nov. 13, 1899.

Lecture on Carburetted Water Gas. Ivison Macadam. Delivered at the annual meeting of the North of Ireland Assn. of Gas Managers. Explains the reactions necessary in the production, describes plant and its working and discusses a few of the advantages. 2800 w. Gas Wld—Aug. 21, 1897.

Carburetted Water Gas. Ivison Macadam. Lecture delivered at the Stirling meeting of the North British Assn. Describes the plant used and its working. Discussion. 3300 w. Gas Wld—July 29, 1899.

Carburetted Water Gas. J. T. Westcott. A paper read before the Civil and Mech. Engs. Assn., given in abstract. Reviews the processes now in successful use, describes the combined type. 1800 w. Gas Wld—March 20, 1897.

Observations on Carburetted Water Gas. J. T. Westcott. A paper prepared at the invitation of the Civil and Mechanical Engineers' Society of London, Eng. Gives the history, method of operation, analysis, cost, advantages, etc. 4800 w. Am Gas Lgt Jour—April 12, 1897.

Inaugural Address before the Southern District Association of Gas Engineers and Managers. A. E. Broadberry. Discusses carburetted water gas and its use, and various troubles at Tottenham, with brief references to matters of interest to the gas industry. 6200 w. Jour Gas Lgt—Feb. 14, 1899.

The Adoption of Carburetted Water Gas. D. Terrace. Read at meeting of the North of England Gas Managers' Assn. States a few of the advantages that led to the introduction into the various gas works, with a short description of the working of the apparatus. Also discussion. Ill. 7500 w. Jour Gas Lgt—May 3, 1898.

The Recent Committee on Carburetted Water Gas. J. Carter. Read at Sleaford, Eng., before the Eastern Counties Gas Mngrs'. Assn. On the work of the commission and its object, with the advantages and disadvantages brought out. Discussion. 11500 w. Jour Gas Lgt—Sept. 26, 1899.

See also **Birmingham; Health Risks; Lowe; GAS MANUFACTURE.**

**Carburetted, Birkenhead.**—Prof. Lewes on Carburetted Water Gas. Report to Birkenhead, with reference to the safety, or otherwise, of supplying a mixture of coal gas and carburetted water gas, and also as to the relative value of such a mixture as compared with coal gas of equal illuminating power. The present paper gives the experimental data and reasons upon which his conclusions are based. 2800 w. Gas Wld—April 17, 1897.

**Carburetted, British Report.**—Carburetted Water Gas. The Home Office report, with appendices treating of the subject under inquiry, concerning the extent of the manufacture, the danger, and the regulations necessary. 7800 w. Gas Wld—Feb. 18, 1899.

**Carburetted, Hastings.**—The Practical Working of Carburetted Water Gas. Charles F. Botley. Read before the British Inst. of Gas Engs. A practical account of the plant which has been put up at Hastings, the conditions and results of the working. Discussion. 15500 w. Gas Wld—May 6, 1899.

**Coal Gas Compared.**—Coal Gas or Water Gas? Abstract of a paper on recent progress in water gas lighting by Dr. Strache, with criticism by E. Körting. Translated from "Journal für Gasbeleuchtung." 1300 w. Gas Wld—Nov. 20, 1897.

**Comparison.**—Water Gas in Comparison with other Combustible Gases (Wassergas im Vergleich mit andern Brennbaren Gasen). Joh. Körting. An examination of gases used both for power and illumination, especially the former, showing under what conditions water gas may be advantageously used. Two articles. 7500 w. Zeitschr d Ver Deutscher Ing—Sept. 29, Oct. 6, 1900.

**Dellwik-Fleischer.**—A New Method of Producing Water Gas. Carl Dellwik. From "Jernkontorets Annalen." Describes the process and makes comparisons between the theoretical value and possibilities of the three kinds of gases—producer gases, water gas by the old process, and by the new. Ill. 2800 w. Ir Age—April 28, 1898.

The Dellwik Method of Producing Water Gas. Carl Dellwik, in "Jernkontorets Annalen." Illustrated description of this method, which claims to be sufficiently economical to meet the conditions of low cost. 1800 w. Ir & Coal Trds Rev—July 1, 1898.

Dellwik's Water Gas. Abstract of a lecture recently delivered by the inventor before the Swedish Teknologförening at Stockholm, describing the producer and discussing the manipulation, composition and cost. Ill. 900 w. Gas Wld—Oct. 1, 1898.

Dellwik's Water Gas. Abstract of a lecture recently delivered by the inventor before the Swedish Teknologförening at Stockholm. Ill. 1800 w. Ir Age—July 21, 1898.

Dellwik's Water Gas. An illustrated description of the producer, the process, and the properties, cost, and applications of the gas. Translated from Teknisk Tidskrift by "The Iron Age." 2000 w. Pro Age—Sept. 15, 1898.

The Manufacture and Application of Water Gas. Carl Dellwik. Read before the Iron and Steel Inst. An explanation of the theory on which the Dellwik-Fleischer process is based and the results obtained in practice, giving also applications made for manufacturing purposes. Ill. 5000 w. Col Guard—May 11, 1900.

Dellwik Water Gas Process. Dr. G. Lunge. Translated from the "Journal für Gasbeleuchtung und Wasserversorgung." A description of the Dellwik process as at present carried on, with statements concerning its advantages and value. Ill. 5400 w. Pro Age—Dec. 1, 1899.

Professor Lunge on the Dellwik Water Gas Process. Abstract translation of an article in the "Journal für Gasbeleuchtung." Ill. 3300 w. Jour Gas Lgt—Oct. 3, 1899.

The Dellwik Water Gas Process. M. Geitel. Translated from the "Polytechnisches Centralblatt." Brief review of the changes in the history of water gas. 1400 w. Pro Age—Dec. 1, 1898.

The Dellwik Water Gas Process. The substance of an interesting pamphlet by Dr. E. Fleischer, with special reference to the relation between the yield of gas and the extent to which the proportion of carbonic acid is pushed up in the blast gases. 3500 w. Gas Wld—Aug. 7, 1897.

The Dellwik-Fleischer Water Gas Process. Describes this process, and claims great economy of production. Ill. 2500 w. Engng—Jan. 26, 1900.

Water Gas and Its Recent Continental Developments. Vivian B. Lewes. Read before Inst. of Gas Engs. Reviews the history of water gas, and describes in detail the Dellwik-Fleischer process. 10000 w. Gas Wld—May 5, 1900.

Water Gas as a Remedy for the Prevalent Scarcity of Coal. H. Dicke. Presenting the advantages due to the Dellwik-Fleischer process. 2000 w. Jour Gas Lgt—Aug. 28, 1900.

The Dellwik Process. Wm. Young. From a paper read before the North British Association of Gas Managers, giving an account of a process in which intense local heating is produced by an air blast. 1000 w. Pro Age—Sept. 15, 1900.

**France.**—The Future of Water Gas in France. Just Alix. Part first consists of an introductory review of the gas industry with some interesting figures relating to water gas, and the results obtainable with particular process and apparatus. Serial. Jour Gas Lgt—April 17, 1900.

**Future Industry.**—Innovation in and Future of the Water Gas Industry. Adapted and translated from a paper read by H. Croissant, at a meeting of the Mid-Rhenish Assn. of Gas and Water Engs. Reviews briefly the differences of the two methods of producing gas from coals; describes the Dellwik and Strache generators, and gives interesting information in part first. Serial. Am Gas Lgt Jour—March 20, 1899.

**Hastings, Eng.**—See Carburetted, Hastings.

**Health Risks.**—Medical Men and Carburetted Water Gas. J. S. Haldane. Extracts from a paper read before the Inc. Soc. of Med. Officers of Health, on the risks attending the use of carburetted water gas for domestic lighting purposes. 8400 w. Gas Wld—April 28, 1900.

**Iron Carbonyl.**—Iron Carbonyl in Water Gas. M. van Breukelween and A. ter Horst, in "Het Gas." Abstract. On the inconveniences caused by its presence, with investigation of causes. 1000 w. Jour Gas Lgt—Nov. 21, 1899.

**Lowe Apparatus.**—A Beginner's Experiments in Studying the Operation of a Lowe Water Gas Apparatus. J. B. Polk. Read before the New England Assn. of Gas Engs. A report of experiments made by the writer. 3000 w. Am Gas Lgt Jour—March 13, 1899.

**Oil Heating.**—Oil Heating in Water Gas Manufacture. E. C. Jones. Abstract of a paper read before the Pacific Coast Gas Association, describing a special form of steam heater which is said to be extremely regular and satisfactory. Data of its performance are given. 1400 w. Gas Wld—Sept. 3, 1898.

**Portland, Ore.**—Water Gas. Charles F. Adams. A recital of interesting experiences with water gas in Portland, Ore. 3300 w. Am Gas Lgt Jour—Aug. 31, 1896.

**Set.**—Depth of Fire in a Water Gas Set. J. M. Rusby. General consideration of the subject with report of special tests, and discussion. 2800 w. Pro Age—Nov. 15, 1898.

**Smelting.**—See **SMELTING—Water Gas.**

**Steam Consumption.**—The Steam Consumption in a Water Gas Plant. Alten S. Miller. Read at meeting of the Am. Gas Lgt. Assn. Discusses what can be done to cut down the consumption of steam in gas works. 1800 w. Am Gas Lgt Jour—Oct. 23, 1899.

See also **GAS MANUFACTURE—Steam Raising; STEAM GENERATION—Gas Works.**

**Strache.**—The Present Status of the Water Gas Question (Der Stand der Wassergasfrage). A strong plea for the introduction of water gas, by Dr. Hugo Strache. 2500 w. Wiener Bauindustrie Zeitung—Jan. 14, 1897.

A Survey of the Position of Water Gas. Dr. Hugo Strache. Brief digest of an address to the chemical section of the Lower Austrian Industrial Association. Summarises merits, recent improvements, etc. 1800 w. Jour Gas Lgt—Jan. 5, 1897.

Water Gas as an Illuminant. Hugo Strache. Discussion of water gas for lighting purposes, the recent improvements, safety burners, and other appliances. 3000 w. Pro Age—Aug. 16, 1897.

Dr. Strache's Improvements in Lighting by Water Gas. Abstract translation of a paper in the "Journal für Gasbeleuchtung." The improvement involves the complete coking of the fuel before the steam is introduced. Serial. Jour Gas Lgt—Aug. 30, 1898.

See also **Coal Gas Compared.**

**Strache-Leyboldt.**—Dr. Bunte's Comments on Water Gas. Comments called forth by published papers by Dr. Strache and Dr. Leyboldt. 1600 w. Jour Gas Lgt—Sept. 13, 1898.

**Tar Separation.**—The Separation of Water Gas Tar. Alten S. Miller. Read at the St. Louis meeting of Am. Gas Lgt. Assn. Outline of a simple and inexpensive method of separating oil residuum or tar from the water as it comes from the scrubbers. 1000 w. Pro Age—Nov. 2, 1896.

See also **GAS MANUFACTURE.**

**Theory.**—Theory of the Water Gas Process. H. Luggin. Translated from the "Journal für Gasbeleuchtung und Wasserversorgung." Reviews the theory of Hoitsema, and the results of his experiments brought forward in support of his theory, making application of the theory to the water gas process. 3000 w. Pro Age—Dec. 15, 1898.

The Theory of the Water Gas Process. Abstract translation of a contribution by H. Luggin to the "Journal für Gasbeleuchtung." Details theoretical considerations and experimental facts set forth by Hoitsema, and discusses the evils consequent on too low a temperature in the generator. 3000 w. Jour Gas Lgt—Dec. 20, 1898.

**Tottenham, Eng.**—See Carburetted.

## WATER GAUGE.

Concerning Water Gauges. W. H. Wakeman. Some suggestions relating to the use of the combination water column. 800 w. Am Mach—Feb. 23, 1899.

Water Column Connections. H. H. Kelly. Calls attention to some elements of danger arising from the neglect of water columns, or of wrong connections. Ill. 1400 w. Sci Mach—July 1, 1898.

Water Gauges. Editorial on the imperfections of the methods in use for determining the level in the boiler. 1800 w. Engr, Lond—March 23, 1900.

**Breakage.**—Corrosion and Breakage of Water Gauge Glasses. G. D. Hiscox. Gives theories explaining the different cracking and breaking of glasses. 1300 w. Sci Am Sup—Aug. 7, 1897.

Water Gauge Glass Failures. Causes of breakage, and their relation to the higher pressures now carried, with practical hints. 1600 w. Power—Feb., 1896.

**Talc.**—Water Gauges for High-Pressure Steam Boilers. T. C. Billetop. Read before the North-east Coast Inst. of Engs. and Shipbuilders. Presents the advantages of the talc gauge, with diagram. 1500 w. Col Guard—Feb. 12, 1897.

**Watson.**—Watson's Balanced Water Gauge. Illustrated description of an unbreakable water gauge for steam boilers. 800 w. Eng, Lond—Oct. 23, 1896.

## WATER HAMMER.

Unsteady Flow of Water in Pipes—Water Ram. Irving P. Church. A brief re-statement of the theory presented in a former article, with an account of the work of B. F. Latting in this field, and later theoretical developments by the writer. Ill. 3800 w. Trans Assn of Civ Engs of Cornell Univ—1898.

Water Hammer. Some experiments to show when it may occur. 1200 w. Bos Jour of Com—Nov. 21, 1896.

**Steam Pipe.**—Water Hammer in a Steam Pipe—The Cause and Its Cure. William J. Williams. Account of the rupture of an iron body stop valve in a 3-inch wrought iron pipe, and of a case of severe water hammering cured by a simple change in the boiler connection of the steampipe. Sketches illustrate the wrong way and the right way. 800 w. Am Mach—March 12, 1896.

Water Hammer in Steam Pipes (Chocs de l'Eau dans les Conduites de Vapeur). M. Walckenaer. A discussion of the causes of water hammer in steam pipes, with illustrations of ruptures due to this cause and suggestions as to their prevention. 5000 w. Ann des Ponts et Chaussées—1 Trimestre, 1899.

**Water Power Mains.**—Water Ram in the Supply Mains of Hydraulic Power Plants. John Richards. An account of some of the difficulties experienced on the Pacific coast in the development of water power under great heads, with editorial discussion. 4500 w. Eng News—July 8, 1897.

**WATER HEATER.**

See also **HEATING; HOT WATER.**

**Instantaneous.**—Instantaneous Water Heaters. Thomas D. Miller. Read at meeting of the Texas Gas and Electric Light Assn. Presenting the advantages of this appliance, with account of its construction and working. Also discussion. 3800 w. Am Gas Lgt Jour—April 18, 1898.

**WATER LAW.**

See **WATER RIGHTS; WATERWORKS LAW.**

**WATER LEVEL INDICATOR.**

See also **RIVER GAUGE; TIDE GAUGE; WATERWORKS—Distribution.**

**Electric Registering.**—Electrical Water Level Recorders, and Their Use in Connection with Waterworks. W. Coles Finch. Abstract of a paper read before the British Assn. of Waterworks Engs. Illustrated description of the instrument, with the conclusions that beside the purpose for which it was intended it can be used for detecting and locating waste, for indicating the variations of level in wells, and for testing the yield. 1600 w. Elec Eng, Lond—Aug. 6, 1897.

Electric Registering Water Level Indicator. Illustrated description of a registering indicator recently brought out by The India Rubber, Gutta Percha and Telegraph Works Company. 1200 w. Sci Am Sup—Dec. 21, 1895.

See also **WATER FLOW—Schultze; WATERWORKS.**

**Siedek-Schäffler.**—Long-Distance Water Level Indicator (Wasserstands-Fernmelde-Apparat). A description of the Siedek-Schäffler apparatus, by which the level of any body of water may be ascertained at a distant station. The indications of a float-device are electrically transmitted. 6000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Dec., 1899.

**WATER LIFT.**

See **AIR LIFT; HYDRAULIC RAM; PUMP; WATER RAISING.**

**WATER MAIN.**

See **WATER FLOW; WATER PIPE.**

**WATER MEASUREMENT.**

See **IRRIGATION—Water Measurement; RIVER DISCHARGE; WATER FLOW; WATER METER.**

**WATER METER.**

See also **HYDROGRAPHY; HYDROMETER; WATER FLOW; WATER RATES; WATER SUPPLY; WATER WASTE; WATERWORKS MANAGEMENT.**

Water Meters. Joseph B. Rider. Examples are given aiming to show that a universal meter system is desirable, and stating its advantages. 32000 w. Fire & Water—May 29, 1897.

Water Meters of the Present Day: With Special Reference to the Small Flows and Waste in Dribbles. William Schönheyder. Read before the Inst. of Mech. Engs. Divides the meters in use into six classes, treating of each and noting the purpose and advantages of each type. Ill. 5000 w. Engr, Lond—Feb. 2, 1900.

**Atlanta, Ga.**—The Results of the Meter System in Atlanta, Ga. Statement of the president of the water board concerning saving in coal for pumping and improvement in fire-protection resulting from universal use of meters. 800 w. Eng Rec—Sept. 3, 1898.

**Battle Creek, Mich.**—How Meter Records are Kept at Battle Creek, Mich. Description of method and its merits, with a sample meter table. 400 w. Eng News—May 21, 1896.

**Boiler Tests.**—Test Meters for Boiler Plants. Lehman B. Holt. Showing the value of the Worthington Test Meter. Discussion. Ill. 3300 w. Jour Assn of Engng Socs—Sept., 1898.

**Calibration.**—Calibration of a Water Meter. William D. Ennis. Describes a form of apparatus, built by the writer for experimenting with meters and an account of experiments made. 1200 w. Stevens Ind—July, 1898.

**Calibration, Worthington.**—Calibration of a Worthington Water Meter. John A. Laird. Results of a series of meter calibrations. The meter tested was a Worthington, made entirely of brass, for hot water, and purchased for testing purposes. 500 w. Am Soc of Mech Engs—Dec., 1896.

**Cincinnati, O.**—Why Water Meters Should Be Used. Abstract from report of engineer commission on water supply for Cincinnati. The same rules that apply to gas distribution should, the author believes, be applied to water distribution. Consumers should pay for the water they waste as well as for what they actually use. 500 w. Pav & Mun Eng—July, 1896.

**Harrisburg, Pa.**—The Progress of Water Meterage. Part first calls attention to the rapid progress made in the introduction of meters and gives report from Harrisburg. Serial. Fire and Water—March 6, 1897.

**Lexington, Ky.**—Experience with Water Meters at Lexington, Ky. Abstract of paper read before the Am. Waterworks Assn., by S. A. Charles, describing the operation of the meter system in a city with 99 per cent. of the services metered. 800 w. Eng Rec—May 19, 1900.

Practical Experience with Water Meters at Lexington, Ky. S. A. Charles. Read before the Am. Waterworks Assn. Considers difficulties real and imaginary in the use of meters. 2000 w. Fire & Water—July 7, 1900.

**Madison, Wis.**—Meterage at Madison, Wis. Explains the thorough success of the system and the results. 1400 w. Fire & Water—May 14, 1898.

**Manchester Canal.**—See **WATER FLOW.**

**Pittsburg.**—Meterage for Pittsburg. A statement of conditions affecting the amount of water used and wasted in this city, and the recommendations of Mr. Allen Hazen in his report to the commission on filtration. 2300 w. Fire & Water—May 13, 1899.

**Popular Errors.**—Popular Errors About Water Meters. John C. Trautwine, Jr. Statements correcting popular errors in regard to the object sought by using meters, giving quoted correspondence from various cities and towns showing their value in checking waste. Ill. 2800 w. Pro Engs Club of Phila, No. 67—Nov., 1898.

**Rates.**—Water Meters and Rates. John B. Heim. Read at meeting of the Am. Waterworks Assn. Discusses the advantages of using meters, the rates, etc., giving illustrations from experience. 3300 w. Munic Engng—July, 1898.

See also **WATER RATES.**

**Richmond, Va.**—The Results of the Meter System in Richmond, Va. A description, with diagram, of the effect of meters on the pressure in street pipes. 900 w. Eng Rec—June 3, 1899.

**Schönheyder's Positive.**—Schönheyder's Positive Water Meter. Illustrated description of a new form of this meter brought out in 1895. 1400 w. Ind & East Eng—July 4, 1896.

**Setting.**—Report of Committee on Best Methods of Setting Meters. Presented to the convention of the American Waterworks Assn., at Indianapolis. Deals with the practical details of position, size, etc., of water meters for different services. 900 w. Fire & Water—July 25, 1896.

**Testing.**—The Accuracy and Durability of Water Meters. John W. Hill. Report of examination by the writer of seventeen different meters, with discussion of tests by others, the construction features of meters, their durability, etc. Ill. 6500 w. Pro Am Soc of Civ Engs—Jan., 1899.

Uniformity of Methods in Testing Water Meters. John Thompson, with discussion. Affirms that it is time water meters should be tested by uniform methods, and sets forth particulars in which uniformity should be attempted. It also describes an apparatus and a method for the more accurate testing of meters. Ill. 10500 w. Jour N Eng Waterworks Assn—Dec., 1895.

See also **Calibration.**

**Testing, Baltimore.**—Meter Testing in Baltimore, Md. Illustrates apparatus used. 500 w. Eng Rec—May 14, 1898.

**Testing, Reading, Pa.**—A Meter Testing Apparatus. Emil L. Nuebling. Illustrates and describes the plant of the Reading, Pa., Water Dept. 700 w. Eng Rec—Dec. 23, 1899.

**Testing, Somerville, Mass.**—Meter Testing, Somerville, Mass. Illustrated description of apparatus for water meter tests. 600 w. Eng Rec—Oct. 8, 1898.

**"Venturi."**—The "Venturi" Meter in Relation to the Measurement of Water in Large Mains. W. G. Kent. Read before the British Assn. of Waterworks Engineers. A description of the instrument and its action. 2500 w. Jour Gas Lgt—Aug. 17, 1897.

The "Venturi" Meter. Report of the Committee on Science and the Arts on the inventions of Clemens Herschel, Frederick N. Connet and Walter W. Jackson. This meter is designed for the measurement of the flow of liquids in pipes of large dimensions. Ill. 8400 w. Jour Fr Inst—Feb., 1899.

The "Venturi" Water Meter. Illustrated description of a complete meter for a 5-ft. main. 500 w. Engng—Aug. 14, 1896.

**Waste Restriction.**—See **WATER WASTE.**

**Worthington.**—See **Boiler Tests; Calibration.**

**WATER MOTOR.**

See also **TURBINE; WATER WHEEL.**

A Simple Water Motor. E. J. Prindle. Illustrates and describes a wheel fitted to a fixed wash basin, by which a power amounting to about 1-12 h. p. was obtained. 1000 w. Ir Age—May 12, 1898.

Making Practical Water Motors. George D. Rice. Describes and illustrates three new forms of these machines. 800 w. Dom Engng—Dec., 1897.

The Construction of Small Water Motors. P. Pitman. Explanation of the principles underlying the action of water motors, and the application of those principles to their design and construction on a small scale. Ill. Serial. Elec, Lond—March 9, 1900.

Water Motors and Their Power. G. D. Hiscox. Deals with the class of motors now upon the market for supplying small power. Details of their construction are illustrated. 1800 w. Sci Am Sup—Feb. 8, 1896.

**Mines.**—Small Water Motors for Mines. George D. Rice. Shows several forms of simple motors, with details of making. Ill. 800 w. Eng & Min Jour—March 5, 1898.

**Nozzle Efficiency.**—Efficiency of Nozzles for Small Water Motors. Arthur B. Ilsley and Herbert R. Thurston. Graduating thesis awarded first honorable mention in "Engineering News" Thesis Competition for 1895. The tabular statements of the experiments are briefly summarized in the table given, and the cuts represent a selection of the different forms of nozzles tested. 1800 w. Eng News—April 23, 1896.

**WATER PIPE.**

See also **PIPE; WATER FLOW; WATER HAMMER; WATER SUPPLY; WATERWORKS.**

A Symposium on Pipe Lines. Reviews the papers on large cast-iron and riveted steel mains, and the salt-water fire-protection system of Boston, presented to the N. E. W. W. Assn. 1700 w. Eng Rec—Jan. 14, 1899.

Experiences in Planning and Constructing Water Pipes (Erfahrungen bei Projectirung und Betrieb von Wasserleitungen). H. Adolf. Giving some points in connection with air trapping and water hammer; also influence of temperature changes. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—April 15, 1898.

The Early History of Cast Iron Pipe. Extract from paper by Jesse Garrett, read at meeting of New England Waterworks Assn., in 1896. Earliest accounts of cast iron and its first use for pipe. 1500 w. Bull of Am Ir & St Assn—March 1, 1897.

**Air Cushions.**—System for Preventing the Bursting of Pipes. Describes and illustrates a recently patented system depending on the elastic cushioning of the pipes at intervals with air, by means of air domes with inclined planes, opposite the mouth of the storage dome. 1500 w. Am Mfr & Ir Wld—Aug. 24, 1899.

**Arch, Steel.**—See **Steel Arch.**

**Asphalt Coatings.**—Asphalt Coatings for Water Pipe. Information concerning the material known as "mineral rubber" asphalt. 1800 w. Eng News—May 17, 1900.

**Assessments.**—Assessments for Water Mains. Review of a decision of the U. S. Supreme Court establishing the legality of a tax per front foot without regard to the cost of the main. 1000 w. Eng Rec—May 21, 1898.

See also **SEWER.**

**Australia.**—Some Notable Australian Steel Pipe Lines. Information concerning the steel pipe line with locking-bar joints, which forms a part of the waterworks of Adelaide, Western Australia. Ill. 1500 w. Eng News—June 29, 1899.

See also **Coolgardie; Rivetless Longitudinal Joint; WATER SUPPLY—South Australia; Western Australia.**

**Auxiliary Fire Systems.**—See **FIRE PROTECTION; WATERWORKS—Fire Service.**

**Back Filling Trenches.**—See **Laying; Trench Filling.**

**Baltimore.**—Laying Large Water Mains in Baltimore. Describes some special methods of machinery used to promote economy and rapidity and prevent street obstruction. Ill. 800 w. Eng Rec—Nov. 20, 1897.

**Boston.**—Twenty-Inch Steel Pipe Substituted for 30-in. Cast-Iron Pipe at a Railway Crossing in Boston. H. F. Winslow. Illustrates and describes a change made necessary by a new railway connection which must pass under the street. 350 w. Eng News—July 26, 1900.

Water Pipes on Metropolitan Waterworks. Dexter Brackett. Brief account of the pipes made of steel plates used in Boston. 2500 w. Jour N E Waterworks Assn—June, 1899.

See also **Raising; Submerged.**

**Break, Brooklyn.**—The Bursting of a Water Main in Brooklyn. An account of the great damage caused by the bursting of a 48-inch main. 700 w. Sci Am—Dec. 24, 1898.

**Break, New York.**—Serious Break in a Water Main. An account of the damage caused by the breaking of a main at Madison avenue and Forty-second street, New York. Ill. 900 w. Fire & Water—Oct. 16, 1897.

**Break, Toronto.**—See **WATERWORKS—Toronto, Ont.**

**Bridge.**—See also **River Crossing; Steel Arch; AQUEDUCT.**

**Bridge, Hartford.**—Carrying a 30-in. Water Main Over and Through a Masonry Arch Bridge at Hartford, Conn. E. D. Graves. Brief extract from paper read before the Conn. Soc. of Civ. Engs. & Surv., with drawings and view showing details of a novel method. 350 w. Eng News—Feb. 23, 1899.

**Brockton, Mass.**—The Design of Force Mains. Describes a method of determining the most economical diameter of force mains used at Brockton, Mass. 1300 w. Eng Rec—Feb. 19, 1898.

**Cast Iron.**—A Few Notes on Cast-Iron Pipe. F. C. Coffin. Paper giving various practical points, with illustration of a joint. 1600 w. Jour N Eng Waterworks Assn—Sept., 1900.

A 61-Inch Cast-Iron Pipe Line. Describes a 61-in. main of pipes 1¼ ins. thick, on which numerous important experiments on the strength of such castings were made. 1700 w. Eng Rec—Dec. 17, 1898.

Making Cast-Iron Pipe. Jesse Garrett. The subject relates to the best means of distributing water to the community. The history of lead, wood, stone and iron pipes is briefly reviewed and illustrated. The manufacture of cast-iron pipe is described and coating discussed. 12000 w. Jour New Eng Waterworks—Sept., 1896.

Specifications for Cast-Iron Pipe. P. D. Wanner. Abstract of paper read before the Am. Waterworks Assn. Recommendations of an experienced foundryman as to the best methods of making cast-iron pipe and the specifications for the material. 1200 w. Eng Rec—June 25, 1898.

The Manufacture and Inspection of Cast-Iron Pipes. Thomas H. Wiggin. An illustrated description of the process of pipe making and inspecting, giving tests and conclusions. 21000 w. Jour Assn of Engng Socs—May, 1899.

See also **Cleaning; Coatings; Joints, Wooden.**

**Cement.**—Test of Crushing Strength of Cement Pipe. Arthur S. Bent. Describes tests made to determine the amount of fill the pipes would stand when laid. 1200 w. Eng News—April 14, 1898.

**Cement-Lined.**—Cement-Lined Service Pipes. F. F. Forbes. Paper giving results of practical experience, with discussion. 5000 w. Jour N Eng Waterworks Assn—Sept., 1900.

**Cleaning.**—Cleaning Cast-Iron Water Pipe with Scrapers at St. John, N. B., and Boston, Mass. Condensed accounts of successful work in the places named. 1400 w. Eng News—July 20, 1899.

The Incrustation of Iron Pipes. Illustrated review of papers before the Inst. of Mech. Engs. on methods of removing tubercles and sediment in iron pipe, with the results of the cleaning on the discharge. 5100 w. Eng Rec—Dec. 30, 1899.

The Removal of Internal Corrosion from the Mains of the Kendal Waterworks. T. N. Ritson. Read before the British Assn. of Waterworks Engineers. An abstract of the paper and discussion. Describes the writer's experiences in the scraping of the mains. 3300 w. Jour Gas Lgt—Aug. 3. 1897.

See also **Torquay.**

**Cleaning, St. John, N. B.**—Cleaning a Water Main in St. John, N. B. William Murdoch. Describes the process used and reports the improvement in pressure and satisfactory results. 3000 w. Jour N E Waterworks Assn—June, 1899.

Water Main Cleaning in St. John, N. B. Describes the mechanical scraper used and the method of cleaning. 1800 w. Can Eng—March, 1898.

**Coating.**—Coating Cast-Iron Pipes. Thomas H. Wiggin. Describes coal-tar coating. 3000 w. Gas Engs' Mag—Oct. 10, 1899.

Coating of Cast-Iron and Steel Riveted Pipes. Condensed from the report of the special committee on coating of cast-iron and steel riveted pipes. George H. Benzenberg, chairman to American Society of Municipal Improvements, at Nashville, Tenn. 3800 w. Munic Engng—Nov., 1897.

Coatings for Cast-Iron Water Pipes. Thomas. H. Wiggin. Extract from a paper on "The Manufacture and Inspection of Cast-Iron Pipes," read before the Boston Society of Civil Engineers. Gives the results of the writer's study and experiments. 6200 w. Jour Am Soc of Nav Engs —Nov., 1899.

See also **Asphalt Coating; Cement Lined; PIPE.**

**Columbus, Ga.**—See **Submerged, Columbus.**

**Concrete-Expanded Metal.**—Experimental Test of a Concrete and Expanded Metal Conduit for the Jersey City Water Supply. R. Godfrey. Illustrated description of the section designed and tested. 700 w. Eng News—Aug. 30, 1900.

**Coolgardie, Australia.**—The Coolgardie Gold Fields Water Supply. Explains the scheme for supplying this great gold centre with an abundance of good water.. Serial. Engr, Lond—Jan. 21, 1898.

Plans of English Engineers for the Coolgardie Pipe Line. Editorial discussion of the plans proposed for a water supply to this mining district in Western Australia. The engineering problem is stated and discussed. 3000 w. Eng News —Feb. 17, 1898.

The Coolgardie Pipe Line; A Remarkable Engineering Problem. Editorial discussing the project for furnishing water to this gold mining district of Western Australia, giving extracts from the final report of the Board of Consulting Engineers. 3000 w. Eng News—Oct. 13, 1898.

The Coolgardie Contract. Relating to the project for furnishing a water supply to this gold mining district in Western Australia. The way it is proposed to solve a difficult problem. 2000 w. Ir & Coal Trds Rev—Nov. 4, 1898.

The Contract for the Coolgardie Steel Pipe Line, Western Australia. Particulars regarding the contract and the pipe to be used for this line 328 miles long to be built by the government to supply water to the mining district. 1500 w. Eng News—Dec. 29, 1898.

The Coolgardie Steel Pipe Contract. A copy of the specifications and comment on the many-sided contract. 2000 w. Ir & Coal Trds Rev —Jan. 13, 1899.

The Coolgardie Pipe Line. A description of a steel force main 328 miles long, now under construction to supply the gold fields of West Australia. The pipe is 30 inches in diameter and provided with special forms of longitudinal and round joints. 3500 w. Eng Rec—Feb. 24, 1900.

**Corrosion.**—See **Cleaning; WATER SUPPLY—Lead Poisoning.**

**Design.**—Old and New Methods Applied in Planning Pipe Lines and Penstocks. F. M. F. Cazin. Presents a new method, conflicting with prevailing practice, and the reasons and causes why it should be adopted in planning supply pipes. A question of hydraulics. Serial. Jour Fr Inst—Sept., 1898.

See also **Brockton, Mass.**

**Detroit, Tests.**—Testing Water Mains in Place at Detroit. Describes and illustrates a device for testing the pipe in short intermediate sections, irrespective of the position of the valves. 900 w. Eng Rec—Jan. 22, 1898.

**Distortion.**—See **Trench Filling.**

**Earthenware.**—See **Vitrified.**

**Electric Thawing.**—See **Thawing by Electricity.**

**Faucets.**—See **PLUMBING; WATER FAUCET.**

**Fire Protection.**—See **FIRE PROTECTION; WATERWORKS—Fire Service.**

**Foot-Bridge.**—See **Steel Arch; HYDRO-ELECTRIC PLANT—La Praz, Savoy.**

**Gutta-Percha.**—Gutta-Percha Water Pipes. J. H. Morrison. An account of the use of these pipes, their advantages and disadvantages. 1700 w. Ind Rub Wld—June 10, 1896.

**Harlem River, N. Y.**—See **Submerged, Harlem River.**

**Incrustation.**—See **Cleaning; Torquay; WATER FLOW.**

**Inspection.**—Cast-Iron Pipe Inspection. T. W. Yardley. Abstract of paper presented at meeting of Am. Waterworks Assn. Gives methods and requirements of inspection. 900 w. Eng Rec—June 18, 1898.

See also **Cast Iron.**

**Joints.**—See **Rivetless Longitudinal Joint; Steel.**

**Joints, Wooden.**—Wooden Joints in Cast-Iron Water Mains. William Murdoch. Short paper, giving an account of experience at St. John, N. B. 1 plate. 1200 w. Jour N Eng Waterworks Assn—Sept., 1900.

**La Praz, Savoy.**—See **Steel Arch.**

**Laying.**—Laying Pipe Under Difficulties. Illustrated description of a difficult piece of work in Waterbury, Conn., caused by a break in the connection of iron and cement pipes where a brook crosses the street. 1000 w. Fire & Water—Jan. 8, 1898.

Laying Water Mains. J. H. Decker. Common sense remarks and suggestions. 1800 w. Fire & Water—July 18, 1896.

Laying Water Mains. J. H. Decker. Common sense remarks on the various branches of the subject. 2000 w. San Plumb—Nov. 15, 1896.

See also **Baltimore; Madison, Wis; Submerged; Trench Filling; GAS PIPE.**

**Laying Costs.**—Costs of Pipe Laying. G. S. W. Abstracted from "The Technic." Notes on nine cases from actual practice, giving conditions, dimensions, wages and other necessary data, with the cost of each item. In most cases old pipes had to be removed and expensive connections made. 900 w. Eng Rec—April 11, 1896.

**Leakage.**—Loss of Water from Pipes. F. H. Crandall. A report on the Burlington (Vt.) High Service, which is free from many of the difficulties ordinarily encountered in solving this question. Discussion. 3000 w. Jour New Eng Waterworks Assn—June, 1898.

The Leakage from Street Mains. Summary of investigations made by J. J. R. Croes, in New York, showing that the leakage from old pipes is much greater than is usually supposed. 1000 w. Eng Rec—Nov. 4, 1899.

See also **GAS PIPE; WATER WASTE.**

**Locating Obstructions.**—See **Obstruction Location; PNEUMATIC TUBE.**

**Madison, Wis.**—The Method of Laying Small-Sized

Water Mains; of Lowering Mains; and the Relief of Violent Fluctuations on the Direct Pressure System at Madison, Wis. John B. Heim. Paper read at convention of the Am. Waterworks Assn., at Denver, Colo. Discusses the methods employed and the results obtained. 2500 w. Fire & Water—July 24, 1897.

**Medford, Mass.**—See **River Crossing.**

**Moving.**—Moving Two 36-in. Water Mains Without Shutting Off the Water. E. C. Moore, with discussion, and correspondence. Illustrated description with itemized cost. 3300 w. Tr Am Soc Civ Eng—Dec., 1895.

**Moving. Philadelphia.**—Movement of Water Mains in Connection with Pennsylvania Avenue Subway Work. Allen J. Fuller. An account of the changes made necessary by the subway and the relaying of the mains. Ill. 1300 w. Pro Engs' Club of Phila—Jan., 1899.

Moving Large Mains in Service. Illustrated description of the apparatus and methods employed in Philadelphia in moving mains up to 48 inches diameter. 1600 w. Eng Rec—April 29, 1899.

**Nashua, N. H.**—See **Submerged, Nashua.**

**New Bedford.**—The Specifications for the New Bedford Force Main. These specifications are for a main eight miles long and forty-eight inches diameter, of riveted steel. 1400 w. Eng Rec—March 28, 1896.

**New York Harbor.**—See **Submerged, Ellis Island.**

**Obstruction Location.**—The Location of Pipe Obstructions by Sound. Illustrated explanation of the method of ascertaining the location by the use of a chronograph and pistol shots. 800 w. Eng Rec—Dec. 30, 1899.

See also **PNEUMATIC TUBE—Locating Obstructions.**

**Orange, Mass.**—See **Repair.**

**Philadelphia.**—See **Moving.**

**Pittsburg, Pa.**—New Rising Main, Pittsburg, Pa. Illustrated description of a 48-inch riveted steel force main, 3930 ft. long, with details of special connection, expansion joint and manholes. 1400 w. Eng Rec—June 9, 1900.

**Plumbing.**—See **PLUMBING—Water Pipes.**

**Pumping Engine.**—See **PUMPING ENGINE—Water Pipe.**

**Raising, Boston.**—Recovering a Line of 24 and 30-in. Cast-Iron Water Pipe at Boston. Frederic I. Winslow. Changes in street grades made necessary the relaying of some large water mains, and it was decided to raise the old pipes for future use. The method employed is described. Also a similar piece of work elsewhere. 1200 w. Eng News—Sept. 9, 1897.

**Redwood, Cal.**—See **WATER FLOW.**

**Repair, Orange, Mass.**—Repairing a Water Main. F. G. Cudworth. Describes an unusual piece of work in the system of the Orange, Mass., waterworks. Ill. 400 w. Eng Rec—Dec. 11, 1897.

**Repair, Rochester, N. Y.**—Repair Details of the Rochester, N. Y., Waterworks. Conduits in 1896. Information from report of Emil Kuichling, chief engineer, in regard to the repairs and condition of both old and new conduits. 2000 w. Eng Rec—July 24, 1897.

**Repair, Submerged.**—See **Submerged Repair.**

**River Crossing.**—Placing a 10-Inch High-Service Pipe Across a River. Frederick W. Gow. Describes the method of crossing the Mystic river, at Medford, Mass. Discussion. 4000 w. Jour N Eng Waterworks Assn—March, 1898.

See also **Bridge. Hartford; Steel Arch; Submerged; AQUEDUCT.**

**Riveted.**—See also **Stave vs. Riveted; Steel.**

**Rivetless Longitudinal Joint.**—A Rivetless Longitudinal Joint for Steel Pipe, Adelaide Waterworks, South Australia. Alex. B. Moncrieff. Describes a new design of pipe considered in every respect an advance. 400 w. Eng News—June 9, 1898.

**Rochester, N. Y.**—See **Repairs; WATER FLOW.**

**St. John, N. B.**—See **Cleaning, St. John.**

**Service Defects.**—Service Pipes Defects and the Remedy. George F. Chace. The writer believes the best service pipe at present in the market is tin-lined iron pipe. Gives account of experience. Discussion. 6000 w. Jour N Eng Waterworks Assn—Sept., 1897.

**Siphon.**—See **SIPHON.**

**Stave.**—Stave Pipe—Its Economic Design and the Economy of Its Use. Arthur L. Adams. Discusses the essential considerations in stave pipe design, and some of the practical and theoretical limitations imposed. Studies several existing lines, outlines a method for making a safe and economic design, and endeavors to determine the rightful place of stave pipe in economic construction. 10600 w. Pro Am Soc of Civ Engs—Sept., 1898.

Stave Pipe; Its Economic Design and Use. Arthur L. Adams. A discussion with illustrations of the essential considerations in stave pipe design, and some of the limitations imposed; with a study of existing lines, and a comparison with leading types of large pressure pipes. 10900 w. Jour N E Waterworks Assn—June, 1899.

**Stave, Floriston, Cal.**—Nine-Foot Wood Stave Pipe, Floriston Pulp and Paper Co., Floriston, Cal. D. C. Henny. Illustrated description of this pipe and its construction, and the power plant supplied. 1200 w. Eng News—Oct. 4, 1900.

**Stave vs. Riveted.**—Wooden Stave Pipe vs. Riveted Pipe. D. C. Henny. A comparison of the two classes of pipe mentioned, especially setting forth the merits of stave pipe. Discussion. 7600 w. Jour Assn of Engng Socs—Nov., 1898.

**Steel.**—The Use of Steel for Water Mains. L. M. Hastings. States the few conditions and situations where steel seems best adapted for use, and the principal advantages, discussing cost, protective coating, durability, etc. 3000 w. Jour N E Waterworks Assn—June, 1899.

Welded Steel Mains and Joints. J. G. Stewart. Paper read before the Manchester Assn. of Engs. The advantages of steel and of cast-iron pipes are discussed, especially when transportation is a factor. The article is illustrated by 9 views and sections of joints used in steel pipes. 3500 w. Ind & Ir—Feb. 28, 1896.

See also **Boston; Joints; New Bedford; Pittsburg; Rivetless; Stave vs. Riveted; Trench Filling.**

**Steel Arch.**—Conduit of Sheet Steel (Conduite en Tole d'Acier). A description of a steel conduit 2.4 metres in diameter spanning the River Arc in the form of an arch of 50 metres span. The computations are also given for a similar structure of reinforced concrete. 1200 w. La Rev Tech—June 10, 1899.

See also **HYDRO-ELECTRIC PLANT—La Praz, Savoy.**

**Steel Friction Coefficient.**—See **WATER FLOW.**

**Steel Riveted Joints.**—The Joints of Riveted Water Pipes. Emil Kuichling. Abstract of an address before the students of Rensselaer Polytechnic Inst. on the design of riveted steel pipe. 3000 w. Eng Rec—June 10, 1899.

**Submerged.**—Laying Submerged Pipes. Part first gives an illustrated description of various methods which have been adopted in executing such work. Serial. Eng Rec—June 24, 1899.

Laying Submerged Water Mains. Describes the laying of a 16-inch pipe across the Cedar River, Iowa, and a 24-inch main at Nashua, N. H. 1000 w. Eng Rec—Jan. 1, 1898.

See also **INTAKE.**

**Submerged, Boston.**—Subaqueous Pipe Laying, Boston, Mass. Illustrated description of construction of several 36-inch submerged mains of the Metropolitan waterworks. 1000 w. Eng Rec—May 14, 1898.

**Submerged, Cleveland.**—Laying a Submerged Water Main in Cleveland, O. Illustrates the manner in which a 48-inch main was laid across a narrow stream. 350 w. Eng Rec—Jan. 29, 1898.

See also **Submerged Repair.**

**Submerged, Columbus, Ga.**—Submerged Water Mains at Columbus, Ga. Illustrated description. 500 w. Eng Rec—June 6, 1896.

**Submerged, Delray, Mich.**—Subaqueous Pipe Laying at Delray. Illustrated account of method of laying 72-inch pipe across the Rouge River, with description of a special joint for such work. 600 w. Eng Rec—April 15, 1899.

**Submerged, Ellis Island.** Ellis Island Submerged Water Main. Description of a 5100-ft. main 6 ins. in diameter laid in New York Harbor. 1300 w. Eng Rec—Nov. 26, 1898.

**Submerged, Harlem River.**—Laying a 36-in. Water Main Under the Harlem River, New York. Brief description, with illustration, of the work of laying a main from 209th st., Manhattan, to

Fordham Heights Landing. 500 w. Eng News—March 22, 1900.

**Submerged, Havana Harbor.**—Laying a 6-in. Water Main Across Havana Harbor. Howard Egleston. Describes the plan adopted. Ill. 1800 w. Eng News—Oct. 12, 1899.

**Submerged, Nashua, N. H.**—Laying a 24-Inch Main Under the Nashua River. Horace G. Holden. Describes the work of connecting the water mains by a loop that would supply the portion of the city of Nashua on the opposite side of the river, in case any accident occurred to the bridge that has for forty-four years held the suspended pipes. Discussion. 3000 w. Jour New Eng Waterworks Assn—June, 1898.

**Submerged, Portland, Ore.**—A Submerged Steel Pipe with Flexible Joints at Portland, Ore. Points of interest in this work and part of the specifications relating to the flexible and flanged joints. Ill. 1400 w. Eng News—Feb. 10, 1898.

**Submerged Repair.**—Repairing a Submerged Water Main. Describes methods used in Cleveland, O., to patch riveted steel mains injured by anchors. 600 w. Eng Rec—Sept. 22, 1900.

Repairing a 30-Inch Submerged Water Main. D. W. French. Abstract of paper read before the Am. Waterworks Assn., describing the lifting of the pipe from a temporary pile trestle and substituting new lengths for those broken. 1700 w. Eng Rec—May 19, 1900.

**Tapping Machine.**—Machine for Tapping Water Mains. Illustrated description of machine for cutting a hole in a main pipe and making a secure connection for a branch or outlet without shutting off the pressure. 700 w. Am Mach—Dec. 17, 1896.

Machines for Inserting Valves and Branches in Water Mains under Pressure. A brief illustrated description of the devices and methods of operating them. 1300 w. Eng News—Oct. 28, 1897.

Making a Thirty-Six-Inch Cut in a Forty-eight-Inch Water Main. An illustrated account of work accomplished by the Smith tapping apparatus. 1000 w. Fire & Water—May 8, 1897.

**Testing.**—Experiments with Water under High Pressures. Their object was to determine the permeability of steel plates and the friction in steel pipes under heavy pressures. 600 w. Eng Rec—April 30, 1898.

See **Detroit; WATERWORKS—Distribution Tests.**

**Thawing by Electricity.**—Electricity for Frozen Water Pipes. Describes a method of thawing pipes by electricity used successfully in several cities. 900 w. Eng Rec—March 4, 1899.

Thawing Frozen Pipes by Electricity. An illustrated account of the methods followed in thawing pipes up to 6 in. in diameter. 1000 w. Eng Rec—March 11, 1899.

Thawing Frozen Water Pipes by Electricity. Abstract of a paper by John B. Helm, read at meeting of the American Waterworks Assn. 1700 w. Eng Rec—May 20, 1899.

**Torquay, Incrustation.**—The Incrustation of Iron Pipes at the Torquay Waterworks. William Ingham. Read before the Inst. of Mech. Engs. Illustrates and describes the pipe scrapers used, also the condition of the pipes, and the results. 4000 w. Engng—Nov. 3, 1899.

**Trench Filling.**—Back Filling Trenches. E. H. Gowing. Considers the expense of doing the work as it should be done. Also discussion. 6400 w. Jour N Eng Waterworks Assn—March, 1898.

Back Filling Trenches. E. A. W. Hammatt. Calls attention to points from the experience of the writer, and discusses the manner of back filling to be recommended. Discussion follows. 6000 w. Jour N Eng Waterworks Assn—March, 1898.

The Distortion of Riveted Pipe by Back Filling. D. D. Clarke. Notes on work near Portland, Ore., with account of tests and results, which may be of service to those investigating the question of the depth of trench permissible for steel water pipe under certain conditions. Tabulated statements of tests. Ill. 2500 w. Pro Am Soc of Civ Engs—May, 1897.

See also **Cement.**

**Valve Inserting.**—See **Tapping Machine.**

**Vitrified, Hartford.**—Vitrified Water Pipe for Hartford. A statement of the reasons for using vitrified clay pipe for a water main, rather than cast-iron pipe or an open channel. 900 w. Eng Rec—March 24, 1900.

**Vitrified Tests.**—Tests of a Vitrified Earthenware Water Conduit. Dabney H. Maury, Jr. The pipes were 24 inches in diameter. The construction of the conduit is described, the nature of the tests explained, and extensive table of data is presented, with discussion. 4500 w. Ill Soc of Engs & Surv—11 An Rept, 1896.

Tests of the Tightness of a Vitrified Earthenware Water Conduit. Dabney H. Maury, Jr. Abstracted from a paper read at the annual convention of the Illinois Soc. of Engs. & Survs. Presents tabulated results. 1600 w. Eng News—May 21, 1896.

**Water Action.**—See **WATER SUPPLY—Lead Poisoning.**

**Waterbury, Conn.**—See **Laying.**

**Wooden.**—Wooden Water Supply Piping. Illustrated description of pipe constructed on an estate in North Wales, for bringing water to a farm for driving a mill and for running a supply for nine different farms. 1300 w. Engng—July 20, 1900.

**Wooden Joints.**—See **Joints, Wooden.**

**Wooden Stave.**—See **Stave.**

**Wyckoff.**—Improved Wyckoff Water Pipe. Geo. L. Wells. Gives a brief description of this pipe and its manufacture, discussing details. Ill. 5400 w. Jour N E Waterworks Assn—June, 1899.

## WATER POLLUTION.

See also **FACTORY WASTE; FILTRATION; RIVER POLLUTION; SANITATION; SEWAGE; SEWAGE DISPOSAL; WATER ANALYSIS; WATER PURIFICATION; WATER SUPPLY.**

Contamination of Our Municipal Water Supplies. Frank J. Thornbury. A popular exposition of what renders a water supply bad or good, and upon the rarity of really safe water supply. 2500 w. Chau—Nov., 1896.

Impure and Unwholesome Water and Its Experimental Improvement. Floyd Davis. Discusses the improvement due to the education of the common people and their better understanding of the danger, calling attention to some organisms that are proof of unwholesomeness. 1800 w. Munic Engng—Aug., 1900.

Sanitary Problems Connected with Municipal Water Supply. W. P. Mason. Presents the dangers arising from insanitary methods, the ignorance of the general public, gives statistics of several noted epidemics and their cost, and an extended discussion of the subject. 7000 w. Jour Fr Inst—May, 1897.

The Relative Importance of Flies and Water Supply in Spreading Disease. Dr. M. A. Veeder. Abstract of paper read at meeting of the Buffalo Sanitary Club. A discussion of dangers from these sources, and means of prevention. 2500 w. Eng News—Dec. 22, 1898.

**Ashland, Wis.**—The Ashland Water Pollution Case. Review of the decision of the Wisconsin Supreme Court of the liability of a water company for the quality of water it supplied. 2000 w. Eng Rec—Dec. 24, 1898.

**Bacteriology of Soils.**—The Bacteriology of Soils with Reference to the Pollution of Water. A review of investigations for the British Local Government Board, showing that the presence of certain innocuous bacteria in drinking water, taken in connection with other facts, may be of aid in determining its sanitary quality. 1400 w. Eng Rec—Aug. 11, 1900.

**Boston.**—See **Organisms, Pipes.**

**Brooklyn.**—See **Fermentation; Organisms, Brooklyn.**

**Burlington, Vt.**—See **WATER SUPPLY.**

**Cincinnati.**—Cincinnati Water Supply and Typhoid Fever. Report of committee at the Nov. meeting of the Cincinnati Academy of Medicine. 2400 w. San—May, 1896.

**England.**—The Pollution of Water and Its Correction. Reginald Empson Middleton. Read before the Society of Engineers, London. Considers generally the sources of pollution, discusses legislation on this subject in England, gives the writer's solution of the difficulty in dealing with sewage, etc. 3500 w. Ind & Ir—Dec. 10, 1897.

**Examination.**—See **WATER ANALYSIS; WATER SUPPLY.**

**Fermentation.**—The Causes and Prevention of Water Fermentation. Samuel McElroy. Discussing the problem in the light of Brooklyn's experience with her water supply. 3300 w. Eng Mag—July, 1897.

**Geology and Disease.**—See **WATER SUPPLY.**

**Ground Water.**—See **Wells; GROUND WATER.**

**King's Lynn, Eng.**—An Insanitary Object Lesson. Perry F. Nursey. A statement of the negligence and ignorance displayed in the town of King's Lynn, Eng., and the typhoid epidemic resulting from it. 2200 w. Ind & Ir—Dec. 10, 1897.

**Lead Poisoning.**—See **WATER SUPPLY.**

**Magdeburg, Germany.**—See **WATER PURIFICATION.**

**Maidstone, Eng.**—The Maidstone Epidemic. Editorial on the impure water supply that has caused the serious epidemic of typhoid in this district of England. 1000 w. Engr, Lond—Oct. 1, 1897.

**New Jersey.**—The Effect of a Pure Water Supply on Typhoid Fever in Newark and Jersey City, New Jersey. Report of the remarkable decrease following the change to pure water, with interesting particulars. 2000 w. Eng News—Sept. 30, 1897.

See also **RIVER POLLUTION; SEWERAGE; WATER SUPPLY.**

**Organisms.**—Algae as a Cause of the Contamination of Drinking Water. G. T. Moore, in the "Amer. Jour. of Pharmacy." Information concerning this group of plants, which produces more trouble than any other members of the vegetable kingdom. 3800 w. San—May, 1900.

Animal and Vegetable Growths Affecting Water Supplies. Prof. Albert R. Leeds. Report of chairman of a special committee of the American* Waterworks' Assn. 1400 w. Pav & Mun Engng—June, 1896.

Anabaena. Report of investigation of the source of the odors imparted by anabaena to water supplies. 500 w. Eng Rec—Aug. 27, 1898.

On Removing Organisms from Water. Frederick S. Hollis. A discussion of these organisms and the methods of removal, with general discussion by members. 3800 w. Jour N E Waterworks Assn—March, 1900.

On Odors and Tastes of Surface Waters, with Special Reference to Anabaena, a Microscopical Organism found in Certain Water Supplies of Massachusetts. D. D. Jackson, and J. W. Ellms. Investigations of organisms giving surface water a disagreeable odor or taste, with results of analysis, etc. 3500 w. Tech Quar—Dec., 1897.

Asterionella—Its Biology, Its Chemistry, and Its Effect on Water Supplies. George C. Whipple and D. D. Jackson. A discussion of the conditions of growth of this diatom, the manner in which it imparts an offensive odor to water, and the most effective method of destroying it. 7500 w. Jour N Eng Waterworks Assn—Sept., 1899.

Some Observations on the Relation of Light to the Growth of Diatoms. George C. Whipple. Presents the results of a series of experiments made during the past year with a view to determining the nature and effect of influences which relate to the growth of diatoms in lakes and ponds. 5000 w. Jour N Eng Waterworks Assn—Sept., 1896.

Raphidomonas. George C. Whipple. Describes the trouble caused by a new infusorian. 3000 w. Jour N Eng Waterworks Assn—June, 1897.

Organisms Which Cause Unpleasant Odors and Tastes in Water Supplies. W. T. Sedgwick. Remarks on micro-organisms and a review of work published by George C. Whipple on "The Microscopical Examination of Drinking Water." 4300 w. Jour N Eng Waterworks Assn—Sept., 1899.

The Method of Removing Organisms from the Water in the Distributing Reservoir of the City of Syracuse, N. Y. An account of the condition of the water and the methods used, with general discussion. 3800 w. Jour N E Waterworks Assn—March, 1900.

The Vitality of Pathogenic Germs in Drinking Water. B. Meade Bolton. On the variability of the bacteria and experiments made to determine their vitality. 1800 w. San Rec—April 15, 1898.

Water Supply and Sewerage as Affected by the Lower Vegetable Organisms. Clarence O. Arey. A study of bacterial life in relation to sewerage, water supply and filtration. 3400 w. Jour Assn of Eng Soc—Sept., 1896.

Water Supply and Sewerage as Affected by the Lower Vegetable Organisms. Clarence O. Arey. From a paper read at Cleveland, O. The study begins with a consideration of the lowest forms of life and the subject of water supplies. Serial. Fire & Water—Jan. 9, 1897.

See also **Fermentation; WATER ANALYSIS.**

**Organisms, Brooklyn.**—Ridgewood Reservoir Diatoms. Samuel McElroy. A statement of the conditions and an explanation of the cause of the trouble. 1300 w. Fire & Water—June 11, 1896.

**Organisms, Pipes.**—Some Observations on the Growth of Organisms in Water Pipes. George C. Whipple. Discussion of this subject based on the biological observations made by the Boston Waterworks, with the results. 500 w. Jour N Eng Waterworks Assn—Sept., 1897.

**Organisms, Spot Pond.**—Chlamydomonas in Spot Pond. Frederick S. Hollis and Horatio N. Parker. An illustrated account of an organism that imparts an unpleasant taste and odor to the water. 1500 w. Jour N Eng Waterworks Assn—Sept., 1899.

**Prevention.**—See **WATER SUPPLY—Protection.**

**Sanitary Control.**—See **SANITARY ENGINEERING—Water Supply Control; WATER SUPPLY—Protection.**

**Sauve, France.**—The Contamination of the Water Supply of Sauve (Sur la Contamination de la Source de Sauve). The contamination of the water supply of this French town was traced by the appearance in the water of the reactions of fluoresceine, which had been placed in the suspected drains. 1000 w. Comptes Rendus—Nov. 29, 1897.

**Typhoid Fever.**—The Water Supplies of Eight Cities in Relation to Typhoid Fever Rates. John W. Hill. An address before the Soc. of Municipal Improvements, Chicago, Ills., Oct. 9, 1896. Facts concerning four well-known cities of Europe and four well-known cities of the United States. 4400 w. San—June, 1897.

Typhoid Fever and Water Supply in 66 American and Foreign Cities. Abstract and review of an address by John W. Hill, before the faculty and students of the University of Illinois, comprising an array of statistics. 1500 w. Eng News—May 21, 1896.

Water-Borne Typhoid Fever. Christopher Childs. A paper introducing a discussion of this subject, and chiefly considering the means by which this pollution may be prevented. Discussion follows. 9500 w. Jour of San Inst—July, 1898.

See also **Cincinnati; King's Lynn; Maidstone; New Jersey; WATER SUPPLY—Philadelphia.**

**Wells.**—See also **GROUND WATER; WELL—Pollution.**

**Wells, France.**—The Contamination of Wells (Sur la Contamination des Puits). M. Duclaux. A note to the French Academy, showing dangers of well water, and the distance and nature of soil through which contamination occurred in a village in the Department of Cantal, France. 1200 w. Comptes Rendus—Dec. 6, 1897.

**York, Pa.**—The York Water Pollution Case. A review of the decision of the Pennsylvania Supreme Court in Commonwealth vs. Yost, restricting the powers of the State Board of Health and refusing to approve the criminal prosecution by a private corporation without powers of eminent domain against any one polluting its source of supply. 1300 w. Eng Rec—Aug. 11, 1900.

## WATER POWER.

See also **DAM; ELECTRIC LIGHTING; ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT; TURBINE; WATER MOTOR; WATER RIGHTS; WATER WHEEL.**

Water Renaissance. John Birkinbine. The author reviews the recent large increase of the use of water-power in the industries of the world, resulting from the electrical distribution of power from power stations located on streams, and discusses a possible farther increase to meet the demands of power for irrigation. Incidentally some remarks are made on the water supply of cities. 3000 w. Pro Eng's Club of Phila—April, 1896.

Water Power—Its Generation and Transmission. Samuel Webber. Presented at the N. Y. meeting of the Am. Soc. of Mech. Eng. A critical examination of the various turbines in use and of their behavior under specified conditions, and modes of testing them. 5000 w. Trans Am Soc of Mech Eng—Dec., 1895.

**Air Compressor.**—See **AIR COMPRESSOR—Hydraulic; COMPRESSED AIR—Power Transmission.**

utilization, and legislation, for France, Italy, and Switzerland. 25000 w. Map. Ann des Ponts et Chaussées—2 Trimestre, 1900.

See also **Gesäuse, Styria; HYDRO-ELECTRIC PLANT.**

**Alps, Maritime.**—Motive Power in the Maritime Alps (Les Forces Motrices des Alpes-Maritimes). An account of the plans to utilize the hydraulic power of the rivers Var and Cians, in the south of France. 1500 w. La Revue Technique—Aug. 25, 1897.

**Austria.**—The Control of Unused Water Rights (Ueber die Frage des Heimfalles von Verliehenen Wasserrechten). An official investigation into the value and ownership of numerous water rights in Austria, with an interesting technical discussion as to the value and availability of water power in general. 8000 w. Zeitschr d Oesterr Ing u Arch Ver—May 21, 1897.

Reform in Water-Power Rights in Austria (Reform des Oesterreichischen Wasserrechtes). Dr. Ernst Seidler. A discussion of the growing importance of water power and the legislation controlling its use in Austria. 3000 w. Oesterr Zeitschr f Berg u Huttenwesen—April 15, 1899.

See also **Gesäuse, Styria.**

**California.**—Water Powers in Southern California. C. G. Baldwin. Statements of the essential considerations which relate to these enterprises, discussing the causes of failure, the vital questions, and the cost of power. 4000 w. Jour of Elec—Jan., 1899.

**Canada.**—Canadian Water Power and Its Electrical Product in Relation to the Undeveloped Resources of the Dominion. Thomas C. Keefer. Presidential address before the Royal Society of Canada. Attempts to give an approximate estimate of the quantity and value of the great water power available. Serial. Can Engr—Aug., 1899.

Water Power in Canada. Presidential address at the annual meeting of the Canadian Society of Civil Engineers. Calls attention to this widely distributed power, its use for transmission purposes, electrical demand, the ice questions, etc. 4500 w. Can Engr—Feb., 1898.

See also **Chambly; Lachine; Ontario; Sault Ste. Marie; Shawinigan.**

**Caratunk Falls, Kennebec River, Me.**—Water Power of Caratunk Falls, Kennebec River, Maine. Samuel McElroy. Paper read at meeting of A. S. M. E. Describes and discusses the catchment basin, rainfall and power investment, and makes comparisons between this water power and that obtainable on other New England rivers, concluding with a discussion of site advantages, etc. 3300 w. Trans Am Soc Mech Eng—Dec., 1895.

**Chambly, Canada.**—The Hydraulic Features of the Chambly Water Power. Illustrated description of the dam and water-wheel plant of a large station on the Richelieu River, near Montreal. 700 w. Eng Rec—June 17, 1899.

**Chicago Drainage Canal.**—Power Development from the Drainage Canal. A statement of the plans for utilizing the 20,000 H. P. afforded by the Chicago Canal. 600 w. Eng Rec—April 7, 1900.

The Water Power of the Drainage and Ship Canal, and Its Transmission to Chicago. H. S. Putnam. A paper read at a meeting of the Illinois Chapter of the American Institute of Architects, claiming that both from an engineering standpoint and financially one can scarcely overestimate the importance of this canal as a source of power for the city of Chicago. 2200 w. Elec Eng—Jan. 15, 1896.

See also **CANAL—Chicago Drainage.**

**Coal Mine.**—See **Mine, France.**

**Economical Arrangement.**—The Economical Arrangement of Hydraulic Power Plants. Walter Ferris. An outline of the points of economy and waste in the design of hydraulic machinery. Ill. 2200 w. Am Mach—April 21, 1898.

See also **HYDRO-ELECTRIC MACHINERY; HYDRO-ELECTRIC PLANT.**

**Electric Transmission.**—The Power of Water. C. A. Stone. The power going to waste in our streams, and the conditions under which electric trans-

**ELECTRIC PLANT.**

**Electro-Chemistry.**—Prof. Lunge, of Zurich, on the Future of Water-Power and Electrolytic Alkali Processes. John B. C. Kershaw. A review of lecture delivered in Liverpool on the changes now being brought about by the utilization of water-power for industrial purposes, especially for chemical manufactures. 1600 w. Elec Rev, Lond—Oct. 20, 1899.

The Value of Water Power for Electrochemical Industries (Die Verwertung von Wasserkräften für Electrochemische Zwecke). Oscar von Miller. A detailed analysis of the value of electricity in chemical industry, for water powers of various costs. 5000 w. Zeitschr f Elektrochemie—Oct. 11, 1900.

See also **ELECTRO-CHEMICAL WORKS; ELECTRO-CHEMISTRY; HYDRO-ELECTRIC PLANT.**

**Fort William, Scotland.**—See **ELECTRIC LIGHTING.**

**"Gesäuse," Styria.**—On Water Powers, with Particular reference to the Utilisation of the Power of the "Gesäuse" Cataract, in Styria (Ueber Wasserkräfte, insbesondere über die Ausnützung der Wasserkraft im Gesäuse). Dr. P. Forchheimer. Abstract of an address at the Polytechnic Club, Gratz, with table of Swiss improved water powers, and plans for using the Gesäuse water power. 1200 w. Wiener Bauindustrie Zeitung—June 21, 1900.

**Hannawa Falls, N. Y.**—The Disaster to the Water-Power Plant at Hannawa Falls, N. Y. Brief description of the works and the damage caused, with illustrations. 1200 w. Eng News—April 26, 1900.

**Holyoke, Mass.**—The Water Power at Holyoke, Massachusetts. Horatio A. Foster. Paper before the Engineers' Society of Western New York, giving an illustrated account, historical, technical and financial, of this water power on the Connecticut River. 5400 w. Jour Assn of Engng Socs—Aug., 1900.

**Idaho, Boise Basin.**—The Boise Basin (Idaho) Power Plant. Theo. F. Van Wagenen. Illustration and description of the construction is given in part first. Serial. Min Rept—Oct. 25, 1900.

**Italy.**—Our Hydraulic Power (Le Nostre Forze Idrauliche). A. Raddi. A general review of the question of utilizing the many natural water powers of Italy, discussing the legal, political, and engineering features of the problem. Serial. Gior d Lav Pub e d Str Ferr—Nov. 8, 1899.

Water Power and Italian Legislation (Le Forze Idraulichi e la Legislazione Italiana). Report of M. Vicari and R. Pinna to the 3d. National Congress of the Società Economiche. A very full discussion of the present status of the subject. In 1897, 4,259,646 tons of coal were imported into Italy, yet the great water power resources of the country are barely used. Present legislative enactments make it difficult to develop this power, and the report urges the grant of concessions to corporations under certain restrictions. It is full of valuable data. 7500 w. L'Elettricità—Oct. 30, 1898.

See also **Terni; HYDRO-ELECTRIC PLANT.**

**Jordan River, Utah.**—A Water Power Plant of the Jordan River, Utah. W. P. Hardesty. Brief description of an important plant in process of construction, 22 miles south of Salt Lake City. 500 w. Eng News—April 28, 1898.

**Lachine, Montreal.**—Proposed Improvements at Lachine Rapids Works. On schemes proposed for preventing the entrance of ice into the head race, and to otherwise improve the plant. 1500 w. Can Engr—Sept., 1899.

See also **HYDRO-ELECTRIC PLANT.**

**Lowell, Mass.**—A New Rack and Other Improvements to the Feeder for the Middlesex Company, Lowell, Mass. Arthur T. Safford. Illustrates and describes work that gave increase of power, and simplified the conditions for controlling the water power. 4300 w. Jour Assn of Engng Socs—July, 1900.

**Maritime Alps.**—See **Alps Maritime.**

**Massena, N. Y.**—Methods of Work on the St. Lawrence Power Co.'s Water Power Canal Near Massena, N. Y. Illustrates and describes one of the most interesting pieces of canal work now in progress in the United States. 2800 w. Eng News—Dec. 15, 1898.

The St. Lawrence Power Plant. Illustrated description of the methods adopted at Massena in cutting a canal about three miles long, for developing 150,000 h. p., with an account of the concrete foundations of the power station. 5000 w. Eng Rec—Jan. 6, 1900.

See also **HYDRO-ELECTRIC PLANT.**

**Mine.**—The Utilization of Mine Water at Hallstatt (Die Verwerthung der Grubenwässer in Hallstatt). C. Schraml. An account of the manner in which the water from the salt mines is used to supplement the local streams in the dry season in connection with the hydraulic power plant. 3000 w. 1 plate. Oesterr Zeitschr f Berg u Hüttenwesen—Jan. 6, 1900.

See also **DAM; ELECTRIC EQUIPMENT.**

**Mine, France.**—The Utilization of Drainage Water to Work a Turbine Driving a Winch. An illustrated account of a turbine installation in a French colliery. 800 w. Ir & Coal Trds Rev—Sept. 8, 1899.

Utilizing a Feeder for Driving a Winch. Illustrates and describes an installation of a turbine-driven winch. 1000 w. Col Guard—June 1, 1900.

**Mojave River, Cal.**—Water Development on the Mojave River, near Dagget, Cal. J. B. Lippincott. Illustrated description. 1800 w. Eng News Sept. 3, 1896.

**New England.**—Application of the Principle of Water Storage to New England Rivers. J. Herbert Shedd. Slightly condensed from a paper read before the American Paper & Pulp Assn. at the New York meeting. Enumerates the advantages which have made this section of the country eminent in manufacturing, and shows the large resources yet undeveloped, and the favorable conditions for water storage. 4000 w. Eng News—Aug. 10, 1899.

Water Power in New England. James Francis. Abstract from a paper entitled "Power" read before the Washburn Engineering Society of the Worcester Polytechnic Institute. A masterly review of practice with turbine water wheels, emphasizing the fact that the effect of draft tubes is a subject that needs further research. Comparison of cost of steam and water is made, and increase in the use of turbines for power stations transmitting power by electricity is predicted. 2200 w. Eng Rec—May 16, 1896.

See also **Holyoke; Lowell.**

**Niagara.**—Niagara Power. F. M. F. Cazin. The purpose of the paper is to discuss the features of power absorption from the falling waters as actually practiced, and to indicate a line for improved methods and machinery. 2200 w. Elec Wld—July 17, 1897.

Power Development at Niagara Falls Other Than That of the Niagara Power Co. W. C. Johnson. Considers early developments, dating back to 1725. 5500 w. Jour Am of Engng Socs—Aug., 1899.

The New Water Power Development Below Niagara Falls. The head of water utilized is about 125 ft. Five illustrations showing the location, arrangement, and general appearance of the paper-mill plant are given. 800 w. Eng News—March 26, 1896.

Water Supply of Niagara. Orrin E. Dunlap. Considering the danger of drawing off so much water for power purposes as to ruin the beauty of the cataract. 1200 w. W Elec—Feb. 8, 1896.

See also **ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT.**

**Niagara Gorge.**—A Proposed Water-Power Improvement in the Gorge of the Niagara River. John Birkinbine. Outlines a plan for diverting a portion of the river into a canal which will deliver 10,000 cu. ft. per second at moderate velocity, capable of producing 35,000 h. p. Ill. 1800 w. Pro of Engs' Club of Phila—Jan., 1899.

The Birkinbine Plan for Utilizing Niagara Gorge Power. Brief illustrated description of the plan proposed. 600 w. Elec Eng, N. Y.—Feb. 9, 1899.

**Ontario.**—Water Powers of Ontario. Thomas W. Gibson. From the report of the Ontario Bureau of Mines. An account of the vast number of waterfalls, the practical uses, with text of the act and regulations which were adopted in 1898. 2800 w. Can Elec News—Feb., 1898.

**Porto Rico.**—See **PORTO RICO.**

**Quinnesec Falls, Wis.**—See **Wisconsin Paper Mill.**

**Rheinfelden.**—See **ELECTRIC TRANSMISSION; HYDRO-ELECTRIC PLANT.**

**Rhine, Switzerland.**—Utilization of the Rhine Water-Power in Switzerland (L'Utilisation des Forces Motrices du Rhin en Suisse). Illustrated account of the proposed exploitation of this power by the Swiss government. 2000 w. Génie Civil—Jan. 7, 1899.

**Rhone.**—See **HYDRO-ELECTRIC PLANT—Lyons.**

**Sault Ste. Marie.**—Greatest Water Power Development in the World. Illustrates and describes the operations at Sault Ste. Marie, and the mammoth water-power development. 5000 w. Marine Rev—April 5, 1900.

The Clergue Enterprises at Sault Ste. Marie. An account of the industries developed to utilize the power of Lake Superior. 4500 w. Ir Age—Aug. 9, 1900.

The Sault Power Canal. Waldon Fawcett. An illustrated account of this project, which will supply an immense amount of power, rivaling Niagara. 1400 w. Sci Am—May 26, 1900.

The "Soo" Water Power. Illustrated description of a plant to develop 40.000 h. p. at Sault Ste. Marie, Mich. 2400 w. Eng Rec—July 23, 1898.

Water-Power Development by the Lake Superior Power Co., at St. Mary's Falls, Mich. Describes the plant of this company on the American side of the river, at Sault Ste. Marie, Mich., which is to be completed in two years. Ill. 3300 w. Eng News—Aug. 4, 1898.

Water Power Plant at the "Soo." Gives general description of the construction of a plant at Sault Ste. Marie, Mich., for which tenders are invited. 1200 w. Ry & Engng Rev—May 28, 1898.

See also **CANAL; ELECTRIC INDUSTRY; LOCK MACHINERY.**

**Shawinigan.**—Construction of the Shawinigan Water and Power Company's Plant. Illustrated description of the hydraulic works to develop 60,000 horse power at Shawinigan Falls, Quebec. The coffer dam details were unusual on account of the great current at the site. 5000 w. Eng Rec—April 28, 1900.

**Spain.**—The Law of Water and Modern Industry (La Ley de Aguas y las Industrias Modernas).) J. Nolla y Alln. An argument that the increasing use of water power for generating electricity requires a reformation of the law of June 13, 1879, referring to water powers. 3000 w. Revista de Obras Publicas—Dec. 21, 1899.

**Switzerland.**—See also **Alps; Gesäuse, Styria; Rhine; HYDRO-ELECTRIC PLANT.**

**Terni, Italy.**—Industrial Works at Terni, Italy (Terni Industriel). An article from the "Rivista di Artiglieria e Genio," giving a general description of various applications of the hydraulic power of the Néra and Vélino rivers, near Terni, Umbria. 5000 w. Revue Technique—April 10, 1900.

**Trenton Falls and Prospect, N. Y.**—The Trenton Falls and Prospect Water Power Development. Orrin E. Dunlap. Description of the locality with account of its power possibilities as given in the report of Mr. Wallace C. Johnson. General plan of development, etc. 1600 w. Elec Eng—April 22, 1896.

**United States.**—Early Development of Water Power in the United States. J. T. Fanning. Extract from a paper read at meeting of the Am. Pulp & Paper Assn. Review of the water power history and development, which began in early colonial times. 2500 w. Eng News—March 2, 1899.

The Development of American Water Powers. Abstract of historical paper by John T. Fanning, giving data concerning colonial and early national hydraulic works, and explaining features of present practice. 3000 w. Eng Rec—Aug. 19, 1899.

See also **HYDRO-ELECTRIC PLANT.**

**Value.**—The Value of Water Power. Editorial, dealing with the general and special conditions and circumstances that should be considered in the condemnation of water supplies for municipal purposes. 1200 w. Eng Rec—May 9, 1896.

**Virginia and West Va.**—Stream Measurements and Water Power in Virginia and West Virginia. D. C. Humphreys. The results of work for the U. S. Geological Survey. 2400 w. Jour of Assn of Eng Soc—Nov., 1895.

**Von der Heydt Current Motor.**—See **WATER WHEEL.**

**Washington State.**—The Water-Power Resources

**Wisconsin Paper Mill.**—The Kimberly & Clark Paper Mill at Quinnesec Falls. Illustrated description of the hydrology of a river-shed utilized by a large paper mill in Wisconsin. Serial. Eng Rec—June 30, 1900.

**Yonne River, France.**—The Utilization of the Yonne River for Supplying the Town of Chateau-Chinou. France, with Drinking Water and Electric Light (Notice sur l'Adduction des Eaux de l'Yonne pour l'Alimentation de Chateau-Chinou et l'Eclairage Electrique de la Ville). MM. Pochet and Assy. An illustrated description of the work, comprising dam, power plant, aqueduct, reservoir, etc. 4000 w. 1 plate. Ann d Ponts et Chaussées—1st quarter, 1900.

**WATER PRESSURE.**

See **HYDRAULIC PRESSURE; TESTING**—**Cast Iron Cylinders; WATER PIPE**—**Testing.**

**WATERPROOFING.**

**Boston Station.**—Waterproofing and Drainage at the New South Terminal Station in Boston. Some portion of the stations lying below high-tide level, has made necessary an extensive covering of waterproof material, and the method adopted is described, with drawings. 800 w. R R Gaz—May 6, 1898.

See also **RAILWAY TERMINAL**—**Boston.**

**WATER PURIFICATION.**

See also **FEED WATER PURIFICATION; FILTRATION; SEWAGE DISPOSAL; WATER POLLUTION; WATER SUPPLY; WATERWORKS.**

Improvement of Water Supplies. G. Bouscaren. Read at Milwaukee meeting of the Am. Soc. of Munic. Imp. On the essential requisites in water for domestic use, and the systems of purification applied. 1400 w. Munic Engng—Oct., 1900.

The Purification of Drinking Water and Sewage (Reinigung von Trink- und Abwasser). A paper by Dr. Zirn of Hamburg, dealing mainly with the purification of sewage in order to avoid contamination of river water. 2500 w. Gesundheits Ingenieur—Oct. 15, 1897.

The Purification of Drinking Water. Henry E. P. Cottrell. An account of the experience in France and the late progress made there in water purification is given in part first. Serial. Engng—Aug. 26, 1898.

The Purification of Public Water Supplies. George H. Rohe. Address delivered at the meeting of the American Medical Assn. at Atlanta, Ga. A general review of the subject in its relation to public sanitation, and the prevention of epidemic diseases. 3000 w. San—July, 1896.

The Purification of Water. Editorial upon the relation of water supply and sources of contamination, discussing the various methods of sterilisation and purification for drinking water. 1500 w. Engr, Lond—Sept. 9, 1898.

The Purification of Water. Frank J. Thornbury. Discusses the various methods in common use for purifying water, showing why they are not successful. 2500 w. Chau—Feb., 1897.

The Purification of Sewage and Water. W. J. Dibdin. It is proposed in this series of articles to place on record the results arrived at in the personal experience of the writer. The purification of the river Thames revealed facts which established principles that have been adopted generally. The subject will be fully dealt with and the practical application considered. Serial. San Rec—March 5, 1897.

The Purification of Public Water Supplies. W. N. Twelvetrees. Abstract of a paper presented at a recent meeting of the British Civ. & Mech. Engs. Considers filtering media, methods of purification, etc. 1600 w. Jour Gas Lgt—April 4, 1899.

**Aeration.**—Purifying Water by Aeration. Extracts from article by Dr. Heysinger, who believes that before many years aeration will be resorted to as the only means of purifying water. 1600 w. Fire & Water—Oct. 9, 1897.

**Aeration, San Francisco, Cal.**—The San Francisco Aerating Plant. Illustrated description. 300 w. Eng Rec—Aug. 15, 1896.

**Anderson Process.**—See **Buenos Aires; Iron; Paris.**

**Archbutt-Deeley.**—Water Purification and Softening by the Archbutt-Deeley Process. Illustrated description of plant for softening and purifying large quantities of water for town use. 1200 w. Ry Wld—Dec., 1895.

Water Purification. Describes the leading features of the Archbutt-Deeley process, hitherto used only for trade purposes, but about to be applied to improving hard waters for town supply. The water is purified by chemicals, and the time required for purifying any given amount of water contained in a tank is said to be usually one hour. 2000 w. Engng—Nov. 15, 1895.

See also **FEED WATER PURIFICATION.**

**Bacterial.**—Bacterial Reduction by Storage. Review of important investigations showing that the bacterial purification of the river-water supplies of London depends largely on storage. 2000 w. Eng Rec—Aug. 15, 1898.

See also **SEWAGE DISPOSAL.**

**Buenos-Aires.**—Application of the Anderson Process to the Water of the River Plate (Aplicación del Procedimento Anderson á las Aguas del Rio de la Plata). Carlos Doynel. A comparison between sand filtration and the Anderson process, giving data of analyses and experiments made by a sanitary commission at Buenos Aires. 3000 w. La Ingeniera—Nov., 1898.

**Camp Thomas, Tenn.**—Drinking Water at Camp Thomas. P. A. Maignen. Discussion of the attempts made to purify the water, with suggestions of treatment necessary to produce a safe agreeable water. 2700 w. Sci Am Sup—Sept. 24, 1898.

**Chemical.**—Chemical Purification of Potable Water. From "La Nature." Describes the method recently proposed by Prof. Lapeyrere that permits of effecting nearly absolute sterilization. The process has been utilized in the manufacture of a small pocket-filter by MM. Delsol & Fillard. 1500 w. Sci Am Sup—Nov. 19, 1898.

**Chloride of Lime.**—The Disinfection of Water Mains with Chloride of Lime. From the London "Surveyor." Describes disinfecting the mains at Maidstone, Eng., after an epidemic of typhoid fever. 1000 w. Eng News—June 21, 1900.

**Chlorine Peroxide-Coke.**—The Sterilization of Drinking Water (La Sterilization des Eaux Alimentaires). Albert Bergé. An illustrated description of a sterilising process in which chlorine peroxide is used, any excess of the latter being afterward removed by filtering through coke. 2800 w. Mem d l Soc d Ing Civils de France, No. 11—1900.

**Clarification.**—The Clarification of River Waters. Allen Hazen. Considers how waters become turbid and the conditions which control it, with the measures which can be taken to remove the turbidity from water supplies. 7400 w. Jour Fr Inst—March, 1899.

See also **Kansas City; Sedimentation Basins.**

**Elevators.**—See **ELEVATOR**—**Water Treatment.**

**Feed Water.**—See **FEED WATER PURIFICATION.**

**Ferozone Polarite.**—English Sewage and Water Works. W. M. Watson. Illustrated description of the ferozone and polarite system of sewage and water filtration. 1200 w. Can Eng—Oct., 1896.

See also **SEWAGE DISPOSAL.**

**Filtration.**—See **FILTRATION.**

**Harrisburg, Pa.**—See **WATER SUPPLY.**

**Heating.**—Purification of Domestic Water Supply. Homer T. Yaryan. The writer proposes to heat every drop of water to 230 degrees F. for seven minutes before it enters the mains. 14000 w. Engr, Cleveland, O.—March 1, 1898.

The Purification of Domestic Water Supplies. H. T. Y. Outlines a plan to heat water to a temperature of 230 degrees Fahr. for seven minutes under pressure before it enters the mains for distribution. 1000 w. San Rec—July 22, 1898.

**Iron.**—Purification of Water by Metallic Iron. C. W. Chancellor. Description of the process as caried out at Antwerp and other European cities. 2400 w. San—Sept., 1896.

Purification of Water by Metallic Iron. C. W. Chancellor. A report of the iron process from the consul at Havre. 2400 w. Am Arch—June 5, 1897.

The Purification of Water by Means of Metallic Iron. F. A. Anderson. A good popular description of the process as carried out at different installations in various cities in Europe. 8000 w. Jour Soc of Arts—Feb. 14, 1896.

See also WATER SUPPLY—Paris Suburbs.

**Iron Removal.**—Removal of Iron from Ground Waters. Harry W. Clark. A report on the efforts to remove iron from the water supply of Provincetown. About 98 per cent. was removed by the use of coke. Discussion follows. 2800 w. Jour N Eng Water Works Assn—June, 1897.

Removal of Iron from Water from a Filter Gallery at Reading, Mass. An outline of investigations made, with illustrated description of the process in use, which consists of the addition of milk and lime, combined with thorough aeration and rapid filtration. 4700 w. Eng News—Nov. 26, 1896.

The Iron-Removal Plant at Reading, Mass. Lewis M. Bancroft. Describes plant, gives Mr. Desmond Fitzgerald's report and recommendations for removing the iron, also the plan adopted and the results. Ill. 1800 w. Jour N Eng Water Works Assn—June, 1897.

The Removal of Iron from Water (Die Enteisenung des Grundwassers). G. Oesten. A paper before the Berlin branch of the Verein Deutscher Ingenieure, giving an illustrated description of methods of removing iron from spring and well water, principally by aeration and filtration. 4000 w. Zeitschr d Ver Deutscher Ing—July 28, 1900.

The Removal of Iron from Ground Water. Illustrated description of several plants built in the U. S. for this purpose, with figures of the efficiency of their operations. 1300 w. Eng Rec—Sept. 30, 1899.

See also Linde-Hess; WATER SUPPLY—Provincetown, Mass.

**Kansas City.**—Reinforcement of the Walls of the Kansas City Settling Basins and the Use of a Coagulant to Aid Clarification. W. Kiersted. Illustrated description of the work, and of the method of clarifying now in use. 3000 w. Eng News—Jan. 4, 1900.

**Linde-Hess Iron Removal.**—The Removal of Iron from Water by the Linde-Hess Process (Die Wasser Enteisenung nach dem Verfahren von H. v. d. Linde und Dr. C. Hess). An illustrated description of this process, in which there is a filter, filled with sawdust impregnated with zinc oxide. 1500 w. Gesundheits Ingenieur—April 15, 1900.

**Magdeburg.**—The Question of the Magdeburg Water Supply (Die Wasserversorgungsfrage der Stadt Magdeburg). Discussing the pollution of the water supply of the city of Magdeburg, and the possible methods of purification. 3500 w. Gesundheits Ingenieur—June 30, 1897.

**Maidstone, Eng.**—See Chloride of Lime; WATER POLLUTION.

**Organisms.**—See SEWAGE DISPOSAL; WATER POLLUTION.

**Ozone.**—The Sterilisation of Potable Water (Sur la Sterilisation Industrielle des Eaux Potables). MM. Marmier and Abraham. A discussion of the experiments made at Lille upon the sterilization of water by ozone, with comments upon the official report. 1000 w. L'Electricien—June 3, 1899.

The Industrial Sterilisation of Water by Ozone (La Sterilisation Industrielle des Eaux Potables par l'Ozone). A discussion of the process of MM. Marmier and Abraham, reviewing the operation of the plant at Lille. 2500 w. Revue Technique—June 25, 1899.

The Sterilization of Water (La Sterilisation de l'Eau). E. Andréoli. A criticism of the report of the Marmier and Abraham ozone process as employed at Lille. 1200 w. L'Electricien—May 13, 1899.

Experiments in the Sterilization of Water by Ozone. Emile Andréoli. The conditions under which the sterilization can be effected, and an account of experiments which demonstrated the powerful action of ozone as a germicide. 1600 w. Elec Rev, Lond—May 5, 1899.

Sterilization of Impure Water by Ozone. E. Andréoli. Reports favorable to the use of ozone for this purpose, and recommends that its efficiency be tried in small towns and villages. 1500 w. Elec Rev, Lond—Oct. 15, 1897.

The Ozonization of Water (L'Eau Ozonisée). E. Andréoli. A discussion of the oxidizing action of ozone upon organic matter contained in water, calling attention to the many extravagant claims which have been made for the process as distinguished from its real merits. 1200 w. L'Electricien—Nov. 4, 1899.

The Purifying and Sterilizing of Water by Ozone. Translated from "La Vie Scientifique." Describes the system employed by Mr. Tindal at the municipal works of Saint Maur. Ill. 800 w. Elec, N. Y.—Dec. 28, 1898.

The Sterilization of Water by Ozone. Abstract translation of an article by Th. Weyl, in "Centralblatt für Bakteriologie," with criticism by Robert Spurr Weston. 900 w. Eng News—Nov. 23, 1899.

Ozone as a Water Purifier. A review of the experiments of Th. Weyl with apparatus on a commercial scale, together with comments of German engineers on the utility of ozone in water purification. 2200 w. Eng Rec—Feb. 3, 1900.

The Purification of Drinking Water by the Use of Ozone. George A. Soper. Reviews the work done by investigators and gives an account of experiments by the writer. 6300 w. Eng News—Oct. 19, 1899.

The Ozonization of Water. Geo. A. Soper. Paper gives results of practical experience, with discussion. 7000 w. Jour N Eng Water Works Assn—Sept., 1900.

See also OZONE.

**Ozone vs. Sand Filtration.**—The Relative Values of Ozone and Slow Sand Filtration as a Means of Purifying Water. Abstract translations from the German, by Allen Hazen. Discussion of Dr. Weyl's paper. 7500 w. Eng News—Feb. 8, 1900.

**Paris.**—Purification and Filtration of Drinking Water for the Paris District (Epuration et Filtration des Eaux d'Alimentation de la Banlieue de Paris). MM. Veilhan and Regnard. A general description of the Anderson process, and the results achieved. 4000 w. Ann d Ponts et Chaussées—1st quarter, 1900.

Rendering the Water of the Seine Wholesome. From "La Nature." Historical review with illustrated description. 3000 w. Sci Am Sup—Oct. 13, 1900.

See also FILTRATION; SEWAGE DISPOSAL; WATER SUPPLY.

**Pittsburg.**—See FILTRATION; WATER METER.

**Potsdam, Prussia.**—The Drainage and Water Supply of Potsdam (Die Entwässerung Potsdams). With brief account of the filtering and clarifying plant. Aug. Kroitzsch. 2500 w. Zeitschr d Oesterr Ing u Arch Ver—July 16, 1897.

**Public Institutions.**—Purification of Water for Barracks, Prisons, and other Institutions. J. Lane Notter. Discusses various methods of filtration, and other means of rendering water sterile. Discussion. 8500 w. Jour of San Inst—July, 1898.

**Reading, Pa.**—See SEWAGE DISPOSAL.

**Sedimentation Basins.**—Sedimentation Basins for Water Works. Wynkoop Kiersted. Illustrated description of a type of basin which has been found useful in clarifying muddy water. 1700 w. Eng Rec—Oct. 28, 1899.

**Seine.**—See Paris.

**Silica Standards.**—See WATER ANALYSIS—Suspended Matter.

**Softening.**—See also Archbutt-Deeley; FEED WATER PURIFICATION.

**Softening, Fort Wayne, Ind.**—Water-Softening Plants. On the advantages and process of water softening, the cost, the most approved method, and illustrations of the plant at the Wayne Knitting Mills of Fort Wayne, Ind. 2200 w. Eng & Min Jour—Feb. 4, 1899.

**Softening, Southampton, Eng.**—Water Softening at Southampton, England. James H. Fuertes. Illustrated description of a plant which reduces the hardness of 4,000,000 gals. daily from 18 to 5 degrees. 2400 w. Eng Rec—Feb. 4, 1899.

**Syracuse, N. Y.**—How the Water Supply of the City of Syracuse Is Kept from an Unpleasant Taste. W. R. Hill. Read before the American Water-Works Assn. Describes a simple operation by which the water has been kept free from vegetation. 2000 w. Fire & Water—May 20, 1899.

**Thames.**—The Purification of the Thames. William Joseph Dibdin. Abstract of paper from "Proceedings of the Institution of Civil Engineers," (England) Vol. CXXIX. Considers the work of effecting the purification of the sewage, in freeing the river from this pollution, and the best method of effecting further improvements. 2400 w. Jour W Soc of Engs—Oct., 1897.

See also **RIVER POLLUTION; SEWAGE DISPOSAL—London; SEWERAGE—London.**

**Turbidity.**—See **Clarification; Sedimentation; WATER ANALYSIS—Suspended Matter.**

**WATER RAISING.**

See also **AIR LIFT; HYDRAULIC RAM; PUMP; WATERWORKS—Crisfield.**

Water-Raising Appliances. Philip R. Björling. Part first gives illustrated description of the earliest mechanical contrivences. Serial. Mech Wld—Aug. 6, 1897.

**Domestic.**—Advantages and Disadvantages of Various Motors for Raising Water to Elevations for Domestic Use. Discusses the windmill, the hydraulic ram, the electric motor, and the hot-air engine. 3300 w. Dom Engng—Sept. 15, 1900.

Installation of Water Lifts. Illustrated description of four systems of installing water lifts. 1000 w. Dom Engng—March 15, 1900.

**India.**—Water Lifts. The results of Mr. Chatterton's experiments on the merits of the various kinds of water lifts used in India for agricultural purposes. Also describes a simple and ingenious machine easily and cheaply constructed and adapted to any well. Ill. 2000 w. Ind Engng—Oct. 2, 1897.

**Lansell's Pneumatic.**—Lansell's Pneumatic Water-Raiser and Ventilator. Description of the pneumatic method of draining mines by means of successive lifts, to a depth of 1560 ft. A section illustrates the arrangement as used at a Bendigo, Victoria, Mine. 1200 w. Aust Min Stand—March 12, 1896.

**Mines.**—Appliances for Winding Water. W. Galloway. Explains an instance in the experience of the writer where the water of a mine was raised by winding it to the surface up a vertical shaft. Serial. Ir & Coal Trds Rev—Feb. 26, 1897.

See also **Tomson; MINE DRAINAGE; PUMP; PUMPING ENGINE; PUMPING MACHINERY.**

**Scoop Wheel.**—A New Scoop Wheel for Raising Water—Paul's System (Neues Schöpfrad, System Paul, zur Entwässerung von Niederungen). An example of one of the most recent forms of apparatus for raising large quantities of water over a low lift, as extensively used in Holland. 1000 w. Zeitschr d Oesterr Ing u Arch Ver—June 18, 1897.

**Tomson.**—The Tomson Water Hoist (Das Tomsonsche Wasserziehverfahren). A description of the method of removing the water from the shaft of the Minister Achenbach mine during the deepening operation. The water was raised in tanks by the mine hoist. 1000 w. 1 plate. Glückauf—May 6, 1899.

Sinking a Shaft with Means for Taking Off the Water. From "Glückauf." Illustrates and describes the Tomson water-raising arrangement. 800 w. Col Guard—Sept. 15, 1899.

**WATER RATES.**

See also **WATER METER; WATER SUPPLY; WATER WASTE; WATERWORKS; WATERWORKS LAW; WATERWORKS MANAGEMENT.**

Methods of Assessment and Collection of Water Rates. F. H. Crandall. Discusses various methods. General discussion. 9500 w. Jour N E W Wks Assn—Dec., 1899.

Water Rates. August Herrmann. Before the A. S. M. I. An analysis of the rates in cities over 80,000 population, showing the variation in the manner of making the charges, their amount, and outlining some of the reasons for the difference in prices. 2100 w. Eng Rec—Oct. 14, 1899.

**American Cities.**—See **United States Cities.**

**Chillicothe, Mo.**—The Chillicothe Water-Works Case. Henry Wollman. Reviews an important suit concerning water rates. 800 w. Eng Rec—Feb. 5, 1898.

The Chillicothe Water Rates Case. Review of a decision of the Missouri Supreme Court as to the meaning of a schedule of meter rates in a charter of a private water company. 1400 w. Eng Rec—Nov. 19, 1898.

**Denver.**—The Denver Water-Rates Case. Abstract of an unusually important decision concerning rates to private consumers. 1100 w. Eng Rec—Feb. 26, 1898.

**Detroit.**—The Equity of the Detroit Water Rates. Reprint of decision of Michigan Supreme Court, upholding the right of the city's commissioners to collect the rates in force in 1890. A unique case. 3300 w. Eng Rec—Aug. 27, 1898.

**Flow.**—See **WATER FLOW—Rates; WATER METER.**

**Hydrant Rentals.**—See **HYDRANT.**

**Massachusetts.**—An Unusual Suit Over Water Rates. Editrial review of a decision of the Massachusetts Supreme Court concerning the use of meters. 800 w. Eng Rec—July 16, 1898.

Liability for Unpaid Water Rates. Review of decision of Massachusetts Supreme Court defining liability of tenant for unpaid rates of previous tenants. 1300 w. Eng Rec—July 2, 1898.

**Meters.**—See also **WATER METER—Rates.**

**Milwaukee.**—The New Water Rates in Milwaukee. Discussion of the first attempt to introduce a uniform rate for water, whether supplied in large or small quantities, or charged by meter or fixture schedules. 1200 w. Eng Rec—Dec. 31, 1898.

Water Rates in Milwaukee. Editorial on objections to charging a uniform rate for large and small supplies. 1200 w. Eng Rec—July 30, 1898.

**Pennsylvania.**—The Right to Sell Water by Meter Rates. Abstract of decision of the Superior Court of Pennsylvania, establishing the legality of meter rates in case all supplies are not metered. 1000 w. Eng Rec—April 9, 1898.

**San Diego Case.**—The San Diego Water-Rates Case. The text of an important decision by the Supreme Court of California. Part first gives the opinion of Justice Van Fleet, Justices Henshaw and McFarland concurring. Serial. Eng Rec—Jan. 15, 1898.

**United States Cities.**—Comparison of Water Rates and Rules. Information collected by Dabney H. Maury, Jr., superintendent of the Peoria Water Co., regarding the rules, rates, and general practice in American cities. 3000 w. Munic Engng—Sept., 1897.

Water Rates in the Larger Cities of the United States. August Herrmann. Read before the Am. Soc. of Munic. Imp. The report considers the rates of 31 cities. 3500 w. Munic Engng—Nov., 1899.

**United States Law.**—The Basis of Water Rates. Review of decision of the California Supreme Court based on a recent decision of the U. S. Supreme Court, as to the method of computing fair water rates to be charged by a local company. 1100 w. Eng Rec—Nov. 5, 1898.

**WATER RIGHTS.**

See also **GROUND WATER; WATER POWER; WATER SUPPLY; WATERWORKS LAW.**

**Austria.**—See **WATER POWER.**

**Compensation for Mills.**—Compensating Reservoirs for Gravity Water Supplies in Lieu of Compensation for Riparian Rights and Its Legal Aspects. Stephen E. Babcock. Read at the convention of the Am. Waterworks Assn. Discusses the ownership of excess flow of water, showing that without infringing on the rights of owners of land, this may be retained and used for water supply. 4000 w. Fire & Water—Aug. 20, 1898.

Compensation Water for Mills. Stephen E. Babcock. Paper, slightly condensed, read before the Am. Waterworks Assn. Describes the method adopted at Little Falls, N. Y., to avoid damages for injured water rights. 3000 w. Eng Rec—June 25, 1898.

**Elgin, Illinois.**—Public and Private Rights in River Water. The decision of an Illinois court concerning the right of Elgin to take water from a mill-pond. 2800 w. Eng Rec—Nov. 18, 1899.

**French Law.**—New French Law Regulating the Use of Water. Law to regulate the ownership and the control of rain water, spring water, and all flowing streams, and to determine the rights of individuals, communities, etc. 1400 w. Eng News—April 13, 1899.

**Ground Water.**—Riparian Rights in Underground Waters. The chief points of a paper by James Mansergh read before the Inst. of Civ. Engs., England, showing the injustice of the old English common law relating to underground waters, when applied to modern conditions, with editorial comment on similar affairs in the United States. 2700 w. Eng News—Aug. 19, 1897.

See also **GROUND WATER.**

by a U. S. District Court, awarding damages to riparian owners of Connecticut against New York City for the diversion of water. 1000 w. Eng Rec—Oct. 18, 1900.

**Irrigation.**—The Adjudication of Water Rights in Irrigation Regions. Elwood Mead. Discusses the differences in ownership between water rights and other property, and advocates individual operation under public ownership as the solution of the problem. 4000 w. Eng Mag—March, 1898.

See also **IRRIGATION.**

**Italy.**—See **WATER POWER.**

**Newton Case.**—An Important Decision Upon a Mill Owner's Suit to Collect Damages for Diversion of Water. Letter from Louis L. Tribus concerning the Newton case, with Judge Dixon's opinion. 2200 w. Eng News—April 5, 1900.

**Riparian.**—The Rights of Riparian Owners. Editorial discussion of the rights and liabilities as affected by the principles of common law relating to surface waters. 3000 w. Engng—Jan. 5, 1900.

See also **Ground Water.**

**Riparian, Maryland and New York.**—Two Recent Decisions Concerning Riparian Rights. Review of decisions in supreme courts of Maryland and New York upholding riparian owners' rights. 1400 w. Eng Rec—July 9, 1898.

**Spain.**—See **WATER POWER.**

**Utah.**—A Utah Attempt at Settling Contested Water Rights. W. P. Hardesty. Description of an attempt by Utah courts to secure an accurate and scientific measurement of waters that had been decreed to parties in dispute. 1100 w. Am Soc of Ir Engs—April, 1895.

**WATER SCOOP.**

See also **WATER RAISING—Scoop Wheel.**

**Pennsylvania R. R.**—The New Water Scoop of the Pennsylvania Railroad. Illustrations showing general arrangement, with some details. 700 w. R R Gaz—Jan. 8, 1897.

**WATER SCREEN.**

See **WATERWORKS—Screens.**

**WATER SHAFT.**

See **MINE DRAINAGE—Gilberton, Pa.**

**WATERSHED.**

See also **WATER POWER; WATER SUPPLY.**

**WATER SOFTENING.**

See **FEED WATER PURIFICATION; WATER PURIFICATION—Softening.**

**WATER STATION.**

See **RAILWAY WATER STATION; TANK; TRACK TANK; WATER SUPPLY—Railway.**

**WATER STORAGE.**

See also **RESERVOIR; STANDPIPE; TANK; WATER POWER; WATER SUPPLY; WATER TOWER; WATERWORKS.**

**Air Pressure.**—Water Storage Systems at Fort Terry and Lacona. Illustrated description of two small works noteworthy for the use of tanks under air pressure as a substitute for standpipes. 900 w. Eng Rec—May 26, 1900.

Water Storage Tanks Under Air Pressure at Babylon and Southampton, N. Y. Brief description of this system of water storage. Ill. 1100 w. Eng News—Dec. 30, 1897.

See also **COMPRESSED AIR—Public Supply; WATER SUPPLY—Tall Building.**

**WATER SUPPLY.**

See also **AQUEDUCT; DAM; FILTRATION; RAINFALL; RESERVOIR; WATER FLOW; WATER METER; WATER PIPE; WATER RATES; WATER WASTE; WATERWORKS; WATERWORKS MANAGEMENT.**

Drainage Areas, Storage Capacity and Compensation Water Discharged from Catchment Reservoirs. W. Watts. An epitome of paper read before the British Assn. of Waterworks Engs., with discussion. The difficulties met with by water authorities. 7500 w. Jour Gas Lgt—Feb. 23, 1897.

The Sources of Town Water Supplies, and Their Bearing Upon the Public Health. R. E. W. Berrington. Abstract of paper and discussion before the British Assn. of Waterworks Engs. Briefly notes the usual sources of supply, the need of being watchful of their purity, and of furnishing a plentiful supply. 3000 w. Jour Gas Lgt—June 14, 1898.

water, how to tell where water will be found by boring, the importance of a pure supply, and some facts concerning mineral springs, etc. 3000 w. Can Engr—June, 1899.

**Aix-la-Chapelle.**—The Extension of the Waterworks of Aix-la-Chapelle (Die Erweiterung des Wasserwerkes der Stadt Aachen). With map showing the additional sources of supply, also a discussion of the probable increased demand, and a description of the covered reservoirs used. 3500 w. Zeitschr d Ver Deutscher Ing—Sept. 17, 1898.

**Albany.**—Albany's Water Supply, and That of Her Neighbors. James D. Featherstonhaugh, in "Albany Medical Annals." On the pollution of the Mohawk and Hudson rivers and the need of securing water from other sources, or properly purifying it. 2400 w. San—Oct., 1899.

See also **FILTRATION.**

**Artesian Well.**—See **Springs; ARTESIAN WELL; GROUND WATER; WATERWORKS; WELL.**

**Ashop, Eng.**—See **Derwent.**

**Bandora, Bombay.**—The Sanitation of Bandora. John Wallace. A report and project of water supply, drainage and conservancy for this municipality. 7500 w. Ind & East Eng—April, 1898.

**Bavaria.**—The Water Supply of the Kingdom of Bavaria (Die Wasserversorgung im Königreich Bayern). An abstract from the official reports giving a general review of the work of the bureau from its establishment in 1878, to 1896. 2500 w. Gesundheits Ingenieur—June 15, 1897.

The Water Supply Question in Bavaria (Der Stand der Wasserversorgung in Bayern). With especial reference to the water-bearing strata beneath Munich and the surrounding country. 2500 w. Zeitschr d Ver Deutscher Ing—Nov. 4, 1899.

**Birmingham, Ala.**—Some Difficulties in Obtaining a Water Supply. Willis J. Milner. Read at Buffalo meeting of the Am. Waterworks Assn. An illustrated account of the supply at Birmingham, Ala. Serial. Fire & Water—Sept. 30, 1899.

Some Difficulties in Obtaining a Water Supply. Abstract of a paper by W. J. Milner, read at a meeting of the Am. Waterworks Assn. On the difficulties met and overcome in supplying Birmingham, Ala., with water. Ill. 1600 w. Eng Rec—May 27, 1899.

**Birmingham, Eng.**—See **WATERWORKS.**

**Boston.**—Water Supply of Boston, Mass. Reports the danger of exhausting the water supply, and the precautions taken to guard against this, with other information of interest. 1000 w. Fire & Water—Dec. 25, 1897.

See also **AQUEDUCT—Nashua; DAM—Wachusett; PUMPING STATION—Chestnut Hill; RESERVOIR; WATER POLLUTION; WATERWORKS.**

**British.**—Local Government and Its Relation to Parish Water Supply and Sewerage. W. O. E. Meade-King. Discusses small communities in England, aiming to show that wealth as well as health is increased by proper sanitation. Also discussion. 6900 w. Jour Soc of Arts—Jan. 26, 1900.

Nation's Water Supply and Its Effective Control. C. E. Jones. Paper read before the British Assn. of Waterworks Engs., with general discussion. On the best means of securing effective control. 7500 w. Jour Gas Lgt—Feb. 27, 1900.

**British Cities.**—Water Supply of English Cities. The water supply of London as compared with other English cities is discussed. 2000 w. Fire & Water—May 22, 1897.

See also **London; WATERWORKS.**

**British, 1895.**—Water and Sanitary Affairs. The principal events of the year 1895. 3000 w. Jour Gas Lgt—Dec. 31, 1895.

**British, 1896.**—Water Supply. Editorial review of the past year in Great Britain. 2000 w. Eng, Lond—Jan. 1, 1897.

**British, 1897.**—Water and Sanitary Affairs of 1897. Reviews the principal events of the year in England, relating to this subject. 3800 w. Jour Gas Lgt—Dec. 28, 1897.

Water Supply. Editorial review of the lessons of the year, and the supply in various parts of England. 1700 w. Engr, Lond—Jan. 7, 1898.

**British, 1898.**—Water and Sanitary Affairs. A review of the principal events of the year 1898 in England. 3700 w. Jour Gas Lgt—Dec. 27, 1898.

Water Supply. Editorial yearly review of the events in the United Kingdom. 2200 w. Engr, Lond—Jan. 6, 1899.

**Brooklyn.**—Reports on an Additional Water Supply for Brooklyn, N. Y. Difficulties experienced in keeping up supply to meet increased demand. Editorial review of Mr. De Varona's report on what is known as the "Long Island Plan," and of Mr. Worthen's reports on the "Housatonic or Ten Mile River Plan," and the "Ramapo and Walkill Plan," followed by a comparison of these three plans, and comments by Mr. Alfred T. White. 5000 w. Eng News—Feb. 13, 1896.

The Report of the Manufacturers' Association of Kings and Queens Counties on the Brooklyn Water Supply. Abstract of report dealing with the future and immediate needs of the city, advocating the use of meters, the establishment of a permanent analytical laboratory, and recommendations for increasing the supply. Also editorial. 1400 w. Eng Rec—March 27, 1897.

See also **Long Island; New York; LABORATORY; PUMPING ENGINE—Ridgewood; RESERVOIR—By-Pass; WATER POLLUTION; WATERWORKS.**

**Burlington, Vt.**—On the Sanitary Condition Past and Present of the Water Supply of Burlington, Vt. William T. Sedgwick. A very interesting and instructive paper. It gives results of analyses, and traces diseases that have prevailed in the city to organic impurities in the water taken from Lake Champlain. 5800 w. Jour New Eng Waterworks Assn—March, 1896.

The Water System of Burlington, Vt. F. H. Crandall. Very complete illustrated detailed description, followed by interesting discussion. 4500 w. Jour New Eng Waterworks Assn—March, 1896.

**Chittagong, India.**—Chittagong Water Supply Project. E. G. Foy. Part first is a detailed account of the need of a plentiful supply of pure water, with suggestions for obtaining it, which are declared inadequate, and the investigations commenced by the writer. Serial. 1st part. Ind Engng—Nov. 14, 1896.

**Cincinnati, O.**—See **WATER POLLUTION; WATERWORKS.**

**Cistern.**—See **CISTERN.**

**Cities.**—The Water Supply of Large Cities. An editorial on the probable return to large streams and ponds as sources of municipal supply, in consequence of the reduced pollution which courts will allow, and of improvements in filtration processes. 900 w. Eng Rec—Jan. 27, 1900.

The Water Supply of Cities. C. F. Ulrich. Read at the Columbus meeting of the Am. Waterworks Assn. Discusses the changed conditions which demand a much more liberal supply, the means of securing purity and freedom from disease germs, the advantages of large reservoirs, filtration, etc. 3200 w. Fire & Water—Aug. 12, 1899.

Towns Water Supply and Its Distribution. W. M. Watson. The duty of supply an abundance of good water, and many suggestions relating to the construction and care of the water supply. 4200 w. Can Eng—June, 1897.

See also **British Cities; European Cities; Small Towns; Statistics.**

**Compressed Air.**—See **Tall Building; COMPRESSED AIR—Public Supply; WATER STORAGE.**

**Constantinople Suburbs.**—The Water Supply of Scutari and Kadiköi (Die Wasserversorgung von Skutari und Kadiköi). Adolf Friedrich. A general description of the new water supply for 100,000 inhabitants of the suburbs of Constantinople, by impounding small streams in the adjacent valleys. 2500 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—July, 1899.

**Consumption.**—A Consideration of the Rate per Head per Day of Supply in Different Towns, and the Causes Which Increase or Diminish It in Particular Instances. James Watson. Read at the Engineering Conference of the Inst. of Civ. Engs., England. Discusses some of the more important causes. 1500 w. Engr, Lond—June 16, 1899.

Notes on Water Consumption. G. S. Williams. A study of the consumption in an American city considering the statistics mainly with reference to the quantity of water that must be provided at various times. 4000 w. Technic—1897.

See also **WATER WASTE.**

**Consumption, British Towns.**—The Consumption of Water per Head in Different Towns. Discusses the causes of the great variation, the need o regulations, and of proper measuring apparatus 1800 w. Jour Gas Lgt—Aug. 8, 1899.

**Consumption, Increased.**—The Increase of Wate Consumption. Editorial comment on this subject 1400 w. Fire & Water—Nov. 4, 1899.

**Contracts.**—See **WATERWORKS LAW.**

**Coolgardie, Australia.**—See **WATER PIPE.**

**Country Districts.**—See **Small Towns; SANITATION.**

**Country Residence.**—See also **PLUMBING; SANITATION; WATERWORKS—Kunhardt Estate.**

**Derwent, Eng.**—The Derwent and Ashop Water Supply Schemes. Leicester, Sheffield, and Derby are each contending for the entire control of the head waters of these rivers for the object of supplementing their supplies. The article describes the schemes as at present suggested, and the claims put forward by each town. Ill. 2500 w. Engr, Lond—Dec. 23, 1898.

The Fight for the Derwent Watershed. Some details of the three schemes of Derby, Leicester and Sheffield (Eng.), for obtaining possession of the Derwent and its supply. 1700 w. Jour Gas Lgt—April 18, 1899.

**Diagram of Watershed.**—See **Watershed Diagram.**

**Distribution.**—See **WATER PIPE; WATERWORKS.**

**Electric Heating.**—See **ELECTRIC HEATING—Marquette Waterworks.**

**European Cities.**—Some of the Important Water Supplies of Europe Considered Mainly from a Sanitary Standpoint. James H. Fuertes. Interesting statistics concerning the water supplies of many European cities. 5700 w. Trans Assn of Civ Engs of Cornell Univ—June, 1897.

**Examination.**—Principles Involved in the Selection of Water Supply (Grundsätze bei der Beurteilung von Trink-und Nutzwasser). Report of a committee of the Society of German Chemists, giving the questions which should be answered in critically examining any proposed source of water supply. 3500 w. Gesundheits Ingenieur—Dec. 31, 1898.

See also **WATER ANALYSIS.**

**Fayetteville, Tenn.**—The Development of Springs at Fayetteville, Tenn. Describes the methods adopted in developing a number of sandrock springs for the supply of a town of 3000 people. 1000 w. Eng Rec—April 21, 1900.

**Field Work.**—Investigations of Water Supply. F. H. Newell. Description of the field-work carried on in various parts of the country. 3500 w. Trans Am Inst of Min Engs—Nov., 1897.

See also **Geological Survey; Locating.**

**Filtration.**—See **FILTRATION.**

**Fire Hydrants.**—See **FIRE HYDRANTS; WATERWORKS.**

**Fire Service.**—See **FIRE HYDRANT; FIRE PROTECTION; WATERWORKS.**

**Flood Water.**—The Use of Filtered Flood Water. M. W. Hervey. Read at the Engineering Conference of the Inst. of Civ Engs., England. Discusses the flood waters of the rivers Thames and Lea. 1500 w. Engr, Lond—June 16, 1899.

**Forestry.**—Effect of Forest Denudation on Water Courses and Water Supply. Daniel W. Baird. Abstract of a paper presented at the annual convention of the American Forestry Assn., at Nashville, Tenn. Notes the fact that the water-level of certain districts has fallen many feet, and shows that if forest growths do not increase the rainfall, they help retain what does fall. 1100 w. Eng News—Oct. 21, 1897.

The Relation of Forestation to Water Supply. Herbert M. Wilson. An important paper by the geographer of the U. S. Geological Survey, showing that there is no proof that deforestation has any appreciable effect on rainfall, or upon the subsequent run-off. 4500 w. Eng Mag—Feb., 1898.

See also **New Jersey Forests; FORESTRY.**

**Genoa.**—See **AQUEDUCT.**

**Geological Survey.**—Investigations of Water Supply by the U. S. Geological Survey. F. H. Newell. Read at meeting of the American Public Health Assn. An explanation of the extensive work done, and an application of the data to the drainage basin of the Potomac. 2200 w. San—Jan., 1898.

**Geology.**—See also **Locating.**

**Geology and Disease.**—Notes on the Relation Between the Geology of the Sources of Water Supply and Disease. Marsden Manson. Facts gathered while traveling on the Pacific coast. 2500 w. Jour Assn of Engng Socs—May, 1900.

**Geology, Housatonic.**—Notes on the Geology of the Sites of the Proposed Dams in the Valleys of the Housatonic and Ten-Mile Rivers. W. O. Crosby. Describes the geology of a region investigated in view of securing water for the supply of Greater New York. 3000 w. Tech Quar—June, 1900.

**Geology, Long Island.**—Outline of the Geology of Long Island in its Relation to the Public Water Supplies. W. O. Crosby. Sketch of that part of Long Island that has a bearing on the supply for Greater New York. 7500 w. Tech Quar—June, 1900.

**Glasgow.**—See WATERWORKS.

**Ground Water.**—See London Underground; Protection; Spring; ARTESIAN WELL; GROUND WATER; WATER RIGHTS; WELL.

**Hampton Court.**—See WATERWORKS.

**Harrisburg, Pa.**—Water Supply of Harrisburg. An account of the improvements made which have overcome the pollution of the water by culm, and by sewage, and increased the supply. Serial. Fire & Water—April 9, 1898.

**History.**—See WATERWORKS.

**Holyoke, Mass.**—The Manhan River Water Supply of Holyoke. Illustrated description. 1200 w. Eng Rec—Oct. 31, 1896.

**Illinois.**—The Water Supplies of Illinois. An account of the survey of the waters of this state for the purpose of determining their present sanitary condition, with statement of results. Ill. 2400 w. Fire & Water—May 29, 1897.

See also WATER ANALYSIS; WATER RIGHTS—Elgin, Ill.

**Improvement.**—See WATER PURIFICATION.

**Ireland.**—See Rain Water, Ireland.

**Jersey City, N. J.**—The Specifications for a New Water Supply for Jersey City. C. C. Vermeule. Reply to an editorial criticism in issue of "Eng. News" (April 30), on report of Engineer C. C. Vermeule, relating to the proposed Jersey City water supply, and an answer to the communication, by the editor of the named journal. 2800 w. Eng News—May 7, 1896.

A Reply to the Expert Report on the Proposed Jersey City Water Contract. Extracts from reply by C. C. Vermeule, with remarks. 900 w. Eng News—Feb. 4, 1897.

The Latest Jersey City Water Supply Specifications. Outline of the specifications, prepared from information furnished by C. C. Vermeule. 450 w. Eng News—Sept. 30, 1897.

The Report of Mr. George W. Rafter on the Jersey City Water Question. Special report to the Board of Trade discussing the proposed contract of the city with the East Jersey Water Co. for a water supply. 1100 w. Eng Rec—Jan. 23, 1897.

Jersey City's Water Supply. An editorial explanation of the manner in which this city's water supply is gradually passing into the control of private companies. 2500 w. Eng Rec—March 19, 1898.

Water for Jersey City, N. J. Editorial showing the foolishness of the specifications adopted for works. 1100 w. Eng Rec—July 9, 1898.

See also FILTRATION; WATERWORKS.

**Kunhardt Estate.**—See WATERWORKS.

**Lancaster, Pa.**—The Water Problem of Lancaster, Pa. A review of the proposed engineering works for conserving, clarifying and purifying the present water supply. 1500 w. Eng Rec—April 22, 1899.

**Lead Poisoning.**—The Action of Water on Lead, Tin, and Zinc Service Pipes. Facts from H. W. Clark's review of investigations made by the Massachusetts Board of Health. Also short editorial. 1900 w. Eng News—Jan. 4, 1900.

**Leighton Buzzard, Eng.**—See WATERWORKS.

**Locating.**—Locating a Public Water Supply. Daniel W. Mead. Showing how topographical, hydrological, and hydro-geological conditions affect the choice of a source of water for public use. 3500 w. Eng Mag—Feb., 1896.

See also Field Work; Geological Survey.

**Locomotive.**—See Railway.

**London.**—London Water Supply. Editorial review of a bill introduced into the House of Lords, providing for vesting the water supply of London in a public trust. 2000 w. Engng—March 20, 1896.

London Water Supply. Editorial presenting the undesirability of intrusting the London County Council with the water supply. 1500 w. Engng—Feb. 19, 1897.

Water Supply from the Chalk. A discussion of the London County Council's Scheme and the opposition to it, and the capability of the chalk as a source of supply. Serial. Builder—Dec. 17, 1898.

London Water Supply. Editorial on the report just issued by the Royal Commission on Water Supply. 3500 w. Engng—Jan. 27, 1899.

The Intercommunication Scheme of the London Water Companies. Text of the portion of the recently issued interim report of the Royal Commission on the Metropolitan Water Supply, which refers to the three schemes for the intercommunication of the different systems. 1000 w. Jour Gas Lgt—Feb. 7, 1899.

London Water Supply. Editorial, outlining the prominent features of the report of the Royal Commissioners, and giving comments on the conclusions reached. 2000 w. Engr, Lond—Jan. 26, 1900.

The London Water Commission Report. Brief statement of the points dealt with in the final report, with editorial discussion of the conclusions. 6000 w. Builder—Feb. 3, 1900.

The Latest Report on the London Water Companies. A review of the report of the Llandaff Commission, which recommends the purchase of the existing private plants. Gives figures of the nominal and market value of the private plants and estimates of the cost of constructing additional works for a total supply of 504,000,000 gals. 2000 w. Eng Rec—Feb. 10, 1900.

East London Water Supply. Editorial discussion of the cause of the present scarcity of water, and the difficulties with which the company has had to contend. 1600 w. Engr, Lond—Aug. 26, 1898.

The Dry Weather and the Water Supply. Account of an inspection of the East London Water Company's reservoirs, detailing the effect of drought on the river Lea. 12000 w. Jour Gas Lgt—Sept. 6, 1898.

The East London Water Company. Vaughan Nash. A statement of the failure of the company to provide the district with water, the history of the undertaking, and severe criticism. 1800 w. Contemporary Rev—Oct., 1898.

London Water Supply. Tables and diagrams showing the rainfall at Greenwich, and a discussion of the sources of supply and the effect of dry weather. 2000 w. Engr, Lond—May 19, 1899.

London Water Supply. Walter Hunter. Reviews the history of the supply, giving a descriptive summary of the works, discussing the future outlook. Discussion. 15500 w. Jour Soc of Arts—April 21, 1899.

London (Welsh) Water Supply. R. E. Middleton. Arguments against the introduction of a water supply from Wales. Followed by discussion. 5500 w. Jour San Inst—July, 1899.

The Hydrography of the Wealden: A Possible Solution of the London Water Question. Edward F. Willoughby. The writer thinks that subsoil waters naturally running to waste, may be found in sufficient quantity. 2600 w. San Rec—March 17, 1899.

The London Water Supply. Dr. Percy F. Frankland. The advances which have been made in knowledge of the hygienic aspects of potable water, due to the discoveries in the science of bacteriology, with facts regarding the treatment of the London supply, and its efficiency. Discussion follows. 11000 w. Jour Soc of Arts—May 21, 1897.

The London Water Supply. Dr. Percy F. Frankland. Extracts from a paper read before the Society of Arts. The value of bacteriology to the water engineer, an account of recent investigations in this field and the information collected, with special reference to the London supply. 4800 w. Jour Gas Lgt—June 22, 1897.

The London Water Supply. Arthur Shadwell. An answer to an article by Mr. Shaw Lefevre, published in the Dec. number of this review. 6600 w. Nineteenth Cent—Feb., 1899.

The London Water Supply: Its Future. Particulars of the possibilities of the Thames and its tributaries being able to meet the increasing demand. 1000 w. Engr, Lond—Aug. 25, 1899.

The London Water Question. Editorial discussion of matters relating to the proposed supply. 3300 w. Builder—Nov. 11, 1899.

The Water Supply of London. W. H. Dickinson. A statement of the existing conditions and favoring the transfer of the undertakings into the hands of public authority. 9000 w. Contemporary Rev—Feb., 1897.

See also **RESERVOIR—Staines; SEWERAGE—London.**

**London and Other Cities.**—Water Supply of London and Other Large Towns. An examination of municipal water supplies as to quantity, purity, cost, etc. 2400 w. Jour Gas Lgt—Feb. 16, 1897.

See also **British Cities.**

**London and Philadelphia.**—A Tale of Two Cities: Water Supply in London and Philadelphia. Milo Roy Maltbie. Cites London as an example of private monopolies serving so poorly as to endanger the health of the people; and Philadelphia as showing official mismanagement and depreciation for the purpose of forcing the city to surrender to a corporation. 7500 w. Munic Af—June, 1899.

**London Sea Water.**—The Supply of Sea Water to London. Frank W. Grierson. A paper read at the meeting of the Soc. of Arts. It gives a general description of the plan of supply, with remarks on its use for municipal purposes, hospitals, schools, hotels, residences, etc., showing the saving of fresh water, and a summary of the advantages. 3300 w. Arch, Lond—Jan. 31, 1896.

**London Underground.**—London's Underground Source of Water Supply. Reports the probability of a natural subterranean reservoir under the city, with a capacity sufficient to supply a daily yield of 7065 million gallons. Also an account of the supply of London three hundred years ago. 1300 w. Fire & Water—Jan. 28, 1899.

**Long Island.**—See **Brooklyn; Geology.**

**Lowell, Mass.**—See **WATERWORKS.**

**Lynn, Mass.**—Lynn, Mass.—Its Water Supply, Waterworks, and Pumping Engines. Illustrated description. 3500 w. Fire & Water—May 30, 1896.

**Massachusetts.**—Surface Water Supplies of Massachusetts. John C. Haskell. Some of the reasons why surface water supplies are not desirable, with report of the waters of the state named. 2000 w. Jour N E Waterworks Assn—Dec., 1898.

See also **Lead Poisoning; WATER ANALYSIS.**

**Massachusetts and Rhode Island.**—Notes on Water Supply and Sewage Disposal in Massachusetts and Rhode Island. Information obtained on a recent short trip. 1600 w. Eng News—Nov. 25, 1897.

**Melbourne, Australia.**—Melbourne Water Supply. The history of the supply, describing the sources, and the improvements carried out. Ill. 3300 w. Engng—Jan. 5, 1900.

**Montauk Point Camp.**—The Water at Montauk Point Camp. Brief account of the state of the water supply, reporting the quantity plentiful at present, but some doubts are expressed of its permanence. 800 w. Fire & Water—Aug. 20, 1898.

**Municipal Ownership.**—See **New York; WATERWORKS; WATERWORKS MANAGEMENT.**

**Mutual Life Building, N. Y.**—The Water Supply of the Mutual Life Insurance Building, New York City. Illustrated description. 1700 w. Eng Rec—Dec. 12, 1896.

**New Britain, Conn.**—Roaring Brook Utilized at New Britain. An account of the work necessary to avail itself of this supply, which is drawn from a watershed of about 1600 acres. Ill. Serial. Fire & Water—July 8, 1899.

**New Jersey.**—See also **Jersey City; Pequannock; WATER POLLUTION; WATERWORKS.**

**New Jersey Forests.**—New Jersey Forests and Their Relation to Water Supply. C. C. Vermeule. Read before the Am. Forestry Assn. Claims that run-off is not affected as to total quantity to any appreciable degree by forests, but depends on temperature and rainfall. Also editorial giving formula based on the conditions observed in many catchment areas. 4000 w. Eng Rec—July 7, 1900.

**New Orleans.**—The Water Supply of New Orleans. John M. Ordway. States the conditions to be met and sketches a scheme for the supply of pure water to the city. 4000 w. Jour Assn of Engng Socs—May, 1900.

**New York.**—Future Water Supply of Greater New York. An exhaustive editorial discussion of what is growing to be a serious problem. It is computed that by the year 1920, no less than 600,000,000 gals. daily will be needed, and there is a strong probability that the daily demand may reach 1,000,000,000 gals. The supply and distribution of this enormous amount of water will demand the highest skill and forethought. 2400 w. Eng News—Feb. 13, 1896.

New York's Water Supply. Facts of interest regarding the storage capacity of the city, the amount of rainfall and the future prospects. 1200 w. Fire & Water—Nov. 14, 1896.

The New Charter and the Water Supply. An abstract of the provisions relating to this subject. Serial. Fire & Water—April 24, 1897.

The Future Water Supply of New York. An interview with Gen. Duane, President of the Croton Aqueduct Commission. 1000 w. Fire & Water—March 20, 1897.

The Water Supply of New York City. High praise for this metropolitan work, with information concerning the new Jerome Park reservoir. Ill. 2000 w. Sci Am—May 15, 1897.

Opening of the Metropolitan System, New York. The new pipe line of this system was opened on New Year's Day. In an address given the scope of the work undertaken is set forth. 1700 w. Fire & Water—Jan. 8, 1898.

Water Supply of Greater New York. Reviews the present supply of the annexed districts and of the city, with some account of the bills to be introduced at the opening of the State legislature. 1200 w. Fire & Water—Dec. 18, 1897.

The Water Question in the Borough of Queens, New York. Reviews the water supplies of the various plants within this territory, discussing their condition and how to supply abundance of potable water when needed. 2200 w. Fire & Water—March 19, 1898.

The Bronx Watershed. Describes this district which gives an additional supply to New York. 900 w. Fire & Water—April 16, 1898.

Greater New York's Water Supply. F. B. Thurber. Calling attention to the need of additional supply in Brooklyn, and suggesting the Catskills as a source of supply, quoting from discussions of the subject. 3800 w. N Am Rev—July, 1898.

Mr. J. R. Freeman's Report on the New York Water Supply. Illustrated review of a report showing that there were serious errors in the assumed discharge of the old and new Croton aqueducts and in the run-off of the Croton River watershed; the records of the latter have previously been accepted as correct and ranked among the most important waterworks data. Also expresses doubt as to any early reduction in water waste. Serial. Eng Rec—April 14, 1900.

The New York Water Supply. A statement of the imminent danger of a water famine in five years in New York, and recommendations of J. R. Freeman for obtaining new supplies. 1600 w. Eng Rec—June 30, 1900.

The Water Waste and Future Water Supply of Greater New York. Editorial on the information given in the reports of the Merchants' Assn., and of John R. Freeman. 2300 w. Eng News—Aug. 23, 1900.

Report of the Merchants' Association on the Water Supply of Greater New York. Gives reports of committees appointed to investigate the whole subject of the present and future supply. 9000 w. Eng News—Aug. 23, 1900.

The Merchants' Association Report on the New York Water Supply. A statement of the conclusions reached by a committee of 33 representatives of engineering, legal, and business interests, concerning the best method, financial and from an engineering standpoint, of supplying New York with water for the next 40 years. 2700 w. Eng Rec—Aug. 25, 1900.

New York's Water Supply. Peter Milne. Gives the writer's opinions concerning some points mentioned in paper of J. J. R. Croes, and calls attention to other facts. 1800 w. Fire & Water—Nov. 18, 1899.

The Water Supply of Manhattan and the Bronx Boroughs. Extracts from the report of J. J. R. Croes, and from a letter of Dr. P. Sherwood Dunn. 2500 w. Fire & Water—Nov. 11, 1899.

Water Consumption in Greater New York. Francis L. Pruyn. Illustrated review of the available water from present sources, and the time it will take to exhaust them. 1500 w. Eng Rec—March 11, 1899.

The Revival of the Ramapo Water Project. A review of various attempts to obtain private contracts to supply New York. 1200 w. Eng Rec—June 25, 1898.

The Future Water Supply of New York City. Editorial discussion of the scheme of the Ramapo Water Co., and of other possibilities for increasing the supply. 3000 w. Eng News—Aug. 24, 1899.

New York's Water Supply. Editorial on the project of the Ramapo Water Co. to supply 200,000,000 gals. daily from works to be designed and built in three years. Also an official statement of the work. 7800 w. Eng Rec—Aug. 26, 1899.

Three Engineering Reports on the Ramapo Project. Review of the main features of reports by G. S. Rice, E. E. McLean, and J. J. R. Croes on the proposal to sell New York 200,000,000 gals. per day at $70 per million gals. Mr. Croes gives important figures concerning leakage from old street mains. 2600 w. Eng Rec—Sept. 2, 1899.

New York Water Supply. Discusses the Ramapo water supply project. 3800 w. Engr, Lond—Sept. 15, 1899.

See also Brooklyn; Geology; Protection, New York; AQUEDUCT—Croton; DAM—Croton; WATER WASTE; WATERWORKS MANAGEMENT.

**New Zealand Gold Fields.**—Water Supplies for Mining Townships on the Hauraki Gold Fields. Recommendations of T. Perham, for supplying water for domestic uses and fire extinction. 6500 w. N Z Mines Rec—Dec. 16, 1898.

**Organisms.**—See WATER ANALYSIS; WATER POLLUTION.

**Paris.**—The Needs of the Water Supply of Paris (Besoins de l'Alimentation d'Eau à Paris). A comparison of the water supply of Paris with that of other cities, showing the necessity for an increased supply of pure water, and indicating the possible sources. 2500 w. Rev Tech—Feb. 25, 1899.

The Water Supply in Paris. An account of the projects for bringing fresh supplies of water to the city, and the distribution. 2300 w. Engr, Lond—Dec. 16, 1898.

The Water Supply of Paris—Its Rise and Progress. Historical particulars with valuable data, from report of chief engineer. Serial. Jour Gas Lgt—Jan. 12, 1897.

See also Vienna vs. Paris.

**Paris Suburbs.**—The Water Supply of the Paris Suburbs. Illustrated general description. 700 w. Eng, Lond—April 3, 1896.

The Water Supply for the Suburbs of Paris (Die Wasserleitung für die Umgebung von Paris). Thomas Hofer. With plan of the environs of Paris, and details of apparatus for water purification by metallic iron. 4000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Oct., 1900.

**Pequannock Watershed, N. J.**—Report on the Yield of the Pequannock Watershed, New Jersey. Mr. C. C. Vermeule recommends an increase of storage capacity and shows at length why he does so. 3900 w. Eng News—Feb. 20, 1896.

**Philadelphia.**—The Water Supply of Philadelphia: Considered with Reference to the Minimum Flow of the Schuylkill River. Edwin F. Smith. The conditions of the water supply are set forth with tabulated statistics bearing upon the relations existing between the maximum consumption of water and the minimum flow of the river. Followed by discussion. 5500 w. Pro Engs' Club of Phila—Nov., 1896.

The Water Supply and Water Consumption of Philadelphia. Graphic representations of water supply and consumption and of various estimates of future consumption, with explanatory text. 1400 w. Eng News—Feb. 27, 1896.

The Upper Schuylkill River. Oscar C. S. Carter. Describes the river and the conditions affecting it, as related to the water supply of Philadelphia, Pa., and several towns along its banks. 4400 w. Jour Fr Inst—Nov., 1897.

Philadelphia Water Supply. Editorial on the situation of the water supply and the plans of the Schuylkill Valley Water Co. 900 w. Eng Rec—Feb. 19, 1898.

The Water Supply Crisis at Philadelphia. Editorial on the plan of turning over the water supply to a private corporation, setting forth the facts and commenting unfavorably. 2400 w. Eng News—March 3, 1898.

Politics and Engineering in Philadelphia. A report of the attacks on the Chief of the Bureau of Water made in the interests of private water companies. 800 w. Eng Rec—Nov. 5, 1898.

The Water Supply Problem of Philadelphia. Reviews a report by J. W. Ledoux on schemes for improving the supply and his estimates of the cost of filtering. 1800 w. Eng Rec—Jan. 7, 1899.

Bureau of Water, Philadelphia. Extracts from report of J. C. Trautwine, with comments. Ill. 1600 w. Fire & Water—Feb. 25, 1899.

The Water Problem in Philadelphia. Address by Prof. Edgar Marburg, on the reasons for the typhoid fever outbreak in the early months of 1899. Also editorial. 3000 w. Eng Rec—April 8, 1899.

Water Supply of Philadelphia. Communications from John C. Trautwine, Jr., and Edgar Marburg, presented at a special meeting held March 25, 1899, to discuss the present problem of the water supply. Also general discussion by Messrs. Hicks, Schermerhorn and Fuller. 5000 w. Pro Engs' Club of Phila—May, 1899.

The Improvement of the Philadelphia Water Supply. Illustrated review of a report by Rudolph Hering, J. M. Wilson and S. M. Gray on the possible sources of a supply, and recommending filtration of river water, with notes on the allowable consumption of water and the growth of cities. 3200 w. Eng Rec—Sept. 30, 1899.

Report of the Commission on the Improvement of the Philadelphia Water Supply. A review of the report of expert engineers appointed to investigate the question and report on plan for immediate improvement and extension. 4000 w. Eng News—Oct. 5, 1899.

Summary of the Report of the Commission on the Extension and Improvement of the Water Supply of the City of Philadelphia. 5000 w. Jour Fr Inst—Nov., 1899.

See also London and Philadelphia; WATERWORKS MANAGEMENT.

**Potomac Basin.**—See Geological Survey.

**Protection.**—Preservation of All Sources of Water Supply from Sewage Disposal. Robert T. Orr. An argument in support of the proposition, that all sources of potable water supply ought to be protected from sewage discharges, and maintianing that whatever mode of purification is adopted the effluent contains elements of danger when freely discharged into sources of water supply. 2400 w. 10th An Rept of Ill Soc of Eng & Surv, —1895.

The Desirability of Making Watershed Areas and Sanitary Districts Coterminous. R. E. Middleton. Shows that the changed conditions of life, especially in England, have greatly increased the tendency to pollute rivers; that the growth of cities and towns has made the water supply more limited, yet increased the demand; and discusses the policy necessary if the water supply is to be efficiently safe-guarded. General discussion. 7500 w. Jour San Inst—July, 1898.

The Desirability of Making Watershed Areas and Sanitary Districts Coterminous. R. E. Middleton. Reprinted from the "Journal of the Sanitary Inst.," England. An able discussion of the subject. 7500 w. Jour N E Waterworks—Dec., 1898.

The Protection of Surface Waters from Pollution. W. T. Sedgwick. A review of the various sources from which the water supply may receive pollution, with discussion. 8500 w. Jour N E Waterworks Assn—March, 1897.

The Protection of Underground Water Supplies. John C. Thresh. Read before the Soc. of Engs., England. Considers briefly some sources of underground supply known to have caused epidemics, and the natural processes of purification. Serial. Brit Arch—April 8, 1898.

The Purchase of the Catchment Area as a Means of Protecting the Sources of a Public Water Supply. J. Spotteswoode Cameron. Cites examples of unintentional fouling of water not easily controlled, unless the city has the absolute ownership of the basin. Discussion. 4500 w. Jour San Inst—Jan., 1899.

See also **State Supervision; WATER POLLUTION.**

**Protection, British.**—The Local Government Board and the Protection of Water Supplies from Pollution. Percy Griffith. Deals with the clauses bearing on this matter, which the Board endeavored recently to introduce into Private Bills which were before the Houses of Parliament, summing the actual condition of affairs at the present time. Serial. Jour Gas Lgt—Aug. 9, 1898.

**Protection, New York.**—The Prevention of the Pollution of Water Supplies. Review of decision of New York Supreme Court permitting acquisition of land bordering reservoirs to prevent pollution. 1000 w. Eng Rec—Aug. 20, 1898.

**Provincetown, Mass.**—The Water Supply of Provincetown, Mass. Louis E. Hawes. A description of the source of supply with observations and remarks concerning the iron in the water. Also discussion. 4200 w. Jour N Eng Waterworks Assn—June, 1897.

**Pure.**—Does Pure Water Pay? Money value of pure water. 1200 w. Eng News—June 4, 1896.

**Railway.**—Locomotive Water Supply. Theodore W. Snow. Discusses tank fixtures, standpipes and track tanks. Also general discussion by Mr. Thomas Appleton. Ill. 2500 w. Jour W Soc of Engs—Aug., 1898.

Notes on Railway Water Supply. W. L. Derr. Considers the sources of supply, reservoirs, dams, wells, tanks, water cranes, pumps, pipes, etc. Also discussion and illustrations. 16500 w. N Y R R Club—March 15, 1900.

Pumping Water with Locomotives. Illustrated description showing the features and operation of a railway water tank feeder; patented by John W. Skilton, of Chicago. 900 w. Ry & Engng Rev—April 23, 1898.

See also **RAILWAY WATER STATION; TANK; TRACK TANK; WATER SCOOP.**

**Rain Water, Ireland.**—The Value of Rain Water Supplies for Domestic Use in Rural Districts in Ireland. Patrick Letters. The abundant rain fall and the possibility of securing the much-needed water, which has thus far been disregarded. 1300 w. San Rec—Dec. 18, 1896.

**Ramapo-New York.**—See **New York.**

**Reading, Pa.**—The Reading, Pa., Water Supply. The first part is historical and statistical with brief references to two sources of present supply. Serial. Fire & Water—Jan. 11, 1896.

**Rochester, N. Y.**—See **WATER FLOW; WATER PIPE; WATERWORKS; WATERWORKS MANAGEMENT.**

**Rockford. Ill.**—See **WATERWORKS.**

**Rome.**—See **PAVEMENT—European Cities; WATERWORKS.**

**Sanitary Control.**—See **Protection; State Supervision; SANITARY ENGINEERING—Water Supply Control; WATER POLLUTION.**

**Salt Water.**—See also **London Sea Water; FIRE PROTECTION; WATERWORKS—Fire Service.**

**San Francisco.**—San Francisco Water Supply. Illustrates and describes the municipal system of artificial storage, giving explanation of the climatic and other conditions prevailing. 1800 w. Sci Am—Nov. 19, 1898.

San Francisco's Water Supply. Engravings giving a good idea of the system, which furnishes an abundant supply, with brief explanation of the peculiar conditions. 900 w. Min & Sci Pr—Aug. 25, 1900.

Water Supply of San Francisco. Brief account of this works and history of the supply since 1855. 1200 w. Fire & Water—March 12, 1898.

**San Jose, Cal.**—Water Supply of San Jose, Cal. Henry A. Brainard. Brief description of the system, whose principal source of supply is found in mountain streams fed by strong springs. 1000 w. Fire & Water—March 26, 1898.

**Savannah, Ga.**—See **ARTESIAN WELL.**

**Schuylkill River.**—See **Philadelphia.**

**Seattle, Wash.**—Cedar River Gravity Water Supply for the City of Seattle, Washington. History of the enterprise. 1500 w. Min & Sci Pr—Jan. 11, 1896.

**Sea Water.**—See **London Sea Water.**

**Small Towns.**—The Water Supply of Small Towns and Rural Districts. Percy Griffith. Paper read before the Society of Engineers. The writer has for eight or ten years been associated with the design and construction of such works and is convinced that a study may be made of them with advantage. The paper deals with works supplying a maximum population of 10,000, and shows points in which both theory and practice as applied to large undertakings are quite distinct from those applicable to small ones. Ill. Serial. Ind & Ir—April 17, 1896.

The Water Supply of Small Towns and Rural Districts. Percy Griffith. Extracts from a paper read at a meeting of the Soc. of Engs. Consideration of features applicable to works supplying a maximum population of 10,000. 3000 w. Jour Gas Lgt—Jan. 26, 1897.

Waterworks for Small Cities and Towns. Treats of surveying watersheds, run-off from watersheds, minimum run-off, storage capacity required, gauging small streams, meaning of chemical analysis, etc. Tables. Serial. Eng Rec—Dec. 21, 1895.

See also **SANITATION.**

**South Australia.**—Water Supply in South Australia. A brief account of the schemes for the supply of towns, and references to irrigation schemes proposed. 1200 w. Engng—April 23, 1897.

**Springs.**—Tracing the Water Supply of Springs (Untersuchung einer Quelle im Herzegowinischen Karste auf ihren Ursprung). An account of methods of tracing sources of water by salt, coloring matter, etc., as compared with topographical investigation. 2000 w. Zeitschr d Oesterr Ing u Arch Ver—Jan. 29, 1897.

Utilizing a Spring as a Source of Water Supply for a Town. Louis E. Hawes. Discusses springs in general, their formation, and the possibility of utilizing them as a source of water supply. Gives data of two springs which have been used for town supplies. 6300 w. Jour New Eng Waterworks—Dec., 1896.

Utilizing Springs as Sources of Water Supplies for Towns. Louis E. Hawes. The origin and causes of springs, their availability for water supply, and examples of their utilization are treated. 4000 w. Eng News—Sept. 3, 1896.

See also **Fayetteville, Tenn.; Yport, France; ARTESIAN WELL; GROUND WATER; WELL.**

**Springs and Wells.**—Springs and Wells for Town Supplies. H. W. Pearson. Extracts from paper read at meeting of British Assn. of Waterworks Engineers, with résumé of discussion. 5000 w. Jour Gas Lgt—Feb. 22, 1898.

**State Supervision.**—Proposed State Supervision of Water Supply and Sewage Disposal. Jacob A. Harmon. A brief review of work being accomplished under supervision of the Boards of Health of states where authority exists. Discussion. 8000 w. Ill Soc of Engs & Surv—1898.

**Statistics, 1898.**—Water Supply in Various Cities. Interesting tables compiled from information concerning the water supply in cities of America, England and Australia for the year 1898. 600 w. Engr, Lond—June 22, 1900.

**Storage Capacity.**—See **Watershed Diagrams; WATER POWER—New England.**

**Surface Water.**—How to Secure Pure Water from a Surface Water Supply. John C. Haskell. Present details observed by the writer, with the effects that he thinks them likely to produce upon a surface water supply, giving both the experimental and philosophical sides of the question. Discussion follows. 9500 w. Jour N Eng Waterworks Assn—Dec., 1896.

**Tall Building.**—A Simple Water Supply System in a Tall Building. A description of the water plumbing in a 17-story New York building without roof tanks, the water being pumped into a compression tank in the basement, where 120-lbs. pressure is maintained by compressed air. 700 w. Eng Rec—Oct. 6, 1900.

New System of Water Supply for High Buildings. W. S. Huyette. Illustrated description of the pressure system as installed in the Union Trust Building, Detroit, Mich. 800 w. Heat & Ven—April 15, 1897.

See also **Mutual Life Building, N. Y.; MECHANICAL PLANT; TALL BUILDING.**

**Toronto, Ont.**—See **WATERWORKS.**

**Torquay, Eng.**—See **WATERWORKS.**

**Typhoid Fever.**—See **Philadelphia; WATER POLLUTION.**

**United States.**—See **Geological Survey; WATER-WORKS—American.**

**Vienna.**—See also **WATER TOWER; WATER-WORKS.**

**Vienna vs. Paris.**—A Comparison Between the Water Supply of Vienna and of Paris (Einige Vergleichende Mittheilungen über Wasserversorgungs-Verhältnisse in Wien und in Paris). Carl Sykora. With interesting data concerning sources, reservoirs and distribution in the two cities. 4000 w. Zeitschr Oesterr Ing u Arch Ver—July 1, 1898.

**Watershed Diagram.**—A Form of Mass Diagram for Studying Yield of Watersheds. Theodore Horton. Describes a graphical solution of these problems, and the construction of the diagram. 2400 w. Eng Rec—July 31, 1897.

Diagrams for Estimating the Required Storage Capacities for River Drainage Areas. F. S. Bailey. Diagram useful for estimating the amount of water which a drainage area or reservoir will supply in extremely dry seasons. 400 w. Eng News—March 4, 1897.

**Western Australia.**—The Water Difficulty in Western Australia. Raymond Radclyffe. Its importance to the industry of mining and to investors. A statement of the condition of affairs with suggestions for conquering the difficulties. 1800 w. Min Jour—June 27, 1896.

See also **WATER PIPE—Australia; Coolgardie.**

**Williamsport, Pa.**—Water Supply of Williamsport. Comments on the exceptional purity of the supply and the care necessary to keep it so, with other information. 1000 w. Fire & Water—Oct. 23, 1897.

**Yonne River, France.**—See **WATER POWER.**

**Yport, France.**—The Water Supply of the City of Yport (Distribution d'Eau de la Ville d'Yport). An interesting account of the manner in which a pure water supply was obtained for a seaport town from springs by the seashore. 300 w. 1 plate. Génie Civil—Feb. 25, 1899.

**Zürich.**—The Water Supply of Zürich (Die Wasserversorgung von Zürich). Official report for the year 1896, giving data concerning the use of high pressure water for power, as well as city supply. Also describes bacteriological and chemical researches. Capacity is 6,500,000 gallons per day. 2500 w. Gesundheits Ingenieur—Dec. 31, 1897.

### WATER TANK.

See also **RESERVOIR; STANDPIPE; TANK; WATER STORAGE; WATER TOWER.**

**Railway.**—See **RAILWAY WATER STATION; TANK; TRACK TANK; WATER SUPPLY.**

### WATER-TIGHT DOOR.

See also **BULKHEAD DOOR; SHIP FITTINGS.**

**O'Brien.**—O'Brien's Water-Tight Doors for Ships. Illustrated description. 800 w. Steamship—March, 1897.

### WATER TOWER.

See also **STANDPIPE; TANK; WATERWORKS.**

Some Recent Examples of Water Tower Construction. Illustrates and describes three interesting designs, located at Warren, Ill., Dwight, Ill., and Lexington, Ky., respectively. 800 w. Eng News—May 27, 1897.

**Baltimore.**—The West Arlington Standpipe, Baltimore. Illustrated description of a standpipe with a masonry protecting tower in which special attention was paid to the architectural effect of the completed structure. 700 w. Eng Rec—Sept. 30, 1899.

**Concrete Reinforced.**—The Waterworks of Calbe (Das Wasserwerk der Stadt Calbe). A description of the waterworks of a small town in Germany, of interest because of the Béton tank in the water tower, constructed on the Monier System. 3500 w. Zeitschr d Ver Deutscher Ing—March 13, 1897.

**Erection.**—See **GIN-POLE—Water Tower Erection.**

**Jacksonville, Fla.**—The New Elevated Water Tank at Jacksonville, Fla. R. N. Ellis. Perspective view and detail drawing with description. 1000 w. Eng News—April 27, 1899.

**Lawrence, Mass.**—Standpipe and Tower at Lawrence. Illustrated description of a standpipe enclosed in a stone and brick tower for the new high-service water system in this city in Massachusetts. 1400 w. Fire & Water—Nov. 6, 1897.

**Mülheim.**—The New Water Tower for the Towns of Mülheim, Deutz and Kalk (Der Neue Hochbehälter des Wasserwerkes für die Städte Mülheim a-Rh., Deutz, und Kalk). F. Thometzek. A description of the manner in which the capacity of a water tower was increased by the erection of a second tower above the original one. Detail drawings are given. 1000 w. 1 plate. Zeitschr d Ver Deutscher Ing—Jan. 28, 1899.

**Murphysboro, Ill.**—New Water Tower at Murphysboro, Ill. Illustrated detailed description of an elevated tank with spherical bottom, encased in wood and provided with horizontal stiffening girders. 1300 w. Eng Rec—July 7, 1900.

See also **STANDPIPE FAILURE.**

**Nijni-Novgorod.**—The Water Tower at Nijni-Novgorod (Le Chateau-d'Eau de Nijni-Novgorod). The tower is made of straight bars of iron in the form of a hyperboloid of revolution, giving great strength and extreme simplicity of construction, all members being alike. An ingenious and effective idea. 1000 w. Le Génie Moderne—Sept. 15, 1897.

**Paris, Illinois.**—A Steel Water Tower. Illustrated description of tower at Paris, Ill., a place of 12,000 inhabitants. 700 w. Eng Rec—Feb. 27, 1897.

**St. Louis.**—Compton Hill Water Tower, St. Louis. Illustrated description of a standpipe 6 feet in diameter and 128 feet high, enclosed in a masonry tower about 171 feet high. 2100 w. Eng Rec—Aug. 5, 1899.

**Schenectady, N. Y.**—New Water Tower at Schenectady, N. Y. Illustrated description of the construction of an enclosed standpipe of 6,000,000 gallons capacity. 1000 w. Eng Rec—April 1, 1899.

**Scotland, Pa.**—See **STANDPIPE.**

**Vienna.**—The City Waterworks in the Favoriten District of Vienna (Das Städtische Wasserwerk in Favoriten). A well illustrated description of a highly ornamental water tower and pumping station. 2 plates. 800 w. Wiener Bauindustrie Zeitung—June 21, 1900.

See also **WATERWORKS.**

### WATER TRANSPORT.

See **CANAL; TRANSPORTATION; WATERWAY.**

### WATER-TUBE BOILER.

See also **BOILER; MARINE BOILER.**

Water-Tube Boilers. W. T. Bonner. Paper read before the Mining Assn. of Quebec. Setting forth facts which the writer believes to be proof of the correctness of the system. Ill. 4200 w. Can Elec News—Feb., 1896.

Water-Tube Boilers. G. L. Burton. Read before the Liverpool Eng. Soc. Abstract. Describes types and presents advantages and disadvantages. 3200 w. Steamship—Jan., 1897.

Steam Raising by Water-Tube Boilers. Harold W. Kolle. Read before the Gloucestershire Engineering Society. States the requirements of a perfect steam boiler, briefly considers bent-tube and straight-tube boilers, and how far they fulfill these requirements, and the advantages of the water-tube over the shell construction. 2200 w. Col Guard—Jan. 14, 1898.

The Coming Boiler. The water-tube boiler is treated as a mechanical necessity, since the safe limit of pressure for the cylindrical boiler has been reached. Abstract of address by G. B. Hartley, before the Boilermakers' Assn. 600 w. Min & Sci Pr—July 18, 1896.

Water-Tube Boilers (Les Chaudières à Tubes d'Eau). G. Humber. A general illustrated description of various types of water-tube boilers with remarks upon their handling and management. 8000 w. Ann des Ponts et Chaussées—3e. Trimestre, 1898.

Water-Tube Boilers. Abstracts of two paper read before the Inst. of Civ. Engs., England, with editorial facts concerning the construction of the various types, and interesting points relating to the working, durability, economy, etc. 3300 w. Engr, Lond—March 17, 1899.

Water-Tube Boilers. Carlton J. Lambert. Circulation in tubulous boilers of the Yarrow type explained and illustrated. 1000 w. Engng—Dec. 6, 1895.

Water-Tube Boilers. A. F. Yarrow. A reply to criticisms made by M. Normand. 500 w. Engng—Nov. 22, 1895.

Water-Tube Boilers. Fred J. Rowan. Abstract of a paper read before the Institution of Engineers and Shipbuilders in Scotland, on Oct. 26, circulation, heating surface and combustion. 4000 w. Engs' Gaz—Nov., 1897.

Water-Tube Boilers. J. Watt. Read at the 37th Session of the Inst. of Naval Architects. A study of defects in the type of boilers and of remedies for some of them, which are not inherent in the types, but result from faults in construction and setting. 2800 w. Eng, Lond—March 27, 1896.

**Almy.**—See also **United States.**

**Almy Test.**—Evaporative Trials of an Almy Water Tube Boiler. Report of a test made by George H. Barnes in the shops of the company at Providence, R. I. Data and results. 1500 w. Am Eng & R R Jour—Feb., 1897.

**Babcock & Wilcox.**—See also **BOILER TESTS; MARINE BOILER.**

**Babcock and Wilcox Test.**—Test of a Babcock and Wilcox Boiler to Determine its Evaporative Efficiency. Descriptions and tabulated results of test made under instructions from the bureau of steam engineering of the U. S. Navy Department, with plates showing construction of the boiler and arrangement of the same in a Plant Line Steamer. 4200 w. Jour Am Soc of Nav Eng—Nov., 1895.

Test of a 240 Horse-Power Babcock and Wilcox Boiler with Three Different Coals, for the Determination of Economy. St. George M. Anderson and Edmund J. Burke. The tabulated data derived from this well conducted test and presented in this article are exhaustive, interesting and instructive. Ill. 4000 w. Stevens Ind—Oct., 1895.

**Belleville.**—See **MARINE BOILER.**

**Blast-Furnace Gas.**—Water-Tube Boilers for Utilising Blast Furnace Gas and Waste Heat. J. H. Ashby. Abstract of paper read at meeting of Cleveland Inst. of Engs., England. The advantages of the Babcock and Wilcox boiler are stated, the arrangement, reheating, etc., are considered. 1800 w. Col Guard—Oct. 7, 1898.

**Borot.**—Borrot Multitubular Boiler (Chaudière Multitubulaire Borrot). An illustrated description of a water-tube boiler in which the tubes cross each other in the form of an X, making a convenient arrangement and saving space. 2000 w. Revue Technique—May 25, 1900.

**Buttner.**—See **BOILER—Buttner Multitubular.**

**Cahall Test.**—Test of a Cahall Boiler. Report of George H. Barrus of a test of one of the 200-H. P. Cahall water-tube boilers at the Narragansett Mills, Fall River, Mass. Extract showing exceptionally good results. 800 w. R R Gaz—Sept. 24, 1897.

Test of the Cahall Boiler at the Armstrong Cork Works. Letter from Thomas Pray, Jr., replying to criticisms, with editorial remarks. 1800 w. Eng News—April 22, 1897.

**Circulation.**—A Study of the Circulation of Water in Multitubular Boilers (Etude de la Circulation de l'Eau dans les Chaudières Multitubulaires). H. Brillié. A discussion of the circulation in water-tube boilers comparing the theories of English, American and French engineers, and a mathematical investigation based on experimental data. Serial. Génie Civil—Dec. 4, 1897.

A Study of the Circulation of Water in Multitubular Boilers (Etude de la Circulation de l'Eau dans les Chaudières Multitubulaires). H. Brillié. A mathematical and experimental treatment, especially relating to the nature and causes of circulation in water-tube boilers. Four articles. 10000 w. Génie Civil—Feb. 19, 26, March 5, 12, 1898.

A Study of the Circulation of Water in Multitubular Boilers (Etude de la Circulation de l'Eau dans les Chaudières Multitubulaires). The beginning of the third section of M. Brillié's elaborate study, devoted to the application of the theoretical principles already deduced. A number of the leading types of water-tube boilers are discussed. Serial. Génie Civil—Sept. 23, 1899.

Circulation in Water-Tube Boilers. A. C. Elliott. An attempt to formulate mathematically the principles of boiler circulation. Serial. Engng—May 1, 1896.

Circulation in Water-Tube Boilers. W. H. Watkinson. Paper read before the Inst. of Naval Architects. The main object of this paper was the models included the more important types of this class of boilers, as applied to marine service, and the paper is a valuable contribution to the literature of the subject. 3800 w. Engng—April 3, 1896.

Experiments on the Circulation of Water in Boiler Tubes. M. C. H. Bellens. Experiments made to determine the influence of the diameter of the tubes upon the circulation of water. 1800 w. Power—Oct., 1899.

The Heat-Absorption Power of Water. G. Halliday. On the circulation in the tubes of water-tube boilers; giving results of experiments. 2000 w. Engr, Lond—July 7, 1899.

Water-Tube Boilers. Hiram S. Maxim. The way circulation takes place in U-Shaped tubes with heat applied at the bend. 900 w. Engng—Nov. 22, 1895.

Water-Tube Boilers. An interesting continuation of the debate upon circulation in water-tube boilers, in which four correspondents take part. 3800 w. Engng—Jan. 24, 1896.

See also **BOILER.**

**Circulation, Yarrow.**—Circulation in Water-Tube Boilers. Illustrated detailed description of a remarkable series of experiments carried out at Messrs. Yarrow and Co.'s Works (England), with editorial introductory remarks. The apparatus and illustrated is elaborate and costly, and the experiments throw much light upon this much debated question. 4800 w. Engr, Lond—Jan. 10, 1896.

Experiments Showing Circulation in Water Tube Boilers. Review and illustrated description of experiments carried out at the works of Yarrow & Co., London, and the results. 2500 w. Power—March, 1896.

**Construction.**—Water-Tube Boiler Construction. Illustrated description of design and construction. Serial. Mech Wld—Jan. 29, 1897.

**D'Allest.**—The D'Allest Water Tube Boilers. Comparative tests of new and old style D'Allest boilers. The description of the tests is by Mr. D'Allest. 1100 w. Eng's Gaz—Feb., 1896.

**Firing Test.**—See **FIRING—Water-Tube Boiler.**

**Iron Works.**—See **Steel and Iron Works.**

**Johnston.**—A New **Water-Tube Boiler.** Illustrates and describes what is known as the "Johnston" water-tube boiler, manufactured by the Brownell Co., of Dayton, Ohio. 1000 w. Eng News—June 2, 1898.

**Joya.**—The Joya Water Tube Boiler (Chaudière Aquitubalaire Système Joya). An improved boiler resembling the Niclausse, but with simplified connection of tubes. 1000 w. Revue Technique—Oct. 10, 1900.

**Locomotive.**—See **LOCOMOTIVE BOILER—Water Tube.**

**Marine.**—See **Babcock & Wilcox; Naval Service; BOILER; BOILER TESTS; MARINE BOILER.**

**Mining.**—Water Tube Boilers. Robert S. Ball. A statement of the advantages of this type for large mining plants. 1100 w. Col Guard—Aug. 11, 1899.

**Miyabara.**—See **MARINE BOILER.**

**Morrin "Climax."**—The Morrin "Climax" Water-Tube Steam Boiler. Description with illustrations. 600 w. Engr, Lond—Sept. 29, 1899.

**Naval Service.**—The Application of Water-Tube Boilers to Naval Service. B. H. Thwaite. Their comparative suitability, efficiency and convenience in warships. 5500 w. Eng Mag—Nov., 1900.

**N. Y. Steam Co.**—A Trio of One Thousand Horse-Power Water Tube Boilers. Illustrated description of the giant water tube boilers erected at the new station of the New York Steam Co. 900 w. Sci Am—Jan. 30, 1897.

**Niclausse.**—See **United States; MARINE BOILER.**

**Parole.**—The "Parole" Water-Tube Boiler. An illustrated description of this type, with report of test. 1400 w. Engng—July 21, 1899.

**Phillips.**—Phillips Water-Tube Boiler. Illustrated detailed description. 450 w. Engng—April 24, 1896.

**Pierpont.**—Water Tube Boilers. The first part gives a sketch of progress and describes and illustrates the Pierpont serial water tube boiler. Serial. Lord's Mag—Dec., 1895.

**Regulations.**—See **BOILER REGULATIONS.**

**Salt Water.**—See **FEED WATER—Salt Water.**

**Saxon Regulations.**—See **BOILER REGULATIONS—Saxony.**

**Seabury.**—See **United States.**

**Steel and Iron Works.**—The Use of Water-Tube Boilers in Steel and Iron Works. John Jardine. From a paper read before the West of Scotland Iron and Steel Inst. The demand for higher pressures and the economy to be effected by the use of these boilers; their safety and the possibility of utilizing the waste heat. 2200 w. Col Guard—April 15, 1898.

**Steinmüller.**—The Steinmüller Boiler (Der Steinmüller Kessel). Especially devoted to a description of the Steinmüller exhibit at the Paris Exposition. 1800 w. Glaser's Annalen—Oct. 1, 1900.

Water-Tube Boilers (Wasserröhrenkessel). A paper by Hr. Ulrici, reviewing the subject generally and giving special information concerning the Steinmüller boiler with data and results of tests. 1500 w. Zeitschr d Ver Deutscher Ing—July 16, 1898.

**Superiority.**—Superiority of Water Tube Boilers Over Other Types. George Shaw. Read before the Columbia Assn. of Stationary Engs. Sums up the points of superiority claimed for the water tube boiler, and discusses each point briefly. 3000 w. Am Mfr & Ir Wld—Jan. 22, 1897.

**Tests.**—Tests of Water-Tube Boilers With Horizontal and Vertical Passes. George H. Barrus. Describes tests made on two 200 h. p. horizontal water-tube boilers set side by side in one battery of brick work. 900 w. Eng Rec—Feb. 19, 1898.

See also **Almy; Babcock & Wilcox; Cahall; Circulation; Steinmüller; Yarrow; BOILER TESTS; STEAM PLANT.**

**Tube Extractor.**—A Novel Boiler-Tube Extractor. Charles J. Mason. A simple device is illustrated for overcoming a troublesome difficulty which often arises in repairing water-tube boilers. 800 w. Mines & Min—Oct., 1899.

**Turgan.**—Water-Tube Boiler (Générateur à Vapeur Aquitubulaire). A description of the Turgan boiler; inclined Field tubes are used, connected to a central steam and water drum overhead. 1500 w. Revue Technique—Feb. 25, 1900.

**United States.**—Commercial Types of Water-Tube Boilers Built in America. Part first illustrates and describes the Almy, Seabury and Niclausse boilers. Serial. Marine Engng—Jan., 1900.

**Warship.**—See **Naval Service; MARINE BOILER; WARSHIP.**

**Yarrow.**—Description of Some Experiments with a Water-Tube Boiler. A. F. Yarrow. Describes some experiments made last year, and shows the advantage of the new feed system. Ill. 1800 w. Engng—April 1, 1898.

Water-Tube Boilers. William Doxford & Sons, Limited. Practical experiences with the "Yarrow" boiler. 500 w. Engng—Nov. 22, 1895.

See also **Circulation, Yarrow; MARINE BOILER.**

## WATER WASTE.

See also **WATER METER; WATER PIPE—Leakage: WATER SUPPLY; WATERWORKS MANAGEMENT.**

Consumption and Waste of Water. Dexter Brackett. A paper read at the annual convention and reprinted from the Trans. of Am. Soc. C. E. Detailed statistics and general remarks. Causes and prevention of waste also considered. Serial. Eng Rec—Jan. 18, 1896.

The Rate of Water Consumption. Illustrated review of an analysis, by John R. Freeman, of the hourly rate of consumption in New York, Brooklyn, Woonsocket, Fall River, and Providence, showing that the variations are practically uniform in all these cities. 1700 w. Eng Rec—Aug. 4, 1900.

The Relationship between Cost of Water and Cost of Detection and Prevention of Waste. A. J. Jenkins. Abstract of paper read before the British Assn. of Water-Works Engs., discussing this subject. Also general discussion. 5000 w. Jour Gas Lgt—July 10, 1900.

The Use and Misuse of Water. R. E. W. Berrington. A paper read before the Brit. Assn. of Water-Works Engs. Waste of water and its prevention by regulation and restriction in the use of certain plumbing appliances, and the employment of meters, are the topics discussed. 2500 w. Eng, Lond—Aug. 7, 1896.

The Use and Misuse of Water. R. E. W. Berrington. A paper read at the Nottingham meeting of the British Assn. of Water Engs. Treats of false ideas with regard to waste, quantity of water required, stop taps, etc. 2000 w. Plumb & Dec—Dec. 1, 1896.

The Use and Waste of Water. Extracts from a report by J. J. R. Croes, analyzing the various sources of use and waste in a large city. 2400 w. Eng Rec—Sept. 1, 1900.

Water Waste. Joseph C. Beardsley. Advocating the use of meters to prevent waste, and giving the experience of Cleveland, O. 3500 w. Jour Assn of Engng Socs—Dec., 1899.

**Albany, N. Y.**—See **WATER WORKS; WATER-WORKS LAW—Cutting Off Supply.**

**British.**—Water Consumption and Waste in Great Britain. A summary of the views of a number of managers of large British works, given at the convention of the Inst. of Civ. Engs. 3000 w. Eng Rec—July 15, 1899.

See also **London; WATER SUPPLY.**

**Brooklyn.**—The Water Famine in Brooklyn. George E. Waring, Jr. Advises the controlling of waste, and shows that the amount wasted sometimes exceeds the amount used. 1100 w. Harper's Weekly—Feb. 6, 1897.

**Erie, Pa.**—Waste of Water at Erie, Pa. A statement of conditions existing in this city, showing that more water is wasted than used. Ill. 1400 w. Fire & Water—May 6, 1899.

**India.**—Water-Supply Waste in India. The difficulties arising from an attempt to manage an alien people in the same manner that obtains among those whose education and conditions are very different. Considers the principle that should be followed in supplying water to consumers. 1100 w. Ind Engng—July 23, 1898.

**London.**—A British View of Water-Waste. Extracts from the report of the Llandaff Commission on the London water-works, in which a supply of 42 U. S. gals. per capita daily is held to indicate waste. 2500 w. Eng Rec—Feb. 17, 1900.

See also **WATER SUPPLY.**

**Madison, Wis.**—The Use of Water in Madison, Wis. A review of the probable use and waste of water in small cities. 1100 w. Eng Rec—May 7, 1898.

**Meters.**—Value of Meters in Restricting Waste. L. N. Case. Extracts from address before the senate committee of the Michigan legislature to oppose the passage of the "free water bill." 1500 w. —June 26, 1897.

See also **WATER METER.**

**Newark, N. J.**—Preventing Water Waste in Newark, N. J. Describes an inspection to determine all the features of plumbing in houses in this city where waste is believed to occur. 1000 w. Eng Rec—July 15, 1899.

The Reduction of Water Waste. Morris R. Sherrerd: Before the A. S. M. I. Describes the methods at Newark and gives their results. 800 w. Eng Rec—Oct. 14, 1899.

**New York.**—The Water Waste and Water Supply of New York City. Review of the report of John R. Freeman, with editorial notes. 8500 w. Eng News—April 19, 1900.

See also **WATER SUPPLY; WATERWORKS MANAGEMENT.**

**Olden Time.**—Water-Waste in the Olden Time. Editorial discussion of a criticism in a Boston journal in regard to the construction of the Roman aqueducts being better than the work of to-day. Gives facts showing the conditions were much worse in Rome than in any modern city. 1000 w. Eng Rec—Sept. 9, 1899.

**Quebec, Ont.**—The Ratio of Water Wasted to That Used. A letter from C. Baillairgé, describing experiments to determine water waste in Quebec. 700 w. Eng Rec—Aug. 18, 1900.

**Rockford, Ill.**—See **WATER SUPPLY.**

**Washington, D. C.**—The Water Supply Problem in Washington, D. C. Explains method of utilising present supply to better advantage by checking waste. 1800 w. Eng Rec—March 12, 1898.

Water Waste and Use in Washington. Extracts from a report by Capt. D. D. Gaillard, describing measurements to determine the waste and the use of water for municipal purposes. 1800 w. Eng Rec—Sept. 22, 1900.

**WATERWAY.**

See also **CANAL; DREDGE; DREDGING; GREAT LAKES; RIVER; RIVER REGULATION; STEEL INDUSTRY—Great Lakes Export.**

The Development of American Waterways, and their influence upon European Exports (Die Entwicklung der Nordamerikanischen Wasserstrassen und deren Rückwirkung auf den Export nach Europa). An address by Herr Rudolf Ritter von Gunesch, showing the influence which cheap water-carriage will have upon competition, and urging the importance of internal waterways in central Europe. Two articles. 7500 w. Zeitschr d Oesterr Ing u Arch Ver—April 15, 22, 1898.

The Navigation Interests of Nations in Ports and Waterways, and Modern Means for Their Improvement. Lindon W. Bates. Read at the International Congress on Navigation, at Paris. Considers improvement of waterways and terminal facilities. 5500 w. Naut Gaz—Aug. 23, 1900.

**Baltic-Black Sea.**—See **CANAL.**

**Baltic-Caspian.**—See **Russia.**

**Bohemia.**—The Status of the Work on the Moldau-Elbe Canal in Bohemia (Ueber den Stand der Canalisierungs-Arbeiten an der Moldau und Elbe in Böhmen). With photographs of various sections, and a plate of weir buildings; together with a record of the variations in level of the Moldau at Prague during 1897. 6000 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—Jan., 1898.

See also **RIVER REGULATION.**

**British.**—Canals and Navigable Rivers. L. B. Wells. Abstract of a paper read before the Manchester Geog. Soc. An examination into the causes for high rates on inland transportation in England, with valuable statistics. Serial. Ind & Ir—Feb. 7, 1896.

Canals and Navigable Rivers. L. B. Wells. Paper read before the Manchester Geog. Soc. on inland transportation. 1400 w. Engr, Lond—Feb. 14, 1896.

See also **HARBOR—United Kingdom.**

**Canada.**—See also **Great Lakes-Atlantic; Great Lakes-St. Lawrence; CANAL; GREAT LAKES; STEEL INDUSTRY—Great Lakes Export.**

**China.**—Opening of Inland Water Routes in China. Extract from a Shanghai journal, on the consent of the government to admit foreign and native steamers to all inland waters, and the effect it will have on trade. 1100 w. Cons Repts, No. 121—May 21, 1898.

**Cosel-Breslau.**—The Waterway Between Cosel and Breslau (Der Wasserweg zwischen Cosel und Breslau). Jos. Riedel. With diagrams showing the mean height of the Oder at various points; also sections of the river bed and a description of the navigation of the upper Oder. 1500 w. Ing u Arch Ver—Dec. 15, 1899.

**Douay, France.**—The Improvement of the Waterway around Douay (Derivation de la Scarpe Autour de Douai). Describing the improvements in the connecting canal which unites the canals of Haute-Deule and Sensée, with profiles, sections, and plans of locks. 4000 w. 1 plate. Génie Civil—June 19, 1897.

**Europe.**—The Second Convention of the German-Austrian-Hungarian Association for Inland Navigation (Der II Verbandstag des Deutsch-Oesterreichisch-Ungarischen Verbandes für Binnenschiffahrt). A full account of the recent discussion at Vienna of the inland waterways of central Europe, with a discussion of the plans for extension and improvement. An important paper. 20000 w. Oesterr Monatschr f d Oeffent Baudienst—July, 1897.

**Europe and America.**—Inland Navigation in Europe and North America, with Special Reference to Inland Navigation in England. Leveson Francis Vernon-Harcourt. Presents the importance of solving this problem, and notes the recent interest; reviews the waterways of N. America, Germany, France and Belgium; states the conditions in England, giving conclusions. Discussion. 16500 w. Jour Soc of Arts—Jan. 30, 1899.

**France.**—Water Transport Between the North of France and Paris (A Propos des Transports par Eau entre le Nord et Paris). A. de Bovet. A discussion of the elements of the cost of the water transport and the best method of reducing it. 4000 w. Mem de la Soc Ing Civ de France—Aug., 1899.

**France, 1898.**—Internal Navigation in France in 1898 (La Navigation Intérieure de la France en 1898). A discussion of the official figures, which show an increase of 4.8 per cent. in ton-kilometres over the preceding year. 1000 w. Moniteur Industriel—Nov. 25, 1899.

**France vs. Germany.**—The Waterways of France compared with those of Germany (Die Wasserstrassen Frankreichs, verglichen mit jenen Deutschlands). A comparison of the extent, carrying capacity and efficiency of the internal waterways of the two countries. 1500 w. Zeitschr d Oesterr Ing u Arch Vereines—Jan. 15, 1897.

**Franklin's Experiments.**—See **Ship Resistance.**

**Germany.**—The Interior Navigation of Germany (La Navigation Intérieure de l'Allemagne). A review of the internal waterway system of Germany. 1100 w. Moniteur Industriel—July 14, 1900.

See also **Cosel-Breslau; Europe; France vs. Germany; CANAL; HARBOR.**

**Great Lakes-Atlantic.**—Joining the Great Lakes to the Sea. Conclusions of the commission appointed by Pres. Cleveland to consider this matter. They think the plan feasible and make suggestions as to route. 1000 w. Bradstreet's—Jan. 23, 1897.

The Report of the United States Deep Waterways Commission. Extracts from the report bearing on the feasibility of the canal as a commercial enterprise, and some conclusions as to the merits of proposed routes. Also editorial comment. 12000 w. Eng News—Feb. 11, 1897.

From the Lakes to the Ocean. Editorial on the report of the United States Deep Waterways Commission. 1400 w. R R Gaz—Feb. 5, 1897.

Two Hundred Million. Considers the final report of the deep waterways commission, dealing with routes for a ship canal within United States territory from the Great Lakes to the Atlantic. 2000 w. Marine Rev—July 12, 1900.

The Economic Dimensions for a Waterway from the Great Lakes to the Atlantic. George Y. Wisner. Discusses the economic depth for canals of large traffic, and gives conclusions drawn. Considers the benefits derived from a 21-ft. waterway nearly as great as could be expected with greater depths. 5400 w. Pro Am Soc of Civ Engs—Oct., 1900.

The Race to the Atlantic Seaboard between Canada and the United States. Editorial discussion of the projects being considered to connect the Great Lakes with the sea. 2000 w. Transport—Nov. 19, 1897.

The Decaying Commerce of New York and How to Restore it. Thomas C. Clarke. Discusses the work on canals in Canada, and the danger to New York commerce; and suggests two routes which would enable New York to meet this competition. One connecting Lakes Erie and Michigan; the other the extension of the Ottawa route through Lake Champlain and the upper Hudson. 1600 w. Eng News—March 31, 1898.

See also **Canada; CANAL; GREAT LAKES; STEEL INDUSTRY—Great Lakes Export.**

**Great Lakes, Levels.**—Raising the Levels of the Great Lakes. B. H. Muehle. Abstract from the advance proofs of a paper presented to the Michigan Engng. Soc. A study of the effect the construction of deep water channels to the sea will have on the levels of the lakes, with a discussion of projects for artificially raising the lakes. 1700 w. Eng News—March 18, 1897.

See also **GREAT LAKES—Levels.**

**Great Lakes-New York.**—Canals Between the Lakes and New York. Joseph Mayer. Examines arguments for and against the construction of this waterway, showing why private capital cannot safely undertake the construction. 7000 w. Pro Am Soc of Civ Engs—Oct., 1900.

The Economic Relation of the Proposed Deep Waterways to the State of New York. George W. Rafter. Reviews the improvements made in transportation by the way of the Great Lakes, Oswego and Mohawk route, especially since the construction of the Erie Canal, and discusses the present project to permit large boats to pass from the Great Lakes to tide water. 3800 w. Tech Quar—March, 1899.

The Great Lakes and New York Waterway. E. P. North. Discussion of the importance of canals in directing railway traffic. 2000 w. Eng Rec—Feb. 17, 1900.

See also Great Lakes-Atlantic; CANAL—Erie; Great Lakes-Atlantic; New York.

**Great Lakes-Gulf.**—See Lake Michigan-Mississippi; CANAL—Chicago Drainage.

**Great Lakes-St. Lawrence.**—Canadian Waterways and the Canadian Tariff. A statement of two important announcements from Canada. First, the decision to begin the enlarging of the canal system connecting the great lakes and St. Lawrence; second, the decision to discriminate against the United States in favor of Great Britain, in the new tariff bill. 900 w. Trans—April 2, 1897.

Deep Waterways from the Great Lakes to the Sea. Allan Ross Davis. A review of the Trent Canal project. Ill. 3800 w. Eng Mag—June, 1897.

The St. Lawrence Water Route to the Sea. Thomas Monro. Address of the retiring president of the Canadian society of civil engineers, in which he expresses some of the reasons why the St. Lawrence River is not more used by commerce. 1300 w. Eng News—March 26, 1896.

See also Great Lakes-Atlantic; CANAL; GREAT LAKES; STEEL INDUSTRY—Great Lakes Export.

**Hungary.**—Canal, River and Lake Communication and Mercantile Marine in Hungary. History of water communication in Hungary, and of what has recently been done to facilitate water transport. 4000 w. Eng, Lond—Dec. 11, 1896.

See also RIVER REGULATION—Danube.

**Iron Gates, Danube.**—See RIVER REGULATION—Danube.

**Lake Michigan-Mississippi.**—A Proposed Waterway from Lake Michigan to the Mississippi River. Extract from the memorial submitted to Congress favoring the construction of this waterway by the Federal government. Also a project to enlarge the Illinois and Michigan canal is discussed. 2800 w. Eng News—May 3, 1900.

**Oswego-Mohawk-Hudson.**—See Great Lakes-Atlantic; Great Lakes-New York; CANAL; SURVEYING—Stadia.

**Russia.**—A Waterway 4000 Kilometers Long between the Baltic and Caspian Seas (De la Mer Baltique à la Mer Caspienne; une Voie de Navigation de 4000 Kilomètres). MM. Suquet and Fontaine. An account of a canal system between St. Petersburg and the Volga River, and improvements of the latter, with map and illustrations. 25000 w. 1 plate. Ann d Ponts et Chaussées—1st quarter, 1900.

The Waterways of Russia. C. H. Moberly. An illustrated description of the waterways, excepting the Volga which has been previously described. Serial. Engng—Jan. 13, 1899.

See also CANAL—Baltic-Black Sea.

**Ship Resistance.**—Benjamin Franklin's Experiments on Depth of Waterways. A letter from him, describing experiments made in 1768, establishing as a fact the retarding influence of shallow depths on the passage of boats; with comments by H. Goldmark. 1300 w. Eng Rec—March 10, 1900.

See also SHIP RESISTANCE.

**Trent, Canada.**—See Great Lakes-St. Lawrence.

**United Kingdom.**—See British; HARBOR.

**United States.**—Inland Navigation in the United States. Extracts from a paper by Smith S. Leach, presented to the Inst. of Civ. Engs. A brief summary of the extent of inland navigation in this country. 500 w. Eng News—Aug. 19, 1897.

From the Mountains to the Sea. Account of a projected outlet from the central states to tide water from which great things are expected. 1800 w. Mfrs' Rec—July 3, 1896.

See also Great Lakes; CANAL; GREAT LAKES; RIVER; RIVER REGULATION.

**WATER WHEEL.**

See also HYDRO-ELECTRIC PLANT; TURBINE; WATER MOTOR; WATER POWER.

The Principles and Construction of Water-Wheels. W. E. Wines. Read before the Technical Soc. of Armour Inst., Chicago. A few fundamental principles relative to the efficiency of water-wheels in general and to the action of a jet of water upon a vane are laid down, followed by discussion of different classes of water-wheels. Serial. Elec Eng—May 12, 1897.

**Ancient and Modern.**—See History.

**Care.**—Care of Water Wheels. Points out how wheels are destroyed and suggests points needing attention. 2000 w. Lord's Mag—June, 1897.

**"Cascade" Tests.**—Report of Tests of a 28-inch and 36-inch "Cascade" Water-Wheel Made at the Mechanical Engineering Laboratory of the Ohio State University. Abstract by John H. Cooper. A brief illustrated description of the "cascade" wheel, with results of a series of tests. 700 w. Jour Fr Inst—May, 1897.

**Cazin.**—See Efficiency; WATER PIPE—Design; WATER POWER—Niagara.

**Efficiency.**—The Efficiency of Water Wheels. F. M. F. Cazin. Letter to the editor criticising statements made in an article by .Wm. Blaue, published Sept. 12, 1896. Also showing the importance to the electrician of water-wheel efficiency. 1300 w. Elec Wld—Jan. 9, 1897.

**Governing.**—A New Method of Governing Water Wheels. Harvey D. Williams. Illustrated description of a new method whereby the speed is corrected by energy that would otherwise be wasted because of incorrect speed. 2000 w. Sib Jour of Engng—March, 1896.

Commercial Requirements of Water-Power Governing. Elmer F. Cassel. A critical examination of the principles involved in the governing of water wheels, and an exposition of an improved method. 2500 w. Eng Mag—Sept., 1900.

Limiting Factors in the Government or Regulation of Water Wheels. Abridged paper by Mark A. Replogle. Indicates the lines on which a water-power plant must be laid down to attain best results. 1200 w. Col Eng—Sept., 1897.

Speed Government in Water-Power Plants. Mark A. Replogle. Discussion of some of the principles that must be adhered to if successful regulation is to be obtained. Ill. 6400 w. Jour Fr Inst—Feb., 1898.

The Limitations of Government in Water-Power Plants. Mark A. Replogle. Names and briefly discusses the factors which determine the speed of a water wheel. 1000 w. Min & Sci Pr—June 5, 1897.

The Limitations of Government in Water-Power Plants. Mark A. Replogle. Discusses the factors that determine the regulation of the speed. 1000 w. Am Mach—Aug. 19, 1897.

Regulation of Water Wheels under High Pressure. Describes methods of regulation of Pioneer Electric Power Co.'s wheels. 800 w. Eng Rec—Feb. 5, 1898.

Water Wheel Regulation. Samuel N. Knight. Refers to methods in use, stating why they are objectionable and describes apparatus adopted by the writer. 1700 w. Jour of Elec—Nov., 1897.

See also GOVERNOR—Electric; Hydraulic; TURBINE.

**Graphics.**—Graphics of Water Wheels. William Fox. Showing the superiority of the graphical method to the analytical in the discussion of the involved problem of turbines and other water wheels. 2500 w. Stevens Ind—Oct., 1898.

**History.**—Some Old-Time Water Wheels. William Wallace Christie. Historical review of wheels used for water power, giving information of interest. 1500 w. Eng News—Dec. 21, 1899.

Water Wheels, Ancient and Modern. Illustrates and describes primitive pieces of apparatus for utilizing the power of water. Part first deals with the ancient methods. Serial. Fire & Water—May 13, 1899.

**Horse-Power.**—Horse-Power of Water Wheels and Turbines. Olin H. Landreth. Gives a diagram for the graphical determination of the horsepower of any given water fall, explaining how to use it. 400 w. Am Elect'n—Feb., 1898.

**Impulse.**—A Complete Theory of Impulse Water Wheels and Its Application to Their Design. R. T. Kingsford. Mathematical demonstration. 2500 w. Eng News—July 21, 1898.

An Interesting Water Wheel Application. Illustrated description of the impulse wheels set up in the force main from a pumping station, to furnish power for electric generation. 600 w. Eng Rec—Nov. 11, 1899.

Impulse Water Wheels. J. T. Farmer. From a paper read before the Canadian Soc. of Civil

Engs. A record of research concerning the desirable use of the impulse wheel, giving a brief outline of its development. Serial. Can Eng—May, 1898.

See also **Cazin; Pelton; Tuthill; AIR COMPRESSOR—Compound Duplex.**

**Impulse Experiments.**—Impulse Water Wheel Experiments. E. A. Hitchcock. Explains the theoretical action of the wheel, and reports experiments carried on in the Ohio State University laboratory. 1000 w. Elec Wld—June 5, 1897.

**Pelton.**—An Efficiency Surface for Pelton Motor. W. Kendrick Hatt. Paper presented to Indiana Academy of Sciences. A mathematical study. 700 w. Jour Fr Inst—June, 1897.

The Applications of the Pelton Motor in Mining Work (Ueber den Pelton Motor und seine Anwendung im Bergwerksbetrieb). C. Blecken. Showing the especial applicability of wheels of this class to mining service. 2000 w. Glückauf—Oct. 1, 1898.

The Efficiency of Pelton Water Wheels. F. K. Bloue. A method of finding deficiencies and faults in connections and settings which interfere with the normal efficiency of a Pelton wheel. Notation and formulae employed and interpretation of results. 2500 w. Elec Wld—Sept. 12, 1896.

**Pioneer Electric Power Co.**—See **Governing.**

**Replacement.**—A Study in the Replacement of Water Wheels (Studie über Auswechslungen von Wasserädern bei Bestehenden Wasserwerken). A discussion of the data to be taken into consideration when replacing the wheels in an existing plant by those of another construction; with a practical example. 1500 w. Oesterr Monatschr f d Oeffent Baudienst—June, 1897.

**Tangential.**—Hurdy-Gurdy or Tangential Water Wheels. Philip R. Björling. Illustrated description of these wheels and the manner in which they are regulated. 2000 w. Col Guard—June 4, 1897.

The Tangential Water Wheel. W. A. Doble. Reviews the development of open or impulse water wheel and the results, discussing briefly its adaptability in the engineering field. Ill. 12600 w. Trans Am Inst of Min Engs—Sept., 1899.

**Tutthill Impulse.**—Electric Transmission in California. Alfred Tregidgo. Illustrates and desribes the Tutthill impulse water wheels in course of erection at the San Gabriel Electric Co.'s Power Station, Azusa, Cal. 400 w. Min & Sci Pr—Oct. 15, 1898.

**Von der Heydt.**—Floating Dam for the Production of Electric Energy (Ein Schwimmendes Durchlauf-Wehr als Erzeuger Elektrischer Energie). An illustrated account of the von der Heydt current motor system, with turbines on horizontal axes, placed in a pontoon dam. 3500 w. Der Elektro Techniker—Dec. 15, 1897.

The Rational Utilization of Waterfalls of Low Head (L'Utilisation Rationelle des Chutes d'Eau de Faible Hauteur). A discussion of the von der Heydt current motor, showing the conditions of its best efficiency, and adaptation to heads of water too low for advantageous use with other motors. 3500 w. La Rev Tech—Feb. 25, 1895.

The Utilization of Running Streams (Utilisation des Eaux Courantes). The von der Heydt current motor consists of a pontoon dam containing turbines and electric generators, and which may be swung aside readily in order to afford a clear waterway. 2500 w. La Rev Tech—Dec. 25, 1897.

## WATERWORKS.

See also **AQUEDUCT; DAM; FILTRATION; PUMP; PUMPING ENGINE; PUMPING STATION; RESERVOIR; STANDPIPE; WATER PIPE; WATER STORAGE; WATER SUPPLY; WATER TOWER; WATER WASTE; WATERWORKS LAW; WATERWORKS MANAGEMENT; WELL.**

**Albany.**—Notes on the Albany Waterworks. Gives hints concerning hydrant maintenance and the prevention of water waste. 1100 w. Eng Rec—July 1, 1899.

See also **FILTRATION; WATER SUPPLY.**

**Aldeburgh-on-Sea, England.**—A Remarkable Water Supply. Describes ridiculous works furnishing alleged filtered water in Aldeburgh-on-Sea, England. 600 w. Eng Rec—Sept. 16, 1899.

**Amateur.**—The History of an Amateur Waterworks Plant. An account of the misfortunes of a plant erected without other engineering advice that of the sales agent of a gas-motor 1300 w. Eng Rec—May 13, 1899.

**Amballa, India.**—The Amballa Waterworks. stract of a paper by Charles E. V. Goument fore the Inst. of Civ. Engs. (England), or Indian water plant, drawing water from w and conducting it to the town through an 8- main by gravity and pumping combined; plant has several unusual features. 2000 w. Rec—April 22, 1899.

**American.**—Capacity of Waterworks Systems American Cities. Data regarding the capacit systems in cities of a population of 100,00 more are given in part first. Serial. M Engng—Jan., 1897.

Ownership and Capacity of Waterworks American Cities. Tabulated statement of ci between 50,000 and 100,000, with explanati 700 w. Munic Engng—Feb., 1897.

Present Tendencies in Waterworks Pract Editorial based upon information contained the 1897 "Manual of American Waterwork Calls attention to the new things since the p lication of the last "Manual," discusses wat pipes, and gives general review of notable t dencies. 2200 w. Eng News—April 15, 1897

Sources, Modes of Supply and Filtration Public Water Supplies in the United Stat Figures taken from a graduating thesis of B jamin H. Flynn, compiled by him from "Manual of American Waterworks" for 18 1400 w. Eng News—July 7, 1898.

Number and Ownership of Waterworks in t United States and Canada. Tabulated statemen giving number and ownership and number towns supplied, with other information; and marks on the improvement in the standard of l ing, etc., by the introduction of a public wat supply. 2800 w. Eng News—April 29, 1897.

**Appraisal.**—See **Gloucester, Mass.; Taxation; Valu tion.**

**Arad, Hungary.**—Arad Waterworks, Hungary. lustration and brief description, with table givi the return of the filters for Oct., 1895. 800 Ind Engng—Jan. 30, 1897.

**Artesian Well.**—See **Camden, N. J.; ARTESIA WELL; GROUND WATER; WATER SUPPL WELL.**

**Association.**—See **WATERWORKS ASSOCIATION**

**Astoria, Ore.**—The Astoria City Waterworks. A thur L. Adams. An instructive and interestin detailed, illustrated description, accompanied b cost tables. 17000 w. Trans Am Soc of Ci Engs—April, 1896.

**Auxiliary Distribution.**—See **Dual Distribution Fire Service.**

**Bangor, Maine.**—The Hydraulic Plant for the Bango Waterworks. Illustrated description of a 10,000,000 gal. pumping station driven by water powe in which unique arrangement of turbines wa necessary to allow for tidal fluctuations. 250 w. Eng Rec—July 2, 1898.

**Basle, Switzerland.**—The Waterworks of the Cit of Basle (Das Wasserwerk der Stadt Basel). A Markus. A detailed account of the use of groun water as a source of supply, together with a description of the new gas motor plant of th Basle waterworks. 7000 w. Schw Bauz—Oct. and 10, 1896.

**Bay City, Mich.**—Bay City Waterworks. E. L Dunbar. An interesting account of the construction of the works and the improvements made. 1700 w. Fire & Water—June 18, 1898.

**Bellary, India.**—Bellary Water Supply—Copper Hill Scheme. Hormusji Nowroji. The conditions of this region in India are described, and the work being done, with costs of the Copper Hill supply. 1800 w. Ind Engng—Sept. 25, 1897.

Bellary Water Supply. D. McNeil Campbell. Brief discussion of the three schemes proposed. 1100 w. Ind Engng—Oct. 9, 1897.

**Bergisch-Gladbach, Germany.**—The Waterworks of Bergisch-Gladbach (Das Wasserwerk der Stadt Bergisch-Gladbach). H. Ehlert. An illustrated description of the plant by which a town of 10,000 inhabitants is supplied from ground water sources. 5000 w. Zeitschr d Ver Deutscher Ing—June 17, 1899.

**Berlin.**—The Waterworks of Berlin. Jas. H. Fuertes. With map showing location of works, also plan of filter beds. 1500 w. Eng Rec—Sept. 10, 1898.

**Bilston, Eng.**—The Waterworks of Bilston, England. James H. Fuertes. Illustrated description of a plant in which there are two sets of pumps, one for high-pressure and the other for low, driven by the same steam end; a concrete vaulted reservoir is also used. 2600 w. Eng Rec—March 10, 1900.

**Binghamton, N. Y.**—See WELL.

**Birmingham, Eng.**—The City of Birmingham Corporation Waterworks. Henry Davey. Read before the Inst. of Mech. Engs. Information of the supply, reservoirs, steam pumps, cost of pumping, etc., with other matters of interest. 2700 w. Engr, Lond—July 30, 1897.

City of Birmingham Corporation Waterworks. Henry Davey. Part first gives an historical account of the water supply since 1826, the present supply, and the interim resources. Serial. Mech Wld—Aug. 27, 1897.

Birmingham Corporation Waterworks. H. Davey. Abstract of paper read at recent meeting of the Inst. of Mech. Engs., in Birmingham, Eng. History of the undertaking, the present condition, reservoirs, etc. 3200 w. Jour Gas Lgt—Sept. 28, 1897.

The New Birmingham Waterworks. From the "Birmingham Daily Post." Describes a visit of inspection made by the City Council to these extensive works, now in process of construction. 2700 w. Arch, Lond—June 11, 1897.

The Water Supply of Birmingham (L'Alimentation d'Eau de Birmingham). A description from English sources, with photographic illustration of pumping engines. 1800 w. La Rev Tech—May 25, 1898.

Birmingham Water Supply from Central Wales. An account of the water supply works for Birmingham, England, by which the water of several streams in Central Wales is to be delivered to the city by gravity through an aqueduct over seventy miles long. Map, profile, and sections of aqueduct are given. 2000 w. Engr, Lond—Sept. 9, 1898.

**Boston.**—The Metropolitan Water Supply of Massachusetts. Albert F. Noyes. A general synopsis of the work done and in progress for obtaining water supply for the metropolitan district of Boston. Discussion. 3000 w. Jour N Eng Waterworks Assn—Dec., 1895.

The Wachusett Reservoir and Aqueduct. Illustrates and describes temporary dam and important features of aqueduct of the metropolitan works for Boston and vicinity. 4000 w. Eng Rec—April 9, 1898.

Progress of the Metropolitan Waterworks. Interesting information from the annual report of the Metropolitan Water Board of Massachusetts, covering the work done in 1898. 3200 w. Eng Rec—May 27, 1899.

Waterworks Expansion in Boston. J. A. Stewart. Illustrates and describes interesting work in carrying out the plans of the Metropolitan Water Board. 2400 w. Sci Am—Nov. 4, 1899.

See also **Screens; AQUEDUCT—Nashua; DAM—Wachusett; PUMPING STATION—Chestnut Hill; RESERVOIR; WATER SUPPLY.**

**Bradford, Eng.**—The Bradford Waterworks. James Watson. Paper read before the British Association on water supply, with a description of the Bradford waterworks. 6000 w. Engng—Sept. 14, 1900.

**Brookline, Mass.**—See WELL.

**Brooklyn.**—The New Pumping Engines and Boiler House at the Ridgewood Station of the Brooklyn Waterworks. Illustrated description. 1700 w. Power—April, 1898.

See also **LABORATORY; PUMPING ENGINE—Ridgewood; RESERVOIR—By-Pass; WATER SUPPLY.**

**Budapest.**—The Water Supply of Budapest (Alimentation d'Eau de Budapest). Illustrated account of filter plant, pumping station, and reservoirs for the supply of the city of Budapest. 4000 w. 1 plate. Génie Civil—July 31, 1897.

**Budapest Tunnel.**—The Danube Tunnel of the Budapest Waterworks (Der Donautunnel des Wasserwerkes von Budapest). Josef Schustber. Explains the construction and gives the various quantities of water supplied by the various springs. 3000 w. Deutsche Bauzeitung—Oct. 24, 1896.

**Buffalo.**—History of the Buffalo Waterworks. Abstract of a paper prepared by Edward B. Guthrie, giving an account of the growth of one of the largest plants in the United States. 2800 w. Eng Rec—Sept. 24, 1898.

The Buffalo, N. Y., Waterworks. Louis H. Knapp. An illustrated general description of the works. 1800 w. Jour N E Waterworks Assn—March, 1900.

See also **INTAKE.**

**Calbe, Germany.**—See **WATER TOWER—Concrete Reinforced.**

**Caledonia, N. Y.**—Cheap Water for a Small Town. Illustrates a plant with gas engines and triplex pumps at Caledonia, N. Y., which furnishes water at a very low cost per capita. 1000 w. Eng Rec—April 23, 1898.

**Cambridge, Mass.**—The Waterworks of Cambridge, Mass. L. M. Hastings. History and description, with illustrations. Followed by discussion. 4500 w. Jour N Eng Waterworks Assn—Dec., 1896.

The Waterworks of Cambridge, Mass. Illustrated description of the recently enlarged works of the only city within the metropolitan district of Massachusetts which will not obtain a supply from the works of the Metropolitan Water Board. The paper gives descriptions of pipe line and dam details. 3000 w. Eng Rec—Aug. 26, 1899.

Waterworks of Cambridge, Mass. Illustrated description of the works, which are being extensively enlarged, so as to increase the supply, pressure and pumping capacity. 1800 w. Fire & Water—March 20, 1897.

See also **STEAM ENGINEERING—United States.**

**Camden, N. J.**—A Large Artesian Well Plant at Camden, N. J. Describes a plant having a contract capacity of 20.000,000 gallons. 1200 w. Eng News—May 11, 1899.

The New Waterworks of Camden, N. J. Illustrated description of a driven-well plant of about 16,000,000 gals. daily capacity, in which the details include special air-lift connections, pump-well, submerged pipe laying and a concrete chimney cap. 300 w. Eng Rec—May 6, 1899.

Waterworks of Camden, N. J. Describes the artesian well system. 1500 w. Fire & Water—Aug. 21, 1897.

**Canada.**—See also **American; Toronto.**

**Canandaigua, N. Y.**—Test of the Canandaigua City Waterworks. E. Hensen and C. M. Riker. Description of plant and of tests, which were made with the object of finding the efficiency of each part and the efficiency of the whole plant. 1000 w. Sib Jour of Engng—Dec., 1896.

**Cardiff, Wales.**—Extension of Filter-Beds, etc., Service Reservoirs, and Water Tower, Cardiff. C. H. Priestley. Abstract of paper and discussion at meeting of British Assn. of Waterworks Engs. Description of improvements. 4800 w. Jour Gas Lgt—June 7, 1898.

**Chattanooga, Tenn.**—The Waterworks Question in Chattanooga. Reviews the expediency of building public works when a private company having a good plant offers to sell its works, or to allow a board of arbitrators to establish a schedule of charges. 600 w. Eng Rec—Feb. 4, 1899.

**Chicago.**—See **INTAKE.**

**Cincinnati, O.**—The New Cincinnati Waterworks. An account of a new intake to be built sufficiently above the mouth of the Miami to avoid all contamination except from remote cities and towns. Map. 1500 w. Eng Rec—Nov. 27, 1897.

Progress on the New Waterworks for Cincinnati, O. Illustrated description of the comprehensive improvements in progress for which $6,500,000 of bonds have been authorized. 3300 w. Eng News—Dec. 8, 1898.

Progress on the New Waterworks for Cincinnati, O. Illustrated account of interesting work now in progress to pump water from the Ohio River to settling basins. 1300 w. Eng News—April 26, 1900.

Water System of Cincinnati. Information from the 57th annual report of the water department. Ill. Serial. Fire & Water—Jan. 8, 1898.

See also **WATER POLLUTION.**

**Cleveland, O.**—See **INTAKE; TUNNEL.**

**Cologne.**—The Municipal Water Supply of Cologne. Illustrated detailed description of an interesting subject. Elevation and plan of boiler house and pumping station are given in first part. Serial. Jour Gas Lgt—Jan. 21, 1896.

**Colorado Springs.**—The Waterworks of Colorado Springs and the Strickler Tunnel. Illustrated de-

1896.

See also **TUNNEL—Strickler.**

**Columbus, O.**—Columbus and Its Waterworks. Historical account, with illustrations of pumping station. 1600 w. Fire & Water—Sept. 1, 1900.

The Waterworks of Columbus, O. Illustrated description of one of the largest plants in the United States drawing water from filter conduits. 3600 w. Eng Rec—June 3, 1899.

**Compressed Air.**—See **COMPRESSED AIR—Waterworks; WATER STORAGE; WATER SUPPLY—Tall Buildings.**

**Concord, N. H.**—Concord, N. H., Water Department. Illustrated description of a plant that has been in use about four years and is satisfactory in every respect. 1200 w. Fire & Water—March 13, 1897.

**Consumption.**—See **WATER SUPPLY; WATER WASTE.**

**Council Grove, Kan.**—Improvements of the Waterworks of Council Grove, Kan. L. I. Tribus. Describes improvements to a river supply in an alluvial region, with fairly satisfactory results. Ill. 1500 w. Eng News—Dec. 15, 1898.

**Crisfield, Md.**—The Waterworks of Crisfield, Md. Illustrated description of small works using air lifts for pumping wells. 1000 w. Eng Rec—June 2, 1900.

**Danville, Ill.**—Private versus Municipal Ownership. C. W. Tooke. A review of the Danville, Ill., water case. 2500 w. Munic Engng—Sept., 1899.

**Dayton, O.**—Water Supply Progress at Dayton. Extracts from the annual report showing constant progress. 1500 w. Fire & Water—Sept. 1, 1900.

**Delhi-India.**—Delhi Waterworks Scheme. B. Parkes. Review of a report submitted to the Delhi (India) Municipal committee, in which it is proposed, under peculiar and interesting conditions to obtain a supply for the city from a group of 211 connecting wells. A map of the district and of the city accompanies the report. Serial. Ind Engng—March 7, 1896.

**Denver, Colo.**—Denver and Its Water System. Brief account of the water supply of this city. 1200 w. Fire & Water—Feb. 4, 1899.

Notes on the Water Supply of Denver, Colo. Information concerning some of the interesting parts of the system, with cuts of the new masonry dam. 1800 w. Eng News—Feb. 25, 1897.

**Detroit.**—See **WATERWORKS MANAGEMENT.**

**Distribution.**—Some Notes on the Design of Waterworks Distribution Systems. Gardner S. Williams. Considers the essentials of this question. Also discussion. 7500 w. Jour N E Waterworks Assn—Dec., 1899.

I. Notes and Distribution. J. Shaw. II. Electrical Water-Level Recorders. W. Coles Finch. Abstracts of two papers read before the British Assn. of Waterworks Engs., with discussion. The first paper describes an ideal service reservoir, and discusses the factors which have to be considered in laying out the distributing mains. The second describes the construction and use of instrument named. 4300 w. Jour Gas Lgt—Aug. 24, 1897.

See also **Dual Distribution; Fire Service; WATER PIPE.**

**Distribution Test.**—Testing Water Pipe Distribution Systems. F. L. Fuller. Describes the manner of testing pipe systems used by the writer with very satisfactory results. Discussion follows. Ill. 3000 w. Jour N Eng Waterworks Assn—June, 1897.

Test of a Pipe Distribution System. James S. Haring. Description of method of detecting defective pipes, valves, and hydrants, with an account of unusual failures of valves. 1700 w. Eng Rec—July 30, 1898.

**Dresden, Saxony.**—Additional Water Supply Works for Dresden, Germany. Abstracted from a paper by Chief Engineer Vacherot before the Dresden Bezirksverein and published in "Zeitschrift des Vereines Deutscher Ingenieure." Illustrates and describes a pumping plant drawing water from infiltration wells, sunk along the banks of the river Elbe. 800 w. Eng News—Sept. 7, 1899.

The Dresden Waterworks. James H. Fuertes. Illustrated description of some of the largest ground-water works now in service. 10000 w. Eng Rec—Dec. 30, 1899.

Dresdener Wasserwerk). A description, by Chief Engineer Vacherot, of the new system of wells and pumping engines by which the city of Dresden is supplied with water. 3000 w. 1 plate. Zeitschr d Ver Deutscher Ing—July 1, 1899.

**Dual Distribution.**—Auxiliary Water Supplies. Describes works for supplying water for other than domestic purposes in Bournemouth, Great Yarmouth, Calcutta, and Richmond. 1200 w. Eng Rec—Sept. 2, 1899.

Pure Water for Drinking and Cooking. S. P. Axtell. Showing the importance to municipalities of adopting a dual water supply system. 3200 w. Eng Mag—April, 1896.

**Duluth, Minn.**—The Municipal Waterworks of the City of Duluth, Minn. W. B. Patton. Describes the situation, geology and topography of the city, giving the history of the water supply, and the plans for an independent system covering the whole city. Ill. 5500 w. Eng News—May 5, 1898.

The New Duluth Waterworks. Illustrated description of the riveted steel intake with flexible and hook joints, pumping station, force main, frost boxes on bridges, and other features. 2800 w. Eng Rec—Jan. 21, 1899.

**East Jersey.**—The East Jersey Water Company's Hydraulic Plant at Little Falls, N. J. Illustrated description of a station designed to have an ultimate capacity of 120,000,000 gals. daily, and fitted with turbines and power pumps designed by Prof. A. Riedler. 2000 w. Eng Rec—July 8, 1899.

See also **PUMPING STATION—Little Falls, N. J.; WATER FLOW; WATER SUPPLY—Jersey City.**

**Edinburgh.**—The Waterworks of Edinburgh. James H. Fuertes. Illustrated description of the system adopted. Serial. Eng Rec—Oct. 29, 1898.

**Electric Heating.**—See **ELECTRIC HEATING—Marquette Waterworks.**

**Electric Stations Combined.**—See **ELECTRIC STATION—Waterworks.**

**Erie, Pa.**—Erie, Pa., Waterworks. Illustrated detailed description. Serial. Fire & Water—March 21, 1896.

See also **INTAKE; WATERWORKS MANAGEMENT.**

**Faesz, Hungary.**—The Water Supply System of Faesz (Die Wasserversorgungs-Anlage der Gemeinde Faesz). An illustrated account of a small water supply and sewerage plant at Faesz near Veszprem, in Hungary. 3500 w. Zeitschr d Oesterr Ing u Arch Ver—Dec. 2, 1898.

**Faulty Construction.**—Faulty Construction in Waterworks Plants—Its Effects upon Fire Departments and Cost of Insurance. William L. Cameron. Read at convention of American Waterworks Assn., at Denver, Colo. Briefly reviews some of the causes of poor construction. 1100 w. Fire & Water—Aug. 7, 1897.

**Filtration.**—See **FILTRATION.**

**Fire Hydrant.**—A Special Street Fire Hydrant. Illustrated description of a special form of hydrant developed in Providence, R. I., where the water pressure in the business districts is delivered at a pressure of 105 lbs. per square inch. 700 w. Eng Rec—Oct. 3, 1896.

See also **FIRE HYDRANT; HYDRANT.**

**Fire Service.**—Supplementary Water Mains for Fire Protection. Extracts from report of Foster Crowell. Describes the systems in use in Cleveland, Milwaukee, Detroit, Buffalo, and Boston. 3800 w. Eng Rec—Jan. 8, 1898.

Pipe Distribution and Water Supply for Fire Service. William Perry. The different systems in use are named and preference given to the gravity system. The carrying out of such a system in all its details forms the subject of the body of the article. 1400 w. Can Eng—March, 1896.

Auxiliary Pipe Systems for Extinguishing Fires. Editorial on the inadequacy for fire-extinguishing purposes of the pressure in the small pipe systems. Suggested by the recent fire at Greenpoint, N. Y. 700 w. Eng News—April 19, 1900.

See also **FIRE HYDRANT; FIRE PROTECTION; STANDPIPE; WATERWORKS LAW.**

**Fire Service, Providence, R. I.**—Rules for the Use of Private Fire Supplies, Providence Waterworks.

Reprinted from the official rules issued by Robert E. Smith, Commissioner of Public Works. 900 w. Eng News—Oct. 28, 1897.

Description of the Separate High Pressure Fire Service System of Providence, R. I. Edmund B. Weston. Gives plan showing pipe and hydrants, and illustrates the design of joints and the manner of securing curved pipe. 3000 w. Jour N Eng Waterworks Assn—Dec., 1898.

The Separate High-Pressure Fire Service System at Providence, R. I. Information of this recently completed work, the area covered, length of pipe, pressure, cost, etc. Ill. 1100 w. Eng News—March 24, 1898.

**Florence, Colo.**—Florence, Colo., Waterworks. R. P. Garrett. Illustrated description of a plant noteworthy for having a submerged dam to force ground water to the surface, and a gravity main about 7 miles long, of vitrified clay pipe. 1500 w. Eng Rec—Feb. 10, 1900.

**Frankfort, Germany.**—The New Waterworks of Frankfort, Germany. James H. Fuertes. Illustrated description of a novel driven-well plant. 900 w. Eng Rec—May 21, 1898.

**Fulda, Minn.**—The Fulda, Minn., Waterworks. Illustrated detailed description. 1500 w. Eng Rec—Nov. 16, 1895.

**Gainsborough, Eng.**—The Gainsborough Waterworks. A brief explanation of the scheme for extending these works, and the vicissitudes through which it has passed, with an account of the recovery of a boring tool that was lost at a depth of 725 feet, on April 1, 1897. 1300 w. Jour Gas Lgt—Feb. 7, 1899.

**Galveston, Texas.**—The Galveston Waterworks. Illustrated description. Part first contains history of development and investigation, map and profile, proposed and adopted location of wells, designed and constructed standpipe, suction well, determination of size of conduit and analysis of engine requirements. Serial. Eng Rec—July 18, 1896.

**Glasgow.**—The Water Supply of the City of Glasgow. Benjamin Taylor. A beautifully illustrated article showing the construction of the great aqueduct by which the water of Loch Katrine is brought to the city of Glasgow by gravity. 4000 w. Eng Mag—Sept., 1899.

The Glasgow Waterworks. James M. Gale. Describes the district from which the water supply is drawn, the means taken to secure it, and the works. 4500 w. Jour N Eng Waterworks Assn—March, 1900.

Glasgow Waterworks. James H. Fuertes. An account of the water supply and the construction of the new reservoir, work on which has been in progress for 13 years, with the general plan of the works. 1200 w. Eng Rec—Aug. 6, 1898.

New Waterworks Extension in Glasgow. J. A. Stewart. Brief illustrated account of an extension of more than local importance to cost $5,000,000. 1200 w. Sci Am Sup—Aug. 18, 1900.

See also **WATER FLOW—Loch Katrine Aqueduct.**

**Gloucester, Mass.**—The Appraisal of the Gloucester Waterworks. A review of the principles adopted by the commissioners appointed to bear testimony and appraise the value of a private water company. 1700 w. Eng Rec—Aug. 19, 1899.

**Godalming, Eng.**—Godalming Waterworks. An account of the conditions in an English town, and the means taken to increase the supply. Serial. Engng—Aug. 3, 1900.

**Gosport, Eng.**—New Works for the Water Supply at Gosport. E. T. Hildred. Read at meeting of the British Assn. of Waterworks Engs. Abstract. Description and discussion. 3500 w. Jour Gas Lgt—June 21, 1898.

**Grafton, W. Va.**—The Grafton, W. Va., Waterworks. Illustrated description of a plant stated to represent standard practice for small works. 600 w. Eng Rec—Nov. 19, 1898.

**Great Lakes Cities.**—See **Buffalo; Cleveland; Erie; INTAKE.**

**Halle, Germany.**—See **GAS WORKS.**

**Hamilton, Ohio.**—Hamilton and Its Waterworks. Illustrated description of an artesian well supply system. 1200 w. Fire & Water—April 30, 1898.

**Hampton Court, Eng.**—How Wolsey Obtained the Water Supply for Hampton Court. From the "Survey Comet." Brief historical account of the early water supply of this palace, with remarks on the value of the pipe and excellence of the work. 600 w. San Rec—May 13, 1898.

**Havana, Cuba.**—The New Waterworks of Havana, Cuba. E. Sherman Gould. Illustrated detailed description. 5000 w. Trans Am Soc of Civ Engs—Aug., 1896.

The Water Supply of a Tropical City. Raimundo Cabrera. Describing the construction of the famous Canal de Vento at Havana. Ill. 3800 w. Eng Mag—Oct., 1896.

**Hereford City, Eng.**—Hereford City Waterworks. Illustrated description of the two engines substituted for two single cylinder condensing beam engines which previously did the work, and the economy resulting. 1500 w. Engr, Lond—July 30, 1897.

**History.**—Early Methods of Collecting, Storing, and Distributing Water. William R. Hill. Read at meeting of Am. Waterworks Assn. Reviews the ancient works of various countries, showing advances made. 4000 w. Munic Engng—July, 1898.

Early Waterworks Plants. Extracts from a paper by William R. Hill presented at the Buffalo meeting of the Am. Waterworks Assn. Interesting historical review of skill in obtaining water. Serial. Fire & Water—Aug. 6, 1898.

Early Methods of Collecting, Storing, and Distributing Water. W. R. Hill. Introductory remarks with description of the earliest construction work is given in part first. Serial. San Rec—Dec. 23, 1898.

Evolutions of Water Supplies. J. T. Fanning. Abstract of a paper delivered before the Indianapolis convention of the Am. Waterworks Assn. Some interesting facts. 1200 w. Eng Rec—Aug. 1, 1896.

Potable Water: Its Supply and Distribution. W. J. Eden Crane. Reviews the various appliances and conductors for furnishing the people with drinking water and water for other purposes, since the earliest times. Ill. 3800 w. Ill Car & Build—April 22, 1898.

Water Supply, Past and Present. Interesting historical account, touching on its combination with architecture. 1600 w. Ill Car & Build—Dec. 20, 1895.

See also **Hampton Court; Rome; WATER WASTE—Olden Time.**

**Hollister, Cal.**—The Waterworks at Hollister, Cal. C. E. Grunsky. Illustrated description, calling attention to special features. 1500 w. Eng News—May 6, 1897.

**Hydraulic Ram.**—See **HYDRAULIC RAM—Waterworks.**

**Ilkeston, Eng.**—See **WELL.**

**Intake Tunnel.**—See **Buffalo; Cincinnati; Erie; North Tonawanda; Richmond, Va.; Toledo, O.; INTAKE.**

**Jersey City, N. J.**—The Jersey City Waterworks. Illustrated description of the 50,000,000 gal. gravity works now under construction, which include a masonry dam over 100 ft. high, an aqueduct of riveted steel pipe and masonry and a long tunnel. 4000 w. Eng Rec—July 21, 1900.

See also **WATER SUPPLY.**

**Kalbe, Germany.**—See **WATER TOWER—Concrete Reinforced.**

**Khandwa, India.**—Khandwa Waterworks. L. M. St. Clair. History of the present town supply, quantity of water available, and schemes proposed for its improvement, with description of new works to be opened. Map. Serial. Ind Engng—March 27, 1897.

**Kingston, N. Y.**—The Kingston, N. Y., Waterworks. Describes a 40,000,000 gallon reservoir and mechanical filter plant. Ill. 2000 w. Eng Rec—March 19, 1898.

**Kowloon, India.**—The Kowloon Waterworks. W. Cheetham. Brief description of these works in India, with costs. 800 w. Ind Engng—Sept. 25, 1897.

**Kunhardt Estate.**—Water Supply and Sewerage of the Kunhardt Estate. Illustrated description of a complicated system for a large country place. 1500 w. Eng Rec—June 18, 1898.

**Landsberg, Prussia.**—The Waterworks of the City of Landsberg on the Wartha, Prussia (Das Wasserwerk der Stadt Landsberg a. d. W.). With full details of wells, pumping station and distribution for this city of 30,000 inhabitants. Two articles. 1 plate. 5000 w. Gesundheits Ingenieur—Nov. 30, Dec. 15, 1897.

Asia Minor. Edward Wegmann. Illustrated description of aqueduct and inverted siphon of stone blocks 7,000 meters long. 1200 w. Eng Rec—Sept. 16, 1899.

**Latrobe, Pa.**—New Waterworks, Latrobe, Pa. Illustrated description of a pumping plant with unusually complete piping for a small station, a reservoir, with concrete and brick lining, and a by-pass for pumping around and much higher than the reservoir to obtain extra head in case of fire. 1200 w. Eng Rec—March 31, 1900.

**Lawrence, Mass.**—The New High-Service System, Lawrence, Mass. Illustrated description of works chiefly noteworthy for an enclosed standpipe, which is described in some detail. 1700 w. Eng Rec—March 25, 1899.

**Lead Poisoning.**—See **WATER SUPPLY.**

**Leicester, Eng.**—Leicester Waterworks. Illustrated general description of a pumping engine recently installed at Leicester. 900 w. Eng, Lond—Nov. 29, 1895.

Leicester Waterworks. Illustrated detailed description. 2300 w. Eng, Lond—Oct. 9, 1896.

**Leighton Buzzard, Eng.**—Water Supply from the Lower Greensand at Leighton Buzzard. H. Bertram Nichols. Read at meeting of the British Assn. of Waterworks Engs. A statement of the conditions of the supply of the named town, with analysis of the water. Discussion. 6800 w. Jour Gas Lgt—Dec. 20, 1898.

The Waterworks of Leighton Buzzard, England. Illustrated description of a plant noteworthy for a water tower with a gas engine pumping plant within its base. The tank is arranged so as to partly eliminate the iron salts dissolved in water. 1200 w. Eng Rec—Aug. 25, 1900.

**Level Recorders.**—See **Distribution; WATER FLOW—Schultze; WATER LEVEL INDICATOR.**

**Liverpool.**—The Vyrnwy Works for the Water Supply of Liverpool. G. F. Deacon. Abstract of paper read before the Inst. of Civ. Engs. Descriptive. 800 w. Col Guard—May 8, 1896.

**Lowell, Mass.**—The Lowell, Mass., Waterworks. Describes and illustrates a notable increase in the driven well system of this city already noted for its driven-well system and its filtration methods. 700 w. Fire & Water—April 18, 1896.

Lowell, Mass., and Its Water Supply. Extracts from the last annual report showing a flourishing condition from a financial standpoint. Ill. 500 w. Fire & Water—June 16, 1900.

See also **WELL.**

**Lynn, Mass.**—See **WATER SUPPLY.**

**Madison, Wis.**—Report of the Water Board of Madison. Account of recent improvements and related matters. Ill. 1600 w. Fire & Water—May 17, 1898.

Municipal Ownership of Waterworks. John B. Heim. States the results at Madison, Wis., showing the advantage when they can be placed on a business basis. 1500 w. Munic Engng—Aug., 1899.

**Management.**—See **WATERWORKS MANAGEMENT.**

**Manchester, Eng.**—The Thirlmere Works for the Water Supply of Manchester. G. H. Hill. Read before the Inst. of Civ. Engs. Abstract. General description. 1000 w. Col Guard—May 8, 1896.

The Water Supply of Manchester, England. James H. Fuertes. Brief description of old and new works. 700 w. Eng Rec—June 4, 1898.

**Marquette, Mich.**—See **ELECTRIC HEATING.**

**Media, Pa.**—The Waterworks of Media, Pa. Illustrated description of a plant containing a number of novel features for the regulation of the supply for high and low service districts, with the results of a test of the pumping plant. 1800 w. Eng Rec—Dec. 2, 1899.

**Meerut, India.**—Meerut Waterworks. A short description of the plant, with illustration. 600 w. Ind Engng—Oct. 31, 1896.

Meerut Waterworks. Brief account, with general plan of site. 800 w. Ind Engng—Oct. 24, 1896.

**Merthyr Tydfil, Wales.**—The Waterworks of Merthyr Tydfil. Illustrated description of works mainly noteworthy for an overflow masonry dam 84-ft. high, built of hydraulic lime concrete, being the second British structure of the kind in which March 10, 1900.

**Meters.**—See **WATER METER; WATER WASTE; WATERWORKS MANAGEMENT.**

**Montreal.**—The Montreal Waterworks. John Kennedy. History and general description, including the aqueduct and pumping machinery. 8000 w. Can Eng—Feb., 1896.

**Munich, Germany.**—The Waterworks of Munich, Germany. James H. Fuertes. Illustrates a plant for collecting about 50,000,000 gallons of ground water daily. 900 w. Eng Rec—June 25, 1898.

**Municipal.**—Town Waterworks from a Financial Standpoint. W. L. Hedenburg. Shows that a town need not necessarily lay out a large sum of money in a pumping plant, nor pay a heavy tax for operating expenses. 2000 w. Munic Engng—Dec., 1898.

The Terms of Purchase of Municipal Water Undertakings. List, prepared by order of London County Council, of the county boroughs in which the waterworks have been purchased, with the date, and remarks briefly setting forth the conditions and terms. 4300 w. Jour Gas Lgt—Feb. 16, 1897.

See also **Cologne; Concord; Danville, Ill.; Madison, Wis.; Newark, N. J.; Portland, Ore.; San Diego; Syracuse, N. Y.; Toledo, O.; Watertown, Mass.; MUNICIPAL OWNERSHIP; WATERWORKS LAW; WATERWORKS MANAGEMENT.**

**Newark, N. J.**—Newark Owns Its Waterworks. Illustrated description of a nine and a half million dollar plant. 110 w. Fire & Water—Oct. 20, 1900.

Newark's Water Supply. Illustrated description of waterworks at Newark, N. J. 1200 w. Fire & Water—Oct. 3, 1896.

See also **East Jersey; WATER POLLUTION.**

**New Bedford, Mass.**—The Further Water Supply of the City of New Bedford, Now Being Constructed. Edmund Wood. A rapid review of the work, dwelling only on those things which may be of more especial interest. Also discussion. 7800 w. Jour N Eng Waterworks Assn—March, 1897.

**New England Association.**—See **WATERWORKS ASSOCIATION.**

**Newport, Kentucky.**—See **WATERWORKS MANAGEMENT.**

**Newport, N. H.**—Construction of the Newport, N. H., Waterworks. Lucian A. Taylor. Describes the works. Discussion. 3500 w. Jour N Eng Waterworks Assn—March, 1898.

**Newton, N. J.**—The Newton, N. J., Waterworks. Illustrated detailed description. 3300 w. Eng Rec—Feb. 15, 1896.

**New York.**—See **AQUEDUCT—Croton; DAM—Croton; WATER SUPPLY; WATER WASTE; WATERWORKS MANAGEMENT.**

**Norfolk, Va.**—Norfolk, Va., Waterworks. Illustrated general description. Serial. Fire & Water—May 16, 1896.

**North Tonawanda, N. Y.**—The North Tonawanda, N. Y., Waterworks. T. W. Barrally. Illustrated description of a new plant with an unusual protective intake pier, riveted steel intake, and about 16 miles of wood distributing mains. 2200 w. Eng Rec—Nov. 12, 1898.

**Ogden, Utah.**—The Water Supply System of Ogden, Utah. W. P. Hardesty. Illustrated description of present system prefaced by a brief description of the old system, now suspended. 2000 w. Eng News—May 21, 1896.

See also **WATER FLOW—Pipe Line; WATERWORKS LAW.**

**Olean, N. Y.**—See **WELL.**

**Omaha, Neb.**—Omaha, Neb., City Waterworks. Owen T. Smith. Development, general design and construction, pumps, pipe line, settling, aeration, general plan and section of basins and arrangement of pipes at pump-house. Serial. Eng Rec—Sept. 12, 1896.

Facts Regarding the Omaha Waterworks. Howard Mansfield. A statement called forth by an article published in this paper which the writer claims is a misrepresentation. 1600 w. Eng Rec—Feb. 6, 1897.

The Waterworks Question in Omaha. Report with editorial comment. 4800 w. Eng Rec—Jan. 9, 1897.

**Orange, N. J.—The Orange Waterworks Extension.**

old abandoned reservoir at higher elevation to furnish water for driving pumps for new supply. 2300 w. Eng Rec—Oct. 27, 1900.

**Ostrawa, Moravia.**—Plant for Increasing the Pressure at Ostrawa, Moravia (Druckerhöhungsanlagen in Mähren-Ostrau). K. Czerwenka. Illustrated description of an economical method of increasing the pressure by one atmosphere at a small waterworks. 800 w. 1 plate. Oesterr Monatschr f d Oeffent Baudienst—April, 1900.

**Panama.**—Waterworks in Panama. Printed translation of the invitation for bids to build the aqueduct to supply the city with water. 3800 w. U S Cons Repts, No. 580—Nov. 15, 1899.

**Peshawar, India.**—Peshawar City Water Supply Project. Rai Bahadur Gauga Ram. Illustrated description, with editorial. First part gives description of the city and an account of the habits of the people. 2700 w. Ind Engng—July 25, 1896.

**Petrolea, Ont.**—The Petrolea Waterworks. Gives the plan adopted, describing the work. 2000 w. Can Eng—Nov., 1897.

**Philadelphia.**—See **WATER SUPPLY; WATERWORKS MANAGEMENT.**

**Plymouth, Eng.**—The Waterworks of Plymouth, England. Illustrates and describes two dams of unusual construction. 2000 w. Eng Rec—Jan. 28, 1899.

Plymouth Waterworks. Gives a brief account of the celebration in honor of the completion of the new reservoir in Dartmoor, and outline of the history of the water supply of Plymouth, Eng., with illustrations. Serial. Engng—Sept. 23, 1898.

**Portland, Eng.**—The Waterworks of Portland, England. Illustrated description of works drawing a supply from a well with headings run out from it; the covered reservoir is of unusual design on account of its combination of a circular ground plan with barrel-arch roof. 2000 w. Eng Rec—Jan. 13, 1900.

**Portland, Ore.**—Portland's Perfect Water System. Brief account of the receipts from the municipal plant, with description. 800 w. Fire & Water—Aug. 27, 1898.

Water Supply of Portland, Ore. A detailed illustrated description. Serial. Fire & Water—Nov. 23, 1895.

See also **WATER FLOW—Iron Pipe.**

**Prenzlau, Prussia.**—The Waterworks of the City of Prenzlau (Das Wasserwerk der Stadt Prenzlau). H. Scheven. The supply is obtained partly from springs and partly by the use of filtered water from Lake Uecker. Details of the filtering and aerating plant are given. 2000 w. Zeitschr d Ver Deutscher Ing—Jan. 13, 1900.

**Rhinelander, Wis.**—The Rhinelander, Wis., Waterworks. Detailed illustrated description. 400 w. Eng Rec—Nov. 30, 1895.

**Richmond, Va.**—Richmond's Model Water System. An illustrated detailed description of the municipal plant. 2000 w. Fire & Water—May 12, 1900.

**Ripley, N. Y.**—The Waterworks and Filter Plant of Ripley, N. Y. E. A. Wilder. Describes the locality and conditions which were unusual, but successfully overcome by the use of a shield. Also describes the filter which had a capacity of 200,000 gallons per day. Ill. 2800 w. Eng News—June 9, 1898.

**Rochester, N. Y.**—A Few Considerations of Municipal Water Supply, with Special Reference to That of Rochester, N. Y. E. Kuichling. Briefly notices a few of the problems of water supply engineering, discusses the quality and quantity of the Rochester supply, and gives the general design and construction of the works. Ill. 4400 w. Trans Assn of Civ Engs of Cornell Univ—1898.

Rochester and Its Waterworks. Extracts from the annual report of Chief Engineer Kuichling. 2800 w. Fire & Water—Dec. 17, 1898.

See also **WATER FLOW; WATER PIPE; WATERWORKS MANAGEMENT.**

**Rockford, Ill.**—The Rockford Waterworks, Rockford, Ill. C. C. Stowell. Descriptive and statistical, with discussion by members. 4000 w. 10th An Rept of Ill Soc of Eng & Surv, 1895.

Increasing the Water Supply of Rockford. Gives the general plan of the work, with suggestions for the avoidance of waste. Ill. 1200 w. Fire & Water—April 30, 1898.

ford's New Waterworks. On the difficulties encountered and overcome in the construction of the new water supply plant. Ill. 1300 w. Munic Engng—April, 1899.

The New Water Supply System of Rockford, Ill. Gives an outline of the various attempts made to supply this city with an abundance of pure water, and gives an illustrated description of the interesting plant for supplying artesian water. 2500 w. Eng News—July 13, 1899.

See also **PUMPING STATION.**

**Rome.**—The Water Supply of Rome. Henry Leffmann. Description of ancient waterworks of Rome, compiled from a variety of sources which the author names, and which form a sort of bibliography of the subject. 3500 w. Pro Eng's Club of Phila—July, 1896.

The Water Supply of Rome. Jas. H. Fuertes. A description of the ancient and modern aqueducts, with map, showing the sources of Roman water supplies. 1800 w. Eng Rec—Sept. 17, 1898.

See also **PAVEMENT—European Cities.**

**Russia.**—Waterworks in Russian Cities. Translation of the specifications for the proposed works for the city of Nicolaiev, Russia. 1300 w. U S Cons Repts, No. 450—June 13, 1899.

**St. Catherines, Ont.**—St. Catherines, Ont., Waterworks. Illustrated general description. Serial. Fire & Water—May 9, 1896.

**St. Etienne, France.**—The Water Supply of St. Etienne, France. James H. Fuertes. Describes two remarkable reservoirs. 800 w. Eng Rec—May 28, 1898.

**St. Joseph, Mo.**—St. Joseph's Valuable Water Plant. An account of the plant and the expensive additions made. New pumps, new filtering plant, many miles of new mains, etc. 1200 w. Fire & Water—May 28, 1898.

**St. Louis, Mo.**—Waterworks of St. Louis. Illustrated description of works for a city having an average daily consumption of 55,000,000 gallons. Serial. Fire & Water—Feb. 12, 1898.

The St. Louis Waterworks. Editorial on proposal to prevent alienation of works except by popular vote. 700 w. Eng Rec—July 9, 1898.

See also **FILTRATION.**

**St. Paul, Minn.**—St. Paul Waterworks. John Caulfield. Historical account, with description of sources of supply, quality of water, plant, etc. Ill. 3000 w. Fire & Water—May 29, 1897.

**Salem, Mass.**—Salem, Mass., Waterworks. Illustrated description. The first part deals principally with installations, costs, and capacities. It is illustrated with portraits of the Salem water board, the building at the pumping station, the Worthington engine—in use since 1868—and a view of Lake Wenham, whence supply is derived. Serial. Fire & Water—April 25, 1896.

**Salt Lake City.**—The Water Supply System of Salt Lake City, Utah. W. P. Hardesty. Illustrated description. 4000 w. Eng News—Oct. 22, 1896.

**San Diego, Cal.**—The Water Supply for San Diego, Cal. The steps taken toward municipal ownership of the waterworks. The developing the supply includes a rock-fill dam with an asphalt face 3100 ft. above the sea, and some 50 miles of conduit. 700 w. Eng News—Aug. 6, 1896.

See also **WATER RATES.**

**San Francisco.**—See **WATER SUPPLY.**

**San Juan, Porto Rico.**—The Waterworks of San Juan. William Dinwiddie. A brief description of the works approaching completion which it is hoped will furnish the much-needed pure water. 1000 w. Harper's Wk—Dec. 24, 1898.

See also **SAN JUAN.**

**Scranton, Pa.**—Scranton, Pa., Water Supply. Illustrated description. 800 w. Fire & Water—Sept. 19, 1896.

**Screens.**—Screens and Screen Lifters; Metropolitan Waterworks, Boston and Vicinity. Chas. W. Sherman. An illustrated description of a standard design of screen, and a mechanical device for handling screens. 500 w. Eng News—Sept. 27, 1900.

**Simla, India.**—The Simla Water Supply. Information from the Annual Report of the Simla Municipality regarding the working of the water supply system, and the proposed extension of the works. 2400 w. Ind Engng—Aug. 21, 1897.

Simla Waterworks. C. E. V. Goument. Illustrates and describes the new works. 2700 w. Ind & East Eng—Dec., 1898.

The Simla Waterworks. An account, by Chas. E. V. Goument of the plant for the very varying demands of this summer resort of India. 3000 w. Eng Rec—Sept. 10, 1898.

**Standpipe.**—See **STANDPIPE; WATER TOWER.**

**Steubenville, O.**—Water System of Steubenville, O. Part first gives a brief historical review of the waterworks systems dating back to 1810, with illustrations. Serial. Fire & Water—March 5, 1898.

The Steubenville, Ohio, Waterworks. Illustrates and describes the new plant in use since 1895. 2000 w. Eng Rec—Sept. 24, 1898.

**Stockport, Eng.**—The Stockport District Waterworks: Description of Borehole, etc., near Wilmslow. T. Molyneux. Abstract of paper read before the Brit. Assn. of Waterworks Engs. Description of a well 180 feet deep, and nine inches in diameter, from which water is raised 120 feet to the surface by a lift-pump at the rate of more than 750,000 gallons per day. Also discussion. 2400 w. Jour Gas Lgt—Aug. 4, 1896.

**Syracuse, N. Y.**—Syracuse Waterworks. W. R. Hill. General description with illustrations. 2700 w. Fire & Water—Sept. 9, 1899.

The Syracuse Waterworks. Illustrated detailed description. 4000 w. Eng Rec—March 21, 1896.

Syracuse and Its Water Supply. Illustrated description. 2000 w. Fire & Water—Oct. 24, 1896.

Syracuse, N. Y., Waterworks. William R. Hill. Historical account, with description, cost, rates, consumption, etc. Ill. 3300 w. Fire & Water—Oct. 2, 1897.

Syracuse Water Supply. James H. Hamilton. Reviews the benefits derived from municipal ownership. 3500 w. Munic Af—March, 1900.

See also **WATERWORKS MANAGEMENT.**

**Tall Building.**—See **WATER SUPPLY.**

**Tampico, Mexico.**—Waterworks and Sewerage in Tampico. Gives a translation of advertisement for bids on work of estimated value of $800,000. 600 w. U S Cons Repts, No. 548—Oct. 9, 1899.

**Taxation.**—The Rating of Water Undertakings. F. J. Bancroft. Read before the British Assn. of Waterworks Engs. An explanation and discussion of British practice. 11000 w. Jour Gas Lgt —July 3, 1900.

See also **Municipal; Valuation; WATERWORKS LAW; WATERWORKS MANAGEMENT.**

**Thirlmere, Eng.**—See **Manchester.**

**Toledo, O.**—Toledo, O., Waterworks. Illustrated detailed description. The department is said not only to pay its own way, but also to make large profits. 1700 w. Fire & Water—April 11, 1896.

**Toronto, Ont.**—Mr. Mansergh's Report on the Water Supply of Toronto. A most interesting and instructive document. The writer is an eminent English engineer, employed by the authorities of the city. 3000 w. Eng News—March 12, 1896.

Mr. Mansergh's Report on the Toronto Waterworks. Editorial review and summary of this able document. 2300 w. Eng Rec—March 14, 1896.

Water Supply of Toronto, Ont. An account of the cost of the water supply works, now owned by the city, and of an accident causing the breakage of a five-foot and a four-foot pipe. Ill. 1000 w. Fire & Water—March 27, 1897.

**Torquay, Eng.**—The Torquay Waterworks. W. Ingham. Read before the British Assn. of Waterworks Engs. An abstract of paper and discussion. Deals with the watersheds, mains, storage cisterns, etc. 3300 w. Jour Gas Lgt—Aug. 10, 1897.

**United States.**—See **American.**

**Valparaiso.**—Works for the Supply of Potable Water to Valparaiso, Chili (Travaux d'Adduction d'Eau Potable à Valparaiso, Chili). A. Marquand. Describing the dam, reservoir and aqueduct recently completed. A supply of over 22,000,000 gallons per day is rendered available by gravity from Penuelas, 12 miles distant. 3500 w. 1 plate. Génie Civil—March 12, 1898.

**Valuation.**—Valuation of Waterworks Property. Wynkoop Kiersted. Discusses the determining power of waterworks property. The difference between cost and value; the various methods of valuation, etc. 7000 w. Pro Am Soc of Civ Engs —March, 1897.

See also **Gloucester, Mass.; Taxation.**

**Vienna.**—The Works on the Vienna Water Supply (Die Arbeiten der Wienthal-Wasserleitung). An account of the four great reservoirs and filter plant now under construction, with plate of details of sand filter, and report of discussion. Five articles. 25000 w. Zeitschr d Oesterr Ing u Arch Ver—April 16, 24, 30, and May 7 and 14, 1897.

The Vienna High-Service Waterworks (Das Wasserwerk der Wiener Hochquellenleitung). Franz Borkowitz. An illustrated account of the Breitensee division of the Vienna water supply, with profile, plan of works, and section of the covered reservoir. 2000 w. 1 plate. Zeitschr d Oesterr Ing u Arch Ver—Aug. 19, 1898.

The Waterworks of the X. District, Vienna (Wasserwerk der Stadt Wien im X. Bezirk). Fr. Borkowitz. An illustrated description of this new secondary pumping station, with full details of the compound pumping engines and water tower, and data and results of tests. 3000 w. 4 plates. Zeitschr d Oesterr Ing u Arch Ver—Jan. 26, 1900.

The New Pumping Station and Water Tower in Vienna. Illustrated description from the "Zeitscrift d. Oest. Ing. u. Arch. Ver.," of an elaborate water tower with both Intze and annular tanks, and small pumping engines with mechanically controlled suction valves; the result of tests of the engines is also given. 1500 w. Eng Rec—Oct. 6, 1900.

See **PUMPING STATION; WATER SUPPLY; WATER TOWER.**

**Vyrnwy, Wales.**—See **Liverpool.**

**Watertown, Mass.**—The Transfer of the Watertown Waterworks. Describes the amicable transfer of a plant from private to public ownership. 1700 w. Eng Rec—March 18, 1899.

**Wellesley, Mass.**—Additional Water Supply of Wellesley. Describes the work of construction so successfully carried out, which consisted of driven wells connected with a suction main, and of a covered reservoir. 1300 w. Fire & Water—March 25, 1899.

**Wells.**—See **Camden, N. J.; Frankfort; Munich; ARTESIAN WELL; GROUND WATER; WATER POLLUTION; WATER SUPPLY; WELL.**

**Western Springs, Ill.**—Western Springs Water System. Ethan Philbrick. Description of a system of waterworks and sewerage for a small town, of unusual completeness, being as comprehensive in scope and detail as would usually be found provided for a town of ten times the population. 1400 w. 10th An Rept of Ill Soc of Eng & Surv, 1895.

**White Plains, N. Y.**—The White Plains Waterworks. Illustrated description of a low masonry dam, a unique method of increasing ground water supplies by the run-off from an adjacent catchment area and a special standpipe valve. 2700 w. Eng Rec—Aug. 25, 1900.

**Wyoming, O.**—See **WATERWORKS MANAGEMENT.**

**York, Pa.**—The Reconstruction of the York, Pa., Water Supply. John Birkinbine. Describes the method followed in correcting defects in a reservoir, and also the present plant. 4500 w. Pro Engs' Club of Phila—Jan., 1899.

The Waterworks of York, Pa. A description of the remarkable works built at this place in which the water was pumped 40 feet higher than needed and the reservoirs were constructed so as to be little better than sieves. 2000 w. Eng Rec—March 25, 1899.

See also **WATER POLLUTION.**

**Zürich.**—See **WATER SUPPLY.**

## WATERWORKS ASSOCIATION.

**New England.**—Annual Convention of the New England Waterworks Association. Abstracts of papers read at Rutland, Vt. 1500 w. Eng News—Sept. 27, 1900.

The New England Waterworks Association. Report of convention, giving abstracts of papers by L. P. Kinnicutt on bacterial sewage treatment in England to prevent pollution of rivers, and of M. Knowles on the efficiency of sand and mechanical filters at Pittsburg, with comparative tables. 4000 w. Eng Rec—Sept. 29, 1900.

## WATERWORKS LAW.

See also **GROUND WATER; WATER RATES; WATER RIGHTS; WATER SUPPLY—Protection; WATERWORKS—Municipal; Taxation; Watertown.**

**Beaver Falls, Pa.**—The Beaver Falls Waterworks Case. Reviews a Pennsylvania decision preventing a borough from building works when it has already given a company a franchise. 700 w. Eng Rec—Oct. 1, 1898.

Two Recent Legal Decisions Concerning the Sale of Water. Reviews decisions in Kansas and California affecting the business of water companies. 800 w. Eng Rec—Aug. 13, 1898.

**Cutting Off Supply.**—The Right to Shut Off Water. Abstract of ruling of Court of Appeals in an action to restrain the water commission of Albany, N. Y., from cutting off supply of a consumer refusing to pay charges for wasted water. 1100 w. Eng Rec—May 7, 1898.

**Danville, Illinois.**—An Important Waterworks Decision. Text of an important decision of the Illinois Supreme Court, rendered by Chief Justice Phillips, maintaining that the city has no more right to break a contract than a private party. 2500 w. Eng Rec—Nov. 20, 1897.

The Reversal of the Danville Waterworks Decision. Reviews an opinion of the Illinois Supreme Court which declares a contract between a water company and a city, running for several years, not binding so far as the schedule of rates in the contract is concerned. 1400 w. Eng Rec—April 8, 1899.

**Fire Protection.**—The Monroe Suit for Defective Fire Protection. Review of an opinion by the Louisiana Supreme Court, holding a private company responsible for deficient fire protection under both a general franchise and special contracts with individuals, while refusing to hold the city liable under like conditions. 1200 w. Eng Rec—June 2, 1900.

**Franchise.**—Municipal Franchise Contracts. H. E. Keeler. Read before the Am. Water Works Assn. Discusses the proper relations of municipalities and private water companies. 2800 w. Eng Rec—June 25, 1898.

The U. S. Supreme Court on the Rights of a Private Water Company. A review of an important decision restraining a city from building works after granting a franchise to a company. 2500 w. Eng Rec—Jan. 28, 1899.

**Georgia.**—"All Persons Who Deal With Public Officials Act at Their Peril." Review of an important decision by the Georgia Supreme Court annulling a contract between a city and a water company because it ran for a longer term than one year, and because certain preliminaries were irregular. 1500 w. Eng Rec—July 15, 1899.

**Hydrant Rentals.**—A Side Light on Hydrant Rentals. Review of a decision of the Supreme Court of Nebraska making all contract provisions in a water ordinance void unless clearly mentioned in the title. 800 w. Eng Rec—Jan. 14, 1899.

See also **HYDRANT.**

**Jersey City, N. J.**—See **WATER SUPPLY.**

**Little Falls, Minn.**—The Little Falls, Minn., Water Contract. The full text of a decision of the U. S. Circuit Court, denying the right of cities to abrogate long-time franchise contracts on the ground of excessive rates, without positively proving the charges to be exorbitant. 2500 w. Eng Rec—Aug. 25, 1900.

**Ogden.**—The Right to Lease Public Works. A decision of the Utah Supreme Court forbidding the lease of the Ogden waterworks to private parties. 1000 w. Eng Rec—May 14, 1898.

**Olean, N. Y.**—See **WELL.**

**Pollution.**—See **WATER POLLUTION—Ashland, Wis., WATER SUPPLY—Protection.**

**Protection of Supply.**—See **WATER SUPPLY—Protection.**

**Rogers Park, Ill.**—The Rogers Park Waterworks Case. Full text of a decision by the Illinois Supreme Court which declares not binding a contract between a local water company and the town of Rogers Park, now part of Chicago. 3000 w. Eng Rec—April 8, 1899.

**San Diego, Cal.**—See **WATER RATES.**

**WATERWORKS MANAGEMENT.**

See also **WATER METER; WATER RATES; WATER SUPPLY; WATER WASTE; WATERWORKS.**

The Financial Management of Waterworks. Freeman C. Coffin. Statistics dealing with municipal works only. The need of a consistent and generally accepted theory of management is shown and the nomenclature of waterworks management is defined. Discussion follows. 13000 w. Jour of New Eng Waterworks Assn—Sept., 1896.

The Financial Managements of Waterworks. Abstract of paper by Freeman C. Coffin, read before the New England Waterworks Assn. The purpose of the paper is to answer some important questions relating to receipts and expenditures, and the self-supporting or non-self-supporting character of munical waterworks systems. 2500 w. Eng Rec—June 20, 1896.

The Financial Management of Waterworks. Freeman C. Coffin. Abstract from paper read before the New England Waterworks Assn. Pertains wholly to municipal waterworks, and deals with several important questions relating thereto. 3400 w. Munic Engng—Oct., 1896.

Increased Revenues, Free Service Pipes and Filtration. Dow R. Gwinn. Read before the convention of the American Waterworks Assn. Describes the inducements offered to obtain customers, the manner and cost of laying service pipes, and the advantages of filtration. 1800 w. Fire & Water—June 12, 1897.

Water Supply. Editorial. General considerations relating to features of municipal engineering practice and apportionment of water rates. 1400 w. Engng—July 24, 1896.

**Consumption.**—See **WATER SUPPLY.**

**Detroit.**—Water Supply of Detroit, Michigan. Report of the prosperous condition of the works, the reduction of rates, improvements made, etc. Ill. 1100 w. Fire & Water—April 23, 1898.

See also **Record System; WATER PIPE.**

**Erie, Pa.**—Furnishing Water. William Himrod. Read at the Buffalo meeting of the Am. Water Works Assn. Some of the experiences of the water commissioners with their customers, giving an account of system of conducting the water business in Erie, Penn. 3300 w. Fire & Water—Aug. 6, 1898.

**Fire Service.**—See **WATERWORKS—Fire Service, WATERWORKS LAW.**

**Newport, Ky.**—A Lesson in Waterworks Management. An account of the partial wreck of a waterworks by incompetent management. 900 w. Eng Rec—June 17, 1899.

**New York.**—A Lesson in Waterworks Management. Illustrated article showing the economy with which the New York waterworks were managed whenever the commissioner was able to understand engineering reports and the waste which occurred at all other times. 800 w. Eng Rec—Nov. 11, 1899.

See also **WATER SUPPLY; WATER WASTE.**

**Philadelphia.**—Plain Talk from a Waterworks Manager. A résumé of the report of the chief of the Philadelphia water bureau concerning the result of the failure to provide money for repairs and improvements. 8000 w. Eng Rec—Feb. 11, 1899.

See also **WATER SUPPLY.**

**Records.**—Prize Waterworks Blanks and Records. Information sifted from replies received in a prize competition, aiming to provide a method of keeping the accounts that is better than any one method now in use. 2000 w. Munic Engng—March, 1897.

**Records, Index.**—The Best Method of Handling Applications and Permits of Water Companies. Describes and explains the use of the card index system for this purpose. 900 w. Munic Engng—Jan., 1898.

**Record System, Detroit.**—The Record System of the Waterworks Department, Detroit. Illustrates a method of keeping pipe records by note books and tracings. 2000 w. Eng Rec—Feb. 12, 1898.

**Rochester, N. Y.**—The Financial Management of Waterworks. E. Kuichling. A discussion of the administrative policy. 7000 w. Pro Am Soc of Civ Eng—April, 1897.

The Financial Management of Waterworks. E. Kuichling. Condensed from annual report of the Executive Board of the city of Rochester, N. Y. Discussion of how the works may be conducted on business principles. 3800 w. Munic Engng—Oct., 1897.

See also **WATERWORKS.**

**Syracuse Rules.**—Rules of Syracuse (N. Y.) Water Department. A copy of the rules and regulations which must be signed by all water takers. Serial. Fire & Water—March 26, 1898.

**Wyoming, Ohio.**—Free Water and Meterage in

### WATT.

See **STEAM ENGINE—History; WATER—Composition.**

### WATTMETER.

See **ELECTRIC METER.**

### WAVE.

See also **ELECTRO-PHYSICS; PHYSICS; RADIOGRAPHY.**

**Heat.**—See **HEAT RADIATION.**

**Longitudinal in Ether.**—On the Generation of Longitudinal Waves in Ether. Lord Kelvin. Paper read before the Royal Society. Showing an arrangement by which a large space of air is traversed by waves essentially longitudinal. 1200 w. Elec—March 25, 1896.

**Ocean.**—The Life History of an Ocean Wave. W. F. Durand. A study of the question how wind acting upon water gives rise to waves, a question never yet satisfactorily answered in detail. 2200 w. Sib Jour of Engng—April, 1896.

**Oil Action.**—See **OIL—Waves.**

**Protective Device.**—New Method of Diminishing the Force of Waves and Surf. An invention consisting of a floating net, retained on the surface of the water by outriggers, or by buoys. Ill. 1100 w. U S Cons Repts, No. 705—April 16, 1900.

### WAVE MOTOR.

See also **TIDE POWER; WAVE POWER; WAVE PROPULSION.**

**Fletcher.**—The Fletcher Wave Motor. An account of the experimental test recently made at Dover, England, describing the plant and the results of test. Ill. 1600 w. Elec Eng, N. Y.—Nov. 25, 1897.

**The Utilization of Wave Power.** Describes the working of the wave motors invented by B. Morley Fletcher. Ill. 2500 w. Ind & Ir—Oct. 29, 1897.

**The Utilization of Wave-Power.** The investigations of B. Morley Fletcher, with illustrated account of a successful visit recently paid to Spanish waters to demonstrate further the value of his invention. Ill. 1800 w. Ind & Ir—Sept. 30, 1898.

**Gerlach.**—Wave Motor Experiments. Illustrated description of Gerlach Wave Motor, and of a partially successful experiment with it, soon to be repeated under more favorable conditions. 1800 w. Jour of Elec—Jan. 1, 1896.

**Wright.**—Successful Tests of the Wright Wave Motor. Illustrates and describes this motor and its working, giving results of tests. 1000 w. Elec Eng, N. Y.—April 7, 1898.

### WAVE POWER.

See also **WAVE MOTOR; WAVE PROPULSION.**

Power from Ocean Waves. A method of utilizing swells, near shores, to pump water in large quantity to heads available for use in driving water-wheels. 400 w. Min & Sci Pr—Dec. 14, 1895.

Some General Notes on Ocean Waves and Wave Force. Theodore Cooper. A learned discussion, illustrated by diagrams, comprising formulae and examples of wave action and force compiled from a variety of sources. 6000 w. Trans Am Soc of Civ Eng—April, 1896.

**Buoy.**—See **BUOY—Wave Power.**

### WAVE PROPULSION.

The Wave Propelled Boat. Illustrates and describes a device attached to boats for producing motion, invented by H. F. L. Linden. 1100 w. Sci Am—Nov. 12, 1898.

### WEATHER BUREAU.

See also **METEOROLOGY.**

**United States.**—The United States Weather Bureau. E. T. Tefft. General popular description of the routine of service of observers. 1200 w. Yale Sci M—June, 1896.

### WEAVE SHED.

See also **ROOF—Saw-Tooth.**

**Grosvenordale, Conn.**—New Weave Shed and a Two-Phase Electric Power System for the Grosvenordale Mills. Illustrated description of a weave shed which is a departure from the ordinary

The Mechanical Advantage of the Wedge. W. W. F. Pullen. Showing the small mechanical advantage of the wedge. 900 w. Prac Eng—June 4, 1897.

**Mining.**—See **MINING—Wedge.**

**Quarrying.**—See **QUARRYING—Wedges.**

### WEIGH-BRIDGE.

Large Weighbridges. Illustrated description of a 110-ton railway weigh-bridge made for a large marine engineering firm, and a large hot iron plate weighing machine. 1400 w. Engr, Lond—May 4, 1900.

**Notes on Weigh-Bridges.** Oscar John Kirby. the two varieties are explained, and the difficulties that are met with, and means of overcoming them are given. 1800 w. Engr, Lond—Sept. 11, 1896.

### WEIGHING.

**Decimal Scales.**—Influence of the Position of Rods and Beams upon the Accuracy of Decimal Scales (Nachweisung des Einflusses des Anzugs der Zugstangen und des Ansteigens des Unterbalkens auf die Empfindlichkeit der Decimalwaagen). A highly mathematical treatment of the sources of error in so-called decimal weighing machines. 3500 w. Glaser's Annalen—Aug. 15, 1897.

**Track.**—Arrangement of Track Scales—Chicago, Lake Shore & Eastern Railway. Illustrates a highly satisfactory arrangement, the distinctive feature of which is the ease of operation and the handling of the cars. 600 w. R R Gaz—Sept. 15, 1899.

### WEIGHING MACHINE.

See also **SLOT MACHINERY; WEIGH-BRIDGE.**

A Power-Feed, Automatic Weighing Machine. Illustrated description of a machine made by the Pratt & Whitney Co., of Hartford, Conn., and designed by Francis H. Richards. 2300 w. R R Gaz—April 16, 1897.

**Coal.**—Automatic Coal-Weighing and Recording Machines. Charles Ingrey. Abstract of paper read at meeting of the Cleveland Inst. of Engs. The writer's views of what should constitute a perfect automatic coal-weighing and recording machine, describing one designed by himself, which he claimed fulfilled these conditions. 3000 w. Col Guard—April 6, 1900.

### WEIGHTS AND MEASURES.

See also **DECIMAL SYSTEM; ELECTRIC UNIT; GAUGE; MEASUREMENT; SCREW THREAD; UNIT.**

**Duodecimal System.**—A Possible Solution of the Problem of Weights and Measures. Sidney A. Reeve. An argument in favor of the duodecimal system and against the decimal system of weights and measures. 800 w. Eng News—July 30, 1896.

**Suggestions for a Duodecimal System of Notation,** Weights and Measures. G. Halliday. An article condemning the metric system, and suggesting the use of 12 as a base for a system and endeavoring to show that no very radical change is necessary for the adoption of such a system. 2800 w. Elec Eng, Lond—April 17, 1896.

**Evolution.**—Evolution of Standard Measurements. John A. Brashear. On the methods employed in all ages, the legislation, and the birth of the metric and foot rule. 5500 w. Am Mfr & Ir Wld—March 29, 1900.

**Foreign.**—Foreign Weights and Measures. Table embraces only such weights and measures as are given in consular reports and commercial relations. 700 w. U S Cons Repts—July, 1896.

**Inidikil System.**—The Inidikil System. A. Lincoln Hyde. Explains a decimal system of weights and measures for the English speaking people. 4300 w. Jour Assn of Engng Socs—July, 1900.

**Metric.**—Metric System. Discussion by members of the Engineers' Club of Philadelphia. A great diversity of views is manifested in the debate, but, on the whole, the weight of opinion seems against the passing of the bill relating to the compulsory adoption of the metric system. 2500 w. Am Mach—Aug. 27, 1896.

Metric System of Measurements Demanded. An argument against the adoption of the metric system in the United States. It is alleged that enthusiasts who do not realize at what cost a change of measurements would be effected. 1800 w. Loc Engng—April, 1896.

Progress of the Metric System in the United States. Abstract of the report of the committee on the metric system, presented at the Chicago meeting of the Am. Ry. Assn., showing its use to be confined to concerns which export to metric countries. 1300 w. Eng News—May 10, 1900.

The Decimal System in Engineering Measurement. Henry Riall Sankey. Read at Civil Engineers' Conference. Considers the advantage of the metric system and reports the results of its introduction into the works of Messrs. Willans and Robinson. Short discussion. 2000 w. Elec Eng, Lond—May 28, 1897.

The Metric System. A sharp criticism upon articles in the "Times" (London), charging that paper with criticising the decimal system, which, it is claimed, is by no means the same as the metric system. 2500 w. Engng—April 17, 1896.

The Metric System. Herbert Spencer. With a letter from Sir Frederick Bramwell. An argument against the adoption of the metric system, claiming that it does not fulfill the requirements of scientific and ideal perfection. 7800 w. Pop Sci M—June, 1896.

The Metric System Lunacy. Part first criticises statements made by Frederick A. P. Barnard, and arguments tending to show that the measurements now used are better. Serial. Engng Mech—Feb., 1897.

The Metric System of Weights and Measures. A deputation representing 46 Chambers of Commerce, waited upon Mr. Balfour, to urge the desirability of adopting the metric system of weights and measures. Abstract of remarks made by the committee and Mr. Balfour's reply. 4000 w. Nature—Nov. 28, 1895.

See also **SCREW THREAD.**

**Metric Electric Industries.**—The Metric System in Electrical Industries. F. S. Hickok. Read before the Chicago Elect. Assn. Discusses the inconvenience of multiple systems of measurement, and the effect, upon the general adoption of the metric system, of the present adoption of eight electrical units, based on the metric system of weights and measures. Serial. Elec—Jan. 20, 1897.

**Metric vs. English.**—Comparison in Practice of the Metric and English Systems of Weights and Measures. Arthur Lagron. An argument in favor of the metric system. The discussion by members brought out the difficulties that must be surmounted in introducing it into general practice in the United States. 2200 w. 10th An Rept of Ill Soc of Eng & Surv—1895.

The English and Metric Systems. Charles T. Porter. A defense of the English system, showing its convenient features and the inadaptibility of the metric system to many uses. 3500 w. Loc Engng—July, 1897.

**Standards.**—Uniformity of Standard. John A. Grier. Showing the importance and convenience of a standard of weights and measures, and of other standards used in business. 2000 w. Prac Eng—June 3, 1898.

See also **GAUGE; SCREW THREAD.**

**Units.**—Systems of Units. William Hallock. Abstract of lecture before the Henry Electric Club. A brief reference to the earliest use of units of measure and how they were established, and the system adopted by the French and called the metric system; also the relation of electrical units to mechanical units is discussed. 2500 w. Elec Pow—May, 1896.

Units of Measurement. W. Moon. A discussion of the systems of mechanical units in use. Serial. Elec Rev, Lond—Nov. 3, 1899.

See also **UNIT.**

**Wire Gauge.**—See **WIRE GAUGE.**

**WEIR.**

See also **DAM; WATER FLOW—Dam.**

**Betwa River, India.**—See **SLUICE.**

**Calibration.**—See **HYDROGRAPHY; PUMP—Sewage. Chicago; RIVER DISCHARGE; WATER FLOW.**

**Foote's Excess.**—A Modification of Foote's Irrigation Excess Weir or Spillbox. Describes modifications recently made by W. Newbrough. 700 w. Eng News—Oct. 26, 1899.

Welding of Metals. F. V. McMullin. States the requirements for a good weld, the methods of welding, etc., and explains why most metals are unweldable. 1600 w. Sib Jour of Engng—June, 1898.

Welding of Metals. F. V. McMullin. A general discussion of the usefulness of this property and the methods used. 1600 w. Min & Sci Pr—Oct. 8, 1898.

**Boiler Plate.**—Boiler-Plate Welding. W. D. Wansbrough. From "The Boilermaker." Explains the restrictions placed on the use of welded boiler seams in England, stating their advantages, and gives practical directions for welding the longitudinal seams of a boiler flue or cross tube. Ill. 4800 w. Mech Wld—Aug. 12, 1898.

**Electric.**—See **ELECTRIC WELDING.**

**Goldschmidt Process.**—See **ALUMINOTHERMY.**

**Pipe.**—See **PIPE MANUFACTURE.**

**Rail Joint.**—See **ALUMINOTHERMY; ELECTRIC WELDING; RAIL JOINT.**

**WELL.**

See also **ARTESIAN WELL; GROUND WATER; WATER SUPPLY; WATERWORKS.**

**Binghamton Suction.**—Construction of the Binghamton Suction Well. Illustrated description of a pump well 33½ ft. in diameter and 24 ft. deep, which was sunk by means of a pneumatic caisson. 600 w. Eng Rec—July 28, 1900.

**Brookline, Mass.**—Driven Wells at Brookline, Mass. F. F. Forbes. Describes the principal details of construction of work done under the writer's direction, to increase the water supply of the town. Discussion. 2300 w. Jour of the N E Water Wks Assn—March, 1897.

**Deep.**—See also **PUMP—Deep Well.**

**Drilled.**—An Experience with a Drilled Well Adjoining Salt Water. James S. Haring. An account of an effort to obtain a new water supply, near Nyack, N. Y. The tests are given and the failure explained. 2000 w. Fire & Water—June 19, 1897.

**Driven.**—Driven Wells and Their Proper Treatment. Jas. R. Maxwell. Read at the convention of the Central States Water Works Assn., Cincinnati, Ohio. Gives suggestions derived from long experience. 1000 w. Fire & Water—Nov. 11, 1899.

Driven Wells (Schlagbrunnen). A discussion of the application of driven wells for local water supply. 1800 w. Gesundheits Ingenieur—Sept. 15, 1900.

Sinking Driven Wells. A description of various methods employed in driving wells through earth and rock. 2300 w. Eng Rec—Sept. 16, 1899.

See also **ARTESIAN WELL.**

**Filtration.**—See **FILTRATION—Well Water.**

**Gas.**—See **NATURAL GAS.**

**Graphical Record.**—Graphical Record of Borings for Petroleum (Graphique d'un Sondage à Pétrole). A graphical chart, of which the abscissas are times and the ordinates depths, thus giving ocular demonstration of the rates at which various portions of the work have progressed. 1500 w. La Revue Technique—Feb. 10, 1897.

**Ilkeston, Eng.**—Interesting Boring Operations at Ilkeston. A brief account of boring for a supply of water for the borough. 900 w. Col Guard—Oct. 16, 1896.

**Irrigation.**—See also **IRRIGATION.**

**Irrigation, India.**—Wells and Irrigation. Discussing the sinking of wells in India for irrigation and domestic use, giving arguments advanced in favor of the project, and also the harm liable to follow unless their use and repairs are controlled. 1200 w. Ind Engng—June 25, 1898.

**Lowell, Mass.**—Tube Well Experiments at Lowell, Mass. George Bowers. From a paper presented at the Portsmouth meeting of the New Eng. Waterworks Assn. Describes the results obtained with the third set of tube wells sunk for the waterworks of Lowell. 1500 w. Eng Rec—Sept. 24, 1898.

See also **WATERWORKS.**

**Natural Gas.**—See **NATURAL GAS.**

**Oil.**—See **Graphical Record; PETROLEUM.**

**Olean, N. Y.**—The Story of a Well. A review of the legal difficulties caused by faulty specifications for a well. 1200 w. Eng Rec—June 11, 1898.

**Petroleum.**—See **Graphical Records; PETROLEUM.**

in this instructive account. The description is illustrated by a diagram showing relative positions of house, drains, wells, etc. 1000 w. Stevens Ind—Oct., 1895.

See also **GROUND WATER; WATER POLLUTION.**

**Porto Rico.**—A Porto Rican Well. Illustrates a well having a brick curb 7 to 9 feet in diameter and considerably over 100 feet deep. 600 w. Eng Rec—June 17, 1899.

**Pump Rods.**—See **PUMP—Deep-Well.**

**Reinforcing by Galleries.**—Reinforcing a Well by Galleries. An account of the method of driving tunnels through water-bearing strata at the foot of a well. 1100 w. Eng Rec—Oct. 7, 1899.

**Temperature.**—See **GROUND WATER; TEMPERATURE—Subterranean.**

**Test.**—What is a Test of a Well? A discussion of legal difficulties due to faulty specifications; the case of Bennett vs. Edison Electric Illuminating Co. 900 w. Eng Rec—Aug. 6, 1898.

**Theory.**—The Theory of Wells (La Theorie des Puits). L. Brouhon. A mathematical investigation of the laws of infiltration of ground water into wells, with the conditions governing flow and levels. 5000 w. 2 plates. Rev Univ des Mines—Feb., 1900.

**Wilmslow, Eng.**—See **WATERWORKS—Stockport, Eng.**

**Yield.**—The Yield of Wells and Collecting Galleries in Permeable Soils. James H. Fuertes. Illustrated article combining the theories of Smreker, Oestern, Lueger, Thèvenet, Kroeber, Soyka, Mancini, Frühling and others in formulas agreeing with experiments. 3200 w. Eng Rec—Dec. 10, 1898.

**WELL BORING.**

See **ARTESIAN WELL; DIAMOND DRILLING; SHAFT SINKING; WATERWORKS; WELL.**

**WELSBACH LIGHT.**

See **INCANDESCENT GAS LIGHTING.**

**WEST INDIES.**

See also **CUBA; PORTO RICO.**

Internal Resources of the West Indies. H. Guzman. Information concerning the agricultural products, ports, trade with the United States, and the importance of the reconstruction of the U. S. merchant marine. 2800 w. Bull Bureau of Am Rep—April, 1897.

**WHALE.**

**Collisions with Steamships.**—See **STEAMSHIP—Whale Collision.**

**WHARF.**

See **DOCK; HARBOR; PIER.**

**WHEAT SUPPLY.**

The Coming Exhaustion of the World's Wheat Supply. Extract from the presidential address of Sir William Crookes at the last meeting of the British Assn. for the Adv. of Science. Statistics are given showing the outlook under present conditions, and suggestions given of what science can do to remedy these conditions. 2500 w. Eng News—Feb. 9, 1899.

**WHEAT WASHING MACHINE.**

The English Steam Whizzer. Illustrated description of a new device for washing wheat previous to grinding it. The process is so rapid and thorough that in passing through the whizzer, while the wheat is nicely cleaned, the grains do not absorb moisture enough to interfere with grinding, and moisture adhering to the surface is separated and thrown out by centrifugal force. 500 w. Am Miller—Feb., 1896.

**WHEEL.**

See also **CAR WHEEL; GEAR; HUB; PULLEY; TIRE.**

The World on Wheels. Edwin Emerson, Jr. Historical review of the progress of wheeled vehicles. Ill. 2400 w. Auto Mag—Dec., 1899.

A New Form of Wheel for Vehicles (Une Nouvelle Roue de Véhicule). D. Bellet. The built-up metallic hub receives the wooden spokes upon rounded bearings in such a manner as to distribute the pressure uniformly; an improved method of lubrication is provided. 1200 w. La Rev Tech—April 10, 1898.

Leonardo da Vinci in 1490. Illustrated description. 1800 w. Sci Am—Oct. 17, 1896.

See also **BICYCLE; BICYCLE MANUFACTURE.**

**Car.**—See **CAR WHEEL.**

**Dished.**—Dished Wheels. H. E. Wimperis. Considers their advantages and disadvantages when applied to motor cars. 1200 w. Auto Jour—Feb., 1900.

**Ferris.**—A 360-foot Ferris Wheel. Illustrates the method of erecting a large wheel in Paris. 500 w. Eng Rec—April 23, 1898.

**Flywheel.**—See **FLYWHEEL.**

**Hub.**—See **HUB.**

**Lobed.**—See **LOBED WHEEL.**

**Locomotive Driving.**—See **LOCOMOTIVE DRIVING WHEEL.**

**Machine-Moulded.**—Machine-Moulded Wheels. Joseph Horner. In this series of articles it is proposed to illustrate and explain the details in the pattern and foundry work involved in wheel moulding, in their relation and application to the numerous and varied classes of gears in common use, including spur and bevel, mortise, helical, worm and angle wheels. Also different methods of moulding and their modifications. Serial. Engng—Jan. 15, 1897.

**Metal.**—How Metal Wheels Are Made. B. F. Spalding. On the increased use of metal wheels, their strength, durability and cheapness, with information concerning them. 2200 w. Am Mach—March 16, 1899.

**Motor.**—See **MOTOR WHEEL.**

**Rim Tension.**—See **CENTRIFUGAL FORCE.**

**100-Foot Steel Framed.**—A Steel Framed Wheel 100-Foot in Diameter. Illustrated detailed description. 400 w. Eng News—July 30, 1896.

**Spiral.**—Designing Spiral Wheels for Given Centers. Robert A. Bruce. Method is described and illustrated by an actual case. Diagrams. 2000 w. Am Mach—April 12, 1900.

**Tire.**—See **TIRE.**

**WHITE LEAD.**

See also **PAINT.**

**Electrolytic.**—Some Electrolytic Processes for the Manufacture of White Lead. Sherard Cowper-Coles. Describes the Dutch process, which is still considered the best as regards its covering capacity and also describes briefly several electrolytic processes. 1300 w. Elec Rev, Lond—Feb. 11, 1898.

**Manufacture.**—Some Notes on the Manufacture of White Lead. Sherard Cowper-Coles. Part first describes various stack and chamber methods and electrolytic methods. Ill. Serial. Ind & Ir—Dec. 16, 1898.

On a New Process for the Manufacture of White Lead. William Tatham. A brief résumé of pre-existing methods is followed by a description of the new method, which is extremely simple and gives a product almost exactly like the best Dutch white lead. 1800 w. Jour Fr Inst—Oct., 1896.

The Manufacture of White Lead. G. H. Robertson. The methods at present employed and the substitutes proposed. 2000 w. Elect'n—July 10, 1896.

**WHIZZER.**

See **WHEAT WASHING MACHINE.**

**WIMSHURST MACHINE.**

See also **ROENTGEN RAYS—Apparatus; Influence Machine; Static Machine.**

Sectorless Wimshurst Machines. S. M. Keenan. Describes how to change a sectored to a sectorless machine, and also different machines constructed by the writer. 1500 w. Am Elect'n—Aug., 1897.

**WINDING.**

See also **HOISTING.**

**Armature.**—See **ARMATURE WINDING.**

**WINDING CAGE.**

See **HOISTING CAGE.**

**WINDING ENGINE.**

See **HOISTING ENGINE.**

**WINDMILL.**

Improvements and Theories in Wind Motors

(Neuerungen und Theorien über Windmotoren). R. Friedlaender. With curves showing the relation between velocity and capacity and especial data from the performance of the pumping plant at Heiligenstadt. 4000 w. Mitt d Ver f d Ford d Local u Strassenbahnwesens—March, 1899.

The Utilization of Wind as a Motive Force. Illustrated description of some modern windmills and a comparison of their advantages with steam power. Serial. Mach, Lond—May 15, 1897.

Windmill Power. E. C. Murphy. Illustrates and describes types of windmills, notes some uses to which they may be applied, and gives data from experimental tests. 2500 w. Trans Assn of Civ Engs of Cornell Univ—1900.

**Compressed Air.**—See **COMPRESSED AIR—Windmill.**

**Electric Generation.**—Electricity from the Wind. E. O. Baldwin. Abstracts from a paper read before the Netherlands Society for the Promotion of Industry, Haarlem, Holland. Refers to unsuccessful undertakings and describes a successful system. Serial. Can Eng—June, 1896.

Electric Plant Run by Wind. From the "Philadelphia Times." Brief description. 800 w. Elec Rev, Lond—Sept. 3, 1897.

Electric Power from Windmills. C. L. Crandall. The substance of this paper was presented at the Boston meeting of the Am. Assn. for the Adv. of Science. Requests for more information led to the preparation of this paper, which gives the lamp hours a day available for electric lighting from a storage battery plant driven by a 12-foot air-motor. 1200 w. R R Gaz—May 5, 1899.

Wind Power for Electrical Purposes. Roy E. Thompson. Describes the two general methods by which wind power may be applied to the generation of electrical energy. 1400 w. Engs' Year Book, Univ of Minn—1900. .

**Governing.**—See **Pump Governing.**

**History.**—Wind Motors. Treats of energy of winds and history of windmills. Serial. Ind & Ir—Dec. 6, 1895.

**Horse-Power.**—Horse-Power of Windmills. General discussion with a half-tone illustration of a flour mill in Holland operated by wind power. 400 w. Am Miller—May 1, 1896.

**Irrigation.**—See **Nebraska; Pumping; Tests; IRRIGATION.**

**Load Influence.**—Influence of Load on the Power of a Windmill. E. C. Murphy. Shows by diagrams how the power of a windmill varies with the load on it. Ill. 1000 w. Eng News—Aug. 19, 1897.

**Nebraska.**—The Homemade Windmills of Nebraska. Erwin Hinckley Barbour. Condensed from "Bull. of U. S. Agri. Ex. Station of Neb." The first of a series of illustrated articles showing the invention of Nebraska farmers for furnishing a cheap means of irrigation. Serial. Sci Am Sup—Jan. 13, 1899.

**Pump.**—See also **IRRIGATION.**

**Pump Governing.**—Automatic Releasing and Governing Device for a Windmill Pump. Frederic W. Blanchard. Illustrates and describes an ingenious device capable of other applications. 1000 w. Am Mach—April 5, 1900.

**Pumping Power.**—The Theoretical and Measured Pumping Power of Windmills. E. C. Murphy. A contribution of data and formulae to the art of constructing and operating windmills. 3500 w. Am Soc of Ir Engs—April, 1895-1896.

**Tests.**—Power of a Twelve-Foot "Power" Windmill. E. C. Murphy. Discusses the results of tests of this windmill, from a mathematical standpoint. 2500 w. Kansas Univ Quar—Oct., 1897.

Results of Windmill Tests. E. C. Murphy. Tests made during the summer of 1896, on large steel mills working large pumps and raising water for irrigating purposes. 1400 w. Kan Univ Quar—April, 1897.

## WINDOW.

See also **ARCHITECTURE.**

Fenestration. Treats of the importance of the design and arrangement of the windows of buildings. 2000 w. Arch, Lond—May 29, 1896.

## WIND PRESSURE.

See also **CYCLONE.**

Experiments on Wind Pressure. An important experimental study of wind pressure upon planes with reference to the determination and measurement of the partial vacuum produced behind a flat plane by winds blowing upon its face, set at different angles with the direction of the wind. Diagrams illustrate the apparatus used and method of experimenting, and graphical representations of different effects aid in elucidating the text. Tabulated results are also presented. The results of this and kindred experiments are likely to modify existing formulae for calculating wind strains. 2200 w. Engng—Dec. 27, 1895.

Experiments on Wind Pressure. H. C. Vogt. General discussion stating the writers' relation to the experimental researches of Prof. Irminger, and giving a formula for computing efficiency of wind propellers. 2400 w. Engng—Jan. 17, 1896.

Wind Pressures on Surfaces of Different Areas. C. Baillargé. An explanation of the difference in unit wind-pressures registered simultaneously on different areas. 800 w. Eng Rec—Dec. 3, 1898.

Wind Pressure (Winddruck). R. Kohfahl. A general discussion of the subject, with illustrations, diagrams and tables. 5000 w. Zeitschr d Ver Deutscher Ing—Aug. 4, 1900.

**Barry Address.**—Sir J. Wolfe Barry's Address. Given before the Mechanical Science Section of the British Association at Bristol. 7000 w. Engr, Lond—Sept. 16, 1898.

Wind Pressure on Exposed Structures. From the inaugural address of Sir J. Wolfe Barry, before the Mech. Science Sec. of the British Assn. The unnecessary anxiety from hasty generalizations on this subject. 800 w. Jour Gas Lgt—Sept. 13, 1898.

**Buildings.**—Wind Pressure on Buildings and Other Structures. J. O. V. Irminger. Read before the British Inst. of Gas Engs. An interesting paper, showing the bearing of the subject on the construction of gasholders. Ill. 5500 w. Gas Wld—May 6, 1899.

**Measurement.**—The Measurement of Wind Pressures. Editorial on paper of Francis E. Nipher, communicated to the Academy of Science of St. Louis. 1200 w. R R Gaz—Feb. 25, 1898.

**Mill Construction.**—The Treatment for Wind Pressure in Mill Construction. James L. Greenleaf. The term mill construction is here used to describe those cases of building in which iron or timber columns support the roof trusses and covering. The paper includes a preliminary discussion of the columns, and truss proper; detailed discussion of the columns and truss proper, with application to a particular example. 9000 w. Sch of Mines Quar—April, 1896.

**St. Louis Tornado.**—High-Wind Pressures at St. Louis. Editorial suggestions of availability of effects of the recent tornado in St. Louis, in the determination of wind pressures with reference to the probable results of similar storms upon high buildings and other structures. 900 w. Eng Rec—June 6, 1896.

Wind Pressures in the St. Louis Tornado. Julius Baier. The paper is presented with the object of placing on record some definite estimates made by the author, of the force exerted by the wind on several structures of known stability that failed under its action, and some further characteristic examples of destruction that will be indicative of this force. Ill. 21500 w. Pro Am Soc of Civ Engs—Jan., 1897.

The Effects of the St. Louis Tornado. Julius Baier. An examination of the affected district of interest to engineers owing to the numerous examples of the destructive power of the wind. 1600 w. Eng News—June 11, 1896.

Wind Pressure in St. Louis Tornado. Julius Baier. Facts ascertained from the inspection of the buildings, with general study of the subject. 3200 w. Ind Arch—May, 1897.

See also **CYCLONE.**

**Trees.**—The Effects of Wind on Trees. J. B. S. Norton. From a paper read before the St. Louis Academy of Science. The results of observations made at the time of the great tornado, and followed by more recent study. 1300 w. Gar & For—July 28, 1897.

## WIRE.

See also **CABLE; ELECTRIC CONDUCTOR; WIRE ROPE.**

Wire. A. L. Orton. Methods of manufacture and the effect upon strength, conductivity, etc. 1800 w. Sib Jour of Engng—April, 1897.

A. L. Orton, in "Sibley Journal of Engineering." Gives history of the development and much gen-

Abstract of a paper read before the West of Scotland Ir. & Steel Inst. Some of the important uses of wire are given, and the operation of drawing described, and other processes in its manufacture. 2500 w. Ir & Coal Trds Rev—Jan. 19, 1900.

Wire and Wire-Making. S. Barnett. Part first gives a report of the proposed combination of all the wire interests of the United States, discussing the production and uses of this product. Serial. Eng & Min Jour—March 26, 1898.

**Elasticity.**—See Steel Elasticity; **ELASTICITY.**

**Manufacture.**—Apparatus for Treating Wire Rods. C. W. Bildt. Translated from "Jernkontorets Annalen." Scale is removed and oxidation prevented by running the wire or rod through water after coming from the rolls, till it has attained about a low cherry-red heat. The apparatus is illustrated and a diagram shows the resulting properties. 1100 w. Ir Age—April 16, 1896.

Recent Progress in Wire Manufacture. Briefly reviews the history of wire-making, and gives an illustrated description of the recent English plant of the Bedson Wire Works in Middlesbrough. 3000 w. Ir & Coal Trds Rev—Dec. 22, 1899.

The Manufacture of Wire. Frederic A. C. Perrine. The general types of insulators are described which are regularly employed for protecting wires, and the protection where necessary to prevent injurious mechanical and chemical action. 7500 w. Elec Engng—Dec., 1896.

See also **COPPER METALLURGY; ELECTRIC CONDUCTOR; WIRE MILL.**

**Manufacture, United States.**—Development of American Wire Rod Rolling. William Garrett. An interesting history of the competition with English rods and wire, and an account of how the early difficulties in manufacture were overcome. The article ends by giving some valuable statistics. 6000 w. Ir Age—Jan. 2, 1896.

**Steel, Elasticity.**—The Elastic Properties of Steel Wire. Archer Dave Keigwin. Excerpt from Proceedings of Inst. of Civ. Engs. Describes experiments undertaken to determine the behavior of annealed and unannealed steel wire when subjected to tensile stress. 2000 w. Mech Wld—Aug. 25, 1899.

**Testing Machine.**—A Convenient Form of Wire-Testing Machine. Arthur L. Rice. Illustrated description. 800 w. Trans Am Soc of Mech Engs—Dec., 1897.

**Tests.**—See **TESTING; WIRE ROPE.**

**WIREDRAWING.**

See also **STEAM; STEAM ENGINEERING; VALVE—Friction.**

Loss by Wiredrawing. W. H. Booth. Shows there is no direct loss from wiredrawing of steam, although it is not economically employed in place of expansion. 1800 w. Mach, N. Y.—June, 1897.

**Locomotives.**—The Wiredrawing of Steam in Locomotives (Die Drosselung des Dampfes bei Lokomotiven). A discussion, by Inspector Leitzmann, of the throttling action of the locomotive valve gear at early cut-off, illustrated by diagrams. 3500 w. Glaser's Annalen—June 15, 1898.

**WIRE GAUGE.**

See also **CALIPER; DECIMAL SYSTEM; GAUGE; MICROMETER GAUGE; WEIGHTS AND MEASURES.**

Wire Gauges. S. H. Stupakoff. Read before the German Engs.' Soc., at Pittsburg. Gives list of gauges in use, discussing their variations, advantages and disadvantages, etc. Serial. Ir Trd Rev—March 23, 1899.

**WIRE GLASS.**

Recent Developments in the Manufacture and Applications of Wire Glass. Francis Schumann. Its principal uses, and fire-resisting qualities. Ill. 1800 w. Jour Fr Inst—Feb., 1898.

**Fire Test.**—The Fire-Retarding Qualities of Wired-Glass. Charles A. Hexamer. At the request of the Mississippi Glass Co., which controls the manufacture of wired-glass, the writer, in conjunction with Inspector William McDevitt, made a series of tests of the fire-resisting qualities of wired-glass. The main test is described in report given. Also report of test made in Boston is given. Ill. 2200 w. Jour Fr Inst—Aug., 1896.

**WIRE MILL.**

See also **ROLLING MILL; WIRE—Manufacture.**

New Trains of Rolls (Neue Walzstrassen). Edm. Weber. A description, with diagrams, of arrangements of rolls for the economical production of wire. 1500 w. Stahl und Eisen—April 15, 1900.

**American.**—American Wire Rod Rolling. Abstract of a paper by M. Baackes, read before the Verein Deutscher Eisenhüttenleute, on the Development of the Wire Rod Mill, with special reference to the United States. Ill. 4500 w. Ir Age—Feb. 15, 1900.

The Development of Wire Rolling Mills, with Especial Reference to the United States (Die Entwicklung des Drahtwalzwerkes mit Besonderer Berücksichtigung von Nordamerika). M. Baackes. A paper read before the Verein Deutscher Eisenhüttenleute giving a very full description of the American wire-rod rolling mills, with discussion. 10000 w. Stahl und Eisen—Jan. 15, 1900.

**Copper.**—A Copper Wire Mill. R. An interesting account of a visit to the Waclark Manufacturing Company, at Bay View, N. J., describing the operations. 1900 w. Am Mach—Feb. 17, 1898.

**Middlesbrough, Eng.**—See **WIRE—Manufacture.**

**WIRE ROPE.**

See also **CABLE; HOISTING; MINE HAULAGE —Wire Rope.**

Influence of Materials and Construction upon the Strength of Wire Rope (Einfluss des Materials und der Konstruktion auf die Festigkeit von Drahtlitzen). Prof. Rudeloff. A most exhaustive report upon the tests made a the Charlottenburg laboratory. A very valuable contribution to engineering knowledge. 30000 w. Mitt a d Kgl Tech Versuchsanstalt—Parts III. and IV., 1897.

The Manufacture and Uses of Wire Rope. F. H. Hopkins. General remarks followed by the description of a sand handling cable plant at Niagara Falls. 2800 w. Can Min Rev—Jan., 1896.

Wire Ropes. Practical points for the consideration of engineers and mining students. A collection of papers from the Transactions of the British Society of Mining Students. 3000 w. Can Min Rev—Aug., 1896.

Wire Rope—Its Uses, Abuses and Care. Justin S. Doe. Read before the Ohio Inst. of Min. Engs. The origin, construction, and need of proper care to preserve it. 2000 w. Mines & Min—June, 1900.

**Corrosion.**—Internal Corrosion of Wire Ropes. T. G. Lees. Extract from paper read at joint meeting of engineers at Sheffield, Eng., with short discussion. Favors galvanized wire ropes. 2000 w. Col Guard—Oct. 29, 1897.

**Dortmund Mining District.**—Statistics of the Wire Ropes in the Dortmund Mining District for 1896 (Statistik der Schachtförderseile im Oberbergamtsbezirk Dortmund für das Jahr. 1896). With tabular data from 1872 to 1896, showing the life and efficiency of various makes of wire ropes. 1000 w. Glückauf—Sept. 11, 1897.

**Mine.**—The Statistics of Wire Ropes in Mine Hoists (Statistik der Schachtförderseile). Giving interesting data about the life of hoisting cables of various kinds, percentage of breakages from 1882 to 1896, and other information chiefly from the Breslau mining district. 1200 w. Oesterr Zeitschr f Berg u Hüttenwesen—Aug. 7, 1897.

Wire Mining Ropes. J. Bucknall-Smith. Their technology, manufacture and uses. Serial. Min Jour—June 6, 1896.

See also **HOISTING; MINE HAULAGE.**

**Splicing.**—A Rapid Method of Splicing Wire Ropes. W. H. Morris. Illustrates and describes a method by which a rope can be spliced in from twenty to thirty minutes. 700 w. Mines & Min—Sept., 1898.

**Tests.**—Impact Tests on Wire Rope. Charles F. Hamilton. Describes tests and comparison with tensile strengths. 800 w. Trans Assn of Civ Engs of Cornell Univ.—1898.

**WIRE-ROPE DRIVING.**

See also **POWER TRANSMISSION; ROPE DRIVING.**

The Transmission of Power by Wire Ropes.

William Hewitt. This paper presents new formulae and tabulated results differing from those hitherto used, based on the fact that the bending of wire laid in rope around a sheave gives a less resistance than the bending of straight wire of the same size around a sheave of the same size, as previous writers have assumed. 1200 w. Eng News—May 7, 1896.

### WIRING.

See also **ELECTRIC WIRING.**

**Interior Conduits.**—See **ELECTRIC CONDUIT—Interior; ELECTRIC WIRING.**

### WOLTMANN MILL.

See **ANEMOMETER; HYDROMETERS; WATER FLOW.**

### WOOD.

See also **BEAM; BUILDING MATERIAL; FORESTRY; TIMBER; TREE;** and specific kinds of wood.

**American.**—Summary of Mechanical Tests on Thirty-two Species of American Woods. Statement of results of the timber investigations carried on by the Div. of Forestry. The object of these investigations is to increase the general knowledge of the properties and behavior of wood and to discover facts that will enable the consumer to judge of the comparative value. 4000 w. U S Dept of Agri—Circ. No. 15.

See also **TIMBER—Testing, U. S. Government.**

**Bending.**—The Bending of Wood (Le Cintrage des Bois). A description of the apparatus for steaming and bending wood used in the works of the Eastern Railway of France at Romilly-sur-Seine. 4000 w. 2 plates. Rev Gen des Chem de Fer—Jan., 1899.

**Imitating.**—Imitating Woods. Directions for imitating oak, mahogany, satinwood, walnut, rosewood, etc. 2100 w. Ill Car & Build—Nov. 22, 1895.

**Paraguay.**—Valuable Woods of Paraguay. Twenty different woods are named and their characteristics and industrial uses specified. 1500 w. Cons Rept—Oct., 1896.

**Preservation.**—See **TIMBER PRESERVATION.**

**Properties.**—Characteristics and Properties of Wood. Valuable information for architects and engineers, prepared by B. E. Fernow, of the Div. of Forestry Dept. of the United States. 3500 w. Can Arch—Aug., 1896.

Some Peculiarities of Wood. B. E. Fernow. Read at the convention of the Am. Inst. of Archt's. Comments on the small amount of knowledge concerning the nature, characteristics and properties of wood, and the wastefulness in consequence. Discusses the advantages and disadvantages as a material, etc. 3400 w. Am Arch—Nov. 19, 1898.

**Shrinkage.**—Shrinkage of Wood. Selection from Timber Bulletin No. 10, Agricultural Dept., Division of Forestry. Ill. 2500 w. Arch & Build—March 7, 1896.

**Strength.**—The Relation of the Strength of Wood under Compression to the Transverse Strength. B. E. Fernow. Some of the results obtained from the study of wood and from extensive experiments. 1000 w. Trans Am Inst of Min Engs—Feb., 1898.

See also **TIMBER.**

**Tests.**—See **American; Strength; TIMBER.**

### WOOD BRIDGE.

See **BRIDGE—Wooden; TRESTLE.**

### WOOD-CARVING.

Wood-Carving and Wood-Carvers. W. H. Romaine Walker, W. Aumonier, J. E. Knox, and W. S. Frith. Four interesting scholarly addresses, finely illustrated, on the above subject. 11000 w. Jour Roy Inst of Brit Arch—Feb. 6, 1896.

**Spanish Churches.**—Carved Woodwork in Spanish Churches. Editorial discussion, dealing specially with the woodwork, but gives some general information of interest. There are numerous illustrations of the wonderful carving. 2200 w Builder—April 25, 1896.

### WOOD DISTILLATION.

See also **WOOD GAS.**

The Principal Methods of Distillation of Wood (Des Principal Methodes de Distillation du Bois). A monograph, describing the various kinds of ovens used in Europe, with data of products and accounts of methods of operation. 7000 w. La Revue Technique—Aug. 25, 1897.

### WOOD GAS.

**Riché.**—Generating Gas from Wood. James M. Neil. Explains the principle of the gas generator invented by H. Riché, of Paris, and gives illustrated description. 900 w. Eng & Min Jour—Sept. 8, 1900.

The Riché Gas Producer. A. Lombard. Translated from the French. Describes the producer and its working. 1200 w. Am Mfr & Ir Wld—Oct. 7, 1898.

The Riché Gas Process (Le Gaz Riché). A. Bainville. An account of the use of gas produced from the distillation of wood as a fuel for gas engines. The wood is distilled in closed retorts, furnishing a high grade of charcoal, and the gas gives more power in a gas engine than illuminating gas. 2000 w. L'Electricien—Jan. 28, 1899.

Lean Gas and the Riché Process (Gaz Pauvre et Gaz Riché). A comparison between the cost and value of producer gas and the gas produced by the distillation of wood by the Riché process. 1800 w. L'Electricien—March 18, 1899.

The Riché Generator of Gas from Wood (Le Gazogène au Bois "Riché"). MM. Manant and Roman. A very full account of the Riché process, with sections and details of generators, and a discussion of its industrial applications. 10000 w. Soc Ing Civ de France—Feb., 1899.

The Riché Gas Producer (La Gazogène Riché). An illustrated description of the Riché apparatus, by which an excellent fuel and power gas is produced in connection with the distillation of wood. 2000 w. Génie Civil—Feb. 11, 1899.

The Riché Gas Apparatus (Les Gazogènes Riché). P. Corbier. An illustrated description of this apparatus for producing gas from wood, to be used principally for power and heating purposes. 2500 w. Génie Civil—June 30, 1900.

### WOOD HOUSE.

See **HOUSE—Wooden.**

### WOOD PAVING.

See **PAVEMENT—Wood.**

### WOOD SCREW.

See **RAIL FASTENING; SCREW—Wood.**

### WOODWORK.

See also **WOOD CARVING.**

The Treatment and Decoration of Woodwork. Walter J. Pearce. Many suggestions, and criticisms of prevailing practice. Ill. 2500 w. Plumb & Dec—Dec. 1, 1897.

### WOOD-WORKING MACHINERY.

See also **MACHINE TOOL; SAW.**

The Development of Wood-Working Machinery. John Richards. The first article of a series which will describe the growth of the now-working industry, the evolution of its machinery, and the present condition of the art. This installment is devoted to the general subjects of cutters and blades, and the development of the planer. Ill. 5600 w. Eng Mag—Feb., 1899.

The Development of Wood-Working Machinery. John Richards. Mr. Richard's second paper is devoted to the evolution of American log-sawing machines, from the small circular mill to the great band log-mills used on the enormous redwood logs of the Pacific coast. 4500 w. Eng Mag—March, 1899.

The Development of Wood-Working Machinery. John Richards. Mr. Richards's third paper discusses the special features of European sawing machinery, including gang saws, band saw mills and various forms of saw benches. 3500 w. Eng Mag—April, 1899.

The Development of Wood-Working Machinery. John Richards. Devoted to a comparison between English and American wood planing machines with many handsome illustrations of characteristic types. 3500 w. Eng Mag—May, 1899.

**Locomotive Work.**—Wood-Working Machinery for Locomotive Work. W. H. Weston. Showing the advantages to be gained by using various wood-working machines in preference to hand labor. Speed, more perfect duplication of parts, and economy are claimed for the machines. 1800 w. Nat Car & Loc Build—Dec., 1895.

**Railway Shops.**—Arrangement of Wood-Working Machinery in Railroad Shops. An example of advantageous arrangement, taken from the C., M. & St. P. shops at Milwaukee, with plan. 900 w. Ry Rev—Oct. 17, 1896.

**Swedish.**—Swedish Wood-Working Machiner
E. Sweet. Illustrations with descriptions
sawing machine and a wood planing ma
unusual excellence. 1000 w. Am Mac
14, 1898.

## WOOLEN INDUSTRY.

See also **FABRIC; FIBRE; TEXTILE.**

**Italian.**—The Italian Woolen Industry. Pa
derived from an official publication of the
ministry of agriculture, industry, and co
2000 w. Bd of Tr Jour—May, 1896.

## WORKMEN'S DWELLINGS.

See also **TENEMENT HOUSE; WORK
AGEMENT.**

Cheap Dwellings (Les Logements
Marché). A general discussion of the
of cheap and sanitary dwellings for labo
the poorer classes. 2500 w. La Revue T
—Nov. 25, 1898.

Improved Housing for the Poor. El
Cooper. Suggests a plan by which man
evils of the present system of tenemen
construction may be mitigated. 2000
ton's Mag—June, 1897.

Need of Better Homes for Wage-Earner
de Graffenried. A comparison between t
of American and foreign cities is made
unfavorable to the former. Many excelle
and suggestions are made. 4400 w.
May, 1896.

Uninhabitable Dwellings. Hugh R. Jo
tract from a paper read at meeting of
tary Inspectors of Carnarvonshire and
Discusses the problem of housing sati
the "wage-earning" classes. 3500 w. S
April 30, 1897.

Working Class Dwellings in Blocks.
Blashill. Read before the British Arc
Discusses designs carried out by the
County Council, and the difficulties of
lem. Also general discussion. 9000 w.
—Feb. 17, 1900.

Workmen's Dwellings. Discusses a
dictated by sanitary science in apartn
signed for the working class. 2000 w.
& Build—Sept. 23, 1898.

**Aberdeen.**—The Housing of the Working
Dr. Beveridge. Read before the Sanitar
tors of Scotland. The difficulties encoun
overcome in Aberdeen. Confined princip
consideration of air space. Serial. S
July 23, 1897.

**Belfast.**—Workmen's Dwellings in Belfas
Munce. Interesting notes on the impro
ings, almost every family occupying o
Ill. 2800 w. Jour of San Inst—April,

**Coal Miners.**—See **Salgo-Tarjan; COAL M
LAGE.**

**Coleman-Stuckert Co-operative.**—The Colen
ert System of Co-operative Residences.
May Gardiner. Describes the model
the middle classes as planned by Mrs.
Stuckert. Ill. Serial. San Rec—Sept.

**Competition.**—See **Shattuck Competition;**

**Dublin.**—The Housing of the Poor. Abstr
dress by the Lord Mayor of Dublin,
that the condition of the very poor is a
mense importance to all classes. 200
Rec—Oct. 28, 1898.

Working-Class Dwellings in Dublin,
from an address by Sir Charles A.
Reviews progress in 30 years, influence
tion, comfort and morality and municip
of the movement. 1700 w. Arch, Lond
1898.

**Edinburgh.**—The Housing of the Worki
Act (1890) in Edinburgh. William
account of improvements made and pr
the benefit of the laboring class. 220
Rec—July 22, 1898.

**England.**—The Housing of the Poor. Wh
done in London and in Dudley. 8500
Rev, Lond—June 15, 1896.

The Housing of the Laboring Classe
Percy Boulnois. Some comments on
developments in England. 1500 w.
Feb. 19, 1897.

**Financial Considerations.**—Dwellings for
ing Classes Financially Considered. P
From a lecture delivered before the Gl
West of Scotland Architectural Craftme
An examination of various dwellings to

**SHOP; MINE MANAGEMENT; STRIKE; TRADE UNION; WAGES; WORKMEN'S DWELLINGS;** and specific industries.

Another Shop System. A. L. Graffam. Explains the foundation of a system adapted to machine tool building, special machinery and jobbing. 3000 w. Am Mach—June 28, 1900.

Economical Production in Engineering Workshops. An effort to show how to produce work at the lowest possible cost, without any drawbacks. Serial. Mach, Lond—Dec. 15, 1896.

Neglected Possibilities of the Modern Machine Shop. Editorial suggestions on planning, arranging and equipping. 700 w. Am Mach—Nov. 28, 1895.

The Engineer, and the Economical Development of Manufacturies. W. Arnold. Read before the Birmingham Assn. of Engs., England. On the means of increasing the output and thus enabling England to compete with other countries. 6000 w. Engr, Lond—Aug. 31, 1900.

The Laws of Profit. R. H. Smith. An examination of the elementary general laws that govern profit-making business. Serial. Engr, Lond—Sept. 8, 1899.

Workshop Administration. David Cowan. Considers the administration a branch of the productive art, and makes special reference to tracing work and ascertaining detailed costs and profits. 6400 w. Trans Inst of Engs & Shipbuilders in Scotland—April, 1900.

Works Management. On the management of engineering workshops. General principles with some suggestions of detail. 2800 w. Engng—June 25, 1897.

**American Tool Works Co.**—The Works of the American Tool Works Company. Illustrated description of these works, the departments, methods, packing, show cabinets, and processes. 3000 w. Ir Age—April 21, 1898.

**American vs. British.**—Some Notes on American Manufactures. J. Grant Birch. Part first considers some of the characteristics of American manufacturers as compared with English, and mentions the labor conditions that impressed him during a recent visit. Serial. Engng—Dec. 16, 1898.

The Engineering Industry in the States. Compares American workmanship and methods with the English, showing the disadvantages under which the latter labor, and the benefits in the United States from labor-saving machinery. 1500 w. Mach, Lond—Oct. 15, 1897.

See also **Europe and America.**

**Baldwin Locomotive Works.**—See **WAGES—Piece Work.**

**Cheney Silk Mills.**—Six Examples of Successful Shop Management. Second paper. Henry Roland. Showing the contented condition of the workmen amid the beautiful natural surroundings of South Manchester, Conn. 4000 w. Eng Mag—Nov., 1896.

**Chicago City Ry.**—Studies in Economic Practice. C. B. Fairchild. Describes shop methods, tools and devices of the Chicago City Railway. Serial. St Ry Jour—July, 1896.

**Coal Mine.**—See **COAL MINE MANAGEMENT.**

**Commercial Organization.**—Commercial Organization of the Machine Shop. Hugo Diemer. Systems for the classification of shop orders, working plans for securing speed, accuracy and economy in the progress of work through the shop. 2700 w. Eng Mag—June, 1900.

Commercial Organization of the Machine Shop. Hugo Diemer. Part 2 of Prof. Diemer's series deals with the production department bills of material. He discusses the listing of material and tools, forms for bills of material, services and record, the duties of material clerks and the cheapening of manufacture by duplication. 3000 w. Eng Mag—July, 1900.

Commercial Organization of the Machine Shop. Hugo Diemer. Part 3 of Prof. Diemer's series deals with storeroom management—location and arrangement of the room, section store-rooms, reservation of special orders, forms of record and report. 3400 w. Eng Mag—Aug., 1900.

Commercial Organization of the Machine Shop. Hugo Diemer. Prof. Diemer's fourth paper deals with the operation of the production department and with the actual execution of the work in the shop. 3000 w. Eng Mag—Sept., 1900.

Commercial Organization of the Machine Shop. Hugo Diemer. The fifth paper of Prof. Diemer's series includes the further discussion of the production department, with especial reference to accurate time-keeping. 3000 w. Eng Mag—Oct., 1900.

Commercial Organization of the Machine Shop. Hugo Diemer. The figuring of total costs is the subject of the sixth and concluding paper of this series. 2400 w. Eng Mag—Nov., 1900.

The Commercial Organization of Factories. Review of a book by J. Slater Lewis. It is for the use of manufacturers, directors, engineers, secretaries, accountants, draughtsmen, etc. 4000 w. Ir & Coal Trds Rev—Nov. 27, 1896.

**Contract System.**—Six Examples of Successful Shop Management. Fifth paper. Henry Roland. Showing the decline of the contract system in machine shops. 3200 w. Eng Mag—March, 1897.

**Cost-Keeping.**—See **COST-KEEPING.**

**Department Stores.**—The Department Store. Samuel Hopkins Adams. The first of a series of articles on "The Conduct of Great Businesses," showing the vital points of American business life. Dealing with the part men's brains play in large business enterprises. Ill. 1800 w. Scribner's Mag—Jan., 1897.

See also **DEPARTMENT STORE.**

**Dolgeville, N. Y.**—Six Examples of Successful Shop Management. Sixth paper. Henry Roland. Describing the pension, insurance and endowment features of the plan of earnings division in operation at the piano felt works of Alfred Dolge & Co. 4800 w. Eng Mag—April, 1897.

**Electric Station.**—See **ELECTRIC STATION MANAGEMENT.**

**Europe and America.**—Machine-Shop Management in Europe and America. H. F. L. Orcutt. This paper treats of specialization vs. generalization of equipment and products. It contrasts the American policy of close concentration upon a limited range of manufacture with the European practice of turning out many diverse products from a single works, and argues the strong influence of the former cause upon higher perfection, capacity, and economy. 3400 w. Eng Mag—Jan., 1899.

Machine-Shop Management in Europe and America. H. F. L. Orcutt. This paper, the second of a series, treats of labor-saving machinery, as exemplified in American works, and low-wage workmen, and contrasts the output and earning power of works equipped with high-class machinery and few men with those using many inferior men and poor tools. 3800 w. Eng Mag—Feb., 1899.

Machine Shop Management in Europe and America. H. F. L. Orcutt. Mr. Orcutt's third paper deals mainly with the effects of environment on the efficiency of workmen, comparing the conditions under which mechanics live in Europe and America. 5000 w. Eng Mag—March, 1899.

Machine Shop Management in Europe and America. H. F. L. Orcutt. Mr. Orcutt's fourth paper discusses the differences in commercial methods and sales management between European and American establishments. 3500 w. Eng Mag—April, 1899.

Machine Shop Management in Europe and America. H. F. L. Orcutt. The fifth paper of the series is devoted to the growth of competition and its influence upon the development of trade, showing the action of national characteristics and methods. 3500 w. Eng Mag—May, 1899.

Machine Shop Management in Europe and America. H. F. L. Orcutt. Mr. Orcutt's sixth paper compares the various systems used in Europe and America with respect to the important questions of output, price and quality. 4000 w. Eng Mag—June, 1899.

Machine Shop Management in Europe and America. H. F. L. Orcutt. A detailed examination of the elements of a modern machine shop, giving the author's conception of the best method of organization and subdivision. 3000 w. Eng Mag—July, 1899.

Machine Shop Management in Europe and America. H. F. L. Orcutt. The conclusion of Mr. Orcutt's notable series of papers, giving his final opinions as to the details of a standard shop design. 3000 w. Eng Mag—Aug., 1899.

See also **American vs. British.**

**Fire Department.**—A Shop Fire Department. Describes the organization of the men and their assignment to duties in case of fire in the shop of J. H. Williams & Co., of Brooklyn, N. Y., manufacturers of drop forgings. 1200 w. Am Mach—Sept. 23, 1897.

**Fitchburg, Mass.**—A New Shop System. George D. Chapman. Describes the system in operation the past two years at the shops of the Fitchburg Machine Works, in Massachusetts, where tools are manufactured. Ill. 2200 w. Mach, N. Y.—March, 1898.

**Labor Questions.**—Labor Questions in England and America. Charles Buxton Going. A review of the parallelism between the engineers' strike of 1897 and the machinists' strike of 1900, showing the futility of the union-labor efforts in America by their failure in Great Britain. 3600 w. Eng Mag—May, 1900.

See also **LABOR; STRIKE; TRADE UNION; WAGES.**

**Labor-Saving Machinery.**—Labor-Saving Machinery, the Secret of Cheap Production. A. E. Outerbridge, Jr. Showing that an ascending wage-scale is an essential of prosperous productivity. 3200 w. Eng Mag—Jan., 1897.

See also **MACHINERY—Labor; TRADE UNION.**

**Location.**—Modern Machine-Shop Economics. Horace L. Arnold. Pointing out the considerations that should govern shop locations. 3700 w. Eng Mag—April, 1896.

The Choice of Location for Manufacturing Plants. Editorial in which the success of a manufacturing industry is considered as depending upon abundant capital, good location, the most modern machinery, and good management. The article is mainly devoted to the topic named in the title and closes with a tabulated statement of the location of the principal manufacturing industries in the United States. 4000 w. Eng News—April 9, 1896.

**Machinery.**—Manufacturing Methods as Applied to the Production of Machinery. F. A. Halsey. Points out some of the means of maintaining dimensions and expediting work. The methods described relate specially to manufacture by aid of special fixtures, and refer to pure machine shop operations only. 3300 w. Sib Jour of Engng—June, 1897.

Manufacturing Methods as Applied to the Production of Machinery. F. A. Halsey. Introductory portion of a lecture before the engineering students of Cornell University. The methods described relate more to manufacture by the aid of special fixtures, rather than by special machines, and refer to pure machine-shop operations only. Am Mach—Aug. 19, 1897.

**Marine Engineers.**—On Works' Organization. Tom Westgarth. Paper read at a meeting of the Northeast Coast Inst. of Engs. and Shipbuilders. Suggestions intended for marine engineers, but applicable to any large work. 2000 w. Steamship—Feb., 1899.

See also **SHIPBUILDING; SHIPYARD.**

**Maximum Production.**—Works Management for the Maximum Production. J. Slater Lewis. The first of a series of articles devoted to a discussion of the need and nature of methods to make supervising talent, labor and equipment yield the largest output at lowest cost. 4500 w. Eng Mag—Oct., 1899.

Works Management for the Maximum of Production. J. Slater Lewis. A thorough study of the problems of so organizing, managing and remunerating labor as to gain the highest efficiency while preserving content and inspiring continued effort among the workers. 3500 w. Eng Mag—Nov., 1899.

Works Management for the Maximum of Production. J. Slater Lewis. A forcible definition of the practical condition of the British engineering trade, a critical discussion of the arguments for and against specialization and a depreciation of unreasoning extravagance in the campaign for reorganization. 3500 w. Eng Mag—Dec., 1899.

Works Management for the Maximum of Production. J. Slater Lewis. A discussion of union labor and the wage elements in affecting the cost of manufacturing, and of technical education as an aid in works management. Concluding an important series under this general title. 4500 w. Eng Mag—May, 1900.

**Mechanics.**—Points in Shop Management. B. F. Fells. Need of thorough-going, alert mechanics. Shiftless ways in some shops lately seen. 1100 w. Ir Tr Rev—July 30, 1896.

**Midvale Steel Co.**—See **WAGES—Piece Work.**

**Mine.**—See **COAL MINE MANAGEMENT; MINE MANAGEMENT.**

**National Cash Register Co.**—An Industrial Democracy. C. R. Richards, in "Pratt Institute Monthly. Describes an interesting industrial system in operation in the works of the National Cash Register Co., at Dayton, Ohio. 2200 w. Sci Am Sup—Sept. 5, 1896.

An Unique Manufacturing Establishment. The first of a series of articles purposing to give an idea of the factory of the National Cash Register Co., of Dayton, O., and of the spirit that pervades it. Ill. Serial. Am Mach—March 25, 1897.

Possibilities of the Present Industrial System. Paul Monroe. Illustrated description of the National Cash Register Factory at Dayton, Ohio, and its methods, based upon inspection and conversations with employés. 6000 w. Am Jour of Soc—May, 1898.

**Ordnance Factories.**—See **GUN MANUFACTURE—Factory Management.**

**Piece Work.**—See **WAGES.**

**Premium Plan.**—See **WAGES.**

**Profit Sharing.**—See **WAGES.**

**Purchasing.**—Functions and Organization of the Purchasing Department. Hugo Diemer. A discussion of a very important factor in successful works management. 2000 w. Eng Mag—March, 1900.

**Reorganization.**—The Task of Reorganization. Considers the problem briefly, discussing the design, men, and methods. 3300 w. Engng—July 27, 1900.

**Revolution.**—The Revolution in Machine Shop Practice. Henry Roland. The first of a series of papers showing the progress of concentration and specialization, and the tendency to use automatic machinery kept in order by skilled tool-makers, but operated by ordinary labor. Illustrations of many historical tools are given in the opening article of the series. 3500 w. Eng Mag—Oct., 1899.

The Revolution in Machine Shop Practice. Henry Roland. Covering the period of the development of the automatic screw machine and tracing the cumulative work of Maudslay, Stone and Spencer in perfecting machine tools for rapid, accurate and economical production. 4000 w. Eng Mag—Nov., 1899.

The Revolution in Machine Shop Practice. Henry Roland. A well and richly illustrated exposition of the adaptation of the turret to multiple-production of machine parts, either from the bar or castings, with consequent enormous reduction of costs. 3500 w. Eng Mag—Dec., 1899.

The Revolution in Machine Shop Practice. Henry Roland. Mr. Roland's fourth paper discusses the practical limitations of tool making as illustrated by the very highly-organized automatic machines used in the Waltham watch factory. 3500 w. Eng Mag—Jan., 1900.

The Revolution in Machine Shop Practice. Henry Roland. A discussion of the application of automatic mechanical production to heavy work, especially in respect to the elimination of skilled labor in adjustments and accuracy of relative position of parts. 4000 w. Eng Mag—Feb., 1900.

The Revolution in Machine Shop Practice. Henry Roland. Mr. Roland's concluding paper discusses the machine shop of the immediate future, showing the probable modifications which may result from the general introduction of automatic tools and repetitive methods. 2000 w. Eng Mag—March, 1900.

**Sellers & Co.**—See **WAGES—Piece Work.**

**Small Shops.**—The Management of Small Engineering Workshops. R. Y. R. The first of a series of articles which will consider the management of small shops, employing up to 150 or 200 hands, confining the attention to the internal working. Serial. Prac Eng—Aug. 13, 1897.

**Time Recorder.**—See **TIME RECORDER.**

**Trust.**—See **TRUST.**

**United States.**—See **American vs. British; Europe vs. America.**

**Waltham, Mass., Watch Factory.**—See **Revolution.**

**Waste.**—On Wastes and Shop Handling. John Richards. Extracts from recent lectures before the students of Leland Stanford Junior University, Palo Alto, Cal. Percentage that should be added for waste, in estimating cost of machinery, methods of arriving at weights, through dimensional data, and suggestions to designers directed to avoidance of excessive waste of material in construction. 1600 w. Ir Trd Rev—Jan. 23, 1896.

The Treatment of Trades Waste. William Naylor. Abstract of a paper read before the Inst. of Civ. Engs. An interesting résumé of progress in reducing waste in a great variety of manufacturing industries. 6000 w. Ind & Ir—Dec. 27, 1895.

See also **BY-PRODUCTS; FACTORY WASTE; WASTE UTILIZATION.**

**Waterworks.**—See **WATERWORKS MANAGEMENT.**

**Whitinsville, Mass.**—Six Examples of Successful Shop Management. First paper. Henry Roland. Showing in this instalment the conditions of labor employment in the Whitinsville Shops. Ill. Serial. Eng Mag—Oct., 1896.

**Workmanship.**—Good Workmanship. Editorial on the waste of time and labor in giving high finish when it adds neither to beauty or efficiency, considering it immoral. 1600 w. Engng—Jan. 6, 1899.

**Yale & Towne.** Six Examples of Successful Shop Management. Third paper. Henry Roland. Showing the methods of the Yale & Towne Co., of Stamford, Conn., in dealing with their employees. 5300 w. Eng Mag—Dec., 1896.

### WORM GEAR.

See **GEAR—Worm.**

### WRECK.

See also **FOG SIGNAL; LIFE-SAVING; NAVIGATION; STEAMSHIP; TORPEDO BOAT; TORPEDO-BOAT DESTROYER; WARSHIP;** and specific types and names of vessels.

Marine Breakdowns and Losses. A narrative of the mishaps which befell some well-known liners. 2000 w. Marine Engng—April, 1899.

The Waste of Shipping. Data of losses of vessels at sea. 600 w. Engng—Aug. 28, 1896.

**"Charleston" and "Patria."**—Loss of the U. S. S. "Charleston" and Burning of the S. S. "Patria" at Sea. Illustrations of these vessels, and a brief account of the disasters. 900 w. Marine Engng—Dec., 1899.

**1896.**—What the Ocean Claims. Interesting data from Lloyd's Register for 1896, especially as related to the United Kingdom. 700 w. Trans—Oct. 8, 1897.

**1898.**—The Shipwrecks of a Year. Editorial on the gross reduction of the mercantile marine in 1898, as given in Lloyd's Registry. 800 Engng—Sept. 1, 1899.

**"La Bourgogne."**—Responsibility of Steamship Companies in Marine Disasters. Dr. C. E. de M. Sajous. Criticism, called out by the "Bourgogne" disaster, concerning the lack of life-saving appliances furnished, and the causes that hasten the sinking of vessels. 1200 w. Sci Am—July 23, 1898.

Safety at Sea. Editorial on the "Bourgogne" disaster, and the lessons to be learned by it. 2500 w. Engng—July 15, 1898.

The Prevention of Steamship Collisions. Editorial on the disaster to the steamer "La Bourgogne," criticising the speed maintained in fogs, and suggesting the improvement of sound signals, and the immediate slackening of speed when signal is heard. 3000 w. Eng News—July 14, 1898.

**"Maine."**—See **BATTLESHIP—"Maine" Disaster.**

**"Merrimac."**—See **"MERRIMAC"—Sinking.**

**"Mohegan."**—Mishaps at Sea. An account of the loss of the Atlantic Transport Line Steamship "Mohegan," off the Lizard, England, and other vessels. Ill. 1000 w. Marine Engng—Nov., 1898.

**Nemi.**—See **SHIP—Ancient; YACHT—Roman.**

**"Tai Hoku."**—The Foundering of the Japanese S. S. "Tai Hoku." Cecil Lightfoot. Letter giving an account of the catastrophe and four snapshot photographs. 1400 w. Ind & East Engr—March, 1898.

### WRECKING.

See also **DIVING BELL.**

Notes on Wreck Raising. David W. Noakes. Read before the Paris Congress of Naval Architecture. An account of operations conducted in the river Thames. 6500 w. Engng—Aug. 17, 1900.

Submerged Ships and Their Salvage. Fred Hood. Gives briefly the history of the attempts at rescue work, the manner of work, and the dangers encountered by divers. 2000 w. Chau—Oct., 1898.

**Wreck Raising.** Illustrated description of methods and appliances used by a leading English firm in salvage operations. The methods and appliances do not seem to differ greatly from those used in American waters. 4000 w. Engng—March 27, 1896.

**Acetylene.**—The Use of Acetylene in Raising Sunken Vessels. Suggests the use of this gas, and gives illustrated description of apparatus to be used. 500 w. Sci Am—April 28, 1900.

**Appliances.**—Patent Marine Salvage Appliances. Illustrated description of a variety of modern appliances for raising sunken vessels and recovering submerged cargoes, with methods of using the same. 1100 w. Marine Eng—Feb. 1, 1896.

**Compressed Air.**—See **COMPRESSED AIR—Ship Raising.**

**1898-99.**—Notable Salvage Operations of the Past Year. Waldon Fawcett. An interesting account of the work of the engineer in the peculiar field of saving and repairing wrecked and disabled vessels. With illustrations of recent important operations. 3000 w. Eng Mag—Jan., 1900.

**"Europe."**—The Raising of the Four Master "Europe" (Remise à Flot du Navire Quatre-Mats "Europe"). Describing the righting of a steel vessel of 3500 tons displacement which had been grounded and capsized by an unexpected tidal change. An important and valuable paper. 3500 w. La Revue Technique—Dec. 10, 1897.

**French Tug.**—See **TOW BOAT.**

**"Maria Teresa."**—See **REPAIR SHIP—Vulcan.**

**"Milwaukee."**—The S. S. "Milwaukee." An account of an interesting and noteworthy feat of marine salvage and repair, with numerous illustrations. 600 w. Engr, Lond—June 30, 1899.

**"Paris."**—Loss and Subsequent Recovery of the American Line Steamship "Paris." An account of the recent disaster, with engraving, and report of Capt. Frederick Watkins. 1500 w. Marine Engng—Aug., 1899.

**Railway.**—See **RAILWAY ACCIDENT—Wrecking.**

**"Rossia."**—The Floating of the Russian Cruiser "Rossia" (Le Relèvement du Croiseur "Rossia"). An account of the manner in which, by very skilful submarine work, divers were successful in floating a 10,000 ton warship, which had run aground in the Neva. 2500 w. Génie Civil—Oct. 16, 1897.

**"Rossia" and "Victorious."**—Raising Sunken Vessels. From "La Nature." Illustrates and describes the methods used in raising the "Rossia," in the river Neva, and the British iron-clad, "Victorious," near Port Said. 1300 w. Sci Am—March 4, 1899.

**Tug.**—See **TOW BOAT.**

**Waller Tube.**—The Waller Tube for Raising Sunken Vessels. Ernest A. Sjöstedt. Describes the apparatus invented by P. A. Waller, a Swedish engineer, as exhibited at the Stockholm Exposition. The "Södra Sverige," a vessel raised by this method from a depth of some 183 ft. was also exhibited. 1500 w. Ir Age—April 7, 1898.

### WRENCH.

See also **TOOL.**

**Proportions.**—Proportions for Wrenches. Information upon the subject of open-end wrenches. Ill. 900 w. Mach, N. Y.—May, 1899.

### WROUGHT IRON.

See also **IRON; IRON MANUFACTURE.**

Hints About Iron. B. F. Spalding. Deals with different heats, stiff white heats, bending elastic and inelastic pieces, cold-short iron, good but unprofitable iron, tests, etc. Ill. 2500 w. Am Mach—Nov. 11, 1897.

**Blooming Mill.**—See **ROLLING MILL—Blooming Mill.**

**Corrosion.**—See **METAL CORROSION.**

**Magnetic Properties.**—See **MAGNETISM—Wrought Iron.**

**Manufacture.**—The Manufacture of Wrought Iron. James Kerr. Describing the conditions of the puddler and the puddling process as they were twenty-five years ago and as they are to-day, dealing with practical work and economy. 1800 w. Ir & Coal Trds Rev—April 17, 1896.

The Manufacture of Wrought Iron. James Kerr. Paper read before the West of Scotland Iron & Steel Inst. Describes the conditions of the puddler and the puddling process as they were twenty-

The Manufacture of Wrought Iron. Historical account of the industry from the earliest records to the present. 3500 w. Ir & Coal Trds Rev—May 1, 1896.

See also **IRON MANUFACTURE; IRON WORKS.**

**Melting.**—Experiments on Melting Wrought Iron. K. K. An account of experiments made to find a cheaper method than the use of the Nobel furnace. 1800 w. Am Mach—Dec. 23, 1897.

Wrought Iron Melting in a Coke Hole. C. Vickers. A record of experiences. 1300 w. Ir Age—Aug. 19, 1897.

**Mitis Founding.**—See **MITIS.**

**New Zealand.**—See **MAGNETISM—Wrought Iron.**

**Puddling.**—See **Manufacture; IRON MANUFACTURE.**

**Steel Compared.**—Wrought Iron and Mild Steel. A. resemblance and difference, why mild steel has so largely displaced iron, and why iron is still preferred for some purposes. 5500 w. Prac Eng—June 18, 1897.

**Structure.**—See **Vibration; IRON; METALLOGRAPHY.**

**Tests.**—The Behavior of Wrought Iron Cylinders under Compression. W. Kendrick Hatt. Presents the results of a series of tests made at Purdue University, to determine the influence of the shape of the specimen on its ultimate strength, and other information. 1200 w. Eng News—May 12, 1898.

See also **MATERIALS' STRENGTH; TESTING.**

**Vibration.**—The Effect of Vibration upon the Structure of Wrought Iron. Continued discussion. 1700 w. Trans Am Inst of Min Engs—Feb., 1896.

## X—Y

**X-RAYS.**

See **ROENTGEN RAYS.**

**YACHT.**

See also **LAUNCH; SHIPBUILDING; STEAM YACHT.**

Yachts. Brief descriptions of recently built yachts. 1100 w. Jour Am Soc of Nav Eng—Nov., 1895.

**"Columbia."**—Cup Defender "Columbia." Illustration with description of this recently completed racing craft, which is representative of the latest developments in yacht construction. 1500 w. Marine Rev—June 29, 1899.

The "Columbia." Particulars and features of the new cup defender, with brief history of the cup races. Ill. 1700 w. Naut Gaz—July 6, 1899.

The Lines and Construction of the Yacht "Columbia." Drawings and description. 1400 w. Sci Am—June 24, 1899.

**"Columbia" and "Shamrock."**—"Columbia" and "Shamrock."—A Comparison. Estimates made show when the speed is over 8 knots an hour, "Shamrock" shows a slight advantage over a windward and leeward course, and "Columbia" a superiority over a triangular course. Also editorial. Ill. 3000 w. Sci Am—Aug. 12, 1899.

**"Defender."**—Notes on the Yacht "Defender" and the Use of Aluminum in Marine Construction. Richmond Pearson Hobson. Extract from a paper contributed to the United States Naval Institute. Deals with corrosion, and the importance of aluminum in marine construction. 2000 w. Sci Am Sup—Dec. 18, 1897.

**Design.**—Yacht Designing. Theodore Lucas. Briefly discusses the appearance, general arrangements, ornamentation, stability, strength, etc. 1400 w. Naut Gaz—Oct. 11, 1900.

**1897.**—Small Yachts and Yacht-Racing—1897. W. P. Stephens. New developments indicating a radical change in yachting for the immediate future. Ill. 1800 w. Harper's Wk—Oct. 9, 1897.

**Electric.**—See **ELECTRIC BOAT.**

**Gasoline.**—See **GASOLINE YACHT.**

**Great Lakes.**—Yachting on the Great Lakes. Waldon Fawcett. Illustrated description of the boats used in contests between the United States and Canada. 2000 w. Sci Am—Nov. 4, 1899.

**Ice.**—See **ICE YACHT.**

**Measurements.**—On Yacht Measurements, Together with Some Remarks on the Action of Sails. H. C. Vogt. Read before the Inst. of Naval Archts. Discusses these subjects and the importance of framing a yacht-tonnage rule which is correct and easily understood. Considers the weight necessary to form such a measurement rule. 3500 w. Engs' Gaz—Aug. 1, 1900.

**Model "Nydia."**—A Yacht That Sails Itself. Illustrated description of the little model yacht "Nydia," which is automatically controlled. 1400 w. Sci Am—July 28, 1900.

**Racing.**—Fifty Years of International Yacht Racing. A review of the history of these races, with illustrations and descriptions of yachts. 2500 w. Sci Am—Oct. 7, 1899.

Typical Forms of Racing Yachts. J. R. Barnett. Read before the Inst. of Engs. and Shipbuilders. Illustrations, with comparison of types and general remarks. 2300 w. Engs Gaz—April, 1900.

**Roman.**—Ancient Roman Yachts. From the N. Y. "Sun." An account of the finding of the two ships of the Emperor Caligula, which have been buried for centuries at the bottom of Lake Nemi. 1000 w. Eng—June 5, 1897.

See also **SHIP—Ancient.**

**"Shamrock."**—Strengthening the "Shamrock" for the Atlantic Voyage. Describes the provision made for the ocean voyage of this cup challenger. 500 w. Engr, Lond—July 28, 1899.

See also **"Columbia" and "Shamrock."**

**Speed and Displacement.**—On the Relation of Speed and Displacement in Racing Yachts. J. T. Bucknill. A mathematical thesis by Colonel T. English, which it is stated proves that in yachts of the present type, the speed varies as the twelfth root of the displacement. 900 w. Engng—Sept. 18, 1896.

**Steam.**—See **LAUNCH; STEAM YACHT.**

**YTTRIUM.**

See **THORIUM.**

## Z

**ZEEMAN EFFECT.**

See **ELECTRO-PHYSICS—Zeeman Effect.**

**ZEROGRAPH.**

See **TELEGRAPH—Zerograph.**

**ZINC.**

See also **LEAD; MINERAL REGION; TIN.**

**Alloys.**—See **ALLOY; BRASS; COPPER ALLOY—Zinc.** —

**Analysis.**—A New Method for the Determination of Zinc. A. C. Langmuir. Presented to the Am. Chem. Soc. Describes the phosphated method which is largely used in America. 1200 w. Ind & Ir—March 10, 1899.

**Analysis, Ferrocyanide Titration.**—Notes on the Ferrocyanide Titration of Zinc. Edmund H. Miller and E. J. Hall. Experiments made to find out the influence of hydrochloric acid and those salts most likely to be present on the estimation of zinc by titration with potassium ferrocyanide, using uranium acetate as an indicator. 1600 w. Sch of Mines Quar—April, 1900.

**Aurora, Mo.**—The Zinc Mines at Aurora. Missouri. H. K. Landis. The article contains the production of all ores since 1890, the prices since 188 a typical set of mining rules, geological sections and two views of plants. 1100 w. Eng & Min Jour—Dec. 28, 1895.

**Dubuque.**—See **LEAD—Iowa; LEAD MINE.**

**1899.**—Zinc in 1899. Report of production and the

1900.

**Electrolysis.**—See ELECTROLYSIS—Zinc; ELECTRO - METALLURGY — Zinc; ZINC METALLURGY.

**Friedensville, Pa.**—Zinc Mining. H. K. Landis. A description of the methods of mining and dressing zinc ores at Friedensville, Pa.; together with a history of their discovery and development, and an account of the early difficulties met with in treating the ores. 1500 w. Col Eng—Sept., 1896.

**Geology.**—Zinc Deposits. C. C. Longridge. A tabular statement illustrating the geological distribution of zinc ores, with interesting information. 1000 w. Engr, Lond—April 6, 1900.

**Iowa.**—See LEAD; LEAD MINE—Dubuque.

**Joplin, Missouri.**—The Joplin Zinc District. F. Lynwood Garrison. Regarding its location, the ores, and the formations in which they occur; the methods of mining and marketing. 2600 w. Mines & Min—May, 1900.

The Purchase of Zinc Ores in the Joplin District. W. George Waring. Considers the selling of zinc ores on an assay basis the only rational system. 1500 w. Eng & Min Jour—July 14, 1900.

The Ore Market of the Joplin, Missouri, District in 1897. Reports the condition of the zinc and lead industry. 1200 w. Eng & Min Jour—Jan. 8, 1898.

The Joplin Zinc District of Southwest Missouri. James H. Steele. An illustrated account of this district, which produces over one-third of the world's supply of zinc. 3400 w. Min & Sci Pr—June 9, 1900.

See also Missouri; LEAD; LEAD MINE; ZINC METALLURGY.

**Missouri.**—See also Aurora; Joplin; LEAD.

**Missouri-Kansas.**—The Missouri-Kansas Zinc and Lead Mines. Harold A. Titcomb. An account of the development, with description of the ore bodies, ore treatment, etc. Ill. 1500 w. Eng & Min Jour—July 28, 1900.

Zinc and Lead Mines of Missouri and Kansas. Horace J. Stevens. An account of these mines, their production and future prospects. 2600 w. Mines & Min—Feb., 1900.

**Production, U. S.**—See also 1899; LEAD—Production, U. S.

**Protective Coating.**—Zinc a Protective Coating for Iron and Steel. Sherard Cowper-Coles. Abstract of paper read at meeting of Cleveland Inst. of Engs., England. Claims it is cheaper and more effective than painting, and describes the processes. Discussion. 2800 w. Col Guard—April 27, 1900.

See also GALVANIZING.

**Purchase of Ore.**—See Joplin, Missouri.

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See also ROOFING.

**Silesia.**—See LEAD MINE.

**ZINC INDUSTRY.**

See LEAD; ZINC; ZINC METALLURGY.

**ZINC METALLURGY.**

See also LEAD METALLURGY; METALLURGY; SILVER METALLURGY; SMELTING; TIN METALLURGY.

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See also GOLD METALLURGY—Zinc Bearing; LEAD METALLURGY; METALLURGY; SILVER METALLURGY; SMELTING; TIN METALLURGY.

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See also ELECTROLYSIS; ELECTRO-METALLURGY.

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See also Missouri; LEAD METALLURGY; ZINC.

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See also Joplin, Missouri; SMELTING.

**ZINC MINE.**

See ZINC.

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